# ANNA UNIVERSITY, CHENNAI

## UNDERGRADUATE CURRICULUM (NON-AUTONOMOUS AFFILIATED INSTITUTIONS)

**Programme:** B.E., Civil Engineering **Regulations:** 2025

**Abbreviations:**

**HUM –** Humanities (Languages, Management, Heritage, and others)

**BS** – Basic Science (Mathematics, Physics, Chemistry)

**ES –** Engineering Science (General (**G**), Programme Core (**PC**), Programme Elective (**PE**) & Emerging Technology (**ET**))

**SD** – Skill Development

**SL** – Self Learning

**CDP** – Capstone Design Project

**OE** – Open Elective

**L** – Laboratory Course

**T** – Theory

**LIT** – Laboratory Integrated Theory

**PW** – Project Work

**IPW** – Internship cum Project Work

**DIC –** Department Introductory Course

**TCP –** Total Contact Period(s)

| Semester – I | | | | | | | |
|---|---|---|---|---|---|---|---|
| **S. No.** | **Course Code** | **Course Name** | **Course Type** | **Periods / Week** | | **Credits** | **Category** |
| | | | | **L-T- P** | **TCP** | | |
| 1. | MA25C01 | Applied Calculus | T | 3-1-0 | 4 | 4 | BS |
| 2. | CE25C01 | Introduction to Civil Engineering | T | 3-0-0 | 3 | 3 | ES (PC) – DIC |
| 3. | PH25C01 | Applied Physics – I | LIT | 2-0-2 | 4 | 3 | BS |
| 4. | CY25C01 | Applied Chemistry – I | LIT | 2-0-2 | 4 | 3 | BS |
| 5. | ME25C01 | Engineering Drawing | LIT | 2-0-4 | 6 | 4 | ES (G) |
| 6. | UC25H01 | தமிழர் மரபு / Heritage of Tamils | T | 1-0-0 | 1 | 1 | HUM |
| 7. | EN25C01 | English Essentials – I | L | 2-0-0 | 2 | 2 | HUM |
| 8. | CS25C02 | Computer Programming: Python | LIT | 2-0-2 | 4 | 3 | ES (PC) |
| 9. | ME25C04 | Makerspace | L | 0-0-4 | 4 | 2 | SD |
| 10. | UC25A01 | Life Skills for Engineers – I* | --- | 1-0-2 | 3 | --- | HUM |
| 11. | UC25A02 | Physical Education – I* | --- | 0-0-4 | 4 | 1 | HUM |
| 12. | | NCC / NSS / NSO | --- | --- | --- | --- | --- |
| | | | **Total Credits** | | **39** | **26** | |

*Audit Course

| Semester – II | | | | | | | |
|---|---|---|---|---|---|---|---|
| **S. No.** | **Course Code** | **Course Name** | **Course Type** | **Periods / Week** | | **Credits** | **Category** |
| | | | | **L-T- P** | **TCP** | | |
| 1. | MA25C02 | Linear Algebra | T | 3-1-0 | 4 | 4 | BS |
| 2. | ME25C02 | Engineering Mechanics | T | 3-1-0 | 4 | 4 | ES (G) |
| 3. | PH25C02 | Applied Physics (CE) - II | T | 2-1-0 | 3 | 3 | BS |
| 4. | EE25C01 | Basic Electrical and Electronics Engineering | T | 3-0-0 | 3 | 3 | ES (G) |
| 5. | CY25C02 | Applied Chemistry (CE) – II | T | 2-0-0 | 2 | 2 | BS |
| 6. | UC25H02 | தமிழர்களும் தொழில்நுட்பமும் / Tamils and Technology | T | 1-0-0 | 1 | 1 | HUM |
| 7. | CE25201 | Construction Materials and Technology | T | 3-0-0 | 3 | 3 | ES (PC) |
| 8. | EN25C02 | English Essentials – II | LIT | 1-0-2 | 3 | 2 | HUM |
| 9. | ME25C05 | Re-Engineering for innovation | L | 0-0-4 | 4 | 2 | SD |
| 10. | UC25A03 | Life Skills for Engineers – II* | --- | 1-0-2 | 3 | --- | HUM |
| 11. | UC25A04 | Physical Education – II* | --- | 0-0-4 | 4 | 1 | HUM |
| 12. | | Foreign Language^ | L | 1-0-2 | 3 | --- | HUM |
| | | | **Total Credits** | | **37** | **25** | |

^ Deutsch / Japanese / Korean *Audit Course

| Semester – III | | | | | | | |
|---|---|---|---|---|---|---|---|
| **S. No.** | **Course Code** | **Course Name** | **Course Type** | **Periods/ Week** | | **Credits** | **Category** |
| | | | | **L-T-P** | **TCP** | | |
| 1. | | Computational Differential Equations | T | 3-1-0 | 4 | 4 | BS |
| 2. | | Fluid Mechanics and Machinery | T | 3-1-0 | 4 | 4 | ES(PC) |
| 3. | | Engineering Geology | T | 3-0-0 | 3 | 3 | ES(PC) |
| 4. | | Strength of Materials I | LIT | 3-0-2 | 5 | 4 | ES(PC) |
| 5. | | Surveying and Geomatics | T | 3-0-0 | 3 | 3 | ES(PC) |
| 6. | | Skill Development Course I | LIT | 1-0-2 | 3 | 2 | SD |
| 7. | | Fluid Mechanics and Machinery Laboratory | L | 0-0-4 | 2 | 2 | ES(PC) |
| 8. | | Surveying and Geomatics Laboratory | L | 0-0-4 | 2 | 2 | ES(PC) |
| 9. | | English Communication Skills Laboratory – II | LIT | 0-0-2 | 2 | 1 | HUM |

| Semester – III | | | | | | | |
|---|---|---|---|---|---|---|---|
| S. No. | Course Code | Course Name | Course Type | Periods/ Week | | Credits | Category |
| | | | | L-T-P | TCP | | |
| Total Credits | | | | | 28 | 25 | |

| Semester - IV | | | | | | | |
|---|---|---|---|---|---|---|---|
| S. No. | Course Code | Course Name | Course Type | Periods /Week | | Credits | Category |
| | | | | L-T-P | TCP | | |
| 1. | | Strength of Materials II | T | 3-0-0 | 3 | 3 | ES(PC) |
| 2. | | Soil Mechanics | T | 3-0-0 | 3 | 3 | ES(PC) |
| 3. | | Water Supply Engineering | T | 3-0-0 | 3 | 3 | ES(PC) |
| 4. | | Introduction to Standards in Civil Engineering | T | 1-0-0 | 1 | 1 | ES(PC) |
| 5. | | Concrete Technology | LIT | 3-0-2 | 5 | 4 | ES(PC) |
| 6. | | Design of Reinforced Cement Concrete Elements | T | 3-0-0 | 3 | 3 | ES(PC) |
| 7. | | Highway Engineering | LIT | 3-0-2 | 5 | 4 | ES(PC) |
| 8. | | Computer-aided Building Drawing | L | 0-0-4 | 4 | 2 | ES(PC) |
| 9. | | Skill Development Course II | LIT | 1-0-2 | 3 | 2 | SD |
| 10. | | English Communication Skills Laboratory – III | LIT | 0-0-2 | 2 | 1 | HUM |
| Total Credits | | | | | 32 | 26 | |

| Semester – V | | | | | | | |
|---|---|---|---|---|---|---|---|
| S. No. | Course Code | Course Name | Course Type | Periods / Week | | Credits | Category |
| | | | | L-T- P | TCP | | |
| 1. | | Structural Analysis - I | T | 3-0-0 | 3 | 3 | ES (PC) |
| 2. | | Foundation Engineering | T | 3-0-0 | 3 | 3 | ES (PC) |
| 3. | | Waste Water Engineering | T | 3-0-0 | 3 | 3 | ES (PC) |
| 4. | | Design of Concrete Structures | T | 3-0-0 | 3 | 3 | ES (PC) |
| 5. | | Programme Elective I | T | 3-0-0 | 3 | 3 | ES (PE) |
| 6. | | Programme Elective II | T | 3-0-0 | 3 | 3 | ES (PE) |
| 7. | | Water and Wastewater Engineering Laboratory | L | 0-0-4 | 4 | 2 | ES (PC) |
| 8. | | Soil Mechanics Laboratory | L | 0-0-4 | 4 | 2 | ES (PC) |
| 9. | | Skill Development Course - III | LIT | 1-0-2 | 3 | 2 | SD |

# Semester I

| MA25C01 | Applied Calculus | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 1 | 0 | 4 |

**Course Objectives:**

- To provide technical competence of modelling engineering problems using calculus.
- To apply the calculus concepts in solving engineering problems using analytical methods and computational tools.

**Differential Calculus:** Functions, graph of functions, New functions from old functions, Limit of a function, Continuity, Limits at infinity, Derivative as a function, Maxima and Minima of functions of single variable, Mean value theorem, Effect of derivatives on the shape of a graph.

**Activities:** Visualization of the functions, Maxima and Minima of a function using open-source software, Solving of Competitive Examination questions (Ex. GATE).

**Functions of Several Variables:** Partial derivatives, Chain rule, Total derivative, Maxima and minima of functions of two variables, Method of Lagrange's Multipliers, Application problems in engineering.

**Activities:** Partial Derivatives with two or three variables, Maxima and Minima of a function using open-source software, Solving of Competitive Examination questions (Ex. GATE).

**Integral Calculus:** Fundamental theorem of Calculus, Indefinite integrals and the Net Change Theorem, Improper integrals, Arc Length, Area of Region, Area of surface of revolution.

**Activities:** Definite and Indefinite Integrals, Determination of Area, Solving of Competitive Examination questions (Ex. GATE).

**Multiple Integrals:** Iterated integrals and Fubini's theorem, Evaluation of double integrals, change of order of integration, change of variables between Cartesian and polar co-ordinates, evaluation of triple integrals-change of variables between Cartesian and cylindrical and spherical co-ordinates.

**Activities:** Double integrals and triple integrals using open-source software, Solving of Competitive Examination questions (Ex. GATE).

**Weightage:** Continuous Assessment: 40%, End Semester Examinations: 60%.

**Assessment Methodology:** Assignments (20%), Solution to application-oriented problems using software (20%), Solving of GATE questions (20%), Internal Examinations (40%).

**References:**

1. Anton, H., Bivens, I. C., & Davis, S. (2021). Calculus: Early transcendentals. John Wiley & Sons.
2. Ron Larson and David C. Falvo,(2013), Calculus: an Applied Approach. Cengage Learning.
3. Stewart, J., Clegg, D., & Watson, S. (2019). *Calculus: Early transcendentals*.
4. Thomas, G. B., Jr., Weir, M. D., Hass, J., & Heil, C. (2018). *Thomas' calculus: Early transcendentals*. Pearson.
5. Singh, K. (2019). *Engineering mathematics through applications*. Bloomsbury Publishing.
6. Grewal, B. S. (2012). *Higher engineering mathematics.* Khanna Publishers.

**E-resources:**

1. https://math.libretexts.org/Bookshelves/Calculus/Map%3A_Calculus__Early_Transcendentals_(Stewart)/
2. https://openstax.org/books/calculus-volume-1/
3. https://tutorial.math.lamar.edu/Classes/CalcII/CalcII.aspx
4. SCILAB, https://www.scilab.org/

| | **Description of CO** | **PO** | **PSO1** | **PSO2** | **PSO3** |
|---|---|---|---|---|---|
| CO1 | Explain the meaning of derivative, integral, and their geometric and physical interpretations. | --- | | | |
| CO2 | Apply differentiation and integration techniques to compute maxima, minima, and area. | PO1(3) | | | |
| CO3 | Analyze the behavior of single and multivariable functions using derivatives and partial derivatives. | PO2(3) | | | |
| CO4 | Utilize modern computational software and online platforms to deepen understanding, perform complex calculations, and visualize mathematical concepts. | PO5(2) PO11(1) | | | |

| CE25C01 | Introduction to Civil Engineering | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 0 | 0 | 3 |

**Course Objective:**

- To impart the significance of the Civil Engineering and provide insight to the essentials of components of infrastructure.

**Overview of Civil Engineering:** Role of civil engineers in society, Ethics in Civil Engineering Practice, outstanding accomplishments of the profession, future trends- Types of projects, stages of projects, specification and scope.

**Fields of Civil Engineering:** Overview of Structural, Construction, Geotechnical, Environmental, Transportation, Water Resources and Environmental Engineering – Introduction to Engineering Geology and seismology.

**Civil Engineering Materials:** Civil Engineering Materials: Bricks – Stones – Sand – Cement – Concrete – Steel – Timber, Glass - Modern Materials, Thermal and Acoustic Insulating Materials, Decorative Panels, Water Proofing Materials. Modern uses of Gypsum, Pre-fabricated Building components.

**Building Components:** Building plans – Setting out of a Building - Foundations: Types of foundations - Bearing capacity and settlement – Brick masonry – Stone Masonry – Beams – Columns – Lintels – Roofing – Flooring – Plastering- NBC.

**Infrastructure:**

Types of Bridges and Dams – Water Supply Network - Rain Water Harvesting – Solid Waste Management system- Introduction to Highways and Railways - Introduction to Green Buildings.

**Activities:**

An Industrial visit to a nearby Civil Engineering Projects.

Seminar / assignment on Emerging Civil Engineering fields.

**Weightage:** Continuous Assessment: 40%, End Semester Examinations: 60%

**Assessment Methodology:** Quiz (10%), Assignments (40%) and Internal Examinations (50%)

**References:**


1. .Ramamrutham, S. (2013). Basic civil engineering. Dhanpat Rai Publishing Co. (P) Ltd.
2. Seetharaman, S. (2005). Basic civil engineering. Anuradha Agencies.
3. Kumar, S. (2001). Building construction. Standard Publishers.
4. Rangwala, S. C. (2009). Building materials (27th ed.). Charotar Publishing House Pvt. Ltd.

**5.** Palanichamy, M. S. (2000). Basic civil engineering. Tata McGraw Hill.

| | Description of CO | PO | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|
| CO1 | Explain core Civil engineering concepts. | --- | | | |
| CO2 | Apply basic engineering calculations in Civil Engineering systems. | PO1(3) | | | |
| CO3 | Identify practices followed in infrastructure construction. | PO2(2) | | | |

| PH25C01 | Applied Physics – I | L | T | P | C |
|---|---|---|---|---|---|
| | | 2 | 0 | 2 | 3 |

**Course Objective(s):**

- To impart knowledge and expose the essentials of physics in various engineering applications.

**Properties of Matter:** Elasticity, Cantilever, Young's modulus (non-uniform bending), Girders: Bridges and buildings, Viscosity: Stokes method, Surface tension: drop weight method, Thermal expansion, Thermal stress, Bimetallic strips, Expansion joints

**Practical**: Non-Uniform bending, Young's modulus of the material, Torsional pendulum, Rigidity modulus of the wire and moment of inertia of the disc.

**Activities:** Virtual demonstration of thermal stress.

**Oscillations:** Simple Harmonic motion, Torsional pendulum, Couple per unit twist, Damped and Forced Oscillation

**Waves:** Waves on a stretched string, Energy and Power, standing waves, Ultrasonics, piezo, electric method, Acoustic grating, Electromagnetic waves: Maxwell equation, Production of EM waves by dipole antenna, Propagation of EM waves in free space , wave equation, Cell phone reception

**Practical**: Melde's string experiment – Frequency of an electrically vibrating metal tip.

**Activities:** Virtual demonstration of propagation of EM waves

**Quantum Mechanics:** Black body radiation, Photoelectric effect, de Broglie hypothesis, Schrodinger Wave equation, Particle in a box (infinite potential well - three-dimensional box), Barrier penetration and quantum tunnelling.

**Practical**: Photo-electric effect, Determination of Planck's constant.

**Activities**: Virtual demonstration of Scanning Transmission Electron Microscope

**Applied Optics:** Interference: Air wedge, Michelson's Interferometer, Fiber optics: Structure of a fiber, Fiber Optic Communication System, Fiber Sensors (Virtual demo), Displacement, pressure sensor and Temperature sensor, Einstein Co-efficient, Nd:YAG laser, $CO_2$ laser (construction, functioning and applications), dye laser

**Practical**: Ruling width of Compact disc using Laser, Thickness of a thin sheet/wire using Air wedge Method.

**Activities**: Demonstration of sensors and applications of Lasers

**Weightage:** Continuous Assessment: 50%, End Semester Examinations: 50%

**Assessment Methodology:** Quiz (5%), Assignments (20%), Flipped Class (5%), Practical (30%), Internal Examinations (40%)

**References:**


1. Young, H. D., & Freedman, R. A. (2020). University physics with modern physics. Pearson.
2. Gaur, R. K., & Gupta, S. L. (2022). Engineering physics. Dhanpat Rai Publications.
3. Mathur, D. S. (2010). Elements of properties of matter. S. Chand Publishing.
4. Griffiths, D. J. (2018). Introduction to quantum mechanics. Cambridge University Press.

Silfvast, W. T. (2008). Laser fundamentals. Cambridge University Press.


**E-Resources:**

1. Barrier penetration problem and Quantum tunnelling: https://archive.nptel.ac.in/courses/115/104/115104096/
2. EM waves and wireless channelling: https://onlinecourses.nptel.ac.in/noc24_ee31/preview
3. CO2 Laser: https://onlinecourses.nptel.ac.in/noc25_ph03/preview
4. Bimetallic Strips _ https://www.youtube.com/watch?v=WZQ8lvxdzDk
5. Cell phone Reception_ https://www.youtube.com/watch?v=1JZG9x_VOwA
6. Dipole Antenna_ https://www.youtube.com/watch?v=4xF1Fq2wB1I
7. Optical Sensors_ https://auece.digimat.in/nptel/courses/video/108106173/L02.html
8. Scanning Tunnelling Electron Microscope_ https://www.youtube.com/watch?v=XNYZYbXNWQA

| | Description of CO | PO | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|
| CO1 | Explain the physics concepts in various applications. | --- | | | |
| CO2 | Apply the principles of wave optics and laser physics in practical systems. | PO1(3) | | | |
| CO3 | Analyse the behaviour of materials under different conditions. | PO2(2) | | | |
| CO4 | Conduct experiments in groups and interpret the data. | PO4(3) PO8(1) | | | |

| CY25C01 | Applied Chemistry – I | L | T | P | C |
|---|---|---|---|---|---|
| | | 2 | 0 | 2 | 3 |

**Course Objectives:**

- To provide students with a solid understanding of the chemical principles for engineering applications.
- To introduce the chemical properties of materials and how these properties influence the selection and use of materials in engineering systems.
- To impart practical applications of chemistry in commonly used engineering devices

**Water Technology:** Water quality parameters and standards. Industrial feed water, Remediation. Municipal water treatment. Desalination.

**Practical:** Analysis of alkalinity, hardness and dissolved oxygen.

**Activity:** Coagulation of water sample using Alum

**Nano-chemistry:** Classification, Size, dependent properties. Preparation of nanomaterials, Top-down and Botton-Up approaches, Applications (Flipped classroom).

**Practical:** Preparation of nanoparticles by Sol-Gel method.

**Electrochemistry:** Electrochemical cell, Electrode potential., Redox reaction. Conductivity of electrolytes, Factors.

**Practical:** Conductometric titrations

**Activity:** Electrochemical cell demonstration

**Corrosion & Control :** Chemical and electrochemical corrosions, galvanic series, factors influencing corrosion, Electrochemical protection. Organic and Inorganic coating.

**Practical:**

- Corrosion study by weight loss and salt spray method.
- Potentiometry/UV-visible spectrophotometer.

**Activities:** Case Study on Corrosion in Pipelines and Electronics, Control measures for a corroded metal

**Batteries :** Conventional, Contemporary and Emerging battery storage technologies, Primary & Secondary Batteries, Battery Pack, Battery Materials, Performance Parameters, Testing, Safety aspects.

**Practical:** Measurement of EMF, Internal Resistance, Charge and Discharge Characteristics.

**Activities:** Demonstration of battery pack in e-vehicles.

**Weightage:** Continuous Assessment: 50%, End Semester Examinations: 50%

**Assessment Methodology:** Quiz (5%), Assignments (20%), Flipped Class (5%), Practical (30%), Internal Examinations (40%)

**References:**


1. Jain, P. C., & Jain, M. (2015). Engineering Chemistry (17th ed.). Dhanpat Rai Publishing Company (P) Ltd.
2. Dara, S. S. (2004). A Textbook of Engineering Chemistry. Chand Publications.
3. Sachdeva, M. V. (2011). Basics of Nano Chemistry. Anmol Publications Pvt Ltd.
4. Friedrich, E. (2014). Engineering Chemistry. Medtech.


**E-Resources:**

1. Water and Wastewater Engineering (Prof. Ligy Philip, IIT Madras) – https://nptel.ac.in/courses/105106202.
2. Electrochemical Energy Systems (Prof. S. Mitra, IIT Madras) – https://nptel.ac.in/courses/113106028.
3. Corrosion (Prof. Kallol Mondal, IIT Kanpur) – https://nptel.ac.in/courses/112104088
4. Chemistry of Battery Systems (Prof. V. R. Marathe, IIT Madras) – https://nptel.ac.in/courses/115106130
5. Resource on all battery types, testing, and safety – https://batteryuniversity.com/articles

| | **Description of CO** | **PO** | **PSO1** | **PSO2** | **PSO3** |
|---|---|---|---|---|---|
| CO1 | Understand the importance of chemistry applications with underlying mechanisms. | --- | | | |
| CO2 | Apply the chemistry concepts in widely used devices. | PO1(3) | | | |
| CO3 | Analyse the effect of various chemical parameters on performance of engineering systems. | PO2(2) | | | |
| CO4 | Perform experimentations as a group and interpret the results. | PO4(3)<br>PO8(1) | | | |
| CO5 | Communicate findings through case studies and reports | PO9(1) | | | |

| ME25C01 | Engineering Drawing | L | T | P | C |
|---|---|---|---|---|---|
| | | 2 | 0 | 4 | 4 |

**Course Objectives:**

- To impart knowledge on dimensions and drawing standards.
- To explore the orthographic projection of lines and solids.
- To provide the understanding of orthographic, isometric and perspective views.

**Fundamentals:** Drawing instruments, Drawing standards (BIS), Lettering in engineering, Sheet layout, elements of dimensioning, Systems of dimensioning. Free hand sketching of 2D & 3D objects, Conics – Ellipse, Parabola and Hyperbola.

**Activities:** Virtual Demonstration of Conics and Cycloids.

**Orthographic Projection:** First angle projection, Projection of points, straight lines and planes.

**Projection of Solids:** Simple Solids, Section of Solids, Development of Surfaces

**Activities:** Development of models of various solids and virtual demonstration of sectioning, CAD modelling of 2D objects.

**Isometric Projection:** Isometric Scale, Projection of Simple solids.

**Activities:** Conversion of 3D into 2D orthographic views, CAD modelling of 3D objects.

**Perspective Projection:** Simple solids projection

**Activities:** Virtual demonstration of perspective views.

**Project:** Development of 2D objects and 3D objects using CAD tools.

**Weightage:**
Continuous Assessment: 50%
End Semester Examinations: 50%

**Assessment Methodology:**
Project – 10%, Models - 5%, Assignments - 35% and Internal Examinations - 50%

**References:**


1. Venugopal, K., & Prabhu Raja, V. (2022). Engineering Drawing + AutoCAD. New Age International Publishers.
2. Natarajan, K. V. (2015). A Text Book of Engineering Graphics. Dhanalakshmi Publisher.


**E-resources:**

1. CAD Software – https://www.freecadweb.org/

2. Engineering Drawing and Computer Graphics, Prof. Rajaram Lakkaraju (IIT Kharagpur) – https://onlinecourses.nptel.ac.in/noc22_me105/preview
3. MIT Design Handbook: Engineering Drawing and Sketching – https://ocw.mit.edu/courses/2-007-design-and-manufacturing-i-spring-2009/pages/related-resources/drawing_and_sketching/

| | **CO Description** | **PO** | **PSO1** | **PSO2** | **PSO3** |
|---|---|---|---|---|---|
| CO1 | Explain the advantages of engineering drawing in engineering applications | --- | | | |
| CO2 | Apply the concepts of projections in formulating various solid parts in engineering systems. | PO1(3) | | | |
| CO3 | Analyse the various view and interpret the engineering drawings. | PO2(3) | | | |
| CO4 | Use CAD tools for creation of various models. | PO3(1) | | | |
| CO5 | Critically think and develop innovative models. | PO11(1) | | | |

| UC25H01 | தமிழர் மரபு | L | T | P | C |
|---|---|---|---|---|---|
| | | 1 | 0 | 0 | 1 |

**மொழி மற்றும் இலக்கியம்:** இந்திய மொழிக் குடும்பங்கள், திராவிட மொழிகள், தமிழ் ஒரு செம்மொழி, தமிழ் செவ்விலக்கியங்கள், சங்க இலக்கியத்தின் சமயச் சார்பற்ற தன்மை, சங்க இலக்கியத்தில் பகிர்தல் அறம், திருக்குறளில் மேலாண்மைக் கருத்துக்கள், தமிழ்க் காப்பியங்கள், தமிழகத்தில் சமண பௌத்த சமயங்களின் தாக்கம், பக்தி இலக்கியம், ஆழ்வார்கள் மற்றும் நாயன்மார்கள், சிற்றிலக்கியங்கள், தமிழில் நவீன இலக்கியத்தின் வளர்ச்சி, தமிழ் இலக்கிய வளர்ச்சியில் பாரதியார் மற்றும் பாரதிதாசன் ஆகியோரின் பங்களிப்பு.

**மரபு – பாறை ஓவியங்கள் முதல் நவீன ஓவியங்கள் வரை – சிற்பக் கலை**: நடுகல் முதல் நவீன சிற்பங்கள் வரை, ஐம்பொன் சிலைகள், பழங்குடியினர் மற்றும் அவர்கள் தயாரிக்கும் கைவினைப் பொருட்கள், பொம்மைகள் , தேர் செய்யும் கலை, சுடுமண் சிற்பங்கள், நாட்டுப்புறத் தெய்வங்கள், குமரிமுனையில் திருவள்ளுவர் சிலை, இசைக் கருவிகள், மிருதங்கம், பறை, வீணை, யாழ், நாதஸ்வரம், தமிழர்களின் சமூக பொருளாதார வாழ்வில் கோவில்களின் பங்கு.

**நாட்டுப்புறக் கலைகள் மற்றும் வீர விளையாட்டுகள்:** தெருக்கூத்து, கரகாட்டம், வில்லுப்பாட்டு, கணியான் கூத்து, ஒயிலாட்டம், தோல்பாவைக் கூத்து, சிலம்பாட்டம், வளரி, புலியாட்டம், தமிழர்களின் விளையாட்டுகள்.

**தமிழர்களின் திணைக் கோட்பாடுகள்**: தமிழகத்தின் தாவரங்களும், விலங்குகளும், தொல்காப்பியம் மற்றும் சங்க இலக்கியத்தில் அகம் மற்றும் புறக் கோட்பாடுகள், தமிழர்கள் போற்றிய அறக்கோட்பாடு, சங்ககாலத்தில் தமிழகத்தில் எழுத்தறிவும், கல்வியும், சங்ககால நகரங்களும் துறை முகங்களும், சங்ககாலத்தில் ஏற்றுமதி மற்றும் இறக்குமதி, கடல்கடந்த நாடுகளில் சோழர்களின் வெற்றி.

**இந்திய தேசிய இயக்கம் மற்றும் இந்திய பண்பாட்டிற்குத் தமிழர்களின் பங்களிப்பு**: இந்திய விடுதலைப்போரில் தமிழர்களின் பங்கு, இந்தியாவின் பிறப்பகுதிகளில் தமிழ்ப் பண்பாட்டின் தாக்கம் , சுயமரியாதை இயக்கம் இந்திய மருத்துவத்தில், சித்த மருத்துவத்தின் பங்கு, கல்வெட்டுகள், கையெழுத்துப்படிகள், தமிழ்ப் புத்தகங்களின் அச்சு வரலாறு.

**References:**


1. தமிழக வரலாறு, மக்களும் பண்பாடும், கே.கே. பிள்ளை (வெளியீடு: தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்).
2. கணினித் தமிழ், முனைவர் இல. சுந்தரம். (விகடன் பிரசுரம்).
3. கீழடி, வைகை நதிக்கரையில் சங்ககால நகர நாகரிகம் (தொல்லியல் துறை வெளியீடு)
4. பொருநை, ஆற்றங்கரை நாகரிகம். (தொல்லியல் துறை வெளியீடு)
5. Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL – (in print)
6. Social Life of the Tamils - The Classical Period (Dr.S.Singaravelu) (Published by: International Institute of Tamil Studies.
7. Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thirunavukkarasu) (Published by: International Institute of Tamil Studies).
8. The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: International Institute of Tamil Studies.)

9. Keeladi - ‘Sangam City C ivilization on the banks of river Vaigai’ (Jointly Published by: Department ofArchaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
10. Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay) (Published by: The Author)
11. Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
12. Journey of Civilization Indus to Vaigai (R.Balakrishnan) (Published by: RMRL) – Reference Book.

| UC25H01 | Heritage of Tamils | L | T | P | C |
|---|---|---|---|---|---|
| | | 1 | 0 | 0 | 1 |

**Language and Literature:** Language Families in India, Dravidian Languages, Tamil as aClassical Language, Classical Literature in Tamil, Secular Nature of Sangam Literature, Distributive Justice in Sangam Literature, Management Principles in Thirukural, Tamil Epics and Impact of Buddhism & Jainism in Tamil Land, Bakthi Literature Azhwars and Nayanmars, Forms of minor Poetry - Development of Modern literature in Tamil - Contribution of Bharathiyar and Bharathidhasan.

**Heritage - Rock Art Paintings to Modern Art – Sculpture:** Hero stone to modern sculpture, Bronze icons, Tribes and their handicrafts, Art of temple car making, Massive Terracotta sculptures, Village deities, Thiruvalluvar Statue at Kanyakumari, Making of musical instruments, Mridhangam, Parai, Veenai, Yazh and Nadhaswaram, Role of Temples in Social and Economic Life of Tamils.

**Folk and Martial Arts:** Therukoothu, Karagattam, Villu Pattu, Kaniyan Koothu, Oyillattam, Leatherpuppetry, Silambattam, Valari, Tiger dance, Sports and Games of Tamils.

**Thinai Concept of Tamils:** Flora and Fauna of Tamils & Aham and Puram Concept from Tholkappiyam and Sangam Literature, Aram Concept of Tamils, Education and Literacy during Sangam Age, Ancient Cities and Ports of Sangam Age, Export and Import during Sangam Age, Overseas Conquest of Cholas.

**Contribution of Tamils to Indian National Movement and Indian Culture:**

Contribution of Tamils to Indian Freedom Struggle, The Cultural Influence of Tamils over the other parts of India, Self-Respect Movement, Role of Siddha Medicine in Indigenous Systems of Medicine, Inscriptions & Manuscripts, Print History of Tamil Books

**References:**


1. தமிழக வரலாறு, மக்களும் பண்பாடும், கே.கே. பிள்ளை (வெளியீடு: தமிழ்நாடு பாடநூல் மற்றும், கல்வியியல் பணிகள் கழகம்).
2. கணினித் தமிழ், முனைவர் இல. சுந்தரம். (விகடன் பிரசுரம்).
3. கீழடி, வைகை நதிக்கரையில் சங்ககால நகர நாகரிகம் (தொல்லியல் துறை வெளியீடு)
4. பொருநை, ஆற்றங்கரை நாகரிகம். (தொல்லியல் துறை வெளியீடு)
5. Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL – (in print)
6. Social Life of the Tamils, The Classical Period (Dr.S.Singaravelu) (Published by: International Institute of Tamil Studies.
7. Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thirunavukkarasu) (Published by: International Institute of Tamil Studies).
8. The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: International Institute of Tamil Studies.)

9. Keeladi, ‘Sangam City C ivilization on the banks of river Vaigai’ (Jointly Published by: Department ofArchaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
10. Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay) (Publishedby: The Author)
11. Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Bookand Educational Services Corporation, Tamil Nadu)
12. Journey of Civilization Indus to Vaigai (R.Balakrishnan) (Published by: RMRL), Reference Book.

| EN25C01 | English Essentials – I | L | T | P | C |
|---|---|---|---|---|---|
| | | 2 | 0 | 0 | 2 |

**Course Objectives:**

- To equip students with the skills to write clear, coherent, and grammatically correct texts for various purposes.
- To strengthen the ability to comprehend, interpret, and analyse written English across diverse contexts.

**Speaking Skills:** Parts of Speech, Articles, Tenses, Sentence Structure, Types of Sentences, Subject-Verb Agreement**,** Synonyms and Antonyms, Prefixes and Suffixes, Idioms and Phrases, Self-Introduction, Expressing Oneself, Everyday Conversations, Team Interactions, Emotions, agreeing & disagreeing

**Activities:** Self-Introduction, Just a Minute (JAM) Video recording, Brainstorming sessions, Situational role plays, Usage of Applications.

**Listening Skills:** Listening to Simple Conversations, Short Speeches / Stories, Extracting key information, Phonemes, Listening to Native Speakers, Listening to Various Accents.

**Activities:** Gap fill exercises, Understanding tone and intent, Listening and imitating, Spell Bee

**Reading Skills:** Reading Strategies, Skimming and Scanning, active reading with short passages.

**Activities:** Summarising, loud reading, Cloze reading, Reading comprehension, Reading newspaper articles, Reading Long passage and note making.

**Drafting Skills:** Sentence Formation, Word Substitution, Keywords Development, Writing Paragraphs, Emails and Letters.

**Activities:** Picture and poster interpretation, formal and informal letters, Official e-mails.

**Weightage:** Continuous Assessment: 40%, End Semester Examinations: 60%

**Assessment Methodology:** Quiz (10%), Assignments (20%), Speaking Task (10%), Reading Task (10%), Writing Task (10%), Internal Examinations (40%)

**References:**


1. Miller, K. Q., & Wahl, S. T. (2023). Business and Professional Communication: KEYS for Workplace Excellence (5th ed.). SAGE Publications.
2. Kumar, Sanjay & Pushpalatha. (2018). English Language and Communication Skills for Engineers. India: Oxford University Press.

3. Sharma, S., & Mishra, B. (2024). Communication Skills for Engineers and Scientists. PHI Learning.

**E-resources:**

1. Cambridge English – https://www.cambridgeenglish.org/learning-english/grammar-and-vocabulary/
2. Perfect English Grammar – https://www.perfect-english-grammar.com/
3. British Council – Learn English - https://learnenglish.britishcouncil.org/grammar
4. Speechling – https://speechling.com/
5. mePro by Pearson – https://mepro.pearson.com/
6. TED Talks – https://www.ted.com/

| | **Description of CO** | **PO** | **PSO1** | **PSO2** | **PSO3** |
|---|---|---|---|---|---|
| CO1 | Comprehend spoken English, take and draft notes. | --- | | | |
| CO2 | Apply vocabulary, with appropriate ways to enhance drafting and communication. | PO1(3) | | | |
| CO3 | Analyze texts in different contexts using appropriate reading strategies. | PO2(2) | | | |
| CO4 | Communicate thoughts and ideas in both planned and unplanned situations. | PO9(2) | | | |
| CO5 | Continuously improving English communication skills relevant to engineering and scientific work. | PO11(1) | | | |

| CS25C02 | Computer Programming: Python | L | T | P | C |
|---|---|---|---|---|---|
| | | 2 | 0 | 2 | 3 |

**Course Objectives:**

- To equip engineering students with the foundational knowledge and practical skills in Python programming to analyse and solve computational problems effectively.
- To foster problem-solving, critical thinking, and modular programming skills essential for engineering domains.

**Introduction to Python:** Problem Solving, Problem Analysis Chart, Developing an Algorithm, Flowchart and Pseudocode, Interactive and Script Mode, Indentation, Comments, Error messages, Variables, Reserved Words, Data Types, Arithmetic operators and expressions, Built-in Functions, Importing from Packages.

**Practical:** Problem Analysis Chart, Flowchart and Pseudocode Practices. (Minimum three)

**Control Structures:** if, if-else, nested if, multi-way if-elif statements, while loop, for loop, nested loops, pass statements.

**Practical:** Usage of conditional logics in programs. (Minimum three)

**Functions:** Hiding redundancy, complexity; Parameters, arguments and return values; formal vs actual arguments, named arguments, Recursive & Lambda Functions.

**Practical:** Usage of functions in programs. (Minimum three)

**Strings & Collections:** String Comparison, Formatting, Slicing, Splitting, Stripping, Lists, tuples, and dictionaries, basic list operators, searching and sorting lists; dictionary literals, adding and removing keys, accessing and replacing values.

**Practical:** String manipulations and operations on lists, tuples, sets, and dictionaries. (Minimum three)

**File Operations:** Create, Open, Read, Write, Append and Close files. Manipulating directories, OS and Sys modules, reading/writing text and numbers, from/to a file; creating and reading a formatted file (csv, tab-separated, etc.).

**Practical:** Opening, closing, reading and writing in formatted file format and sort data. (Minimum three)

**Packages:** Built-in modules, User-Defined modules, Numpy, SciPy, Pandas, Scikit-learn**.**

**Practical:** Usage of modules and packages to solve problems. (Minimum three), Project (Minimum Two)

**Weightage:** Continuous Assessment: 50%, End Semester Examinations: 50%

**Assessment Methodology:** Quiz (5%), Project (15%), Assignment Programs (25%), Practical (25%), Internal Examinations (30%)

**References:**


1. Matthes, E. (2019). Python crash course: A hands-on, project-based introduction to programming. No Starch Press.
2. Brown, M. C. (2018). Python: The complete reference. McGraw Hill Publishers.
3. Guttag, J. V. (2016). Introduction to computation and programming using Python: With applications to understanding data. MIT Press.
4. McKinney, W. (2017). Python for data analysis: Data wrangling with pandas, NumPy, and IPython. Shroff/O'Reilly.


**E-resources:**

1. Official Python Documentation – https://docs.python.org/3/
2. Python Tutorials – https://www.w3schools.com/python/
3. NumPy – https://numpy.org/doc/
4. SciPy – https://scipy.org/
5. Google's Python class – https://developers.google.com/edu/python/

| | Description of CO | PO | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|
| CO1 | Explain the potential usage of Python in engineering applications | --- | | | |
| CO2 | To apply the concepts of Python in solving engineering problems and formulate new projects. | PO1 (2)<br>PO5 (2) | | | |
| CO3 | To interpret the data and effectively communicate in groups. | PO2 (3)<br>PO8 (1)<br>PO9 (1) | | | |
| CO4 | Adapt new programming concepts and technologies in the profession. | PO11 (1) | | | |

| ME25C04 | Makerspace | L | T | P | C |
|---|---|---|---|---|---|
| | | 0 | 0 | 4 | 2 |

**Course Objectives:**

1. To impart practical skills in the assembly, disassembly, and welding of components using appropriate tools and techniques.
2. To provide hands-on training in electrical wiring practices, and the use of electronic components, sensors, and actuators.

**List of Activities**

**(A). Dis-assembly & Assembly Practices**

i. Tools and its handling techniques.
ii. Dis-assembly and assembly of home appliances – Grinder Mixer Grinder, Ceiling Fan, Table Fan & Washing Machine.
iii. Dis-assembly and assembly of Air-Conditioners & Refrigerators.
iv. Dis-assembly and assembly of a Bicycle.

**(B). Welding Practices**

i. Welding Procedure, Selection & Safety Measures.
ii. Power source of Arc Welding – Gas Metal Arc Welding & Gas Tungsten Arc Welding processes.
iii. Hands-on session of preparing base material & Joint groove for welding.
iv. Hands-on session of MAW, GMAW, GTAW, on Carbon Steel & Stainless Stell plates / pipes, for fabrication of a simple part.

**(C). Electrical Wiring Practices**

i. Electrical Installation tools, equipment & safety measures.
ii. Hands-on session of basic electrical connections for Fuses, Miniature Circuit Breakers and Distribution Box.
iii. Hands-on session of electrical connections for Lightings, Fans, Calling Bells.
iv. Hands-on session of electrical connections for Motors & Uninterruptible Power Supply.

**(D). Electronics Components / Equipment Practices**

i. Electronic components, equipment & safety measures.
ii. Dis-assembly and assembly of Computers.
iii. Hands-on session of Soldering Practices in a Printed Circuit Board.
iv. Hands-on session of Bridge Rectifier, Op-Amp and Transimpedance amplifier.
v. Hands-on session of integration of sensors and actuators with a Microcontroller.

vi. Demonstration of Programmable Logic Control Circuit.

**(E). Contemporary Systems**

i. Demonstration of Solid Modelling of components.
ii. Demonstration of Assembly Modelling of components.
iii. Fabrication of simple components / parts using 3D Printers.
iv. Demonstration of cutting of wood / metal in different complex shapes using Laser Cutting Machine.

**References:**


1. Stephen Christena, Learn to Weld: Beginning MIG Welding and Metal Fabrication Basics, Crestline Books, 2014.
2. H. Lipson, Fabricated - The New World of 3D Printing, Wiley, 1st edition, 2013.
3. Code of Practice for Electrical Wiring Installations (IS 732:2019)


| | Description of CO | PO | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|
| CO1 | Demonstrate proper use and handling of basic hand and power tools. | --- | | | |
| CO2 | Carry out electrical wiring installations and repairs, applying safety measures in domestic applications. | PO1(3) | | | |
| CO3 | Develop solid innovative models through software. | PO5(2) | | | |
| CO4 | Adapt and follow safety protocols in the work environment. | PO11(2) | | | |

| UC25A01 | Life Skills for Engineers – I | L | T | P | C |
|---|---|---|---|---|---|
| | | 1 | 0 | 2 | - |

**Course Objectives**

- To equip engineering students with essential life skills encompassing personal and emotional development, effective management of time and stress, financial literacy, digital safety, and civic responsibility.
- To enhance self-awareness, interpersonal skills, and resilience to prepare students for the professional and personal challenges of engineering careers and life beyond academics**.**

**Personal and Emotional Development:** Self-Awareness & Personality, Emotional Intelligence & Empathy, Positive thinking, Right attitude, Stress & Anger Management, Goal-Setting & Time Management, Growth Mindset & Resilience.

**Activities:** Personality tests (MBTI, DISC), reflection journals, Empathy circle, role-playing difficult conversations, Guided mindfulness sessions, stress relief toolkit creation, Vision board creation, weekly time audit and planner, Group challenge scenarios, resilience journal.

**Management Skills:** Financial Literacy: Budgeting & Saving, Nutrition, Health, and Hygiene, Digital Literacy & Online Safety, Civic Responsibility & Ethics

**Activities**: Create a monthly budget, financial simulation game, Meal planning workshop, physical wellness challenge, Social media audit, privacy and safety scenarios, Community service, values debate.

**Weightage:** Continuous Assessment: 100%

**Assessment Methodology:** Assignments (20%), Flipped Class & Worksheets (10%), Practical (30%), Internal Examinations (40%)

**References:**


1. Khera, S. (2003). *You can win*. Macmillan.
2. Levesque, H. (n.d.). *Life skills 101: A practical guide to leaving home and living on your own*. (Publication year not specified)
3. Mitra, B. K. (2017). *Personality development & soft skills* (3rd impression). Oxford University Press.
4. ICT Academy of Kerala. (2016). *Life skills for engineers*. McGraw Hill Education (India) Private Ltd.

| | Description of CO | PO | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|
| CO1 | Understand personality traits and emotional intelligence, in interpersonal interactions. | --- | | | |
| CO2 | To work and execute as a team through successful implementation of set goals. | PO7 (1)<br>PO8 (2)<br>PO9 (2) | | | |
| CO3 | Develop and implement best practices in day-to-day life, in terms of planning and execution. | PO11 (3) | | | |

| UC25A02 | Physical Education - I | L | T | P | C |
|---|---|---|---|---|---|
| | | 0 | 0 | 4 | 1 |

**Course Objectives:**

- To impart the fundamentals of physical education for development of students' physical, mental, and social well-being.
- To instill a lifelong appreciation for physical activity towards the development of positive attitude and fostering values of team work and sportsmanship.

**Introduction to physical education:** Exercise for Good Posture – Conditioning and Calisthenics for Before start, Jogging, Bending, Twisting, Standing, Sitting and Relaxation, Training on First Aid Practices.

**Participation of athletic events:** Rules and regulations of important athletic events, Sprint, Jumps, Throws and Hurdles.

**Skill development in any one of the following outdoor games:** Basket Ball, Volley Ball, Ball Badminton, Football, Hockey, Kho-Kho, Kabaddi, Cricket, Hand ball and Tennis.

**Skill development in any one of the following indoor games:** Shuttle Badminton, Chess and Table Tennis.

**Weightage:** Continuous Assessment: 100%

**Assessment Methodology:** Attendance (60%), Quiz (10%), Participation in Sports and Games (20%) and Viva Voce (10%)

**References:**


1. Singh, A. (2008). Essentials of physical education. Kalyani Publishers.
2. Kamlesh, M. L. (2006). Psychology in physical education and sport (3rd ed.). Metropolitan Book Co.
3. Mangal, S. K. (2009). *Psychology of sports performance*. Sports Publication.


**E-resources:**

**https://www.who.int/health-topics/physical-activity**

| | CO Description | PO | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|
| CO1 | Understand and explain the importance of physical activity for mental and physical health. | --- | | | |
| CO2 | Apply basic principles of exercise science in the routine life. | PO1(3) | | | |
| CO3 | Develop teamwork, discipline, and leadership through sports and group activities and collaborate effectively. | PO8(3) | | | |
| CO4 | Demonstrate independent learning in health, nutrition, and fitness-related topics. | PO11(2) | | | |

# Semester II

| MA25C02 | Linear Algebra | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 1 | 0 | 4 |

**Course Objectives:**

- To impart foundational knowledge in linear algebra essential for analysing and solving problems in engineering applications.
- To provide the knowledge on computation using software and interpret key linear algebra concepts using software.

**Vector Spaces** Introduction to Vector Spaces, Examples, Subspaces, Linear Combinations, Span, Generating Sets, Linear Dependence and Independence, Basis and Dimension, Dimension of Subspaces.

**Activities:** Open-Source software, exercises to test linear dependence and independence using rank, compute span and basis of a set of vectors, determine the dimension of subspaces, and illustrate the concept of subspace and basis in $\boldsymbol{R^2/R^3}$ with visualization.

**Linear Transformations and Diagonalization:** Null space, Range, Dimension Theorem (statement only), Matrix representation of a linear transformation, Eigenvalues & Eigenvectors, Diagonalizability.

**Activities:** Open-Source software, exercises to compute the matrix representation of a linear transformation, find the null space and range of a matrix, and compute eigenvalues and eigenvectors of a matrix.

**Inner Product Spaces:** Inner product, Norms, Cauchy, Schwarz inequality, Gram, Schmidt orthogonalization, Simple problems (up to $\boldsymbol{R^3}$).

**Activities:** Open-Source software, exercises to compute inner products and vector norms.

**Matrix Decomposition:** Orthogonal transformation of a symmetric matrix to diagonal form - Positive definite matrices, QR decomposition, Singular Value Decomposition (SVD), Least squares solutions- simple problems (up to $3 \times 3\ matrices$).

**Activities:** Open-Source software, exercises to check if a matrix is positive definite, perform QR decomposition and SVD using built-in functions.

**Weightage:** Continuous Assessment: 40%, End Semester Examinations: 60%.

**Assessment Methodology:** Assignment (20%), Software activity (20%), Quiz (20%), Internal Examinations (50%).

**References:**

1. Friedberg, S. H., Insel, A. J., & Spence, L. E. (2022). *Linear algebra*. Pearson.

2. Lay, D. C., Lay, S. R., & McDonald, J. J. (2020). *Linear algebra and its applications with MATLAB*. Pearson.
3. Bronson, R. (2011). *Schaum's outline of matrix operations*. McGraw-Hill Education.
4. Strang, G., & Thomson, R. (2005). *Linear algebra and its applications*. Brooks/Cole.
5. Lipschutz, S., & Lipson, M. (2009). *Schaum's outline of linear algebra*. McGraw-Hill.
6. Kreyszig, E. (2018). *Advanced engineering mathematics*. Wiley India.

| | **Description of CO** | **PO** | **PSO1** | **PSO2** | **PSO3** |
|---|---|---|---|---|---|
| CO1 | Explain the fundamental concepts of Linear Algebra. | --- | | | |
| CO2 | Compute and interpret eigenvalues and eigenvectors. | PO1(3) | | | |
| CO3 | Apply inner product concepts and perform orthogonalization. | PO1 (3) | | | |
| CO4 | Compute least squares solutions of linear system of equations. | PO1 (2)<br>PO2 (2) | | | |
| CO5 | Use MATLAB to implement and validate key linear algebra concepts | PO5 (1)<br>PO11 (1) | | | |

| ME25C02 | Engineering Mechanics | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 1 | 0 | 4 |

**Course Objectives:**

- To introduce the fundamental concepts and principles of statics related to forces acting on particles and rigid bodies.
- To develop the ability to formulate and apply equilibrium equations for particles and rigid bodies in two and three dimensions.
- To enable students to analyse force systems through vector resolution and calculation of moments and couples.

**Statics of Particles:** Resultant of forces in a plane, Equilibrium of a particle in a plane, Addition of concurrent forces in space, Equilibrium of a particle in space.

**Activities:** Assignments and Quiz on resultant forces, Solving of GATE questions.

**Statics of Rigid Bodies:** Concept of Free Body Diagram, Equivalent systems of forces, Transmissibility, Moment of a force about a point and an axis, Couples and force-couple systems, Equilibrium of rigid bodies in two and three dimensions, Principle of virtual work.

**Activities:** Virtual demonstration of rigid bodies, Solving of GATE questions.

**Moments of Inertia:** First moments of areas and lines, Centroids of composite areas and lines, Theorems of Pappus-Guldinus, Second moment of area, Parallel axis theorem, Rectangular and Polar Moments of inertia of composite areas, Radius of Gyration, Product of Inertia, Principal Axes and Principal Moments of Inertia, Mass moments of inertia of thin plates.

**Activities:** Virtual Simulation of Moment of Inertia, Principal Axes Determination, Solving of GATE questions.

**Friction:** Laws of friction, Coefficients of Friction, Angles of Friction, Types of Friction Problems, Wedges and Ladder friction, Belt friction.

**Activities:** Virtual Demonstration of Friction in belts and pulleys, Solving of GATE questions

**Weightage:** Continuous Assessment: 40%, End Semester Examinations: 60%

**Assessment Methodology:** Quiz - 10%, Assignments - 20%, Solving of GATE questions (20%) and Internal Examinations - 50%

**References:**


1. Beer, F. P., Johnston Jr., E. R., DeWolf, J. T., & Mazurek, D. F. (2015). Mechanics of Materials. McGraw-Hill Education.
2. Meriam, J. L., & Kraige, L. G. (2018). *Engineering Mechanics: Statics and Dynamics*. Wiley.

3. Pytel, A., & Kiusalaas, J. (2014). Engineering Mechanics (Indian Edition). Cengage Learning India.

**E-resources:**

1. Moment of Inertia Calculator – https://skyciv.com/free-moment-of-inertia-calculator/
2. OpenStax – University Physics Volume 1 – https://openstax.org/books/university-physics-volume-1/pages/10-4-moment-of-inertia-and-rotational-kinetic-energy
3. Engineering Mechanics, Dr. Dwarakish. G. S. – https://onlinecourses.swayam2.ac.in/ntr24_ed75/preview

| | CO Description | PO | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|
| CO1 | Explain the principles of statics in determination of forces acting on particles and rigid bodies. | --- | | | |
| CO2 | Apply equilibrium conditions to predict the behaviour of particles and rigid bodies under various force configurations | PO1(3) | | | |
| CO3 | Analyse various systems through resolution of forces and moments. | PO2(2) | | | |
| CO4 | Demonstrate the ability to engage in adapting new techniques in the analysis of force and moments in a system. | PO11(1) | | | |

| PH25C02 | Applied Physics (CE) – II | L | T | P | C |
|---|---|---|---|---|---|
| | | 2 | 1 | 0 | 3 |

**Course Objectives:**

- To provide a comprehensive understanding of physics concepts in Civil engineering applications.

**Mechanic:** Elasticity – Types of supports and loads – free body diagrams - Equilibrium of rigid bodies – Types of structures: Beams, frames, trusses – Analysis of trusses – internal forces in members – Moment of inertia and bending- cantilever

**Activities:** Virtual Demonstration of deflection of beams and moment of inertia.

**Acoustics:** Reverberation – Loudness – Focusing – Echelon – Noise – Echo - Resonance – Interference – Sabine's formula (Derivation) – Absorption coefficient – Sonometer - Sound insulation.

**Activities:** Virtual Demonstration of sound insulation and resonance.

**Lighting:** Visual field glare, colour – day light calculations – day light design of windows, measurement of day light and use of models and artificial skies - artificial lighting – LED characteristics.

**Activities:** Virtual Demonstration of heat infiltration in glass, glass as building material, LED Characteristics.

**Engineering Materials:** Composites – Fibre Reinforced Plastics (FRP) – Fiber Reinforced Metals (FRM) – Fiber Reinforced Bricks (FRB) - Shape memory alloys – Ceramics – Thermal, Mechanical, Electrical and Chemical properties –3D printed construction materials - Nano materials.

**Activities:** Demonstration of 3D printing of materials, Composite fabrication.

**Weightage:** Continuous Assessment: 40%, End Semester Examinations: 60%

**Assessment Methodology:** Quiz (10%), Assignments (30%), Flipped Class (10%), Internal Examinations (50%)

**References:**


1. Balasubramaniam, R. (2014). Callister's materials science and engineering. Wiley India Pvt. Ltd.
2. Hibbeler, R. C. (2017). Engineering mechanics. Pearson.
3. Hibbeler, R. C. (2023). Structural analysis. Pearson.
4. Medved, S. (2021). Building physics. Springer.


**E-resources**:

1. Moment of Inertia: https://youtu.be/fDJeVR0o__w

2. Ceramics: https://www.youtube.com/watch?v=oeDANQrsnZ0
3. Sound Insulation: https://youtu.be/nhE2a4GEOtA
4. Shape memory alloys: https://nescacademy.nasa.gov/video/00a31561480547248033a1c2df6f87831d
5. White LED: https://archive.nptel.ac.in/courses/108/108/108108122/
6. Daylighting and lighting design: https://youtu.be/vZO09qL-vZs
7. 3D Printed construction materials_ https://www.youtube.com/watch?v=UntRnpuWBtU

| | **Description of CO** | **PO** | **PSO1** | **PSO2** | **PSO3** |
|---|---|---|---|---|---|
| CO1 | Explain the concepts of physics in civil engineering stream. | --- | | | |
| CO2 | Apply appropriate techniques in physics to solve engineering problems. | PO1(3) | | | |
| CO3 | Analyse physical systems and interpret data from the virtual studies in the core branches in civil engineering. | PO2(2) | | | |

| EE25C01 | Basic Electrical and Electronics Engineering | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 0 | 0 | 3 |

**Course Objectives:**

- To impart foundational knowledge in principles and applications of electrical and electronics engineering.

**DC Fundamentals:** Current and Voltage sources, Resistance, Inductance and Capacitance; Ohm's law, Kirchhoff's law, Series parallel combination of R, L and C components, Voltage Divider and Current Divider Rules.

**Activities:** Virtual Demonstration of electrical laws & circuits, Hands-on Breadboarding, Solving GATE questions.

**AC Fundamentals:** Faraday's Laws of Electro-magnetic Induction, Definition of Self and Mutual Inductances, Generation of sinusoidal voltage, Instantaneous & RMS values of sinusoidal signals, Introduction to 3-phase systems, Electrical Safety, Fuses and Earthing.

**Activities:** Virtual Demonstration of electromagnetic induction, Measurement of instantaneous and RMS values of AC signals, Solving GATE questions.

**Electric Machines:** DC Machines, Transformers, Star and delta Connections, Three phase Induction motors, Synchronous Generators, Single Phase Induction Motors, Stepper Motor, Universal Motor and BLDC motor.

**Activities:** Virtual demonstration of step-up and step-down transformers, Virtual working models of Universal and BLDC motors, Solving GATE questions.

**Semiconductor Devices:** PN junction diodes, Zener Diode, Voltage regulator, BJT & FET Transistors, Timers, Operational Amplifiers.

**Activities:** Virtual demonstration of V-I characteristics of PN junction and Zener diodes using simulation, inverting/non-inverting amplifiers, Solving GATE questions.

**Digital Electronics:** Boolean algebra, Basic and Universal Gates, adders, multiplexers, demultiplexers and flip-flops.

**Activity:** Online logic gate simulators, Solving GATE questions.

**Microcontrollers:** Introduction, Architecture, Potential Applications.
**Activities:** Physical demonstration of a microcontroller and online simulation of microcontroller.

**Weightage:** Continuous Assessment: 40%, End Semester Examinations: 60%

**Assessment Methodology:** Quiz (5%), Assignments (25%), GATE Questions (20%), Internal Examinations (50%)

**References:**


1. Del Toro, V. (2022). Electrical engineering fundamentals. Pearson Education.
2. Hambley, A. R. (Year). Electrical engineering: Principles and applications (Edition if known). Publisher.(Note: Please provide the year and edition for complete citation)
3. Mehta, V. K., & Mehta, R. (2006). Principles of electrical engineering and electronics. S. Chand Publishing.


**E-resources:**

1. https://archive.nptel.ac.in/courses/108/106/108106172/
2. Circuit Simulator – https://www.falstad.com/circuit/

| | Description of CO | PO | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|
| CO1 | Understand and explain basic electrical and electronic concepts. | --- | | | |
| CO2 | Apply and analyse electrical circuits in real-time applications. | PO1 (3)<br>PO2 (1) | | | |
| CO3 | Identify and utilise key electronic devices used in engineering applications | PO2 (2) | | | |

| CY25C02 | Applied Chemistry (CE) – II | L | T | P | C |
|---|---|---|---|---|---|
| | | 2 | 0 | 0 | 2 |

**Course Objectives**

- To provide comprehensive understanding of chemistry concepts in building materials.

**Building Materials:** Introduction, Bricks, Glass, Cement, Special Cement, Concrete, Reinforcement.

**Activities:** Virtual demonstration of properties of building materials.

**Composites:** Types, Matrix materials, Hybrids, Fiber Reinforcement, Characteristics, PMC, MMC, CM Applications.

**Activities:** Virtual demonstration of fabrication of composite materials.

**Sustainable Materials:** Bio-based materials, Product & Technology development, Admixtures, Environmental aspects, energy efficiency.

**Activities:** Calculation of carbon footprint in buildings.

**Analytical Methods:** Thermal conductivity, porosity, absorption and emission characteristics of building materials.

**Activities:** Analytical methods with virtual experiments, Hands-on demonstration of any one of the methods.

**Weightage:** Continuous Assessment: 40%, End Semester Examinations: 60%

**Assessment Methodology:** Quiz (5%), Assignments (20%), Flipped Class (5%), Virtual Practice (20%), Internal Examinations (50%)

**References:**


1. Jain, P. C., & Jain, M. (2022). Engineering chemistry. Dhanpat Rai Publishing Company (P) Ltd.
2. Eckold, G. (1994). Design and manufacture of composite structures. Woodhead Publishing Ltd.
3. Skoog, D. A., West, D. M., Holler, F. J., & Crouch, S. R. (2022). Fundamentals of analytical chemistry. Cengage Learning India Pvt. Ltd.
4. Spitzer, W. G., & Simonson, K. (2011). Green building materials: A guide to product selection and specification. Wiley


**E- resources:**

1. https://archive.nptel.ac.in/courses/112/104/112104229/
2. https://nptel.ac.in/courses/103108100

| | Description of CO | PO | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|
| CO1 | Explain the applications of chemistry in civil engineering stream. | --- | | | |
| CO2 | Apply chemistry concepts to select appropriate materials. | PO1(3) | | | |
| CO3 | Analyse the systems and interpret data from the virtual studies in the field of civil engineering. | PO2(2) | | | |

| UC25H02 | தமிழர்களும் தொழில்நுட்பமும் | L | T | P | C |
|---|---|---|---|---|---|
| | | 1 | 0 | 0 | 1 |

**நெசவு மற்றும் பானைத் தொழில்நுட்பம்**: சங்க காலத்தில் நெசவுத் தொழில், பானைத் தொழில்நுட்பம், கருப்பு சிவப்பு பாண்டங்கள், பாண்டங்களில் கீறல் குறியீடுகள்.

**வடிவமைப்பு மற்றும் கட்டிடத் தொழில்நுட்பம்:** சங்க காலத்தில் வடிவமைப்பு மற்றும் கட்டுமானங்கள் & சங்க காலத்தில் வீட்டுப் பொருட்களில் வடிவமைப்பு, சங்க காலத்தில் கட்டுமான பொருட்களும் நடுகல்லும் – சிலப்பதிகாரத்தில் மேடை அமைப்பு பற்றிய விவரங்கள், மாமல்லபுரச் சிற்பங்களும், கோவில்களும், சோழர் காலத்துப் பெருங்கோயில்கள் மற்றும் பிற வழிபாட்டுத் தலங்கள் – நாயக்கர் காலக் கோயில்கள், மாதிரி கட்டமைப்புகள் பற்றி அறிதல், மதுரை மீனாட்சி அம்மன் ஆலயம் மற்றும் திருமலை நாயக்கர் மஹால் – செட்டிநாட்டு வீடுகள், பிரிட்டிஷ் காலத்தில் சென்னையில் இந்தோ, சாரோசெனிக் கட்டிடக் கலை.

**உற்பத்தித் தொழில் நுட்பம்:** கப்பல் கட்டும் கலை, உலோகவியல், இரும்புத் தொழிற்சாலை, இரும்பை உருக்குதல், எஃகு, வரலாற்றுச் சான்றுகளாக செம்பு மற்றும் தங்க நாணயங்கள், நாணயங்கள் அச்சடித்தல், மணி உருவாக்கும் தொழிற்சாலைகள், கல்மணிகள், கண்ணாடி மணிகள், சுடுமண் மணிகள், சங்கு மணிகள், எலும்புத்துண்டுகள், தொல்லியல் சான்றுகள், சிலப்பதிகாரத்தில் மணிகளின் வகைகள்.

**வேளாண்மை மற்றும் நீர்ப்பாசனத் தொழில் நுட்பம்:** அணை, ஏரி, குளங்கள், மதகு, சோழர்காலக் குமுழித் தூம்பின் முக்கியத்துவம், கால்நடை பராமரிப்பு, கால்நடைகளுக்காக வடிவமைக்கப்பட்ட கிணறுகள், வேளாண்மை மற்றும் வேளாண்மைச் சார்ந்த செயல்பாடுகள், கடல்சார் அறிவு, மீன்வளம், முத்து மற்றும் முத்துக்குளித்தல், பெருங்கடல் குறித்த பண்டைய அறிவு, அறிவுசார் சமூகம்.

**அறிவியல் தமிழ் மற்றும் கணித்தமிழ்:** அறிவியல் தமிழின் வளர்ச்சி, கணித்தமிழ் வளர்ச்சி, தமிழ் நூல்களை மின்பதிப்பு செய்தல், தமிழ் மென்பொருட்கள் உருவாக்கம், தமிழ் இணையக் கல்விக்கழகம், தமிழ் மின் நூலகம், இணையத்தில் தமிழ் அகராதிகள், சொற்குவைத் திட்டம்.

**References**


1. தமிழக வரலாறு, மக்களும் பண்பாடும், கே.கே. பிள்ளை (வெளியீடு: தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்).
2. கணினித் தமிழ் – முனைவர் இல. சுந்தரம். (விகடன் பிரசுரம்).
3. கீழடி – வைகை நதிக்கரையில் சங்ககால நகர நாகரிகம் (தொல்லியல் துறை வெளியீடு)
4. பொருநை, ஆற்றங்கரை நாகரிகம். (தொல்லியல் துறை வெளியீடு)
5. Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL – (in print)
6. Social Life of the Tamils – The Classical Period (Dr.S.Singaravelu) (Published by: International Institute of Tamil Studies.
7. Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thirunavukkarasu) (Published by: International Institute of Tamil Studies).
8. The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: International Institute of Tamil Studies.)
9. Keeladi – 'Sangam City C ivilization on the banks of river Vaigai' (Jointly Published by: Department ofArchaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
10. Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay) (Publishedby: The Author)
11. Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Bookand Educational Services Corporation, Tamil Nadu)
12. Journey of Civilization Indus to Vaigai (R.Balakrishnan) (Published by: RMRL) – Reference Book.

| UC25H02 | Tamils and Technology | L | T | P | C |
|---|---|---|---|---|---|
| | | 1 | 0 | 0 | 1 |

**Weaving and Ceramic Technology:** Weaving Industry during Sangam Age, Ceramic technology, Black and Red Ware Potteries (BRW), Graffiti on Potteries.

**Design and Construction Technology:** Designing and Structural construction House & Designs in household materials during Sangam Age, Building materials and Hero stones of Sangam age, Details of Stage Constructions in Silappathikaram, Sculptures and Temples of Mamallapuram, Great Temples of Cholas and other worship places,Temples of Nayaka Period, Type study (Madurai Meenakshi Temple), Thirumalai Nayaka rMahal, Chetti Nadu Houses, Indo, Saracenic architecture at Madras during British Period.

**Manufacturing Technology:** Art of Ship Building , Metallurgical studies, Iron industry, Iron smelting, steel, Copper and gold Coins as source of history - Minting of Coins, Beads making, industries Stonebeads, Glass beads, Terracotta beads, Shell beads / bone beats, Archeological evidences, Gem stone types described in Silappathikaram.

**Agriculture and Irrigation Technology:** Dam, Tank, ponds, Sluice, Significance of Kumizhi Thoompuof Chola Period, Animal Husbandry - Wells designed for cattle use , Agriculture and Agro Processing -Knowledge of Sea -Fisheries, Pearl, Conche diving, Ancient Knowledge of Ocean -Knowledge Specific Society.

**Scientific Tamil & Tamil Computing:** Development of Scientific Tamil, Tamil computing, Digitalization of Tamil Books, Development of Tamil Software, Tamil Virtual Academy, Tamil Digital Library, Online Tamil Dictionaries, Sorkuvai Project.

**References**


1. தமிழக வரலாறு, மக்களும் பண்பாடும், கே.கே. பிள்ளை (வெளியீடு: தமிழ்நாடு பாடநூல் மற்றும்
   கல்வியியல் பணிகள் கழகம்).
2. கணினித் தமிழ், முனைவர் இல. சுந்தரம். (விகடன் பிரசுரம்).
3. கீழடி, வைகை நதிக்கரையில் சங்ககால நகர நாகரிகம் (தொல்லியல் துறை வெளியீடு)
4. பொருநை, ஆற்றங்கரை நாகரிகம். (தொல்லியல் துறை வெளியீடு)
5. Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL – (in print)
6. Social Life of the Tamils, The Classical Period (Dr.S.Singaravelu) (Published by: International Institute of Tamil Studies.
7. Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thirunavukkarasu) (Published by: International Institute of Tamil Studies).
8. The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: International Institute of Tamil Studies.)
9. Keeladi , 'Sangam City C ivilization on the banks of river Vaigai' (Jointly Published by: Department ofArchaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)

10. Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay) (Publishedby: The Author)
11. Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Bookand Educational Services Corporation, Tamil Nadu)
12. Journey of Civilization Indus to Vaigai (R.Balakrishnan) (Published by: RMRL) – Reference Book.

| CE25201 | Construction Materials and Technology | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 0 | 0 | 3 |

**Course Objectives:**

- To impart fundamental knowledge of traditional and modern building materials used in construction.
- To introduce methods of construction such as masonry, formwork, scaffolding, plastering, and joints.

**Stones, Bricks and Concrete Blocks:** Stone as building material, Criteria for selection, Tests on stones, Deterioration and preservation of stonework. Bricks, Classification, Manufacturing of clay bricks, Tests on bricks, Compressive strength, Water absorption, Efflorescence, Bricks for special uses, Refractory bricks. Concrete blocks, Types, Hollow and solid blocks, Lightweight concrete blocks, Applications.

**Activities:** Visit to brick / block manufacturing plant.

**Lime, Cement, Aggregates and Mortar:** Types, Preparation of lime mortar, Applications. Cement, Ingredients, Manufacturing process, Types and grades, Properties: hydration, compressive and tensile strength, soundness, consistency, setting time. Fine aggregates, River sand, crushed stone sand (M and P-Sand), Properties. Coarse aggregates, Crushing strength, impact strength, flakiness and elongation index, abrasion resistance, Grading. Mortar, Cement and lime mortars, Uses and proportions.

**Activities:** Virtual Demonstration of Cement Manufacturing.

**Timber, Metals and Other Materials:** Timber, Market forms, Industrial timber, Plywood, Laminated panels. Metals, Steel, Aluminum, Composition, properties, Market forms, Mechanical treatment, Aluminum composite panels. Surface finishes, Paints, Varnishes, Distempers, Bituminous products. Sealants for joints, Insulating materials, Acoustic and thermal insulation, Fire protection, Damp proofing, Ventilation, Air conditioning.

**Construction Technology and Construction Practices:** Masonry construction, Brick and stone masonry. Formwork, Centering, shuttering, Scaffolding, Shoring, Underpinning. Construction joints, Contraction, construction and expansion joints. Plastering, Pointing, Cavity and diaphragm walls.

**Activities:** Virtual Demonstration of different types of masonry works.

**Advanced Materials:** Advanced materials, Glass, Solar Panels - Ceramics, Clay products, Refractories, Fibre reinforced plastics, Fibre textiles, Geomembranes, Geotextiles. Composite materials, Types, Laminar composites, Applications in construction.

**Activities:** Visit to Construction sites, virtual demonstration of FRP.

**Construction Equipment and Planning:** Construction equipment, Selection for earthwork, concreting, material handling, dewatering and pumping. Construction planning.

**Activities:** Case Study in Concrete Mixing Plan.

**Weightage**: Continuous Assessment: 40%, End Semester Examinations: 60%

**Assessment Methodology:** Quiz (10%), Assignments (40%) and Internal Examinations (50%)

**References:**


1. Varghese, P. C. (2015). Building materials. PHI Learning Pvt. Ltd.
2. Arora, S. P., & Bindra, S. P. (2013). Building construction. Dhanpat Rai Publications.
3. Punmia, B. C. (2008). Building construction. Laxmi Publications Pvt. Ltd.
4. Peurifoy, R. L., Schexnayder, C. J., Shapira, A., & Schmitt, R. (2011). Construction planning, equipment and methods. Tata McGraw-Hill.
5. Srinath, L. S. (2001). PERT and CPM: Principles and applications. Affiliated East-West Press.
6. Rangwala, S. C. (2017). Building materials. Charotar Publishing House Pvt. Ltd.


| | CO Description | PO | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|
| CO1 | Explain the concepts and selection criteria of the building materials. | --- | | | |
| CO2 | Apply the civil engineering fundamentals and identify the suitable building materials. | PO1(2)<br>PO2 (1) | | | |
| CO3 | Apply various techniques in the construction of buildings | PO2(2) | | | |
| CO4 | Independently explore the emerging construction material for innovation | PO11(1) | | | |

| EN25C02 | English Essentials – II | L | T | P | C |
|---|---|---|---|---|---|
| | | 1 | 0 | 2 | 2 |

**Course Objectives:**

- To integrate vocabulary and functional grammar into communication tasks to improve fluency and accuracy.
- To articulate ideas clearly and effectively in formal and informal spoken interactions.
- To construct well-organised written documents including summaries, reports, and emails relevant to academic and workplace contexts

**Communication:** Types, Inter and Intra-personal, communication barriers, Summarising visuals, media terminology, rhetorical devices and TED Talks.

**Activities:** Short presentation, Media based responses and Speeches, Error detection, Welcome, Vote of Thanks and Formal Speeches, Listen and respond to short podcast, Worksheets.

**Correspondence:** Modal Verbs, Job Application Letters, Resume Writing, Statement of Purpose, Paraphrasing & Summarizing, Executive Summary.

**Activities:** Email writing, Submission of applications, Graphical summaries, Report on college events.

**Professional Writing:** Paraphrasing & Summarizing, Executive Summary, Proposal, Decision Making, Recommendations.

**Activities:** Report preparation and recommendation letters.

**Team Work:** Team Leader, Quality of Team leader, Leadership model, Negotiations.

**Activities:** SWOT Analysis, Mock meetings, Group discussions, Brainstorming sessions.

**Weightage:** Continuous Assessment: 50%, End Semester Examinations: 50%

**Assessment Methodology:** Worksheets (10%), Group Activity (20%), Report Writing (20%), Internal Examinations (50%)

**References:**


1. Koneru Aruna. (2020). English Language Skills for Engineers. McGraw Hill Education.
2. Taylor, Shirley & Chandra .V. (2010). Communication for Business A Practical Approach. India: Pearson Longman.
3. Ian Badger, et al., (2014). Listening: B2 (Collins English for Life: Skills), Collins.
4. Raymond Murphy (2019), Grammar in Use, Cambridge University Press.

**E-resources:**

1. Communication for Business Success - https://open.umn.edu/opentextbooks/textbooks/8
2. TED Talks – https://www.ted.com/

| | Description of CO | PO | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|
| CO1 | Understand the importance of communication and drafting skills in engineering and technology. | --- | | | |
| CO2 | Apply listening strategies to comprehend spoken English in various contexts. | PO1(3) | | | |
| CO3 | Participate actively in group discussions by analysing critically from different views. | PO2(2)<br>PO8(1) | | | |
| CO4 | Create written reports coherently for various purposes. | PO9(2) | | | |
| CO5 | Adapt communication styles to global, multicultural environments. | PO11(1) | | | |

| ME25C05 | Re-Engineering for innovation | L | T | P | C |
|---|---|---|---|---|---|
| | | 0 | 0 | 4 | 2 |

**Course Objectives:**

- To cultivate foundational skills in prototyping, and automation for development of prototypes with real-world applications.
- To provide a comprehensive, hands-on exposure to product development through reverse engineering concepts.

**Bootcamp 1:** Introduction to Product Development, Reverse Engineering, Overview of the product lifecycle, Hands-on disassembly of simple products, Practice of basic measurements and sketching, Introduction to CAD modeling of disassembled parts, Virtual assembly of parts.

**Bootcamp 2:** Embedded System Programming (Open-source platforms), Practice of interfacing sensors, reading data, automation in home, healthcare and agriculture.

**Reverse Engineering:** Sketch and prototype alternative designs, Group brainstorming sessions, Manufacture prototype parts using 3D printing and / or workshop tools, Assemble prototype product.

**Weightage:** Continuous Assessment: 60%, End Semester Examinations: 40%

**Assessment Methodology:** Project (30%), Assignment (10%), Practical (30%), Internal Examinations (30%)

**References:**


1. Wang, W. (2010). Reverse engineering: Mechanisms, structures, systems & materials. CRC Press.
2. Margolis, M. (2020). Arduino cookbook: Recipes to begin, expand, and enhance your projects. O'Reilly Media.


**E-resources:**

1. GrabCAD – https://grabcad.com/
2. GitHub – https://github.com/

| | Description of CO | PO | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|
| CO1 | Understand the product development lifecycle, including stages such as concept generation, design, prototyping, and testing. | --- | | | |
| CO2 | Apply reverse engineering techniques to analyze and document existing products. | PO1 (3)<br>PO2 (2) | | | |
| CO3 | Collaborate in teams to fabricate prototypes using appropriate tools. | PO5 (2)<br>PO8 (1)<br>PO9 (1) | | | |
| CO4 | Engage in independent learning and continuously adapt to emerging technologies in product design | PO11(2) | | | |

| UC25A03 | Life Skills for Engineers – II | L | T | P | C |
|---|---|---|---|---|---|
| | | 1 | 0 | 2 | - |

**Course Objectives:**

- To impart and cultivate analytical reasoning, innovative thinking, effective collaboration, and ethical leadership to prepare students for complex challenges in professional and personal environments.

**Critical Thinking:** Creativity, Critical Thinking, Collaboration, Problem Solving, Decision Making, Imagination, Intuition, Experience, Sources of Creativity, Lateral Thinking, Myths of creativity, Critical thinking Vs Creative thinking, Convergent & Divergent Thinking, Critical reading & Multiple Intelligence.

**Activities:** Two-Brainstorm Method, “30 Circles” Challenge, “Desert Survival” Simulation, Lateral thinking riddles and puzzles, "What If?" Scenario Writing, Fast vs. Slow Thinking Game, Creativity Myth Busters

**Problem Solving:** Techniques, Six Thinking Hats, Mind Mapping, Forced Connections. Analytical Thinking, Numeric, symbolic, and graphic reasoning. Scientific temperament and Logical thinking.

**Activities:** Case study analysis, Escape Room challenge.

**Leadership:** Leadership Styles & Self-Assessment, Communication & Active Listening, Decision-Making & Responsibility, Teamwork & Delegation, Empathy, Integrity & Conflict Management, Vision, Motivation & Goal-Setting.

**Activities:** Crisis Leadership Simulation, Tower Challenge, Leadership Dilemmas Role-Play, Team Vision Board

**Weightage:** Continuous Assessment: 100%

**Assessment Methodology:** Assignments (20%), Flipped Class & Worksheets (10%), Practical (30%), Internal Examinations (40%)

**References:**


1. De Bono, E. (2017). *Six thinking hats*, Little, Brown Book Group.
2. Facione, P. A. (2015). *Critical thinking: What it is and why it counts*. Insight Assessment.
3. Kahneman, D. (2011). *Thinking, fast and slow*. Farrar, Straus and Giroux.
4. Whetten, D. A., & Cameron, K. S. (2016). *Developing management skills*. Pearson.

| | Description of CO | PO | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|
| CO1 | Explain the importance of leadership and management skills in life. | --- | | | |
| CO2 | Apply and demonstrate creative thinking techniques to generate innovative solutions. | PO7 (3) | | | |
| CO3 | Exhibit effective collaboration and communication skills through teamwork, active listening, and conflict resolution strategies. | PO8 (2) | | | |
| CO4 | Integrate scientific temperament and logical reasoning into c problem solving in engineering and real-world contexts. | PO11 (2) | | | |

| UC25A04 | Physical Education - II | L | T | P | C |
|---|---|---|---|---|---|
| | | 0 | 0 | 4 | 1 |

**Course Objectives:**

- To impart knowledge on gymnastic exercises and pressing needs for upskilling in a particular game.

**Basic gymnastics exercises:** Warming up, Suitable exercise, Lead up games, Safety education, Movement education, Balanced Walk, execution, floor exercise, tumbling/acrobatics, grip, release, swinging, parallel bar exercise, horizontal bar exercise, flic-flac-walk and pyramids.

**Upskilling in any one of the athletics:** Broad Jump, High Jump, Triple Jump, Relay Sprints, Javelin Throw, Discuss Throw, Shot Put, Short and Long-distance Running.

**Advance skills in any one of the indoor/outdoor games, which has been opted by the student in the I semester.**

**Weightage:** Continuous Assessment: 100%

**Assessment Methodology:** Attendance (60%), Quiz (10%), Participation in Sports and Games (20%) and Viva Voce (10%)

**References:**


1. Singh, A. (2008). Essentials of physical education. Kalyani Publishers.
2. Kamlesh, M. L. (2006). Psychology in physical education and sport (3rd ed.). Metropolitan Book Co.
3. Mangal, S. K. (2009). *Psychology of sports performance*. Sports Publication.
4. Kandappan, K. (2004). *Foundations of physical education*. Friends Publications.


**E-resources:**

**https://www.who.int/health-topics/physical-activity**

| | CO Description | PO | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|
| CO1 | Understand and explain the importance of physical activity for mental and physical health. | --- | | | |
| CO2 | Apply safety principles and methods during sports activities. | PO1(3) | | | |
| CO3 | Develop teamwork, discipline, and leadership through sports and group activities and collaborate effectively. | PO8 (3) | | | |
| CO4 | Demonstrate the advanced technical skills and strategic understanding in the game of their interest. | PO11(1) | | | |

**Foreign Language^**

| UC25F01 | Deutsch – I | L | T | P | C |
|---|---|---|---|---|---|
| | | 1 | 0 | 2 | - |

**Course Objectives:**

- To impart fundamentals of the Deutsch language, including reading, writing systems, pronunciation, and speaking.

**Basics & Introduction:** German alphabet and pronunciation, Basic greetings and farewells, Introducing yourself and others (Ich heiße…, Wer bist du?), Numbers 1–100 and days of the week, Personal pronouns (ich, du, er, sie…), Sentence structure (SVO word order).

**Activities:** Alphabet spelling game, short skits, Use color-coded cards for SVO sentences.

**Grammar Essentials & Everyday Vocabulary:** Present tense of regular verbs (spielen, arbeiten, machen…), Common irregular verbs: sein (to be), haben (to have), gehen, kommen, Articles and gender (der, die, das; ein, eine), Simple questions and negation (nicht, kein), Describing people and things: adjectives and colors, Family, school, food, and common objects vocabulary.

**Activities:** Conjugate regular and irregular verbs, “Question Chain” game, Create a simple family tree.

**Everyday Communication in German:** Asking for and giving directions, Telling the time and talking about schedules, Ordering food and drinks at a café or restaurant, Talking about hobbies, weather, and daily routines, Listening to short conversations and responding appropriately, Introduction to German culture and formal/informal language use (du vs Sie).

**Activities:** Ordering food and drinks, Give directions, Formal / Informal greetings, Do’s and Don’ts.

**Weightage:** Continuous Assessment: 100%

**Assessment Methodology:** Assignments (30%), Quiz (10%) and Internal Examinations 60%

**References:**

1. Funk, H., Kuhn, C., & Demme, S. (2015). Menschen A1: Deutsch als Fremdsprache Kursbuch. Hueber Verlag.

| | CO Description | PO | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|
| CO1 | Understand simple spoken Deutsch in everyday contexts. | --- | | | |
| CO2 | Communicate with widely used Deutsch words effectively. | PO9 (2) | | | |
| CO3 | Develop the skills necessary for self-directed learning and continuous improvement in Deutsch language. | PO11 (1) | | | |

| UC25F02 | Japanese – I | L | T | P | C |
|---|---|---|---|---|---|
| | | 1 | 0 | 2 | - |

**Course Objectives:**

- To impart fundamentals of the Japanese language, including reading, writing systems, pronunciation, and speaking.

**Writing Systems & Basic Communication:** Introduction to Hiragana: vowels, basic characters, reading & writing, Introduction to Katakana: basic characters and usage, Basic greetings and farewells (こんにちは, おはようございます, さようなら), Introducing yourself (名前、出身、年齢), Basic sentence structure: Subject–Object–Verb, Numbers 1–100, days of the week, classroom expressions.

**Activities:** Flashcard games and writing drills, Self-introduction, Numbers & date-matching, Greeting expressions, Listening to audio.

**Grammar & Everyday Vocabulary:** Particles: は (wa), を (wo), の (no), へ (e), に (ni), Present tense verbs: です, ます-form conjugation (たべます、のみます), Negative forms: ではありません, ません, Describing people and objects using adjectives (い and な), Question formation: なに、どこ、だれ、いつ, Vocabulary for family, food, colors, and basic actions.

**Activities:** Verb conjugation drills, Guessing game, Picture description, “Shopping” with food vocab and counters

**Conversation & Cultural Etiquette:** Talking about routines and schedules (daily verbs, time expressions), Asking and giving simple directions (〜はどこですか？), Ordering food and making polite requests (〜をください、〜をおねがいします), Expressing likes and dislikes (すき・きらい), Listening to short conversations and identifying key phrases, Introduction to formal/informal speech and Japanese etiquette.

**Activities:** Skits and role-plays, daily schedule, beginner-level dialogue, Group discussion on etiquette.

**Activities:** Practice worksheets and flashcards for hiragana, Writing drills and reading simple katakana words, Dialogue practice for greetings and self-introduction, Sentence construction exercises with basic SOV structure, Particle usage exercises and short dialogues, Role-play scheduling, shopping, and telling time, Verb conjugation drills for common verbs, Descriptive sentence exercises using adjectives, Practice Q&A dialogues forming questions and negations, Kanji writing practice and quizzes for basic characters, Vocabulary tests and conversational practice on daily topics, Oral presentations and listening comprehension quizzes.

**Weightage:** Continuous Assessment: 100%

| |
|---|
| **Assessment Methodology:** Assignments (30%), Quiz (10%) and Internal Examinations 60% |
| **References:**<br>1. Banno, E., Ikeda, Y., Ohno, Y., Shinagawa, C., & Tokashiki, K. (2011). Genki I: An integrated course in elementary Japanese. The Japan Times.<br>2. The Japan Foundation. (2017). Marugoto Japanese language and culture starter (A1) course book for communicative language activities. Goyal Publishers. |

| | CO Description | PO | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|
| CO1 | Understand simple spoken Japanese in everyday contexts. | --- | | | |
| CO2 | Communicate with widely used Japanese words effectively. | PO9 (2) | | | |
| CO3 | Develop the skills necessary for self-directed learning and continuous improvement in Japanese language. | PO11 (1) | | | |

| UC25F03 | Korean – I | L | T | P | C |
|---|---|---|---|---|---|
| | | 1 | 0 | 2 | - |

**Course Objectives:**

- To impart fundamentals of the Korean language, including reading, writing systems, pronunciation, and speaking.

**Fundamentals of Korean:** Introduction to Hangul: consonants and vowels, Basic pronunciation and syllable formation, Common greetings and self-introductions, Numbers (Sino-Korean and Native Korean basics), Basic sentence structure (Subject-Object-Verb), Simple expressions (e.g., 감사합니다, 안녕하세요).

**Activities:** Writing and reading Hangul practice sheets, Pronunciation drills and audio repetition, Dialogue practice for greetings and self-introduction, Counting and number exercises.

**Essential Grammar and Vocabulary:** Particles (은/는, 이/가, 을/를) and usage, Basic verbs and present tense conjugation, Sentence patterns: affirmative, negative, interrogative, Common adjectives and descriptive sentences, Expressing possession and location, Asking simple questions (어디, 뭐, 누구).

**Activities:** Verb conjugation and sentence formation drills, Role-play conversations for shopping and daily routines, Descriptive writing and speaking exercises, Question and answer practice.

**Everyday Korean Communication:** Polite speech levels and honorifics introduction, Talking about time, dates, and schedules, Ordering food, shopping phrases, counting objects, Simple directions and transportation vocabulary, Listening practice with short dialogues, Cultural notes on etiquette and communication.

**Activities:** Role-play ordering at a restaurant or buying items, Listening comprehension exercises, Giving and asking for directions practice, Group conversations and presentations.

**Weightage:** Continuous Assessment: 100%

**Assessment Methodology:** Assignments (30%), Quiz (10%) and Internal Examinations 60%

**References:**


1. King, R., Yeon, J., & Brown, A. (2015). Elementary Korean. Tuttle Publishing.
2. Cho, Y., Lee, H., Schulz, C., Sohn, H.-M., & Sohn, S.-O. (2001). Integrated Korean: Beginning 1. University of Hawai‘i Press.

| | CO Description | PO | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|
| CO1 | Understand simple spoken Korean in everyday contexts. | --- | | | |
| CO2 | Communicate with widely used Korean words effectively. | PO9 (2) | | | |
| CO3 | Develop the skills necessary for self-directed learning and continuous improvement in Korean language. | PO11 (1) | | | |

# ANNA UNIVERSITY, CHENNAI

## UNDERGRADUATE CURRICULUM (NON-AUTONOMOUS AFFILIATED INSTITUTIONS)

**Programme:** B.E. Computer Science and Engineering **Regulations:** 2025

**Abbreviations:**

**HUM –** Humanities (Languages, Management, Heritage, and others)

**BS** – Basic Science (Mathematics, Physics, Chemistry)

**ES –** Engineering Science (General (**G**), Programme Core (**PC**), Programme Elective (**PE**) & Emerging Technology (**ET**))

**SD** – Skill Development

**SL** – Self Learning

**CDP** – Capstone Design Project

**OE** – Open Elective

**L** – Laboratory Course

**T** – Theory

**LIT** – Laboratory Integrated Theory

**PW** – Project Work

**IPW** – Internship cum Project Work

**DIC –** Department Introductory Course

**TCP –** Total Contact Period(s)

| Semester – I | | | | | | | |
|---|---|---|---|---|---|---|---|
| **S. No.** | **Course Code** | **Course Name** | **Course Type** | **Periods / Week** | | **Credits** | **Category** |
| | | | | **L-T- P** | **TCP** | | |
| 1. | MA25C01 | Applied Calculus | T | 3-1-0 | 4 | 4 | BS |
| 2. | EN25C01 | English Essentials – I | T | 2-0-0 | 2 | 2 | HUM |
| 3. | UC25H01 | தமிழர் மரபு / Heritage of Tamils | T | 1-0-0 | 1 | 1 | HUM |
| 4. | PH25C01 | Applied Physics – I | LIT | 2-0-2 | 4 | 3 | BS |
| 5. | CY25C01 | Applied Chemistry – I | LIT | 2-0-2 | 4 | 3 | BS |
| 6. | CS25C01 | Computer Programming: C | LIT | 2-0-2 | 4 | 3 | ES (PC) |
| 7. | CS25C03 | Essentials of Computing | LIT | 2-0-2 | 4 | 3 | ES (PC)-DIC |
| 8. | ME25C04 | Makerspace | L | 0-0-4 | 4 | 2 | SD |
| 9. | UC25A01 | Life Skills for Engineers – I* | --- | 1-0-2 | 3 | --- | HUM |
| 10. | UC25A02 | Physical Education – I* | --- | 0-0-4 | 4 | 1 | HUM |
| 11. | | NCC / NSS / NSO | --- | --- | --- | --- | --- |
| | | | **Total Credits** | | **34** | **22** | |

*Audit Course

| Semester – II | | | | | | | |
|---|---|---|---|---|---|---|---|
| **S. No.** | **Course Code** | **Course Name** | **Course Type** | **Periods / Week** | | **Credits** | **Category** |
| | | | | **L-T- P** | **TCP** | | |
| 1. | MA25C02 | Linear Algebra | T | 3-1-0 | 4 | 4 | BS |
| 2. | EE25C01 | Basic Electrical and Electronics Engineering | T | 3-0-0 | 3 | 3 | ES (G) |
| 3. | CS25C06 | Digital Principles and Computer Organization | T | 3-1-0 | 4 | 4 | ES (PC) |
| 4. | UC25H02 | தமிழர்களும் தொழில்நுட்பமும் / Tamils and Technology | T | 1-0-0 | 1 | 1 | HUM |
| 5. | PH25C03 | Applied Physics (CSIE) – II | T | 2-1-0 | 3 | 3 | BS |
| 6. | CS25C07 | Object Oriented Programming | LIT | 3-0-4 | 7 | 5 | ES (PC) |
| 7. | EN25C02 | English Essentials – II | LIT | 1-0-2 | 3 | 2 | HUM |
| 8. | ME25C05 | Re-Engineering for Innovation | L | 0-0-4 | 4 | 2 | SD |
| 9. | UC25A03 | Life Skills for Engineers – II* | --- | 1-0-2 | 3 | --- | HUM |
| 10. | UC25A04 | Physical Education – II* | --- | 0-0-4 | 4 | 1 | HUM |
| 11. | | Foreign Language^ | L | 1-0-2 | 3 | --- | HUM |
| | | | **Total Credits** | | **39** | **25** | |

^ Deutsch / Japanese / Korean *Audit Course

| Semester – III | | | | | | | |
|---|---|---|---|---|---|---|---|
| **S. No.** | **Course Code** | **Course Name** | **Course Type** | **Periods / Week** | | **Credits** | **Category** |
| | | | | **L-T- P** | **TCP** | | |
| 1. | | Discrete Mathematics | T | 3-1-0 | 4 | 4 | BS |
| 2. | | Operating Systems | T | 3-0-2 | 4 | 4 | ES (PC) |
| 3. | | Object Oriented Software Engineering | T | 3-0-0 | 3 | 3 | ES (PC) |
| 4. | | Data Structures | LIT | 3-0-4 | 7 | 5 | ES (PC) |
| 5. | | Java Programming | LIT | 3-0-4 | 7 | 5 | ES (PC) |
| 6. | | English Communication Skills Laboratory – II | L | 0-0-2 | 2 | 1 | HUM |
| 7. | | Skill Development Course – I | LIT | 1-0-2 | 3 | 2 | SD |
| | | | **Total Credits** | | **30** | **24** | |

| Semester – IV | | | | | | | |
|---|---|---|---|---|---|---|---|
| **S. No.** | **Course Code** | **Course Name** | **Course Type** | **Periods / Week** | | **Credits** | **Category** |
| | | | | **L-T- P** | **TCP** | | |
| 1. | | Probability and Statistics | T | 3-0-0 | 3 | 3 | BS |
| 2. | | Algorithms | T | 3-0-0 | 3 | 3 | ES (PC) |
| 3. | | Theory of Computation | T | 3-1-0 | 4 | 4 | ES (PC) |
| 4. | | Standards in Computer Science | T | 1-0-0 | 1 | 1 | ES (PC) |
| 5. | | Python for Data Science | LIT | 3-0-2 | 5 | 4 | ES (PC) |
| 6. | | Database Management Systems | LIT | 3-0-4 | 7 | 5 | ES (PC) |
| 7. | | Skill Development Course – II | LIT | 1-0-2 | 3 | 2 | SD |
| 8. | | English Communication Skills Laboratory – III | L | 0-0-2 | 2 | 1 | HUM |
| | | | **Total Credits** | | **28** | **23** | |

| Semester – V | | | | | | | |
|---|---|---|---|---|---|---|---|
| **S. No.** | **Course Code** | **Course Name** | **Course Type** | **Periods /Week** | | **Credits** | **Category** |
| | | | | **L-T- P** | **TCP** | | |
| 1. | | Computer Networks | T | 3-0-2 | 5 | 4 | ES (PC) |
| 2. | | Compiler Design | T | 3-0-0 | 3 | 3 | ES (PC) |
| 3. | | Programme Elective – I | T | 3-0-0 | 3 | 3 | ES (PE) |
| 4. | | Cryptography and Cyber Security | T | 3-1-0 | 4 | 4 | ES (PC) |
| 5. | | Artificial Intelligence and Machine Learning | LIT | 3-0-2 | 5 | 4 | ES (PC) |
| 6. | | Full stack Development | LIT | 3-0-2 | 5 | 4 | ES (PC) |
| 7. | | Skill Development Course – III | LIT | 1-0-2 | 3 | 2 | SD |
| 8. | | Industry Oriented Course - I | LIT | 1-0-2 | 3 | 1 | SD |
| | | | | **Total Credits** | **31** | **25** | |
| **For Honours Degree** | | | | | | | |
| 1. | | Capstone Design Project – Level I | CDP | 0-0-12 | 12 | 6 | SD |
| **OR** | | | | | | | |
| 1. | | Honours Elective – I | T | 3-0-0 | 3 | 3 | |
| 2. | | Honours Elective – II | T | 3-0-0 | 3 | 3 | |
| **For Minor Degree** | | | | | | | |
| 1. | | Minor Elective – I | T | 3-0-0 | 3 | 3 | |
| 2. | | Minor Elective – II | T | 3-0-0 | 3 | 3 | |

# Semester I

| MA25C01 | Applied Calculus | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 1 | 0 | 4 |

**Course Objectives:**

- To provide technical competence of modelling engineering problems using calculus.
- To apply the calculus concepts in solving engineering problems using analytical methods and computational tools.

**Differential Calculus:** Functions, graph of functions, New functions from old functions, Limit of a function, Continuity, Limits at infinity, Derivative as a function, Maxima and Minima of functions of single variable, Mean value theorem, Effect of derivatives on the shape of a graph.

**Activities:** Visualization of the functions, Maxima and Minima of a function using open-source software, Solving of Competitive Examination questions (Ex. GATE).

**Functions of Several Variables:** Partial derivatives, Chain rule, Total derivative, Maxima and minima of functions of two variables, Method of Lagrange's Multipliers, Application problems in engineering.

**Activities:** Partial Derivatives with two or three variables, Maxima and Minima of a function using open-source software, Solving of Competitive Examination questions (Ex. GATE).

**Integral Calculus:** Fundamental theorem of Calculus, Indefinite integrals and the Net Change Theorem, Improper integrals, Arc Length, Area of Region, Area of surface of revolution.

**Activities:** Definite and Indefinite Integrals, Determination of Area, Solving of Competitive Examination questions (Ex. GATE).

**Multiple Integrals:** Iterated integrals and Fubini's theorem, Evaluation of double integrals, change of order of integration, change of variables between Cartesian and polar co-ordinates, evaluation of triple integrals-change of variables between Cartesian and cylindrical and spherical co-ordinates.

**Activities:** Double integrals and triple integrals using open-source software, Solving of Competitive Examination questions (Ex. GATE).

**Weightage:** Continuous Assessment: 40%, End Semester Examinations: 60%.

**Assessment Methodology:** Assignments (20%), Solution to application-oriented problems using software (20%), Solving of GATE questions (20%), Internal Examinations (40%).

**References:**

1. Anton, H., Bivens, I. C., & Davis, S. (2021). Calculus: Early transcendentals. John Wiley & Sons.

2. Ron Larson and David C. Falvo, (2013), Calculus: an Applied Approach. Cengage Learning.
3. Stewart, J., Clegg, D., & Watson, S. (2019). Calculus: Early transcendentals.
4. Thomas, G. B., Jr., Weir, M. D., Hass, J., & Heil, C. (2018). Thomas' calculus: Early transcendentals. Pearson.
5. Singh, K. (2019). Engineering mathematics through applications. Bloomsbury Publishing.
6. Grewal, B. S. (2012). Higher engineering mathematics. Khanna Publishers.

**E-resources:**

1. https://math.libretexts.org/Bookshelves/Calculus/Map%3A_Calculus__Early_Transcendentals_(Stewart)/
2. https://openstax.org/books/calculus-volume-1/
3. https://tutorial.math.lamar.edu/Classes/CalcII/CalcII.aspx
4. SCILAB, https://www.scilab.org/

| | Description of CO | PO | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|
| CO1 | Explain the meaning of derivative, integral, and their geometric and physical interpretations. | --- | | | |
| CO2 | Apply differentiation and integration techniques to compute maxima, minima, and area. | PO1(3) | | | |
| CO3 | Analyze the behavior of single and multivariable functions using derivatives and partial derivatives. | PO2(3) | | | |
| CO4 | Utilize modern computational software and online platforms to deepen understanding, perform complex calculations, and visualize mathematical concepts. | PO5(2) PO11(1) | | | |

| EN25C01 | English Essentials – I | L | T | P | C |
|---|---|---|---|---|---|
| | | 2 | 0 | 0 | 2 |

**Course Objectives:**

- To equip students with the skills to write clear, coherent, and grammatically correct texts for various purposes.
- To strengthen the ability to comprehend, interpret, and analyse written English across diverse contexts.

**Speaking Skills:** Parts of Speech, Articles, Tenses, Sentence Structure, Types of Sentences, Subject-Verb Agreement**,** Synonyms and Antonyms, Prefixes and Suffixes, Idioms and Phrases, Self-Introduction, Expressing Oneself, Everyday Conversations, Team Interactions, Emotions, agreeing & disagreeing

**Activities:** Self-Introduction, Just a Minute (JAM) Video recording, Brainstorming sessions, Situational role plays, Usage of Applications.

**Listening Skills:** Listening to Simple Conversations, Short Speeches / Stories, Extracting key information, Phonemes, Listening to Native Speakers, Listening to Various Accents.

**Activities:** Gap fill exercises, Understanding tone and intent, Listening and imitating, Spell Bee

**Reading Skills:** Reading Strategies, Skimming and Scanning, active reading with short passages.

**Activities:** Summarising, loud reading, Cloze reading, Reading comprehension, Reading newspaper articles, Reading Long passage and note making.

**Drafting Skills:** Sentence Formation, Word Substitution, Keywords Development, Writing Paragraphs, Emails and Letters.

**Activities:** Picture and poster interpretation, formal and informal letters, Official e-mails.

**Weightage:** Continuous Assessment: 40%, End Semester Examinations: 60%

**Assessment Methodology:** Quiz (10%), Assignments (20%), Speaking Task (10%), Reading Task (10%), Writing Task (10%), Internal Examinations (40%)

**References:**


1. Miller, K. Q., & Wahl, S. T. (2023). Business and Professional Communication: KEYS for Workplace Excellence (5th ed.). SAGE Publications.
2. Kumar, Sanjay & Pushpalatha. (2018). English Language and Communication Skills for Engineers. India: Oxford University Press.
3. Sharma, S., & Mishra, B. (2024). Communication Skills for Engineers and Scientists (2nd ed.). PHI Learning.


**E-Resources:**

1. Cambridge English – https://www.cambridgeenglish.org/learning-english/grammar-and-vocabulary/
2. Perfect English Grammar – https://www.perfect-english-grammar.com/

3. British Council – Learn English - https://learnenglish.britishcouncil.org/grammar
4. Speechling – https://speechling.com/
5. mePro by Pearson – https://mepro.pearson.com/
6. TED Talks – https://www.ted.com/

| | Description of CO | PO | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|
| CO1 | Comprehend spoken English, take and draft notes. | --- | | | |
| CO2 | Apply vocabulary, with appropriate ways to enhance drafting and communication. | PO1(3) | | | |
| CO3 | Analyze texts in different contexts using appropriate reading strategies. | PO2(2) | | | |
| CO4 | Communicate thoughts and ideas in both planned and unplanned situations. | PO9(2) | | | |
| CO5 | Continuously improving English communication skills relevant to engineering and scientific work. | PO11(1) | | | |

| UC25H01 | தமிழர் மரபு | L | T | P | C |
|---|---|---|---|---|---|
| | | 1 | 0 | 0 | 1 |

**மொழி மற்றும் இலக்கியம்**: இந்திய மொழிக் குடும்பங்கள், திராவிட மொழிகள், தமிழ் ஒரு செம்மொழி, தமிழ் செவ்விலக்கியங்கள், சங்க இலக்கியத்தின் சமயச் சார்பற்ற தன்மை, சங்க இலக்கியத்தில் பகிர்தல் அறம், திருக்குறளில் மேலாண்மைக் கருத்துக்கள், தமிழ்க் காப்பியங்கள், தமிழகத்தில் சமண பௌத்த சமயங்களின் தாக்கம், பக்தி இலக்கியம், ஆழ்வார்கள் மற்றும் நாயன்மார்கள், சிற்றிலக்கியங்கள், தமிழில் நவீன இலக்கியத்தின் வளர்ச்சி, தமிழ் இலக்கிய வளர்ச்சியில் பாரதியார் மற்றும் பாரதிதாசன் ஆகியோரின் பங்களிப்பு.

**மரபு – பாறை ஓவியங்கள் முதல் நவீன ஓவியங்கள் வரை – சிற்பக்கலை**: நடுகல் முதல் நவீன சிற்பங்கள் வரை, ஐம்பொன் சிலைகள், பழங்குடியினர் மற்றும் அவர்கள் தயாரிக்கும் கைவினைப் பொருட்கள், பொம்மைகள் , தேர் செய்யும் கலை, சுடுமண் சிற்பங்கள், நாட்டுப்புறத் தெய்வங்கள், குமரிமுனையில் திருவள்ளுவர் சிலை, இசைக் கருவிகள், மிருதங்கம், பறை, வீணை, யாழ், நாதஸ்வரம், தமிழர்களின் சமூக பொருளாதார வாழ்வில் கோவில்களின் பங்கு.

**நாட்டுப்புறக் கலைகள் மற்றும் வீர விளையாட்டுகள்**: தெருக்கூத்து, கரகாட்டம், வில்லுப்பாட்டு, கணியான் கூத்து, ஒயிலாட்டம், தோல்பாவைக் கூத்து, சிலம்பாட்டம், வளரி, புலியாட்டம், தமிழர்களின் விளையாட்டுகள்.

**தமிழர்களின் திணைக் கோட்பாடுகள்**: தமிழகத்தின் தாவரங்களும், விலங்குகளும், தொல்காப்பியம் மற்றும் சங்க இலக்கியத்தில் அகம் மற்றும் புறக் கோட்பாடுகள், தமிழர்கள் போற்றிய அறக்கோட்பாடு, சங்ககாலத்தில் தமிழகத்தில் எழுத்தறிவும், கல்வியும், சங்ககால நகரங்களும் துறை முகங்களும், சங்ககாலத்தில் ஏற்றுமதி மற்றும் இறக்குமதி, கடல்கடந்த நாடுகளில் சோழர்களின் வெற்றி.

**இந்திய தேசிய இயக்கம் மற்றும் இந்திய பண்பாட்டிற்குத் தமிழர்களின் பங்களிப்பு:** இந்திய விடுதலைப்போரில் தமிழர்களின் பங்கு, இந்தியாவின் பிறப்பகுதிகளில் தமிழ்ப் பண்பாட்டின் தாக்கம் , சுயமரியாதை இயக்கம் இந்திய மருத்துவத்தில், சித்த மருத்துவத்தின் பங்கு, கல்வெட்டுகள், கையெழுத்துப்படிகள், தமிழ்ப் புத்தகங்களின் அச்சு வரலாறு.

**References:**


1. தமிழக வரலாறு, மக்களும் பண்பாடும், கே.கே. பிள்ளை (வெளியீடு: தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்).
2. கணினித் தமிழ், முனைவர் இல. சுந்தரம். (விகடன் பிரசுரம்).
3. கீழடி, வைகை நதிக்கரையில் சங்ககால நகர நாகரிகம் (தொல்லியல் துறை வெளியீடு)
4. பொருநை, ஆற்றங்கரை நாகரிகம். (தொல்லியல் துறை வெளியீடு)
5. Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL – (in print)
6. Social Life of the Tamils - The Classical Period (Dr.S.Singaravelu) (Published by: International Institute of Tamil Studies.
7. Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thirunavukkarasu) (Published by: International Institute of Tamil Studies).
8. The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: International Institute of Tamil Studies.)
9. Keeladi - 'Sangam City C ivilization on the banks of river Vaigai' (Jointly Published by: Department ofArchaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
10. Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay) (Published by: The Author)
11. Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
12. Journey of Civilization Indus to Vaigai (R.Balakrishnan) (Published by: RMRL) – Reference Book.

| UC25H01 | Heritage of Tamils | L | T | P | C |
|---|---|---|---|---|---|
| | | 1 | 0 | 0 | 1 |

**Language and Literature:** Language Families in India, Dravidian Languages, Tamil as a Classical Language - Classical Literature in Tamil – Secular Nature of Sangam Literature, Distributive Justice in Sangam Literature, Management Principles in Thirukural, Tamil Epics and Impact of Buddhism & Jainism in Tamil Land, Bakthi Literature Azhwars and Nayanmars - Forms of minor Poetry - Development of Modern literature in Tamil, Contribution of Bharathiyar and Bharathidhasan.

**Heritage - Rock art Paintings to Modern Art – Sculpture:** Hero stone to modern sculpture, Bronze icons, Tribes and their handicrafts - Art of temple car making, Massive Terracotta sculptures, Village deities, Thiruvalluvar Statue at Kanyakumari, Making of musical instruments, Mridhangam, Parai, Veenai, Yazh and Nadhaswaram, Role of Temples in Social and Economic Life of Tamils.

**Folk and Martial Arts:** Therukoothu, Karagattam, Villu Pattu, Kaniyan Koothu, Oyillattam, Leather puppetry, Silambattam, Valari, Tiger dance - Sports and Games of Tamils

**Thinai Concept of Tamils :** Flora and Fauna of Tamils & Aham and Puram Concept from Tholkappiyam and Sangam Literature, Aram Concept of Tamils, Education and Literacy during Sangam Age - Ancient Cities and Ports of Sangam Age, Export and Import during Sangam Age - Overseas Conquest of Cholas.

**Contribution of Tamils to Indian National Movement and Indian Culture:** Contribution of Tamils to Indian Freedom Struggle, The Cultural Influence of Tamils over the other parts of India, Self-Respect Movement, Role of Siddha Medicine in Indigenous Systems of Medicine, Inscriptions & Manuscripts, Print History of Tamil Books.

**References**:


1. தமிழக வரலாறு – மக்களும் பண்பாடும் – கே.கே. பிள்ளை (வெளியீடு: தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்).
2. கணினித் தமிழ் – முனைவர் இல. சுந்தரம். (விகடன் பிரசுரம்).
3. கீழடி – வைகை நதிக்கரையில் சங்ககால நகர நாகரிகம் (தொல்லியல் துறை வெளியீடு)
4. பொருநை – ஆற்றங்கரை நாகரிகம். (தொல்லியல் துறை வெளியீடு)
5. Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL – (in print)
6. Social Life of the Tamils - The Classical Period (Dr.S.Singaravelu) (Published by: International Institute of Tamil Studies.
7. Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thirunavukkarasu) (Published by: International Institute of Tamil Studies).
8. The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: International Institute of Tamil Studies.)
9. Keeladi - 'Sangam City C ivilization on the banks of river Vaigai' (Jointly Published by: Department ofArchaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
10. Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay) (Publishedby: The Author)
11. Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Bookand Educational Services Corporation, Tamil Nadu)
12. Journey of Civilization Indus to Vaigai (R.Balakrishnan) (Published by: RMRL) – Reference Book.

| PH25C01 | Applied Physics – I | L | T | P | C |
|---|---|---|---|---|---|
| | | 2 | 0 | 2 | 3 |

**Course Objective(s):**

- To impart knowledge and expose the essentials of physics in various engineering applications.

**Properties of Matter:** Elasticity, Cantilever, Young's modulus (non-uniform bending), Girders: Bridges and buildings, Viscosity: Stokes method, Surface tension: drop weight method, Thermal expansion, Thermal stress, Bimetallic strips, Expansion joints

**Practical**: Non-Uniform bending, Young's modulus of the material, Torsional pendulum, Rigidity modulus of the wire and moment of inertia of the disc.

**Activities:** Virtual demonstration of thermal stress.

**Oscillations:** Simple Harmonic motion, Torsional pendulum, Couple per unit twist, Damped and Forced Oscillation

**Waves:** Waves on a stretched string, Energy and Power, standing waves, Ultrasonics, piezo, electric method, Acoustic grating, Electromagnetic waves: Maxwell equation, Production of EM waves by dipole antenna, Propagation of EM waves in free space, wave equation, Cell phone reception

**Practical**: Melde's string experiment – Frequency of an electrically vibrating metal tip.

**Activities:** Virtual demonstration of propagation of EM waves

**Quantum Mechanics:** Black body radiation, Photoelectric effect, de Broglie hypothesis, Schrodinger Wave equation, Particle in a box (infinite potential well - three-dimensional box), Barrier penetration and quantum tunnelling.

**Practical**: Photo-electric effect, Determination of Planck's constant.

**Activities**: Virtual demonstration of Scanning Transmission Electron Microscope

**Applied Optics:** Interference: Air wedge, Michelson's Interferometer, Fiber optics: Structure of a fiber, Fiber Optic Communication System, Fiber Sensors (Virtual demo), Displacement, pressure sensor and Temperature sensor, Einstein Co-efficient, Nd:YAG laser, $CO_2$ laser (construction, functioning and applications), dye laser

**Practical**: Ruling width of Compact disc using Laser, Thickness of a thin sheet/wire using Air wedge Method.

**Activities**: Demonstration of sensors and applications of Lasers

**Weightage:** Continuous Assessment: 50%, End Semester Examinations: 50%

**Assessment Methodology:** Quiz (5%), Assignments (20%), Flipped Class (5%), Practical (30%), Internal Examinations (40%)

**References:**


1. Young, H. D., & Freedman, R. A. (2020). University physics with modern physics. Pearson.
2. Gaur, R. K., & Gupta, S. L. (2022). Engineering physics. Dhanpat Rai Publications.
3. Mathur, D. S. (2010). Elements of properties of matter. S. Chand Publishing.
4. Griffiths, D. J. (2018). Introduction to quantum mechanics. Cambridge University Press.
5. Silfvast, W. T. (2008). Laser fundamentals. Cambridge University Press.


**E-Resources:**

1. Barrier penetration problem and Quantum tunnelling: https://archive.nptel.ac.in/courses/115/104/115104096/
2. EM waves and wireless channelling: https://onlinecourses.nptel.ac.in/noc24_ee31/preview
3. CO2 Laser: https://onlinecourses.nptel.ac.in/noc25_ph03/preview
4. Bimetallic Strips _ https://www.youtube.com/watch?v=WZQ8lvxdzDk
5. Cell phone Reception_ https://www.youtube.com/watch?v=1JZG9x_VOwA
6. Dipole Antenna_ https://www.youtube.com/watch?v=4xF1Fq2wB1I
7. Optical Sensors_ https://auece.digimat.in/nptel/courses/video/108106173/L02.html
8. Scanning Tunnelling Electron Microscope_ https://www.youtube.com/watch?v=XNYZYbXNWQA

| | Description of CO | PO | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|
| CO1 | Explain the physics concepts in various applications. | --- | | | |
| CO2 | Apply the principles of wave optics and laser physics in practical systems. | PO1(3) | | | |
| CO3 | Analyse the behaviour of materials under different conditions. | PO2(2) | | | |
| CO4 | Conduct experiments in groups and interpret the data. | PO4(3)<br>PO8(1) | | | |

| CY25C01 | Applied Chemistry – I | L | T | P | C |
|---|---|---|---|---|---|
| | | 2 | 0 | 2 | 3 |

**Course Objectives:**

- To provide students with a solid understanding of the chemical principles for engineering applications.
- To introduce the chemical properties of materials and how these properties influence the selection and use of materials in engineering systems.
- To impart practical applications of chemistry in commonly used engineering devices

**Water Technology:** Water quality parameters and standards. Industrial feed water, Remediation. Municipal water treatment. Desalination.

**Practical:** Analysis of alkalinity, hardness and dissolved oxygen.

Activity: Coagulation of water sample using Alum

**Nano-chemistry:** Classification, Size, dependent properties. Preparation of nanomaterials, Top-down and Botton-Up approaches, Applications (Flipped classroom).

**Practical:** Preparation of nanoparticles by Sol-Gel method.

**Electrochemistry:** Electrochemical cell, Electrode potential., Redox reaction. Conductivity of electrolytes, Factors.

**Practical:** Conductometric titrations

**Activity:** Electrochemical cell demonstration

**Corrosion & Control:** Chemical and electrochemical corrosions, galvanic series, factors influencing corrosion, Electrochemical protection. Organic and Inorganic coating.

**Practical:**

- Corrosion study by weight loss and salt spray method.
- Potentiometry/UV-visible spectrophotometer.

**Activities:** Case Study on Corrosion in Pipelines and Electronics, Control measures for a corroded metal

**Batteries:** Conventional, Contemporary and Emerging battery storage technologies, Primary & Secondary Batteries, Battery Pack, Battery Materials, Performance Parameters, Testing, Safety aspects.

**Practical:** Measurement of EMF, Internal Resistance, Charge and Discharge Characteristics.

**Activities:** Demonstration of battery pack in e-vehicles.

**Weightage:** Continuous Assessment: 50%, End Semester Examinations: 50%

**Assessment Methodology:** Quiz (5%), Assignments (20%), Flipped Class (5%), Practical (30%), Internal Examinations (40%)

**References:**

1. Jain, P. C., & Jain, M. (2015). Engineering Chemistry (17th ed.). Dhanpat Rai Publishing Company (P) Ltd.

2. Dara, S. S. (2004). A Textbook of Engineering Chemistry. Chand Publications.
3. Sachdeva, M. V. (2011). Basics of Nano Chemistry. Anmol Publications Pvt Ltd.
4. Friedrich, E. (2014). Engineering Chemistry. Medtech.

**E-Resources:**

1. Water and Wastewater Engineering (Prof. Ligy Philip, IIT Madras) – https://nptel.ac.in/courses/105106202.
2. Electrochemical Energy Systems (Prof. S. Mitra, IIT Madras) – https://nptel.ac.in/courses/113106028.
3. Corrosion (Prof. Kallol Mondal, IIT Kanpur) – https://nptel.ac.in/courses/112104088
4. Chemistry of Battery Systems (Prof. V. R. Marathe, IIT Madras) – https://nptel.ac.in/courses/115106130
5. Resource on all battery types, testing, and safety – https://batteryuniversity.com/articles

| | Description of CO | PO | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|
| CO1 | Understand the importance of chemistry applications with underlying mechanisms. | --- | | | |
| CO2 | Apply the chemistry concepts in widely used devices. | PO1(3) | | | |
| CO3 | Analyse the effect of various chemical parameters on performance of engineering systems. | PO2(2) | | | |
| CO4 | Perform experimentations as a group and interpret the results. | PO4(3)<br>PO8(1) | | | |
| CO5 | Communicate findings through case studies and reports | PO9(1) | | | |

| CS25C01 | Computer Programming: C | L | T | P | C |
|---|---|---|---|---|---|
| | | 2 | 0 | 2 | 3 |

**Course Objectives:**

- To equip engineering students with the foundational knowledge and practical skills in 'C' programming to analyse and solve computational problems effectively.
- To foster problem-solving, critical thinking, and modular programming skills essential for engineering domains.

**Introduction to C:** Problem Solving, Problem Analysis Chart, Developing an Algorithm, Flowchart and Pseudocode, program structure, Compilation & Execution process, Interactive and Script mode, Comments, Indentation, Error messages, Primitive data types, Constants, Variables, Reserved words, Arithmetic, Relational, Logical, Bitwise, Assignment, Conditional operators, Input/Output Functions, Built-in Functions.

**Practical:** Create Problem Analysis Charts, Flowcharts and Pseudocode for simple C programs (Minimum three).

**Control Structures:** if, if-else, nested if, switch-case, while, do-while, for, nested loops, Jump statements.

**Practical:** Usage of conditional logics in programs. (Minimum three)

**Functions:** Function Declaration, Definition and Calling, Function Parameters and Return Types, Call by Value and Call by Reference, Recursive Functions, Scope and Lifetime of Variables, Header files and Modular Programming.

**Practical:** Usage of functions in programs. (Minimum three)

**Strings & Pointers:** One-dimensional and Multi-dimensional Arrays, Array operations and traversals, String Handling: String declaration, input/output, string library functions, Pointer arithmetic, Pointers and Arrays, Pointers to function, Dynamic memory allocation.

**Practical:** Programs using pointers, dynamic memory, pointer arithmetic, string manipulations, array operations. (Minimum three)

**Structures & Unions:** Defining and using structures, Array of structures, Pointers to structures, Unions and their uses, Enumerations.

**Practical:** Program to use structures and unions

**File Operations:** Open, read, write, close file operations, Binary vs Text files, File pointers, Error handling in file operations.

**Practical:** Programs reading/writing data in text and binary files (Minimum three).

**Standard Libraries & Header Files:** Using standard libraries like stdio.h, stdlib.h, string.h, math.h, Creating and using user-defined header files and libraries.

**Practical:** Use of standard and user-defined libraries in solving problems. (Minimum three), Project (Minimum Two)

**Weightage:** Continuous Assessment: 50%, End Semester Examinations: 50%

**Assessment Methodology:** Quiz (5%), Project (15%), Assignment Programs (25%), Practical (25%), Internal Examinations (30%)

**References:**


1. Thareja, R. (2021). Programming in C . Oxford University Press.
2. Balagurusamy, E. (2019). Programming in ANSI C. McGraw Hill Education.
3. Kanetkar, Y. (2020). Let us C. BPB Publications.
4. Kalicharan, N. (2022). Learn to program with C: An introduction to programming using the C language. Apress.
5. Forouzan, B. A., & Afyouni, H. (2023). Computer science: A structured programming approach in C (4th ed.). Cengage.


**E-resources:**

1. Learn-C.org - https://www.learn-c.org/
2. GeeksforGeeks - C Programming - https://www.geeksforgeeks.org/c-programming-language/
3. GNU C Library Documentation - https://www.gnu.org/software/libc/manual/
4. “Introduction to C Programming”, Swayam MOOC Course, https://onlinecourses.swayam2.ac.in/imb25_mg71/

| | Description of CO | PO | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|
| CO1 | Explain the potential usage of ‘C’ in engineering applications | --- | | | |
| CO2 | To apply the concepts of ‘C’ in solving engineering problems and formulate new projects. | PO1 (2)<br>PO5 (2) | | | |
| CO3 | To interpret the data and effectively communicate in groups. | PO2 (3)<br>PO8 (1)<br>PO9 (1) | | | |
| CO4 | Adapt new programming concepts and technologies in the profession. | PO11 (1) | | | |

| CS25C03 | Essentials of Computing | L | T | P | C |
|---|---|---|---|---|---|
| | | 2 | 0 | 2 | 3 |

**Course Objectives:**

1. To introduce the basic components and operations of computers.
2. To develop problem-solving and computational thinking skills.
3. To enable learners to design simple solutions using algorithms and flowcharts.
4. To provide hands-on experience in visual programming and basic app development.

**Computers:** Computer, Characteristics of Computers, History of Computers, Classification of Computers, Applications of Computers, Basic Organization of a Computer. Data Representation, Using spread sheets for basic operations on data and visualize the data.

**Practical:**

1. Office Software for documentation and presentation
2. Spread sheets for calculations and data. Visualization

**Computational Thinking:** What is Computational Thinking, Decomposition, Abstraction, Real World Information to Computable Data, Number Systems, Conversions among Number systems, what is Logic, Boolean Logic, Applications of Propositional Logic.

**Activities:**

1. Solving problems based on number systems and logics.
2. Virtual Demonstration of Computational thinking

**Problem Solving Basics:** Problem Definition, Logical Reasoning, Decomposition, Software Design Concept of an Algorithm, Algorithm Representation – Algorithm Discovery – Iterative Structures – Recursive Structures – Efficiency and Correctness - Implementation of Algorithms - Fundamental Algorithms: Exchanging the values of two variables, Counting, Summation of a set of numbers, Factorial computation, Generation of Fibonacci Sequence, Reversing the digits of an Integer, Base Conversion.

**Activities:** Algorithm Development for simple mathematical problems

**Programming Languages:** Program Development Life Cycle, Program Design Tools, Algorithms, Flowcharts, Pseudocodes, Role of Algorithms, Programming Languages, Programming Paradigms Traditional Programming Concepts, Procedural Units, Language Implementation, Declarative Programming.

**Activities:** Flowchart design for simple mathematical problems

**Scratch Programming:** What is Scratch, Scratch Programming Environment, Paint Editor, Scratch Blocks, Arithmetic Operators and Functions, Use Motion Commands, Pen Commands and Easy Draw, Looks Palette, Sound Palette, Power of Repeat, Data Types, Variables, Getting Input from Users.

Making Decisions, Comparison Operators, Decision Structures, Logical Operators, Repetition, Loop Blocks, Stop Commands, Counters, Nested Loops, Recursion, String Processing, String Manipulation, Lists, Dynamic Lists, Numerical Lists, Searching and Sorting Lists.

**Activities:**

1. Creation of Functional Block for simple mathematical problems
2. Drawing and Painting operations
3. Scratch Animation for understanding Conditional and Loop statements.
4. Draw artistic, geometric patterns and create games.
5. Scratch Programs for applied scientific computing and data manipulations

**App Development:** Building Apps using problem, solving techniques on any app development platform, Modeling, incremental and iterative, reuse, modularization, algorithmic thinking, abstracting and modularizing, decomposition, testing and debugging.

**Activities:** Sample App Developments for societal problems.

**Weightage:** Continuous Assessment: 40%, End Semester Examinations: 60%

**Assessment Methodology:** Assignments (10%), Quiz (5%), Project based learning (20%), Flipped Classroom (5%), Review of GATE questions (10%) & Internal Assessment: 50%

**References:**


1. Thareja, R. (2020). Fundamentals of computers. Oxford University Press.
2. Rajaraman, V., & Adabala, N. (2014). Fundamentals of computers. PHI Learning.
3. Brookshear, J. G., & Brylow, D. (2015). Computer science: An overview. Pearson.
4. Dromey, R. G. (1982). How to solve it by computer. Prentice Hall International.
5. Marji, M. (2014). Learn to program with Scratch: A visual introduction to programming with games, art, science and math. No Starch Press.
6. Riley, D. D., & Hunt, K. A. (2014). Computational thinking for the modern problem solver. CRC Press.
7. Venkatesh, G., & Mukund, M. (2021). Computational thinking. Notion Press.

**E-Resources:**

1. Brennan and Resnick's CT Framework 2012: https://scratched.gse.harvard.edu/ct/files/AERA2012.pdf
2. CS50X 2025 Scratch YouTube lectures by Prof. David J Malan, Harvard University: https://www.youtube.com/watch?v=2WtPyqwTLKM
3. https://teachinglondoncomputing.org/resources/developing-computational-thinking/
4. Scratch software: https://scratch.mit.edu/
5. MIT APP INVENTOR software: https://appinventor.mit.edu/
6. app.diagrams.net

| | Description of CO | PO | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|
| CO1 | Describe the basic components and functioning of computers, number systems, and data representation. | | | | |
| CO2 | Apply computational thinking and problem-solving techniques to design simple algorithms for real-world problems | PO1(3) | | | |
| CO3 | Design and represent solutions using flowcharts, pseudocode, and basic visual programming tools. | PO2 (2) | | | |
| CO4 | Demonstrate the ability to independently learn new computing tools and practices essential for life-long learning | PO11(1) | | | |

| ME25C04 | Makerspace | L | T | P | C |
|---|---|---|---|---|---|
| | | 0 | 0 | 4 | 2 |

**Course Objectives:**

1. To impart practical skills in the assembly, disassembly, and welding of components using appropriate tools and techniques.
2. To provide hands-on training in electrical wiring practices, and the use of electronic components, sensors, and actuators.

**List of Activities**

**(A). Dis-assembly & Assembly Practices**

i. Tools and its handling techniques.
ii. Dis-assembly and assembly of home appliances – Grinder Mixer Grinder, Ceiling Fan, Table Fan & Washing Machine.
iii. Dis-assembly and assembly of Air-Conditioners & Refrigerators.
iv. Dis-assembly and assembly of a Bicycle.

**(B). Welding Practices**

i. Welding Procedure, Selection & Safety Measures.
ii. Power source of Arc Welding – Gas Metal Arc Welding & Gas Tungsten Arc Welding processes.
iii. Hands-on session of preparing base material & Joint groove for welding.
iv. Hands-on session of MAW, GMAW, GTAW, on Carbon Steel & Stainless Stell plates / pipes, for fabrication of a simple part.

**(C). Electrical Wiring Practices**

i. Electrical Installation tools, equipment & safety measures.
ii. Hands-on session of basic electrical connections for Fuses, Miniature Circuit Breakers and Distribution Box.
iii. Hands-on session of electrical connections for Lightings, Fans, Calling Bells.
iv. Hands-on session of electrical connections for Motors & Uninterruptible Power Supply.

**(D). Electronics Components / Equipment Practices**

i. Electronic components, equipment & safety measures.
ii. Dis-assembly and assembly of Computers.
iii. Hands-on session of Soldering Practices in a Printed Circuit Board.
iv. Hands-on session of Bridge Rectifier, Op-Amp and Transimpedance amplifier.
v. Hands-on session of integration of sensors and actuators with a Microcontroller.
vi. Demonstration of Programmable Logic Control Circuit.

**(E). Contemporary Systems**

i. Demonstration of Solid Modelling of components.
ii. Demonstration of Assembly Modelling of components.
iii. Fabrication of simple components / parts using 3D Printers.
iv. Demonstration of cutting of wood / metal in different complex shapes using Laser Cutting Machine.

**References:**


1. Stephen Christena, Learn to Weld: Beginning MIG Welding and Metal Fabrication Basics, Crestline Books, 2014.
2. H. Lipson, Fabricated - The New World of 3D Printing, Wiley, 1st edition, 2013.
3. Code of Practice for Electrical Wiring Installations (IS 732:2019)


| | Description of CO | PO | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|
| CO1 | Demonstrate proper use and handling of basic hand and power tools. | --- | | | |
| CO2 | Carry out electrical wiring installations and repairs, applying safety measures in domestic applications. | PO1(3) | | | |
| CO3 | Develop solid innovative models through software. | PO5(2) | | | |
| CO4 | Adapt and follow safety protocols in the work environment. | PO11(2) | | | |

| UC25A01 | Life Skills for Engineers – I | L | T | P | C |
|---|---|---|---|---|---|
| | | 1 | 0 | 2 | - |

**Course Objectives:**

- To equip engineering students with essential life skills encompassing personal and emotional development, effective management of time and stress, financial literacy, digital safety, and civic responsibility.
- To enhance self-awareness, interpersonal skills, and resilience to prepare students for the professional and personal challenges of engineering careers and life beyond academics**.**

**Personal and Emotional Development:** Self-Awareness & Personality, Emotional Intelligence & Empathy, Positive thinking, Right attitude, Stress & Anger Management, Goal-Setting & Time Management, Growth Mindset & Resilience.

**Activities:** Personality tests (MBTI, DISC), reflection journals, Empathy circle, role-playing difficult conversations, Guided mindfulness sessions, stress relief toolkit creation, Vision board creation, weekly time audit and planner, Group challenge scenarios, resilience journal

**Management Skills:** Financial Literacy: Budgeting & Saving, Nutrition, Health, and Hygiene, Digital Literacy & Online Safety, Civic Responsibility & Ethics

Activities: Create a monthly budget, financial simulation game, Meal planning workshop, physical wellness challenge, Social media audit, privacy and safety scenarios, Community service, values debate.

**Weightage: Continuous Assessment: 100%**

**Assessment Methodology:** Assignments (20%), Flipped Class & Worksheets (10%), Practical (30%), Internal Examinations (40%)

**References:**


1. Khera, S. (2003). *You can win*. Macmillan.
2. Levesque, H. (n.d.). Life skills 101: A practical guide to leaving home and living on your own. (Publication year not specified)
3. Mitra, *B. K. (2017).* Personality development & soft skills *(*3rd impression). Oxford University Press.
4. *ICT Academy of Kerala. (2016).* Life skills for engineers*.* McGraw Hill Education (India) Private Ltd.

| | Description of CO | PO | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|
| CO1 | Understand personality traits and emotional intelligence, in interpersonal interactions. | --- | | | |
| CO2 | To work and execute as a team through successful implementation of set goals. | PO7 (1)<br>PO8 (2)<br>PO9 (2) | | | |
| CO3 | Develop and implement best practices in day-to-day life, in terms of planning and execution. | PO11 (3) | | | |

| UC25A02 | Physical Education - I | L | T | P | C |
|---|---|---|---|---|---|
| | | 0 | 0 | 4 | 1 |

**Course Objectives:**

- To impart the fundamentals of physical education for development of students' physical, mental, and social well-being.
- To instill a lifelong appreciation for physical activity towards the development of positive attitude and fostering values of team work and sportsmanship.

**Introduction to physical education:** Exercise for Good Posture – Conditioning and Calisthenics for Before start, Jogging, Bending, Twisting, Standing, Sitting and Relaxation, Training on First Aid Practices.

**Participation of athletic events:** Rules and regulations of important athletic events, Sprint, Jumps, Throws and Hurdles.

**Skill development in any one of the following outdoor games:** Basket Ball, Volley Ball, Ball Badminton, Football, Hockey, Kho-Kho, Kabaddi, Cricket, Hand ball and Tennis.

**Skill development in any one of the following indoor games:** Shuttle Badminton, Chess and Table Tennis.

**Weightage:** Continuous Assessment: 100%

**Assessment Methodology:** Attendance (60%), Quiz (10%), Participation in Sports and Games (20%) and Viva Voce (10%)

**References:**


1. Singh, A. (2008). Essentials of physical education. Kalyani Publishers.
2. Kamlesh, M. L. (2006). Psychology in physical education and sport (3rd ed.). Metropolitan Book Co.
3. Mangal, S. K. (2009). *Psychology of sports performance*. Sports Publication.


**E-resources:**

**https://www.who.int/health-topics/physical-activity**

| | CO Description | PO | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|
| CO1 | Understand and explain the importance of physical activity for mental and physical health. | --- | | | |
| CO2 | Apply basic principles of exercise science in the routine life. | PO1(3) | | | |
| CO3 | Develop teamwork, discipline, and leadership through sports and group activities and collaborate effectively. | PO8(3) | | | |
| CO4 | Demonstrate independent learning in health, nutrition, and fitness-related topics. | PO11(2) | | | |

# Semester II

| MA25C02 | Linear Algebra | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 1 | 0 | 4 |

**Course Objectives:**

- To impart foundational knowledge in linear algebra essential for analysing and solving problems in engineering applications.
- To provide the knowledge on computation using software and interpret key linear algebra concepts using software.

**Vector Spaces** Introduction to Vector Spaces, Examples, Subspaces, Linear Combinations, Span, Generating Sets, Linear Dependence and Independence, Basis and Dimension, Dimension of Subspaces.

**Activities:** Open-Source software, exercises to test linear dependence and independence using rank, compute span and basis of a set of vectors, determine the dimension of subspaces, and illustrate the concept of subspace and basis in $\boldsymbol{R^2}/\boldsymbol{R^3}$ with visualization.

**Linear Transformations and Diagonalization:** Null space, Range, Dimension Theorem (statement only), Matrix representation of a linear transformation, Eigenvalues & Eigenvectors, Diagonalizability.

**Activities:** Open-Source software, exercises to compute the matrix representation of a linear transformation, find the null space and range of a matrix, and compute eigenvalues and eigenvectors of a matrix.

**Inner Product Spaces:** Inner product, Norms, Cauchy, Schwarz inequality, Gram, Schmidt orthogonalization, Simple problems (up to $\boldsymbol{R^3}$).

**Activities:** Open-Source software, exercises to compute inner products and vector norms.

**Matrix Decomposition:** Orthogonal transformation of a symmetric matrix to diagonal form - Positive definite matrices, QR decomposition, Singular Value Decomposition (SVD), Least squares solutions- simple problems (up to $3 \times 3\ matrices$).

**Activities:** Open-Source software, exercises to check if a matrix is positive definite, perform QR decomposition and SVD using built-in functions.

**Weightage:** Continuous Assessment: 40%, End Semester Examinations: 60%.

**Assessment Methodology:** Assignment (20%), Software activity (20%), Quiz (20%), Internal Examinations (50%).

**References:**


1. Friedberg, S. H., Insel, A. J., & Spence, L. E. (2022). Linear algebra. Pearson.
2. Lay, D. C., Lay, S. R., & McDonald, J. J. (2020). Linear algebra and its applications with MATLAB. Pearson.
3. Bronson, R. (2011). Schaum's outline of matrix operations. McGraw-Hill Education.
4. Strang, G., & Thomson, R. (2005). Linear algebra and its applications. Brooks/Cole.
5. Lipschutz, S., & Lipson, M. (2009). Schaum's outline of linear algebra. McGraw-Hill.
6. Kreyszig, E. (2018). Advanced engineering mathematics. Wiley India.


| | **Description of CO** | **PO** | **PSO1** | **PSO2** | **PSO3** |
|---|---|---|---|---|---|
| CO1 | Explain the fundamental concepts of Linear Algebra. | --- | | | |
| CO2 | Compute and interpret eigenvalues and eigenvectors. | PO1(3) | | | |
| CO3 | Apply inner product concepts and perform orthogonalization. | PO1 (3) | | | |
| CO4 | Compute least squares solutions of linear system of equations. | PO1 (2)<br>PO2 (2) | | | |
| CO5 | Use MATLAB to implement and validate key linear algebra concepts | PO5 (1)<br>PO11 (1) | | | |

| EE25C01 | Basic Electrical and Electronics Engineering | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 0 | 0 | 3 |

**Course Objectives:**

- To impart foundational knowledge in principles and applications of electrical and electronics engineering.

**DC Fundamentals:** Current and Voltage sources, Resistance, Inductance and Capacitance; Ohm's law, Kirchhoff's law, Series parallel combination of R, L and C components, Voltage Divider and Current Divider Rules.

**Activities:** Virtual Demonstration of electrical laws & circuits, Hands-on Breadboarding, Solving GATE questions.

**AC Fundamentals:** Faraday's Laws of Electro-magnetic Induction, Definition of Self and Mutual Inductances, Generation of sinusoidal voltage, Instantaneous & RMS values of sinusoidal signals, Introduction to 3-phase systems, Electrical Safety, Fuses and Earthing.

**Activities:** Virtual Demonstration of electromagnetic induction, Measurement of instantaneous and RMS values of AC signals, Solving GATE questions.

**Electric Machines:** DC Machines, Transformers, Star and delta Connections, Three phase Induction motors, Synchronous Generators, Single Phase Induction Motors, Stepper Motor, Universal Motor and BLDC motor.

**Activities:** Virtual demonstration of step-up and step-down transformers, Virtual working models of Universal and BLDC motors, Solving GATE questions.

**Semiconductor Devices:** PN junction diodes, Zener Diode, Voltage regulator, BJT & FET Transistors, Timers, Operational Amplifiers.

**Activities:** Virtual demonstration of V-I characteristics of PN junction and Zener diodes using simulation, inverting/non-inverting amplifiers, Solving GATE questions.

**Digital Electronics:** Boolean algebra, Basic and Universal Gates, adders, multiplexers, demultiplexers and and flip-flops.

**Activity:** Online logic gate simulators, Solving GATE questions.

**Microcontrollers:** Introduction, Architecture, Potential Applications.

**Activities:** Physical demonstration of a microcontroller and online simulation of microcontroller.

**Weightage:** Continuous Assessment: 40%, End Semester Examinations: 60%

**Assessment Methodology:** Quiz (5%), Assignments (25%), GATE Questions (20%), Internal Examinations (50%)

**E-resources:**

1. https://archive.nptel.ac.in/courses/108/106/108106172/
2. Circuit Simulator – https://www.falstad.com/circuit/

| | Description of CO | PO | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|
| CO1 | Understand and explain basic electrical and electronic concepts. | --- | | | |
| CO2 | Apply and analyse electrical circuits in real-time applications. | PO1 (3)<br>PO2 (1) | | | |
| CO3 | Identify and utilise key electronic devices used in engineering applications | PO2 (2) | | | |

| CS25C06 | Digital Principles and Computer Organization | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 1 | 0 | 4 |

**Course Objective:**

- To impart knowledge on digital logic and provide functional concepts of computer systems with necessary illustrations.

**Digital Logic:** Digital Systems, Integer Arithmetic, Addition and Subtraction of Signed Numbers, Boolean Algebra, Theorems and Postulates, Functions, Truth Table, Canonical and Standard Forms, Simplification using K-Maps, Digital Logic Gates, Universal gates, Implementation of Logic Gates, Integrated Circuits.

**Activities:**

- Assignment on Karnaugh Map.
- Build logic circuits.
- Virtual demonstration of logical gates.

**Computer System:** Basic structure of a computer, Classes of Computer, Functional units - Interconnection of components, Von Neumann architecture and Harvard architecture - Instruction execution cycle, Performance metrics: MIPS, MFLOPS, CPI, throughput.

**Activities:**

- MIPS, MFLOPS, and CPI calculations.
- Preparations of report on comparison of two CPU from different manufacturing.

**Arithmetic and Logic Unit:** Combinational Circuits: Adders, Binary Adder, Binary Parallel Adder, Subtractor, Multiplexers, Decoders, Design of Fast Adder, Multiplication of Signed and Unsigned Numbers, Fast Multiplication - Integer Division, Floating Point Numbers and Operations, Booth's algorithm for signed multiplication, Sequential Circuits: Flip-Flops, Registers, Counters.

**Activities:**

- Virtual demonstration on Binary adder.
- Build a parallel order.

**Processing and Pipelining:** Instruction Set Architecture: RISC vs CISC, Addressing modes, Hardwired control and Micro programmed control unit, Concepts of Pipelining, Pipeline stages and Timing diagram, Hazards: Structural, Data and Control Hazards, Instruction-level parallelism, Parallel processing concepts: SIMD, MIMD, Superscalar processors, Vector and Array Processor.

**Activities:**

- Comparison of RISC-V and x86 ISAs; present findings on their relevance to AI accelerators.
- Spot and resolve different types of pipeline hazards in given scenarios.

**Memory:** Memory hierarchy: Registers, Cache, Main Memory- RAM- ROM: PROM, EPROM, EEPROM-Secondary storage, HDD, SSD, Cache Organization, Cache replacement policies, NUMA- DMA- ECC.

**I/O Systems**

I/O Techniques: Programmed, Interrupt-Driven, DMA, I/O Devices and Interface Standards: PCI, USB, SATA, Interrupt Types and Priority Handling, Buses and Bus Arbitration, Peripheral Communication.

**Activities:**

- Virtual demonstration of DMA.
- I/O in Real AI Systems.

**Weightage:** Continuous Assessment: 40%, End Semester Examinations: 60%

**Assessment Methodology:** Quiz (5%), Assignments (10%), Flipped Classroom (5%), Project (20%), Review of GATE questions (10%) & Internal Assessment (50%).

**References:**


1. Mano, M. M., & Ciletti, M. D. (2018). Digital design: With an introduction to the Verilog HDL, VHDL, and System Verilog. Pearson.
2. Patterson, D. A., & Hennessy, J. L. (2012). Computer organization and design: The hardware/software interface. Morgan Kaufmann.
3. Stallings, W. (2015). Computer organization and architecture: Designing for performance. Pearson.


**E resources/E materials:**

1. NPTEL Courses (Indian MOOCs – Free & Government Certified):
    a. Computer Architecture: Computer Architecture - Course
    b. Computer Architecture and Organization: Computer Architecture and Organization - Course
2. Digital Circuit Simulator: CircuitVerse - Online Digital Logic Circuit Simulator
3. Cloud environment: https://www.cloudbus.org/cloudsim/

| | Description of CO | PO | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|
| CO1 | Identify basic digital components and their functions in a computer system | --- | | | |
| CO2 | Apply Boolean algebra and number systems to design simple digital circuits and simulate them using tools | PO1 (3) | | | |
| CO3 | Analyze instruction sets, arithmetic units, and performance metrics to evaluate processor design | PO2 (2) | | | |
| CO4 | Engage in continuous learning to update with advancements through evolving computing trends. | PO11 (1) | | | |

| UC25H02 | தமிழர்களும் தொழில்நுட்பமும் | L | T | P | C |
|---|---|---|---|---|---|
| | | 1 | 0 | 0 | 1 |

**நெசவு மற்றும் பானைத் தொழில்நுட்பம்**: சங்க காலத்தில் நெசவுத் தொழில், பானைத் தொழில்நுட்பம், கருப்பு சிவப்பு பாண்டங்கள், பாண்டங்களில் கீறல் குறியீடுகள்.

**வடிவமைப்பு மற்றும் கட்டிடத் தொழில்நுட்பம்**: சங்க காலத்தில் வடிவமைப்பு மற்றும் கட்டுமானங்கள் & சங்க காலத்தில் வீட்டுப் பொருட்களில் வடிவமைப்பு- சங்க காலத்தில் கட்டுமான பொருட்களும் நடுகல்லும், சிலப்பதிகாரத்தில் மேடை அமைப்பு பற்றிய விவரங்கள், மாமல்லபுரச் சிற்பங்களும், கோவில்களும், சோழர் காலத்துப் பெருங்கோயில்கள் மற்றும் பிற வழிபாட்டுத் தலங்கள், நாயக்கர் காலக் கோயில்கள், மாதிரி கட்டமைப்புகள் பற்றி அறிதல், மதுரை மீனாட்சி அம்மன் ஆலயம் மற்றும் திருமலை நாயக்கர் மஹால், செட்டிநாட்டு வீடுகள், பிரிட்டிஷ் காலத்தில் சென்னையில் இந்தோ-சாரோசெனிக் கட்டிடக் கலை.

**உற்பத்தித் தொழில் நுட்பம்**: கப்பல் கட்டும் கலை, உலோகவியல், இரும்புத் தொழிற்சாலை, இரும்பை உருக்குதல், எஃகு, வரலாற்றுச் சான்றுகளாக செம்பு மற்றும் தங்க நாணயங்கள், நாணயங்கள் அச்சடித்தல், மணி உருவாக்கும் தொழிற்சாலைகள், கல்மணிகள், கண்ணாடி மணிகள், சுடுமண் மணிகள், சங்கு மணிகள், எலும்புத்துண்டுகள், தொல்லியல் சான்றுகள், சிலப்பதிகாரத்தில் மணிகளின் வகைகள்.

**வேளாண்மை மற்றும் நீர்ப்பாசனத் தொழில் நுட்பம்**: அணை, ஏரி, குளங்கள், மதகு, சோழர்காலக் குமுழித் தூம்பின் முக்கியத்துவம், கால்நடை பராமரிப்பு, கால்நடைகளுக்காக வடிவமைக்கப்பட்ட கிணறுகள், வேளாண்மை மற்றும் வேளாண்மைச் சார்ந்த செயல்பாடுகள், கடல்சார் அறிவு, மீன்வளம், முத்து மற்றும் முத்துக்குளித்தல், பெருங்கடல் குறித்த பண்டைய அறிவு, அறிவுசார் சமூகம்.

**அறிவியல் தமிழ் மற்றும் கணித்தமிழ்**: அறிவியல் தமிழின் வளர்ச்சி, கணித்தமிழ் வளர்ச்சி, தமிழ் நூல்களை மின்பதிப்பு செய்தல், தமிழ் மென்பொருட்கள் உருவாக்கம், தமிழ் இணையக் கல்விக்கழகம் – தமிழ் மின் நூலகம், இணையத்தில் தமிழ் அகராதிகள், சொற்குவைத் திட்டம்.

**References:**


1. தமிழக வரலாறு – மக்களும் பண்பாடும் – கே.கே. பிள்ளை (வெளியீடு: தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்).
2. கணினித் தமிழ் – முனைவர் இல. சுந்தரம். (விகடன் பிரசுரம்).
3. கீழடி – வைகை நதிக்கரையில் சங்ககால நகர நாகரிகம் (தொல்லியல் துறை வெளியீடு)
4. பொருநை – ஆற்றங்கரை நாகரிகம். (தொல்லியல் துறை வெளியீடு)
5. Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL – (in print)
6. Social Life of the Tamils – The Classical Period (Dr.S.Singaravelu) (Published by: InternationalInstitute of Tamil Studies.
7. Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thirunavukkarasu) (Published by: International Institute of Tamil Studies).
8. The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: International Institute of Tamil Studies.)
9. Keeladi – 'Sangam City C ivilization on the banks of river Vaigai' (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
10. Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay) (Publishedby: The Author)
11. Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Bookand Educational Services Corporation, Tamil Nadu)
12. Journey of Civilization Indus to Vaigai (R.Balakrishnan) (Published by: RMRL) – Reference Book.

| UC25H02 | Tamils and Technology | L | T | P | C |
|---|---|---|---|---|---|
| | | 1 | 0 | 0 | 1 |

**Weaving and Ceramic Technology:** Weaving Industry during Sangam Age, Ceramic technology, Black and Red Ware Potteries (BRW), Graffiti on Potteries.

**Design and Construction Technology:** Designing and Structural construction House & Designs in household materials during Sangam Age, Building materials and Hero stones of Sangam age, Details of Stage Constructions in Silappathikaram, Sculptures and Temples of Mamallapuram, Great Temples of Cholas and other worship places - Temples of Nayaka Period -Type study (Madurai Meenakshi Temple), Thirumalai Nayakar Mahal -Chetti Nadu Houses, Indo-Saracenic architecture at Madras during British Period.

**Manufacturing Technology:** Art of Ship Building - Metallurgical studies, Iron industry, Iron smelting, steel -Copper and gold- Coins as source of history - Minting of Coins, Beads making-industries Stonebeads, Glass beads, Terracotta beads -Shell beads/ bone beats, Archeological evidences - Gem stone types described in Silappathikaram.

**Agriculture and Irrigation Technology:** Dam, Tank, ponds, Sluice, Significance of Kumizhi Thoompuof Chola Period, Animal Husbandry - Wells designed for cattle use - Agriculture and Agro Processing - Knowledge of Sea, Fisheries, Pearl, Conche diving - Ancient Knowledge of Ocean -Knowledge Specific Society.

**Scientific Tamil & Tamil Computing:** Development of Scientific Tamil, Tamil computing, Digitalization of Tamil Books, Development of Tamil Software, Tamil Virtual Academy, Tamil Digital Library, Online Tamil Dictionaries, Sorkuvai Project.

**References:**


1. தமிழக வரலாறு – மக்களும் பண்பாடும் – கே.கே. பிள்ளை (வெளியீடு: தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்).
2. கணினித் தமிழ் – முனைவர் இல. சுந்தரம். (விகடன் பிரசுரம்).
3. கீழடி – வைகை நதிக்கரையில் சங்ககால நகர நாகரிகம் (தொல்லியல் துறை வெளியீடு)
4. பொருநை – ஆற்றங்கரை நாகரிகம். (தொல்லியல் துறை வெளியீடு)
5. Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL – (in print)
6. Social Life of the Tamils – The Classical Period (Dr.S.Singaravelu) (Published by: International Institute of Tamil Studies.
7. Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thirunavukkarasu) (Published by: International Institute of Tamil Studies).
8. The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: International Institute of Tamil Studies.)
9. Keeladi – 'Sangam City C ivilization on the banks of river Vaigai' (Jointly Published by: Department ofArchaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
10. Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay) (Publishedby: The Author)
11. Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Bookand Educational Services Corporation, Tamil Nadu)
12. Journey of Civilization Indus to Vaigai (R.Balakrishnan) (Published by: RMRL) – Reference Book.

| PH25C03 | Applied Physics (CSIE) – II | L | T | P | C |
|---|---|---|---|---|---|
| | | 2 | 1 | 0 | 3 |

**Course Objectives:**

- To provide a comprehensive understanding of physics concepts in computer science and engineering applications.

**Magnetic Materials:** Parameters, Ferromagnetic materials, Ferrites - Soft and Hard magnetic materials – GMR sensors - magnetic disk memories – Principle of magnetic recording – Magnetic data storage.

**Activities:** Determination of Hysteresis loop for ferromagnetic materials.

**Logic Gates:** Conversion of Binary to decimal - decimal to binary – binary coded decimal code-logic gates (OR, AND, NOT, NAND and NOR)–Exclusive OR gate-simplification based on basic Boolean theorems (sum of products, product of sums expression)- simplification by Karnaugh Map method (don't care conditions).

**Activities:** Virtual demonstration of Logic Gates.

**Nano-Devices:** Introduction – electron density in bulk material – size dependence of Fermi energy-quantum confinement – quantum structures: quantum wells, wires and dots – band gap of nanomaterials. Tunneling- Coulomb blockade - single electron transistor - resonant-tunneling diode- Carbon nanotubes: Properties and applications.

**Activities:** Virtual demonstration of single electron transistor

**Quantum Computing:** Quantum system for information processing - quantum states – classical bits – quantum bits or qubits – Bloch sphere -CNOT gate – Single and multiple qubits – quantum gates (Pauli – X, Y and Z Gates, Hadamard Gate, Phase gate - T gate .CNOT Gate) – advantage of quantum computing over classical computing.

**Activities:** Virtual demonstration of quantum computing

**Weightage:** Continuous Assessment: 40%, End Semester Examinations: 60%

**Assessment Methodology:** Quiz (10%), Assignments (30%), Flipped Class (10%), Internal Examinations (50%)

**References:**


1. Kasap, S. O. (2007). Principles of electronic materials and devices. McGraw-Hill Education.
2. Bernhardt, C. (2019). Quantum computing for everyone. MIT Press.
3. Hanson, G. W. (2009). Fundamentals of nanoelectronics. Pearson Education.


**E-Resources:**

1. Single electron Transistor: https://youtu.be/MTT729LtB-o?si=RGaEhGgmyWJWcZib
2. Basics of quantum computing- https://lab.quantumflytrap.com

3. Single electron transistor - http://vlabs.iitkgp.ac.in/tcad
4. Quantum Computing: http://www.digimat.in/nptel/courses/video/106106232/L01.html
5. Review article: Claude Chappert, Albert Fert and Frédéric Nguyen Van Dau, “The emergence of spin electronics in data storage” Nature Publishing 2007

| | Description of CO | PO | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|
| CO1 | Explain the concepts of physics in computer science stream. | --- | | | |
| CO2 | Apply appropriate techniques in physics to solve engineering problems. | PO1(3) | | | |
| CO3 | Analyse physical systems and interpret data from the virtual studies in the core branches in computer science and engineering. | PO2(2) | | | |

| CS25C07 | Object Oriented Programming | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 0 | 4 | 5 |

**Course Objectives:**

- To impart the principles of object-oriented programming and their advantages over procedural programming.
- To develop problem-solving skills by creating real-world applications using OOP features.

**Principles of Object-Oriented Programming:** Characteristics of object-oriented languages, C++ Program structure, Procedure Oriented Programming vs Object Oriented Programming, C++ constructs and syntax, tokens, variables, data-types, type conversion, operators, Expressions, Namespace, flow Control and decision, making statements.

**Practical:**

1. Simple programs to using Operators, and type conversion.
2. Programs using Conditional and Loop statements and loops.

**Classes and Objects:** Abstraction mechanism: Classes, Objects, member data, member functions - Constructors and types - destructors, inline function, friend function -- array of objects, objects as function arguments - memory allocation for objects, static members static data and static function.

**Practical:**

1. Programs using in-line and friend functions.
2. Programs using constructors and destructors

**Inheritance and Compile Time Polymorphism:** Inheritance: Derived Classes – Single inheritance – Multilevel Inheritance – Multiple Inheritance - Hierarchical inheritance – Hybrid inheritance. Operator Overloading: Compile time Polymorphism – Overloading Functions, Overloading Operators, Overloading Unary Operators – Overloading Binary Operators – Operator Overloading with Friend Functions.

**Practical:**

1. Programs for inheritance and its types.
2. Programs using friend function and operator overloading.

**Pointers and Runtime Polymorphism**

Pointers with arithmetic operations - this pointer – Pointers to Derived classes and Base classes - Compile time versus Runtime Polymorphism - Virtual functions - Late Binding - Abstract classes- Pure virtual functions and Virtual Destructors - Virtual base class.

**Practical:**

1. Programs for pointer manipulation.
2. Programs for virtual functions.

**Templates and Exception Handling**

Class Templates - Function Templates – Overloading of Template Functions - String, iterators, hashes, IO streams; Exception Handling.

**Practical:**

1. Programs using function and class templates.
2. Programs using exception handling.

**I/O Systems and File I/O**

C++ Streams - Formatted and Unformatted I/O –File stream classes – File modes - File operations, Sequential Read / Write operations – Binary and ASCII Files - Error handling in file I/O with member function.

**Practical Activities**

1. Programs for error handling in file and I/O management
2. Develop applications using OOP features.

**Weightage:** Continuous Assessment: 40%, End Semester Examinations: 60%

**Assessment Methodology:** Quiz (5%), Assignments (10%), Flipped Classroom (5%), Project (20%), Review of GATE questions (10%) & Internal Assessment (50%).

**References:**


1. Deitel, P., & Deitel, H. (2024). C++ how to program: An objects-natural approach. Pearson Education.
2. Bronson, G. (2011). A first book of C++. Course Technology Inc.
3. Balagurusamy, E. (2020). Object oriented programming with C++. McGraw Hill Education.


**eResources / eMaterials**

1. https://en.cppreference.com/w/cpp
2. https://youtu.be/M-mKgBHaMb0?si=1I-pEiAFgwwBA8IC

| | Description of CO | PO | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|
| CO1 | Understand the core OOP concepts and applications | --- | | | |
| CO2 | Apply Object Oriented Paradigms to solve problems using C++ | PO1 (3) | | | |
| CO3 | Design and Analyze solutions involving code reusability and complexity management | PO2 (2) | | | |
| CO4 | Demonstrate life-long learning skills through application development | PO11 (1) | | | |

| EN25C02 | English Essentials – II | L | T | P | C |
|---|---|---|---|---|---|
| | | 1 | 0 | 2 | 2 |

**Course Objectives:**

- To integrate vocabulary and functional grammar into communication tasks to improve fluency and accuracy.
- To articulate ideas clearly and effectively in formal and informal spoken interactions.
- To construct well-organised written documents including summaries, reports, and emails relevant to academic and workplace contexts.

**Communication:** Types, Inter and Intra-personal, communication barriers, Summarising visuals, media terminology, rhetorical devices and TED Talks.

**Activities:** Short presentation, Media based responses and Speeches, Error detection, Welcome, Vote of Thanks and Formal Speeches, Listen and respond to short podcast, Worksheets.

**Correspondence:** Modal Verbs, Job Application Letters, Resume Writing, Statement of Purpose, Paraphrasing & Summarizing, Executive Summary.

**Activities:** Email writing, Submission of applications, Graphical summaries, Report on college events.

**Professional Writing:** Paraphrasing & Summarizing, Executive Summary, Proposal, Decision Making, Recommendations.

**Activities:** Report preparation and recommendation letters.

**Team Work:** Team Leader, Quality of Team leader, Leadership model, Negotiations.

**Activities:** SWOT Analysis, Mock meetings, Group discussions, Brainstorming sessions.

**Weightage:** Continuous Assessment: 50%, End Semester Examinations: 50%

**Assessment Methodology:** Worksheets (10%), Group Activity (20%), Report Writing (20%), Internal Examinations (50%)

**References:**


1. Koneru Aruna. (2020). English Language Skills for Engineers. McGraw Hill Education.
2. Taylor, Shirley & Chandra.V. (2010). Communication for Business A Practical Approach. India: Pearson Longman.
3. Ian Badger, et al., (2014). Listening: B2 (Collins English for Life: Skills), Collins.
4. Raymond Murphy (2019), Grammar in Use, Cambridge University Press.


**E-Resources:**

1. Communication for Business Success- https://open.umn.edu/opentextbooks/textbooks/8
2. TED Talks – https://www.ted.com/

| | Description of CO | PO | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|
| CO1 | Understand the importance of communication and drafting skills in engineering and technology. | --- | | | |
| CO2 | Apply listening strategies to comprehend spoken English in various contexts. | PO1(3) | | | |
| CO3 | Participate actively in group discussions by analysing critically from different views. | PO2(2)<br>PO8(1) | | | |
| CO4 | Create written reports coherently for various purposes. | PO9(2) | | | |
| CO5 | Adapt communication styles to global, multicultural environments. | PO11(1) | | | |

| ME25C05 | Re-Engineering for Innovation | L | T | P | C |
|---|---|---|---|---|---|
| | | 0 | 0 | 4 | 2 |

**Course Objectives:**

- To cultivate foundational skills in prototyping, and automation for development of prototypes with real-world applications.
- To provide a comprehensive, hands-on exposure to product development through reverse engineering concepts.

**Bootcamp 1:** Introduction to Product Development, Reverse Engineering, Overview of the product lifecycle, Hands-on disassembly of simple products, Practice of basic measurements and sketching, Introduction to CAD modeling of disassembled parts, Virtual assembly of parts.

**Bootcamp 2:** Embedded System Programming (Open-source platforms), Practice of interfacing sensors, reading data, automation in home, healthcare and agriculture.

**Reverse Engineering:** Sketch and prototype alternative designs, Group brainstorming sessions, Manufacture prototype parts using 3D printing and / or workshop tools, Assemble prototype product.

**Weightage:** Continuous Assessment: 60%, End Semester Examinations: 40%

**Assessment Methodology:** Project (30%), Assignment (10%), Practical (30%), Internal Examinations (30%)

**References:**


1. Wang, W. (2010). Reverse engineering: Mechanisms, structures, systems & materials. CRC Press.
2. Margolis, M. (2020). Arduino cookbook: Recipes to begin, expand, and enhance your projects (3rd ed.). O'Reilly Media.


**E-Resources:**

1. GrabCAD – https://grabcad.com/
2. GitHub – https://github.com/

| | Description of CO | PO | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|
| CO1 | Understand the product development lifecycle, including stages such as concept generation, design, prototyping, and testing. | --- | | | |
| CO2 | Apply reverse engineering techniques to analyze and document existing products. | PO1 (3)<br>PO2 (2) | | | |
| CO3 | Collaborate in teams to fabricate prototypes using appropriate tools. | PO5 (2)<br>PO8 (1)<br>PO9 (1) | | | |
| CO4 | Engage in independent learning and continuously adapt to emerging technologies in product design | PO11(2) | | | |

| UC25A03 | Life Skills for Engineers – II | L | T | P | C |
|---|---|---|---|---|---|
| | | 1 | 0 | 2 | - |

**Course Objectives:**

- To impart and cultivate analytical reasoning, innovative thinking, effective collaboration, and ethical leadership to prepare students for complex challenges in professional and personal environments**.**

**Critical Thinking:** Creativity, Critical Thinking, Collaboration, Problem Solving, Decision Making, Imagination, Intuition, Experience, Sources of Creativity, Lateral Thinking, Myths of creativity, Critical thinking Vs Creative thinking, Convergent & Divergent Thinking, Critical reading & Multiple Intelligence.

**Activities:** Two-Brainstorm Method, “30 Circles” Challenge, “Desert Survival” Simulation, Lateral thinking riddles and puzzles, "What If?" Scenario Writing, Fast vs. Slow Thinking Game, Creativity Myth Busters

**Problem Solving:** Techniques, Six Thinking Hats, Mind Mapping, Forced Connections. Analytical Thinking, Numeric, symbolic, and graphic reasoning. Scientific temperament and Logical thinking.

**Activities:** Case study analysis, Escape Room challenge.

**Leadership:** Leadership Styles & Self-Assessment, Communication & Active Listening, Decision-Making & Responsibility, Teamwork & Delegation, Empathy, Integrity & Conflict Management, Vision, Motivation & Goal-Setting.

**Activities:** Crisis Leadership Simulation, Tower Challenge, Leadership Dilemmas Role-Play, Team Vision Board

**Weightage:** Continuous Assessment: 100%

**Assessment Methodology:** Assignments (20%), Flipped Class & Worksheets (10%), Practical (30%), Internal Examinations (40%)

**References:**


1. De Bono, E. (2017). Six thinking hats, Little, Brown Book Group.
2. Facione, P. A. (2015). Critical thinking: What it is and why it counts. Insight Assessment.
3. Kahneman, D. (2011). Thinking, fast and slow. Farrar, Straus and Giroux.
4. Whetten, D. A., & Cameron, K. S. (2016). Developing management skills. Pearson


| | Description of CO | PO | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|
| CO1 | Explain the importance of leadership and management skills in life. | --- | | | |
| CO2 | Apply and demonstrate creative thinking techniques to generate innovative solutions. | PO7 (3) | | | |
| CO3 | Exhibit effective collaboration and communication skills through teamwork, active listening, and conflict resolution strategies. | PO8 (2) | | | |

| UC25A04 | Physical Education - II | L | T | P | C |
|---|---|---|---|---|---|
| | | 0 | 0 | 4 | 1 |

**Course Objectives:**

- To impart knowledge on gymnastic exercises and pressing needs for upskilling in a particular game.

**Basic gymnastics exercises:** Warming up, Suitable exercise, Lead up games, Safety education, Movement education, Balanced Walk, execution, floor exercise, tumbling/acrobatics, grip, release, swinging, parallel bar exercise, horizontal bar exercise, flic-flac-walk and pyramids.

**Upskilling in any one of the athletics:** Broad Jump, High Jump, Triple Jump, Relay Sprints, Javelin Throw, Discuss Throw, Shot Put, Short and Long-distance Running.

**Advance skills in any one of the indoor/outdoor games, which has been opted by the student in the I semester.**

**Weightage:** Continuous Assessment: 100%

**Assessment Methodology:** Attendance (60%), Quiz (10%), Participation in Sports and Games (20%) and Viva Voce (10%)

**References:**


1. Singh, A. (2008). Essentials of physical education. Kalyani Publishers.
2. Kamlesh, M. L. (2006). Psychology in physical education and sport (3rd ed.). Metropolitan Book Co.
3. Mangal, S. K. (2009). *Psychology of sports performance*. Sports Publication.
4. Kandappan, K. (2004). *Foundations of physical education*. Friends Publications.


**E-resources:**

**https://www.who.int/health-topics/physical-activity**

| | CO Description | PO | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|
| CO1 | Understand and explain the importance of physical activity for mental and physical health. | --- | | | |
| CO2 | Apply safety principles and methods during sports activities. | PO1(3) | | | |
| CO3 | Develop teamwork, discipline, and leadership through sports and group activities and collaborate effectively. | PO8 (3) | | | |
| CO4 | Demonstrate the advanced technical skills and strategic understanding in the game of their interest. | PO11(1) | | | |

## Foreign Language

| UC25F01 | Deutsch – I | L | T | P | C |
|---|---|---|---|---|---|
| | | 1 | 0 | 2 | - |

**Course Objectives:**

- To impart fundamentals of the Deutsch language, including reading, writing systems, pronunciation, and speaking.

**Basics & Introduction:** German alphabet and pronunciation, Basic greetings and farewells, Introducing yourself and others (Ich heiße…, Wer bist du?), Numbers 1–100 and days of the week, Personal pronouns (ich, du, er, sie…), Sentence structure (SVO word order).

**Activities:** Alphabet spelling game, short skits, Use color-coded cards for SVO sentences.

**Grammar Essentials & Everyday Vocabulary:** Present tense of regular verbs (spielen, arbeiten, machen…), Common irregular verbs: sein (to be), haben (to have), gehen, kommen, Articles and gender (der, die, das; ein, eine), Simple questions and negation (nicht, kein), Describing people and things: adjectives and colors, Family, school, food, and common objects vocabulary.

**Activities:** Conjugate regular and irregular verbs, “Question Chain” game, Create a simple family tree.

**Everyday Communication in German:** Asking for and giving directions, Telling the time and talking about schedules, Ordering food and drinks at a café or restaurant, Talking about hobbies, weather, and daily routines, Listening to short conversations and responding appropriately, Introduction to German culture and formal/informal language use (du vs Sie).

**Activities:** Ordering food and drinks, Give directions, Formal / Informal greetings, Do’s and Don’ts.

**Weightage:** Continuous Assessment: 100%

**Assessment Methodology:** Assignments (30%), Quiz (10%) and Internal Examinations 60%

**References:**

1. Funk, H., Kuhn, C., & Demme, S. (2015). Menschen A1: Deutsch als Fremdsprache Kursbuch. Hueber Verlag.

| | CO Description | PO | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|
| CO1 | Understand simple spoken Deutsch in everyday contexts. | --- | | | |
| CO2 | Communicate with widely used Deutsch words effectively. | PO9 (2) | | | |
| CO3 | Develop the skills necessary for self-directed learning and continuous improvement in Deutsch language. | PO11 (1) | | | |

| UC25F02 | Japanese – I | L | T | P | C |
|---|---|---|---|---|---|
| | | 1 | 0 | 2 | - |

**Course Objectives:**

- To impart fundamentals of the Japanese language, including reading, writing systems, pronunciation, and speaking.

**Writing Systems & Basic Communication:** Introduction to Hiragana: vowels, basic characters, reading & writing, Introduction to Katakana: basic characters and usage, Basic greetings and farewells (こんにちは, おはようございます, さようなら), Introducing yourself (名前、出身、年齢), Basic sentence structure: Subject–Object–Verb, Numbers 1–100, days of the week, classroom expressions.

**Activities:** Flashcard games and writing drills, Self-introduction, Numbers & date-matching, Greeting expressions, Listening to audio.

**Grammar & Everyday Vocabulary:** Particles: は (wa), を (wo), の (no), へ (e), に (ni), Present tense verbs: です, ます-form conjugation (たべます、のみます), Negative forms: ではありません, ません, Describing people and objects using adjectives (い and な), Question formation: なに、どこ、だれ、いつ, Vocabulary for family, food, colors, and basic actions.

**Activities:** Verb conjugation drills, Guessing game, Picture description, “Shopping” with food vocab and counters

**Conversation & Cultural Etiquette:** Talking about routines and schedules (daily verbs, time expressions), Asking and giving simple directions (～はどこですか？), Ordering food and making polite requests (～をください、～をおねがいします), Expressing likes and dislikes (すき・きらい), Listening to short conversations and identifying key phrases, Introduction to formal/informal speech and Japanese etiquette.

**Activities:** Skits and role-plays, daily schedule, beginner-level dialogue, Group discussion on etiquette.

**Activities:** Practice worksheets and flashcards for hiragana, Writing drills and reading simple katakana words, Dialogue practice for greetings and self-introduction, Sentence construction exercises with basic SOV structure, Particle usage exercises and short dialogues, Role-play scheduling, shopping, and telling time, Verb conjugation drills for common verbs, Descriptive sentence exercises using adjectives, Practice Q&A dialogues forming questions and negations, Kanji writing practice and quizzes for basic characters, Vocabulary tests and conversational practice on daily topics, Oral presentations and listening comprehension quizzes.

**Weightage:** Continuous Assessment: 100%

**Assessment Methodology:** Assignments (30%), Quiz (10%) and Internal Examinations 60%

**References:**


1. Banno, E., Ikeda, Y., Ohno, Y., Shinagawa, C., & Tokashiki, K. (2011). Genki I: An integrated course in elementary Japanese. The Japan Times.
2. The Japan Foundation. (2017). Marugoto Japanese language and culture starter (A1) course book for communicative language activities. Goyal Publishers.


| | CO Description | PO | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|
| CO1 | Understand simple spoken Japanese in everyday contexts. | --- | | | |
| CO2 | Communicate with widely used Japanese words effectively. | PO9 (2) | | | |
| CO3 | Develop the skills necessary for self-directed learning and continuous improvement in Japanese language. | PO11 (1) | | | |

| UC25F03 | Korean – I | L | T | P | C |
|---|---|---|---|---|---|
| | | 1 | 0 | 2 | - |

**Course Objectives:**

- To impart fundamentals of the Korean language, including reading, writing systems, pronunciation, and speaking.

**Fundamentals of Korean:** Introduction to Hangul: consonants and vowels, Basic pronunciation and syllable formation, Common greetings and self-introductions, Numbers (Sino-Korean and Native Korean basics), Basic sentence structure (Subject-Object-Verb), Simple expressions (e.g., 감사합니다, 안녕하세요).

**Activities:** Writing and reading Hangul practice sheets, Pronunciation drills and audio repetition, Dialogue practice for greetings and self-introduction, Counting and number exercises.

**Essential Grammar and Vocabulary:** Particles (은/는, 이/가, 을/를) and usage, Basic verbs and present tense conjugation, Sentence patterns: affirmative, negative, interrogative, Common adjectives and descriptive sentences, Expressing possession and location, Asking simple questions (어디, 뭐, 누구).

**Activities:** Verb conjugation and sentence formation drills, Role-play conversations for shopping and daily routines, Descriptive writing and speaking exercises, Question and answer practice.

**Everyday Korean Communication:** Polite speech levels and honorifics introduction, Talking about time, dates, and schedules, Ordering food, shopping phrases, counting objects, Simple directions and transportation vocabulary, Listening practice with short dialogues, Cultural notes on etiquette and communication.

**Activities:** Role-play ordering at a restaurant or buying items, Listening comprehension exercises, Giving and asking for directions practice, Group conversations and presentations.

**Weightage:** Continuous Assessment: 100%

**Assessment Methodology:** Assignments (30%), Quiz (10%) and Internal Examinations 60%

**References:**


1. King, R., Yeon, J., & Brown, A. (2015). Elementary Korean (2nd ed.). Tuttle Publishing.
2. Cho, Y., Lee, H., Schulz, C., Sohn, H.-M., & Sohn, S.-O. (2001). Integrated Korean: Beginning 1. University of Hawai‘i Press.

| | CO Description | PO | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|
| CO1 | Understand simple spoken Korean in everyday contexts. | --- | | | |
| CO2 | Communicate with widely used Korean words effectively. | PO9 (2) | | | |
| CO3 | Develop the skills necessary for self-directed learning and continuous improvement in Korean language. | PO11 (1) | | | |

## ANNA UNIVERSITY, CHENNAI

### UNDERGRADUATE CURRICULUM (NON-AUTONOMOUS AFFILIATED INSTITUTIONS)

**Programme:** B.E - Electronics and Communication Engineering **Regulations:** 2025

**Abbreviations:**

**HUM –** Humanities (Languages, Management, Heritage, and others)

**BS** – Basic Science (Mathematics, Physics, Chemistry)

**ES –** Engineering Science (General (**G**), Programme Core (**PC**), Programme Elective (**PE**) & Emerging Technology (**ET**))

**SD** – Skill Development

**SL** – Self Learning

**CDP** – Capstone Design Project

**OE** – Open Elective

**L** – Laboratory Course

**T** – Theory

**LIT** – Laboratory Integrated Theory

**PW** – Project Work

**IPW** – Internship cum Project Work

**DIC –** Department Introductory Course

**TCP –** Total Contact Period(s)

| **Semester – I** | | | | | | | |
|---|---|---|---|---|---|---|---|
| **S. No.** | **Course Code** | **Course Name** | **Course Type** | **Periods / Week** | | **Credits** | **Category** |
| | | | | **L-T- P** | **TCP** | | |
| 1. | MA25C01 | Applied Calculus | T | 3-1-0 | 4 | 4 | BS |
| 2. | EN25C01 | English Essentials – I | T | 2-0-0 | 2 | 2 | HUM |
| 3. | UC25H01 | தமிழர் மரபு / Heritage of Tamils | T | 1-0-0 | 1 | 1 | HUM |
| 4. | EE25C04 | Basic Electronics and Electrical Engineering | T | 2-1-0 | 3 | 3 | ES (PC) |
| 5. | PH25C01 | Applied Physics - I | LIT | 2-0-2 | 4 | 3 | BS |
| 6. | CY25C01 | Applied Chemistry - I | LIT | 2-0-2 | 4 | 3 | BS |
| 7. | CS25C01 | Computer Programming: C | LIT | 2-0-2 | 4 | 3 | ES (G) |
| 8. | ME25C04 | Makerspace | L | 0-0-4 | 4 | 2 | SD |
| 9. | UC25A01 | Life Skills for Engineers – I* | --- | 1-0-2 | 3 | --- | HUM |
| 10. | UC25A02 | Physical Education – I* | --- | 0-0-4 | 4 | 1 | HUM |
| 11. | | NCC / NSS / NSO | --- | --- | --- | --- | --- |
| | | | | **Total Credits** | **33** | **22** | |

*Audit Course

| Semester – II | | | | | | | |
|---|---|---|---|---|---|---|---|
| **S. No.** | **Course Code** | **Course Name** | **Course Type** | **Periods / Week** | | **Credits** | **Category** |
| | | | | **L-T- P** | **TCP** | | |
| 1. | MA25C02 | Linear Algebra | T | 3-1-0 | 4 | 4 | BS |
| 2. | UC25H02 | தமிழர்களும் தொழில்நுட்பமும் / Tamils and Technology | T | 1-0-0 | 1 | 1 | HUM |
| 3. | EN25C02 | English Essentials – II | LIT | 1-0-2 | 3 | 2 | HUM |
| 4. | EC25C01 | Electron Devices | LIT | 3-0-2 | 5 | 4 | ES (PC) |
| 5. | EC25C02 | Circuits and Network Analysis | LIT | 3-0-2 | 5 | 4 | ES (PC) |
| 6. | CS25C05 | Data Structures using C++ | LIT | 3-0-2 | 5 | 4 | ES (G) |
| 7. | ME25C05 | Re-Engineering for Innovation | L | 0-0-4 | 4 | 2 | SD |
| 8. | UC25A03 | Life Skills for Engineers – II* | --- | 1-0-2 | 3 | --- | HUM |
| 9. | UC25A04 | Physical Education – II* | --- | 0-0-4 | 4 | 1 | HUM |
| 10. | | Foreign Language^ | L | 1-0-2 | 3 | --- | HUM |
| | | | | **Total Credits** | **37** | **22** | |

^ Deutsch / Japanese / Korean *Audit Course

| Semester – III | | | | | | | |
|---|---|---|---|---|---|---|---|
| **S. No.** | **Course Code** | **Course Name** | **Course Type** | **Periods/ Week** | | **Credits** | **Category** |
| | | | | **L-T- P** | **TCP** | | |
| 1. | | Transforms and its Applications | T | 3-1-0 | 4 | 4 | BS |
| 2. | | Signals and Systems | T | 3-1-0 | 4 | 4 | ES (PC) |
| 3. | | Computer Architecture and Organization | T | 3-0-0 | 3 | 3 | ES (PC) |
| 4. | | Electronic Circuits and Analysis | LIT | 3-0-2 | 5 | 4 | ES (PC) |
| 5. | | Digital System Design | LIT | 3-0-2 | 5 | 4 | ES (PC) |
| 6. | | Problem solving using phython | LIT | 1-0-2 | 3 | 2 | ES(G) |
| 7. | | Skill Development Course-I | LIT | 1-0-2 | 3 | 2 | SD |
| 8. | | English Communication Skills Laboratory – II | L | 0-0-2 | 2 | 1 | HUM |
| | | | | **Total Credits** | **29** | **24** | |

| Semester – IV | | | | | | | |
|---|---|---|---|---|---|---|---|
| **S. No.** | **Course Code** | **Course Name** | **Course Type** | **Periods/ Week** | | **Credits** | **Category** |
| | | | | **L-T- P** | **TCP** | | |
| 1. | | Probability and Random Processes | T | 3-1-0 | 4 | 4 | BS |
| 2. | | Electro Magnetic Fields and Transmission Lines | T | 3-1-0 | 4 | 4 | ES (PC) |
| 3. | | Introduction to Standards in Electronics and Communication | T | 1-0-0 | 1 | 1 | ES (PC) |
| 4. | | Linear Integrated Circuits | LIT | 3-0-2 | 5 | 4 | ES (PC) |
| 5. | | Analog Communication | LIT | 3-0-2 | 5 | 4 | ES (PC) |
| 6. | | Digital Signal Processing | LIT | 3-0-2 | 5 | 4 | ES (PC) |
| 7. | | Skill Development Course – II | LIT | 1-0-2 | 3 | 2 | SD |
| 8. | | English Communication Skills – III | L | 0-0-2 | 2 | 1 | HUM |
| **Total Credits** | | | | | **29** | **24** | |

| Semester – V | | | | | | | |
|---|---|---|---|---|---|---|---|
| **S. No.** | **Course Code** | **Course Name** | **Course Type** | **Periods / Week** | | **Credits** | **Category** |
| | | | | **L-T- P** | **TCP** | | |
| 1. | | Control Systems | T | 3-0-0 | 3 | 3 | ES (PC) |
| 2. | | Programme Elective – I | T | 3-0-0 | 3 | 3 | ES (PE) |
| 3. | | Data Communication Networks | LIT | 3-0-2 | 5 | 4 | ES (PC) |
| 4. | | Digital Communication | LIT | 3-0-2 | 5 | 4 | ES (PC) |
| 5. | | Microprocessor and Microcontroller | LIT | 3-0-2 | 5 | 4 | ES (PC) |
| 6. | | Artificial Intelligence & Machine Learning | LIT | 2-0-2 | 4 | 3 | ES (PC) |
| 7. | | Skill Development Course – III | LIT | 1-0-2 | 3 | 2 | SD |
| 8. | | Industry Oriented Course - I | LIT | 1-0-2 | 3 | 1 | SD |
| **Total Credits** | | | | | **31** | **24** | |
| **For Honours Degree** | | | | | | | |
| 1. | | Capstone Design Project – Level I | CDP | 0-0-12 | 12 | 6 | SD |
| **OR** | | | | | | | |
| 1. | | Honours Elective – I | T | 3-0-0 | 3 | 3 | |
| 2. | | Honours Elective – II | T | 3-0-0 | 3 | 3 | |
| **For Minor Degree** | | | | | | | |

# Semester I

| MA25C01 | Applied Calculus | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 1 | 0 | 4 |

**Course Objectives:**

- To provide technical competence of modelling engineering problems using calculus.
- To apply the calculus concepts in solving engineering problems using analytical methods and computational tools.

**Differential Calculus:** Functions, graph of functions, New functions from old functions Limit of a function, Continuity, Limits at infinity, Derivative as a function, Maxima and Minima of functions of single variable, Mean value theorem, Effect of derivatives on the shape of a graph.

**Activities:** Visualization of the functions, Maxima and Minima of a function using open-source software, Solving of Competitive Examination questions (Ex. GATE).

**Functions of Several Variables:** Partial derivatives, Chain rule, Total derivative, Maxima and minima of functions of two variables, Method of Lagrange's Multipliers, Application problems in engineering.

**Activities:** Partial Derivatives with two or three variables, Maxima and Minima of a function using open-source software, Solving of Competitive Examination questions (Ex. GATE).

**Integral Calculus:** Fundamental theorem of Calculus, Indefinite integrals and the Net Change Theorem, Improper integrals, Arc Length, Area of Region, Area of surface of revolution.

**Activities:** Definite and Indefinite Integrals, Determination of Area, Solving of Competitive Examination questions (Ex. GATE).

**Multiple Integrals:** Iterated integrals and Fubini's theorem, Evaluation of double integrals, change of order of integration, change of variables between Cartesian and polar co-ordinates, evaluation of triple integrals-change of variables between Cartesian and cylindrical and spherical co-ordinates.

**Activities:** Double integrals and triple integrals using open-source software, Solving of Competitive Examination questions (Ex. GATE).

**Weightage:** Continuous Assessment: 40%, End Semester Examinations: 60%.

**Assessment Methodology:** Assignments (20%), Solution to application-oriented problems using software (20%), Solving of GATE questions (20%), Internal Examinations (40%).

**References:**

1. Anton, H., Bivens, I. C., & Davis, S. (2021). Calculus: Early transcendentals. John Wiley & Sons.
2. Ron Larson and David C. Falvo,(2013), Calculus: an Applied Approach. Cengage Learning.

3. Stewart, J., Clegg, D., & Watson, S. (2019). *Calculus: Early transcendentals*.
4. Thomas, G. B., Jr., Weir, M. D., Hass, J., & Heil, C. (2018). *Thomas' calculus: Early transcendentals*. Pearson.
5. Singh, K. (2019). *Engineering mathematics through applications*. Bloomsbury Publishing.
6. Grewal, B. S. (2012). *Higher engineering mathematics.* Khanna Publishers.

**E-resources:**

1. https://math.libretexts.org/Bookshelves/Calculus/Map%3A_Calculus__Early_Transcendentals_(Stewart)/
2. https://openstax.org/books/calculus-volume-1/
3. https://tutorial.math.lamar.edu/Classes/CalcII/CalcII.aspx
4. SCILAB, https://www.scilab.org/

| | Description of CO | PO | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|
| CO1 | Explain the meaning of derivative, integral, and their geometric and physical interpretations. | --- | | | |
| CO2 | Apply differentiation and integration techniques to compute maxima, minima, and area. | PO1(3) | | | |
| CO3 | Analyze the behavior of single and multivariable functions using derivatives and partial derivatives. | PO2(3) | | | |
| CO4 | Utilize modern computational software and online platforms to deepen understanding, perform complex calculations, and visualize mathematical concepts. | PO5(2) PO11 (1) | | | |

| EN25C01 | English Essentials – I | L | T | P | C |
|---|---|---|---|---|---|
| | | 2 | 0 | 0 | 2 |

**Course Objectives:**

- To equip students with the skills to write clear, coherent, and grammatically correct texts for various purposes.
- To strengthen the ability to comprehend, interpret, and analyse written English across diverse contexts.

**Speaking Skills:** Parts of Speech, Articles, Tenses, Sentence Structure, Types of Sentences, Subject-Verb Agreement**,** Synonyms and Antonyms, Prefixes and Suffixes, Idioms and Phrases, Self-Introduction, Expressing Oneself, Everyday Conversations, Team Interactions, Emotions, agreeing & disagreeing

**Activities:** Self-Introduction, Just a Minute (JAM) Video recording, Brainstorming sessions, Situational role plays, Usage of Applications.

**Listening Skills:** Listening to Simple Conversations, Short Speeches / Stories, Extracting key information, Phonemes, Listening to Native Speakers, Listening to Various Accents.

**Activities:** Gap fill exercises, Understanding tone and intent, Listening and imitating, Spell Bee

**Reading Skills:** Reading Strategies, Skimming and Scanning, active reading with short passages.

**Activities:** Summarising, loud reading, Cloze reading, Reading comprehension, Reading newspaper articles, Reading Long passage and note making.

**Drafting Skills:** Sentence Formation, Word Substitution, Keywords Development, Writing Paragraphs, Emails and Letters.

**Activities:** Picture and poster interpretation, formal and informal letters, Official e-mails.

**Weightage:** Continuous Assessment: 40%, End Semester Examinations: 60%

**Assessment Methodology:** Quiz (10%), Assignments (20%), Speaking Task (10%), Reading Task (10%), Writing Task (10%), Internal Examinations (40%)

**References:**


1. Miller, K. Q., & Wahl, S. T. (2023). *Business and Professional Communication: KEYS for Workplace Excellence* (5th ed.). SAGE Publications.
2. Kumar, Sanjay & Pushpalatha. (2018). *English Language and Communication Skills for Engineers*. India: Oxford University Press.
3. Sharma, S., & Mishra, B. (2024). *Communication Skills for Engineers and Scientists* (2nd ed.). PHI Learning.


**E-Resources:**

1. Cambridge English – https://www.cambridgeenglish.org/learning-english/grammar-and-vocabulary/

2. Perfect English Grammar – https://www.perfect-english-grammar.com/
3. British Council – Learn English - https://learnenglish.britishcouncil.org/grammar
4. Speechling – https://speechling.com/
5. mePro by Pearson – https://mepro.pearson.com/
6. TED Talks – https://www.ted.com/

| | Description of CO | PO | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|
| CO1 | Comprehend spoken English, take and draft notes. | --- | | | |
| CO2 | Apply vocabulary, with appropriate ways to enhance drafting and communication. | PO1(3) | | | |
| CO3 | Analyze texts in different contexts using appropriate reading strategies. | PO2(2) | | | |
| CO4 | Communicate thoughts and ideas in both planned and unplanned situations. | PO9(2) | | | |
| CO5 | Continuously improving English communication skills relevant to engineering and scientific work. | PO11(1) | | | |

| UC25H01 | தமிழர் மரபு | L | T | P | C |
|---|---|---|---|---|---|
| | | 1 | 0 | 0 | 1 |

**மொழி மற்றும் இலக்கியம்:** இந்திய மொழிக் குடும்பங்கள், திராவிட மொழிகள், தமிழ் ஒரு செம்மொழி, தமிழ் செவ்விலக்கியங்கள், சங்க இலக்கியத்தின் சமயச் சார்பற்ற தன்மை, சங்க இலக்கியத்தில் பகிர்தல் அறம், திருக்குறளில் மேலாண்மைக் கருத்துக்கள், தமிழ்க் காப்பியங்கள், தமிழகத்தில் சமண பௌத்த சமயங்களின் தாக்கம், பக்தி இலக்கியம், ஆழ்வார்கள் மற்றும் நாயன்மார்கள், சிற்றிலக்கியங்கள், தமிழில் நவீன இலக்கியத்தின் வளர்ச்சி, தமிழ் இலக்கிய வளர்ச்சியில் பாரதியார் மற்றும் பாரதிதாசன் ஆகியோரின் பங்களிப்பு.

**மரபு – பாறை ஓவியங்கள் முதல் நவீன ஓவியங்கள் வரை – சிற்பக் கலை:** நடுகல் முதல் நவீன சிற்பங்கள் வரை, ஐம்பொன் சிலைகள், பழங்குடியினர் மற்றும் அவர்கள் தயாரிக்கும் கைவினைப் பொருட்கள், பொம்மைகள், தேர் செய்யும் கலை, சுடுமண் சிற்பங்கள், நாட்டுப்புறத் தெய்வங்கள், குமரிமுனையில் திருவள்ளுவர் சிலை, இசைக் கருவிகள், மிருதங்கம், பறை, வீணை, யாழ், நாதஸ்வரம், தமிழர்களின் சமூக பொருளாதார வாழ்வில் கோவில்களின் பங்கு.

**நாட்டுப்புறக் கலைகள் மற்றும் வீர விளையாட்டுகள்:** தெருக்கூத்து, கரகாட்டம், வில்லுப்பாட்டு, கணியான் கூத்து, ஒயிலாட்டம், தோல்பாவைக் கூத்து, சிலம்பாட்டம், வளரி, புலியாட்டம், தமிழர்களின் விளையாட்டுகள்.

**தமிழர்களின் திணைக் கோட்பாடுகள்:** தமிழகத்தின் தாவரங்களும், விலங்குகளும், தொல்காப்பியம் மற்றும் சங்க இலக்கியத்தில் அகம் மற்றும் புறக் கோட்பாடுகள், தமிழர்கள் போற்றிய அறக்கோட்பாடு, சங்ககாலத்தில் தமிழகத்தில் எழுத்தறிவும், கல்வியும், சங்ககால நகரங்களும் துறை முகங்களும், சங்ககாலத்தில் ஏற்றுமதி மற்றும் இறக்குமதி, கடல்கடந்த நாடுகளில் சோழர்களின் வெற்றி.

**இந்திய தேசிய இயக்கம் மற்றும் இந்திய பண்பாட்டிற்குத் தமிழர்களின் பங்களிப்பு**: இந்திய விடுதலைப்போரில் தமிழர்களின் பங்கு, இந்தியாவின் பிறப்பகுதிகளில் தமிழ்ப் பண்பாட்டின் தாக்கம், சுயமரியாதை இயக்கம், இந்திய மருத்துவத்தில், சித்த மருத்துவத்தின் பங்கு, கல்வெட்டுகள், கையெழுத்துப்படிகள், தமிழ்ப் புத்தகங்களின் அச்சு வரலாறு.

## References:


1. தமிழக வரலாறு – மக்களும் பண்பாடும் – கே.கே. பிள்ளை (வெளியீடு: தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்).
2. கணினித் தமிழ் – முனைவர் இல. சுந்தரம். (விகடன் பிரசுரம்).
3. கீழடி – வைகை நதிக்கரையில் சங்ககால நகர நாகரிகம் (தொல்லியல் துறை வெளியீடு)
4. பொருநை – ஆற்றங்கரை நாகரிகம். (தொல்லியல் துறை வெளியீடு)
5. Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL – (in print)
6. Social Life of the Tamils - The Classical Period (Dr.S.Singaravelu) (Published by: International Institute of Tamil Studies.
7. Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thirunavukkarasu) (Published by: International Institute of Tamil Studies).
8. The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: International Institute of Tamil Studies.)
9. Keeladi - 'Sangam City C ivilization on the banks of river Vaigai' (Jointly Published by: Department ofArchaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
10. Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay) (Published by: The Author)
11. Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
12. Journey of Civilization Indus to Vaigai (R.Balakrishnan) (Published by: RMRL) – Reference Book.

| UC25H01 | Heritage of Tamils | L | T | P | C |
|---|---|---|---|---|---|
| | | 1 | 0 | 0 | 1 |

**Language and Literature:** Language Families in India, Dravidian Languages, Tamil as a Classical Language, Classical Literature in Tamil, Secular Nature of Sangam Literature, Distributive Justice in Sangam Literature, Management Principles in Thirukural, Tamil Epics and Impact of Buddhism & Jainism in Tamil Land, Bakthi Literature Azhwars and Nayanmars, Forms of minor Poetry, Development of Modern literature in Tamil, Contribution of Bharathiyar and Bharathidhasan.

**Heritage - Rock Art Paintings to Modern Art – Sculpture:** Hero stone to modern sculpture, Bronze icons, Tribes and their handicrafts, Art of temple car making,Massive Terracotta sculptures, Village deities, Thiruvalluvar Statue at Kanyakumari, Making of musical instruments, Mridhangam, Parai, Veenai, Yazh and Nadhaswaram, Role of Temples in Social and Economic Life of Tamils.

**Folk and Martial Arts:** Therukoothu, Karagattam, Villu Pattu, Kaniyan Koothu, Oyillattam, Leatherpuppetry, Silambattam, Valari, Tiger dance, Sports and Games of Tamils.

**Thinai Concept of Tamils:** Flora and Fauna of Tamils & Aham and Puram Concept from Tholkappiyam and Sangam Literature, Aram Concept of Tamils, Education and Literacy during Sangam Age, Ancient Cities and Ports of Sangam Age, Export and Import during Sangam Age, Overseas Conquest of Cholas.

**Contribution of Tamils to Indian National Movement and Indian Culture:** Contribution of Tamils to Indian Freedom Struggle, The Cultural Influence of Tamils over the other parts of India, Self-Respect Movement, Role of Siddha Medicine in Indigenous Systems of Medicine, Inscriptions & Manuscripts, Print History of Tamil Books.

**References:**


1. தமிழக வரலாறு – மக்களும் பண்பாடும் – கே.கே. பிள்ளை (வெளியீடு: தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்).
2. கணினித் தமிழ் – முனைவர் இல. சுந்தரம். (விகடன் பிரசுரம்).
3. கீழடி – வைகை நதிக்கரையில் சங்ககால நகர நாகரிகம் (தொல்லியல் துறை வெளியீடு)
4. பொருநை – ஆற்றங்கரை நாகரிகம். (தொல்லியல் துறை வெளியீடு)
5. Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL – (in print)
6. Social Life of the Tamils - The Classical Period (Dr.S.Singaravelu) (Published by: InternationalInstitute of Tamil Studies.
7. Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thirunavukkarasu) (Published by: International Institute of Tamil Studies).
8. The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: International Institute of Tamil Studies.)
9. Keeladi - 'Sangam City C ivilization on the banks of river Vaigai' (Jointly Published by: Department ofArchaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
10. Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay) (Publishedby: The Author)
11. Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Bookand Educational Services Corporation, Tamil Nadu)
12. Journey of Civilization Indus to Vaigai (R.Balakrishnan) (Published by: RMRL) – Reference Book.

| EE25C04 | Basic Electronics and Electrical Engineering | L | T | P | C |
|---|---|---|---|---|---|
| | | 2 | 1 | 0 | 3 |

**Course Objectives:**

- Students will understand the fundamentals and evolution of electronics, electrical systems

**Basic Electronics:** Passive and active components – Resistors, Capacitors, Inductors-Types, features and specification, Energy band diagram of conductors, semiconductor, insulator – Intrinsic & extrinsic semiconductor - types. PN junction diode – zener diode.

**Activities:** VI characteristics of PN junction and Zener diode.

**Electrical Machines:** Construction, Principle of Operation, Basic Equations and Applications - DC Generators, DC Motors, Single Phase Transformer, Single phase Induction Motor, Three phase Induction Motor, Three phase Alternator, Stepper and BLDC motors.

**Activities:** Demonstration of Electrical Machines.

**Measurements and Instrumentation:** Functional elements of an instrument, Standards and calibration, Operating Principle, types - Moving Coil and Moving Iron meters, Measurement of three phase power, Energy Meter, Instrument Transformers-CT and PT, DSO- Block diagram- Data acquisition.

**Activities**: Demonstration of measuring equipment's

**Basics of Power Systems:** Power system structure -Generation, Transmission and distribution , Various voltage levels, Earthing – methods of earthing, protective devices-switch fuse unit- Miniature circuit breaker- moulded case circuit breaker- earth leakage circuit breaker, safety precautions and First Aid

**Activities**: Demonstration of Earthing and safety precautions in electrical circuits

**Sensors and Transducers**

Solenoids, electro-pneumatic systems, proximity sensors, limit switches, piezoelectric, hall effect, photo sensors, Strain gauge, LVDT, piezo electric crystals, differential pressure transducer, optical and digital transducers, Smart sensors, Thermal Imagers

**Weightage:** Continuous Assessment: 40%, End Semester Examinations: 60%

**Assessment Methodology:** Quiz (10%), Assignments (40%), Internal Examinations (50%)

**References:**


1. Bell, D. (2008). *Electronic devices and circuits*. Oxford University Press.
2. Tooley, M. A. (2006). *Electronic circuits: Fundamentals and applications*. Elsevier Limited.
3. Malvino, A., & Bates, D. J. (2012). *Basic electronics: Problems and solutions*. Tata McGraw-Hill Publishing Company Pvt. Ltd.

4. Hughes, E. (2016). *Electrical and electronic technology*. Pearson.
5. Theraja, B. L. (2014). *A textbook of electrical technology*. S. Chand & Company.

**E- Resources:**

1. https://ocw.mit.edu/courses/electrical-engineering-and-computer-science
2. https://www.khanacademy.org/science/electrical-engineering

| | Description of CO | PO | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|
| CO1 | Understand and explain basic electrical and electronic concepts. | --- | | | |
| CO2 | Apply and analyse electrical circuits in real-time applications. | PO1 (3)<br>PO2 (1) | | | |
| CO3 | Identify and utilise key electrical and electronic devices used in engineering applications | PO2 (3) | | | |

| PH25C01 | Applied Physics – I | L | T | P | C |
|---|---|---|---|---|---|
| | | 2 | 0 | 2 | 3 |

**Course Objective(s):**

- To impart knowledge and expose the essentials of physics in various engineering applications.

**Properties of Matter:** Elasticity, Cantilever –Young's modulus (non-uniform bending), Girders: Bridges and buildings, Viscosity: Stokes method – Surface tension: drop weight method, Thermal expansion, Thermal stress, Bimetallic strips, Expansion joints

**Practical**: Non-Uniform bending, Young's modulus of the material, Torsional pendulum, Rigidity modulus of the wire and moment of inertia of the disc.

**Activities:** Virtual demonstration of thermal stress.

**Oscillations:** Simple Harmonic motion, Torsional pendulum, Couple per unit twist, Damped and Forced Oscillation

**Waves:** Waves on a stretched string, Energy and Power, standing waves, Ultrasonics, piezo-electric method, Acoustic grating, Electromagnetic waves: Maxwell equation, Production of EM waves by dipole antenna, Propagation of EM waves in free space, wave equation, Cell phone reception

**Practical**: Melde's string experiment, Frequency of an electrically vibrating metal tip.

**Activities:** Virtual demonstration of propagation of EM waves

**Quantum Mechanics:** Black body radiation, Photoelectric effect, de Broglie hypothesis-Schrodinger Wave equation, Particle in a box (infinite potential well, three-dimensional box), Barrier penetration and quantum tunnelling.

**Practical**: Photo-electric effect – Determination of Planck's constant.

**Activities**: Virtual demonstration of Scanning Transmission Electron Microscope

**Applied Optics:** Interference: Air wedge, Michelson's Interferometer, Fiber optics: Structure of a fiber – Fiber Optic Communication System – Fiber Sensors (Virtual demo) – Displacement, pressure sensor and Temperature sensor - Einstein Co-efficient - Nd:YAG laser, $CO_2$ laser (construction, functioning and applications), dye laser

**Practical**: Ruling width of Compact disc using Laser, Thickness of a thin sheet/wire using Air wedge Method.

**Activities**: Demonstration of sensors and applications of Lasers

**Weightage:** Continuous Assessment: 50%, End Semester Examinations: 50%

**Assessment Methodology:** Quiz (5%), Assignments (20%), Flipped Class (5%), Practical (30%), Internal Examinations (40%)

**References:**


1. Young, H. D., & Freedman, R. A. (2020). University physics with modern physics. Pearson.
2. Gaur, R. K., & Gupta, S. L. (2022). Engineering physics. Dhanpat Rai Publications.
3. Mathur, D. S. (2010). Elements of properties of matter. S. Chand Publishing.
4. Griffiths, D. J. (2018). Introduction to quantum mechanics. Cambridge University Press.
5. Silfvast, W. T. (2008). Laser fundamentals (2nd ed.). Cambridge University Press.


**E-resources:**

1. Barrier penetration problem and Quantum tunnelling: https://archive.nptel.ac.in/courses/115/104/115104096/
2. EM waves and wireless channelling: https://onlinecourses.nptel.ac.in/noc24_ee31/preview
3. CO2 Laser : https://onlinecourses.nptel.ac.in/noc25_ph03/preview
4. Bimetallic Strips _ https://www.youtube.com/watch?v=WZQ8lvxdzDk
5. Cell phone Reception_ https://www.youtube.com/watch?v=1JZG9x_VOwA
6. Dipole Antenna_ https://www.youtube.com/watch?v=4xF1Fq2wB1I
7. Optical Sensors_ https://auece.digimat.in/nptel/courses/video/108106173/L02.html
8. Scanning Tunnelling Electron Microscope_ https://www.youtube.com/watch?v=XNYZYbXNWQA

| | Description of CO | PO | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|
| CO1 | Explain the physics concepts in various applications. | --- | | | |
| CO2 | Apply the principles of wave optics and laser physics in practical systems. | PO1(3) | | | |
| CO3 | Analyse the behaviour of materials under different conditions. | PO2(2) | | | |
| CO4 | Conduct experiments in groups and interpret the data. | PO4(3) PO8(1) | | | |

| CY25C01 | Applied Chemistry – I | L | T | P | C |
|---|---|---|---|---|---|
| | | 2 | 0 | 2 | 3 |

**Course Objectives:**

- To provide students with a solid understanding of the chemical principles for engineering applications.
- To introduce the chemical properties of materials and how these properties influence the selection and use of materials in engineering systems.
- To impart practical applications of chemistry in commonly used engineering devices.

**Water Technology:** Water quality parameters and standards. Industrial feed water – Remediation. Municipal water treatment. Desalination.

**Practical:** Analysis of alkalinity, hardness and dissolved oxygen.

**Activity:** Coagulation of water sample using Alum

**Nano-chemistry:** Classification, Size-dependent properties. Preparation of nanomaterials – Top-down and Botton-Up approaches, Applications (Flipped classroom).

**Practical:** Preparation of nanoparticles by Sol-Gel method.

**Electrochemistry:** Electrochemical cell - Electrode potential- Redox reaction. Conductivity of electrolytes – Factors.

**Practical:** Conductometric titrations

**Activity:** Electrochemical cell demonstration

**Corrosion & Control:** Chemical and electrochemical corrosions, galvanic series, factors influencing corrosion, Electrochemical protection. Organic and Inorganic coating.

**Practical:**

Corrosion study by weight loss and salt spray method.
Potentiometry/UV-visible spectrophotometer.

**Activities:** Case Study on Corrosion in Pipelines and Electronics, Control measures for a corroded metal

**Batteries:** Conventional, Contemporary and Emerging battery storage technologies, Primary & Secondary Batteries, Battery Pack, Battery Materials, Performance Parameters, Testing, Safety aspects.

**Practical:** Measurement of EMF, Internal Resistance, Charge and Discharge Characteristics.

**Activities:** Demonstration of battery pack in e-vehicles.

**Weightage:** Continuous Assessment: 50%, End Semester Examinations: 50%

**Assessment Methodology:** Quiz (5%), Assignments (20%), Flipped Class (5%), Practical (30%), Internal Examinations (40%)

**References:**


1. Jain, P. C., & Jain, M. (2015). *Engineering Chemistry*. Dhanpat Rai Publishing Company (P) Ltd.
2. Dara, S. S. (2004). *A Textbook of Engineering Chemistry*. Chand Publications.
3. Sachdeva, M. V. (2011). *Basics of Nano Chemistry*. Anmol Publications Pvt Ltd.
4. Friedrich, E. (2014). *Engineering Chemistry*. Medtech.


**E-Resources:**

1. Water and Wastewater Engineering (Prof. Ligy Philip, IIT Madras) – https://nptel.ac.in/courses/105106202.
2. Electrochemical Energy Systems (Prof. S. Mitra, IIT Madras) – https://nptel.ac.in/courses/113106028.
3. Corrosion (Prof. Kallol Mondal, IIT Kanpur) – https://nptel.ac.in/courses/112104088
4. Chemistry of Battery Systems (Prof. V. R. Marathe, IIT Madras) – https://nptel.ac.in/courses/115106130
5. Resource on all battery types, testing, and safety – https://batteryuniversity.com/articles

| | Description of CO | PO | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|
| CO1 | Understand the importance of chemistry applications with underlying mechanisms. | --- | | | |
| CO2 | Apply the chemistry concepts in widely used devices. | PO1(3) | | | |
| CO3 | Analyse the effect of various chemical parameters on performance of engineering systems. | PO2(2) | | | |
| CO4 | Perform experimentations as a group and interpret the results. | PO4(3)<br>PO8(1) | | | |
| CO5 | Communicate findings through case studies and reports | PO9(1) | | | |

| CS25C01 | Computer Programming: C | L | T | P | C |
|---|---|---|---|---|---|
| | | 2 | 0 | 2 | 3 |

**Course Objectives:**

- To equip engineering students with the foundational knowledge and practical skills in 'C' programming to analyse and solve computational problems effectively.
- To foster problem-solving, critical thinking, and modular programming skills essential for engineering domains.

**Introduction to C:** Problem Solving, Problem Analysis Chart, Developing an Algorithm, Flowchart and Pseudocode, program structure, Compilation & Execution process, Interactive and Script mode, Comments, Indentation, Error messages, Primitive data types, Constants, Variables, Reserved words, Arithmetic, Relational, Logical, Bitwise, Assignment, Conditional operators, Input/Output Functions, Built-in Functions.

**Practical:** Create Problem Analysis Charts, Flowcharts and Pseudocode for simple C programs (Minimum three).

**Control Structures:** if, if-else, nested if, switch-case, while, do-while, for, nested loops, Jump statements.

**Practical:** Usage of conditional logics in programs. (Minimum three)

**Functions:** Function Declaration, Definition and Calling, Function Parameters and Return Types, Call by Value and Call by Reference, Recursive Functions, Scope and Lifetime of Variables, Header files and Modular Programming.

**Practical:** Usage of functions in programs. (Minimum three)

**Strings & Pointers:** One-dimensional and Multi-dimensional Arrays, Array operations and traversals, String Handling: String declaration, input/output, string library functions, Pointer arithmetic, Pointers and Arrays, Pointers to function, Dynamic memory allocation.

**Practical:** Programs using pointers, dynamic memory, pointer arithmetic, string manipulations, array operations. (Minimum three)

**Structures & Unions:** Defining and using structures, Array of structures, Pointers to structures, Unions and their uses, Enumerations.

**Practical:** Program to use structures and unions

**File Operations:** Open, read, write, close file operations, Binary vs Text files, File pointers, Error handling in file operations.

**Practical:** Programs reading/writing data in text and binary files (Minimum three).

**Standard Libraries & Header Files:** Using standard libraries like stdio.h, stdlib.h, string.h, math.h, Creating and using user-defined header files and libraries.

**Practical:** Use of standard and user-defined libraries in solving problems. (Minimum three), Project (Minimum Two)

**Weightage:** Continuous Assessment: 50%, End Semester Examinations: 50%

**Assessment Methodology:** Quiz (5%), Project (15%), Assignment Programs (25%), Practical (25%), Internal Examinations (30%)

**References:**


1. Thareja, R. (2021). Programming in C . Oxford University Press.
2. Balagurusamy, E. (2019). Programming in ANSI C. McGraw Hill Education.
3. Kanetkar, Y. (2020). Let us C. BPB Publications.
4. Kalicharan, N. (2022). Learn to program with C: An introduction to programming using the C language. Apress.
5. Forouzan, B. A., & Afyouni, H. (2023). Computer science: A structured programming approach in C (4th ed.). Cengage.


**E-resources:**

1. Learn-C.org - https://www.learn-c.org/
2. GeeksforGeeks - C Programming - https://www.geeksforgeeks.org/c-programming-language/
3. GNU C Library Documentation - https://www.gnu.org/software/libc/manual/
4. “Introduction to C Programming”, Swayam MOOC Course, https://onlinecourses.swayam2.ac.in/imb25_mg71/

| | Description of CO | PO | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|
| CO1 | Explain the potential usage of ‘C’ in engineering applications | --- | | | |
| CO2 | To apply the concepts of ‘C’ in solving engineering problems and formulate new projects. | PO1 (2)<br>PO5 (2) | | | |
| CO3 | To interpret the data and effectively communicate in groups. | PO2 (3)<br>PO8 (1)<br>PO9 (1) | | | |
| CO4 | Adapt new programming concepts and technologies in the profession. | PO11 (1) | | | |

| ME25C04 | Makerspace | L | T | P | C |
|---|---|---|---|---|---|
| | | 0 | 0 | 4 | 2 |

**Course Objectives:**

- To impart practical skills in the assembly, disassembly, and welding of components using appropriate tools and techniques.
- To provide hands-on training in electrical wiring practices, and the use of electronic components, sensors, and actuators.

**List of Activities**

**(A). Dis-assembly & Assembly Practices**

i. Tools and its handling techniques.
ii. Dis-assembly and assembly of home appliances – Grinder Mixer Grinder, Ceiling Fan, Table Fan & Washing Machine.
iii. Dis-assembly and assembly of Air-Conditioners & Refrigerators.
iv. Dis-assembly and assembly of a Bicycle.

**(B). Welding Practices**

i. Welding Procedure, Selection & Safety Measures.
ii. Power source of Arc Welding – Gas Metal Arc Welding & Gas Tungsten Arc Welding processes.
iii. Hands-on session of preparing base material & Joint groove for welding.
iv. Hands-on session of MAW, GMAW, GTAW, on Carbon Steel & Stainless Stell plates / pipes, for fabrication of a simple part.

**(C). Electrical Wiring Practices**

i. Electrical Installation tools, equipment & safety measures.
ii. Hands-on session of basic electrical connections for Fuses, Miniature Circuit Breakers and Distribution Box.
iii. Hands-on session of electrical connections for Lightings, Fans, Calling Bells.
iv. Hands-on session of electrical connections for Motors & Uninterruptible Power Supply.

**(D). Electronics Components / Equipment Practices**

i. Electronic components, equipment & safety measures.
ii. Dis-assembly and assembly of Computers.
iii. Hands-on session of Soldering Practices in a Printed Circuit Board.
iv. Hands-on session of Bridge Rectifier, Op-Amp and Transimpedance amplifier.
v. Hands-on session of integration of sensors and actuators with a Microcontroller.
vi. Demonstration of Programmable Logic Control Circuit.

**(E). Contemporary Systems**

i. Demonstration of Solid Modelling of components.
ii. Demonstration of Assembly Modelling of components.

iii. Fabrication of simple components / parts using 3D Printers.
iv. Demonstration of cutting of wood / metal in different complex shapes using Laser Cutting Machine.

**References:**


1. Stephen Christena, Learn to Weld: Beginning MIG Welding and Metal Fabrication Basics, Crestline Books, 2014.
2. H. Lipson, Fabricated - The New World of 3D Printing, Wiley, 1st edition, 2013.
3. Code of Practice for Electrical Wiring Installations (IS 732:2019)


**Course Outcomes:**

| | Description of CO | PO | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|
| CO1 | Demonstrate proper use and handling of basic hand and power tools. | --- | | | |
| CO2 | Carry out electrical wiring installations and repairs, applying safety measures in domestic applications. | PO1 (3) | | | |
| CO3 | Develop solid innovative models through software. | PO5 (2) | | | |
| CO4 | Adapt and follow safety protocols in the work environment. | PO11(2) | | | |

| UC25A01 | Life Skills for Engineers – I | L | T | P | C |
|---|---|---|---|---|---|
| | | 1 | 0 | 2 | - |

**Course Objectives:**

- To equip engineering students with essential life skills encompassing personal and emotional development, effective management of time and stress, financial literacy, digital safety, and civic responsibility.
- To enhance self-awareness, interpersonal skills, and resilience to prepare students for the professional and personal challenges of engineering careers and life beyond academics.

**Personal and Emotional Development:** Self-Awareness & Personality, Emotional Intelligence & Empathy, Positive thinking, Right attitude, Stress & Anger Management, Goal-Setting & Time Management, Growth Mindset & Resilience.

**Activities:** Personality tests (MBTI, DISC), reflection journals, Empathy circle, role-playing difficult conversations, Guided mindfulness sessions, stress relief toolkit creation, Vision board creation, weekly time audit and planner, Group challenge scenarios, resilience journal.

**Management Skills:** Financial Literacy: Budgeting & Saving, Nutrition, Health, and Hygiene, Digital Literacy & Online Safety, Civic Responsibility & Ethics

**Activities:** Create a monthly budget, financial simulation game, Meal planning workshop, physical wellness challenge, Social media audit, privacy and safety scenarios, Community service, values debate.

**Weightage:** Continuous Assessment: 100%

**Assessment Methodology:** Assignments (20%), Flipped Class & Worksheets (10%), Practical (30%), Internal Examinations (40%)

**References:**


1. Khera, S. (2003). *You can win*. Macmillan.
2. Levesque, H. (n.d.). *Life skills 101: A practical guide to leaving home and living on your own*. (Publication year not specified)
3. Mitra, B. K. (2017). *Personality development & soft skills* (3rd impression). Oxford University Press.
4. ICT Academy of Kerala. (2016). *Life skills for engineers*. McGraw Hill Education (India) Private Ltd.


| | Description of CO | PO | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|
| CO1 | Understand personality traits and emotional intelligence, in interpersonal interactions. | --- | | | |
| CO2 | To work and execute as a team through successful implementation of set goals. | PO7 (1)<br>PO8 (2)<br>PO9 (2) | | | |
| CO3 | Develop and implement best practices in day-to-day life, in terms of planning and execution. | PO11 (3) | | | |

| UC25A02 | Physical Education - I | L | T | P | C |
|---|---|---|---|---|---|
| | | 0 | 0 | 4 | 1 |

**Course Objectives:**

- To impart the fundamentals of physical education for development of students' physical, mental, and social well-being.
- To instill a lifelong appreciation for physical activity towards the development of positive attitude and fostering values of team work and sportsmanship.

**Introduction to physical education:** Exercise for Good Posture – Conditioning and Calisthenics for Before start, Jogging, Bending, Twisting, Standing, Sitting and Relaxation, Training on First Aid practices.

**Participation of athletic events:** Rules and regulations of important athletic events, Sprint, Jumps, Throws and Hurdles.

**Skill development in any one of the following outdoor games:** Basket Ball, Volley Ball, Ball Badminton, Football, Hockey, Kho-Kho, Kabaddi, Cricket, Hand ball and Tennis.

**Skill development in any one of the following indoor games:** Shuttle Badminton, Chess and Table Tennis.

**Weightage:** Continuous Assessment: 100%

**Assessment Methodology:** Attendance (60%), Quiz (10%), Participation in Sports and Games (20%) and Viva Voce (10%)

**References:**


1. Singh, A. (2008). Essentials of physical education. Kalyani Publishers.
2. Kamlesh, M. L. (2006). Psychology in physical education and sport (3rd ed.). Metropolitan Book Co.
3. Mangal, S. K. (2009). *Psychology of sports performance*. Sports Publication.


**E-resources:**

1. **https://www.who.int/health-topics/physical-activity**

| | CO Description | PO | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|
| CO1 | Understand and explain the importance of physical activity for mental and physical health. | --- | | | |
| CO2 | Apply basic principles of exercise science in the routine life. | PO1(3) | | | |
| CO3 | Develop teamwork, discipline, and leadership through sports and group activities and collaborate effectively. | PO8(3) | | | |
| CO4 | Demonstrate independent learning in health, nutrition, and fitness-related topics. | PO11(2) | | | |

# Semester II

| MA25C02 | Linear Algebra | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 1 | 0 | 4 |

**Course Objectives:**

- To impart foundational knowledge in linear algebra essential for analysing and solving problems in engineering applications.
- To provide the knowledge on computation using software and interpret key linear algebra concepts using software.

**Vector Spaces** Introduction to Vector Spaces, Examples, Subspaces, Linear Combinations, Span, Generating Sets, Linear Dependence and Independence, Basis and Dimension, Dimension of Subspaces.

**Activities:** Open-Source software, exercises to test linear dependence and independence using rank, compute span and basis of a set of vectors, determine the dimension of subspaces, and illustrate the concept of subspace and basis in $\boldsymbol{R^2}/\boldsymbol{R^3}$ with visualization.

**Linear Transformations and Diagonalization:** Null space, Range, Dimension Theorem (statement only), Matrix representation of a linear transformation, Eigenvalues & Eigenvectors, Diagonalizability.

**Activities:** Open-Source software, exercises to compute the matrix representation of a linear transformation, find the null space and range of a matrix, and compute eigenvalues and eigenvectors of a matrix.

**Inner Product Spaces:** Inner product, Norms, Cauchy, Schwarz inequality, Gram, Schmidt orthogonalization, Simple problems (up to $\boldsymbol{R^3}$).

**Activities:** Open-Source software, exercises to compute inner products and vector norms.

**Matrix Decomposition:** Orthogonal transformation of a symmetric matrix to diagonal form - Positive definite matrices, QR decomposition, Singular Value Decomposition (SVD), Least squares solutions- simple problems (up to $3 \times 3\ matrices$).

**Activities:** Open-Source software, exercises to check if a matrix is positive definite, perform QR decomposition and SVD using built-in functions.

**Weightage:** Continuous Assessment: 40%, End Semester Examinations: 60%.

**Assessment Methodology:** Assignment (20%), Software activity (20%), Quiz (20%), Internal Examinations (50%).

**References:**


1. Friedberg, S. H., Insel, A. J., & Spence, L. E. (2022). *Linear algebra*. Pearson.
2. Lay, D. C., Lay, S. R., & McDonald, J. J. (2020). *Linear algebra and its applications with MATLAB*. Pearson.
3. Bronson, R. (2011). *Schaum's outline of matrix operations*. McGraw-Hill Education.
4. Strang, G., & Thomson, R. (2005). *Linear algebra and its applications*. Brooks/Cole.

5. Lipschutz, S., & Lipson, M. (2009). *Schaum's outline of linear algebra*. McGraw-Hill.
6. Kreyszig, E. (2018). *Advanced engineering mathematics*. Wiley India.

| | Description of CO | PO | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|
| CO1 | Explain the fundamental concepts of Linear Algebra. | --- | | | |
| CO2 | Compute and interpret eigenvalues and eigenvectors. | PO1(3) | | | |
| CO3 | Apply inner product concepts and perform orthogonalization. | PO1 (3) | | | |
| CO4 | Compute least squares solutions of linear system of equations. | PO1 (2)<br>PO2 (2) | | | |
| CO5 | Use MATLAB to implement and validate key linear algebra concepts | PO5 (1)<br>PO11 (1) | | | |

| UC25H02 | தமிழர்களும் தொழில்நுட்பமும் / Tamils and Technology | L | T | P | C |
|---|---|---|---|---|---|
| | | 1 | 0 | 0 | 1 |

**நெசவு மற்றும் பானைத் தொழில்நுட்பம்**: சங்க காலத்தில் நெசவுத் தொழில், பானைத் தொழில்நுட்பம், கருப்பு சிவப்பு பாண்டங்கள், பாண்டங்களில் கீறல் குறியீடுகள்.

**வடிவமைப்பு மற்றும் கட்டிடத் தொழில்நுட்பம்**: சங்க காலத்தில் வடிவமைப்பு மற்றும் கட்டுமானங்கள் & சங்க காலத்தில் வீட்டுப் பொருட்களில் வடிவமைப்பு, சங்க காலத்தில் கட்டுமான பொருட்களும் நடுகல்லும், சிலப்பதிகாரத்தில் மேடை அமைப்பு பற்றிய விவரங்கள், மாமல்லபுரச் சிற்பங்களும், கோவில்களும், சோழர் காலத்துப் பெருங்கோயில்கள் மற்றும் பிற வழிபாட்டுத் தலங்கள், நாயக்கர் காலக் கோயில்கள், மாதிரி கட்டமைப்புகள் பற்றி அறிதல், மதுரை மீனாட்சி அம்மன் ஆலயம் மற்றும் திருமலை நாயக்கர் மஹால், செட்டிநாட்டு வீடுகள், பிரிட்டிஷ் காலத்தில் சென்னையில் இந்தோ-சாரோசெனிக் கட்டிடக் கலை.

**உற்பத்தித் தொழில் நுட்பம்**: கப்பல் கட்டும் கலை, உலோகவியல், இரும்புத் தொழிற்சாலை, இரும்பை உருக்குதல், எஃகு, வரலாற்றுச் சான்றுகளாக செம்பு மற்றும் தங்க நாணயங்கள், நாணயங்கள் அச்சடித்தல், மணி உருவாக்கும் தொழிற்சாலைகள், கல்மணிகள், கண்ணாடி மணிகள், சுடுமண் மணிகள், சங்கு மணிகள், எலும்புத்துண்டுகள், தொல்லியல் சான்றுகள், சிலப்பதிகாரத்தில் மணிகளின் வகைகள்.

**வேளாண்மை மற்றும் நீர்ப்பாசனத் தொழில் நுட்பம்**: அணை, ஏரி, குளங்கள், மதகு, சோழர்காலக் குமுழித் தூம்பின் முக்கியத்துவம், கால்நடை பராமரிப்பு, கால்நடைகளுக்காக வடிவமைக்கப்பட்ட கிணறுகள், வேளாண்மை மற்றும் வேளாண்மைச் சார்ந்த செயல்பாடுகள், கடல்சார் அறிவு, மீன்வளம், முத்து மற்றும் முத்துக்குளித்தல், பெருங்கடல் குறித்த பண்டைய அறிவு, அறிவுசார் சமூகம்.

**அறிவியல் தமிழ் மற்றும் கணித்தமிழ்**: அறிவியல் தமிழின் வளர்ச்சி, கணித்தமிழ் வளர்ச்சி. தமிழ் நூல்களை மின்பதிப்பு செய்தல். தமிழ் மென்பொருட்கள் உருவாக்கம். தமிழ் இணையக் கல்விக்கழகம். தமிழ் மின் நூலகம். இணையத்தில் தமிழ் அகராதிகள். சொற்குவைத் திட்டம்.

## References


1. தமிழக வரலாறு – மக்களும் பண்பாடும் – கே.கே. பிள்ளை (வெளியீடு: தமிழ்நாடு பாடநூல் மற்றும்
   கல்வியியல் பணிகள் கழகம்).
2. கணினித் தமிழ் – முனைவர் இல. சுந்தரம். (விகடன் பிரசுரம்).
3. கீழடி – வைகை நதிக்கரையில் சங்ககால நகர நாகரிகம் (தொல்லியல் துறை வெளியீடு)
4. பொருநை – ஆற்றங்கரை நாகரிகம். (தொல்லியல் துறை வெளியீடு)
5. Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL – (in print)
6. Social Life of the Tamils – The Classical Period (Dr.S.Singaravelu) (Published by: InternationalInstitute of Tamil Studies.
7. Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thirunavukkarasu) (Published by: International Institute of Tamil Studies).
8. The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: International Institute of Tamil Studies.)
9. Keeladi – 'Sangam City C ivilization on the banks of river Vaigai' (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
10. Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay) (Publishedby: The Author)
11. Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Bookand Educational Services Corporation, Tamil Nadu).
12. Journey of Civilization Indus to Vaigai (R.Balakrishnan) (Published by: RMRL) – Reference Book.

| UC25H02 | Tamils and Technology | L | T | P | C |
|---|---|---|---|---|---|
| | | 1 | 0 | 0 | 1 |

**Weaving and Ceramic Technology:** Weaving Industry during Sangam Age, Ceramic technology, Black and red Ware Potteries (BRW), Graffiti on Potteries.

**Design and Construction Technology:** Designing and Structural construction House & Designs in household materials during Sangam Age, Building materials and Hero stones of Sangam age, Details of Stage Constructions in Silappathikaram, Sculptures and Temples of Mamallapuram, Great Temples of Cholas and other worship places, Temples of Nayaka Period, Type study (Madurai Meenakshi Temple), Thirumalai Nayaka rMahal, Chetti Nadu Houses, Indo-Saracenic architecture at Madras during British Period.

**Manufacturing Technology:** Art of Ship Building, Metallurgical studies, Iron industry, Iron smelting, steel -Copper and gold- Coins as source of history, Minting of Coins, Beads making-industries Stonebeads, Glass beads, Terracotta beads, Shell beads/ bone beats, Archeological evidences, Gem stone types described in Silappathikaram.

**Agriculture and Irrigation Technology:** Dam, Tank, ponds, Sluice, Significance of Kumizhi Thoompuof Chola Period, Animal Husbandry, Wells designed for cattle use, Agriculture and Agro Processing, Knowledge of Sea, Fisheries, Pearl, Conche diving, Ancient Knowledge of Ocean, Knowledge Specific Society.

**Scientific Tamil & Tamil Computing:** Development of Scientific Tamil, Tamil computing, Digitalization of Tamil Books, Development of Tamil Software, Tamil Virtual Academy, Tamil Digital Library, Online Tamil Dictionaries, Sorkuvai Project.

**References**


1. தமிழக வரலாறு – மக்களும் பண்பாடும் – கே.கே. பிள்ளை (வெளியீடு: தமிழ்நாடு பாடநூல் மற்றும்
   கல்வியியல் பணிகள் கழகம்).
2. கணினித் தமிழ் – முனைவர் இல. சுந்தரம். (விகடன் பிரசுரம்).
3. கீழடி – வைகை நதிக்கரையில் சங்ககால நகர நாகரிகம் (தொல்லியல் துறை வெளியீடு)
4. பொருநை – ஆற்றங்கரை நாகரிகம். (தொல்லியல் துறை வெளியீடு)
5. Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL – (in print)
6. Social Life of the Tamils – The Classical Period (Dr.S.Singaravelu) (Published by: International Institute of Tamil Studies.
7. Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thirunavukkarasu) (Published by: International Institute of Tamil Studies).
8. The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: International Institute of Tamil Studies.)
9. Keeladi – 'Sangam City C ivilization on the banks of river Vaigai' (Jointly Published by: Department ofArchaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
10. Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay) (Publishedby: The Author)
11. Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Bookand Educational Services Corporation, Tamil Nadu)
12. Journey of Civilization Indus to Vaigai (R.Balakrishnan) (Published by: RMRL) – Reference Book.

| EN25C02 | English Essentials – II | L | T | P | C |
|---|---|---|---|---|---|
| | | 1 | 0 | 2 | 2 |

**Course Objectives:**

- To integrate vocabulary and functional grammar into communication tasks to improve fluency and accuracy.
- To articulate ideas clearly and effectively in formal and informal spoken interactions.
- To construct well-organised written documents including summaries, reports, and emails relevant to academic and workplace contexts.

**Communication:** Types, Inter and Intra-personal, communication barriers, Summarising visuals, media terminology, rhetorical devices and TED Talks.

**Activities:** Short presentation, Media based responses and Speeches, Error detection, Welcome, Vote of Thanks and Formal Speeches, Listen and respond to short podcast, Worksheets.

**Correspondence:** Modal Verbs, Job Application Letters, Resume Writing, Statement of Purpose, Paraphrasing & Summarizing, Executive Summary.

**Activities:** Email writing, Submission of applications, Graphical summaries, Report on college events.

**Professional Writing:** Paraphrasing & Summarizing, Executive Summary, Proposal, Decision Making, Recommendations.

**Activities:** Report preparation and recommendation letters.

**Team Work:** Team Leader, Quality of Team leader, Leadership model, Negotiations.

**Activities:** SWOT Analysis, Mock meetings, Group discussions, Brainstorming sessions.

**Weightage:** Continuous Assessment: 50%, End Semester Examinations: 50%

**Assessment Methodology:** Worksheets (10%), Group Activity (20%), Report Writing (20%), Internal Examinations (50%)

**References:**


1. Koneru Aruna. (2020*). English Language Skills for Engineers*. McGraw Hill Education.
2. Taylor, Shirley & Chandra .V. (2010). *Communication for Business A Practical Approach*. India: Pearson Longman.
3. Ian Badger, et al., (2014). *Listening: B2 (Collins English for Life: Skills)*, Collins.
4. Raymond Murphy (2019), *Grammar in Use*, Cambridge University Press.


**E-resources:**

1. Communication for Business Success - https://open.umn.edu/opentextbooks/textbooks/8
2. TED Talks – https://www.ted.com/

| | Description of CO | PO | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|
| CO1 | Understand the importance of communication and drafting skills in engineering and technology. | --- | | | |
| CO2 | Apply listening strategies to comprehend spoken English in various contexts. | PO1(3) | | | |
| CO3 | Participate actively in group discussions by analysing critically from different views. | PO2(2)<br>PO8(1) | | | |
| CO4 | Create written reports coherently for various purposes. | PO9(2) | | | |
| CO5 | Adapt communication styles to global, multicultural environments. | PO11(1) | | | |

| EC25C01 | Electron Devices | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 0 | 2 | 4 |

**Course Objective:**

- To acquaint with the construction, theory and operation of the basic electronic devices such as PN junction diode, Bipolar and Field Effect Transistors, Power control devices, LED, LCD and other Optoelectronic devices.

**Semiconductor**: Types, Conductivity, Electron energy levels and energy band diagram, Carrier concentration, Mass action law, Characteristics and behavior of intrinsic semiconductors, Variation in properties with temperature, Carrier drift and diffusion, Current density equation, Excess carrier generation and recombination rates, Carrier life time. Continuity equation.

**Activity:** Virtual demonstration of energy levels, Drift and diffusion current.

**PN Junction Diodes:** Energy band diagram of open-circuited PN junction, Forward and reverse bias characteristics, Diode resistance, Transition and diffusion capacitance, Effect of temperature on diode behavior, Applications of PN junction diodes.

**Special Diodes**: Zener diode – breakdown mechanisms and voltage regulation, Varactor diode, Tunnel diode, Photo diode – construction, operation, and applications.

**Activities:** Virtual demonstration of characteristics of junction diodes, Design of a constant voltage regulator using Zener Diode.

**Bipolar Junction Transistors:** Construction, working, characteristics in CB, CE, and CC configurations, regions of operation, current gain, input/output characteristics, Early effect. Other Devices: Multi-emitter transistor – construction and applications.

**Practical:** Input and Output characteristics of Characteristics of BJT.

**Field Effect Transistors:** JFET – construction, working, characteristics, parameters. MOSFET, MOS capacitor, depletion and enhancement modes, nMOS and pMOS, threshold voltage, transfer and output characteristics. CMOS – introduction and basic operation.

**Practical:** Input and Output characteristics of Characteristics of JFET, MOSFET.

**Thyristors:** Shockley diode, Silicon Controlled Rectifier (SCR), TRIAC and DIAC – operation and applications, Thyristor protection techniques**.**

**Unijunction Transistor (UJT):** Construction, characteristics and application as relaxation oscillator.

**Optoelectronic Devices:** LED, LCD, Photo transistor, Opto-coupler – principle, characteristics and applications. Power MOSFETs: Construction, switching characteristics and applications in power circuits.

**Practical:** VI characteristics of SCR, UJT.

**Weightage:** Continuous Assessment: 50%, End Semester Examinations: 50%

**Assessment Methodology:** Quiz (5%), Assignments (20%), Flipped Class (5%), Practical (30%), Internal Examinations (40%)

**References:**


1. Neamen, D. A. (2012). *Semiconductor physics and devices*. Tata McGraw-Hill.
2. Boylestad, R. L., & Nashelsky, L. (2008). *Electronic devices and circuit theory*. Pearson Prentice Hall.
3. Yang, C. Y. (1978). *Fundamentals of semiconductor devices*. McGraw-Hill International.
4. Salivahanan, S., Suresh Kumar, N., & Vallavaraj, A. (2008). *Electronic devices and circuits*. Tata McGraw-Hill.
5. Floyd, T. L. (2018). *Electronic Devices: Conventional Current Version*. Pearson.


**E-Resources:**

1. https://archive.nptel.ac.in/courses/108/108/108108122/
2. https://onlinecourses.nptel.ac.in/noc21_ee80/preview
3. Razavi Electronics 1, Lec 1, Intro., Charge Carriers, Doping
4. Semiconductor Devices: Fundamentals

| | CO Description | PO | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|
| CO1 | Explain the behavior of Semiconductor physics and its applications in electron devices. | --- | | | |
| CO2 | Apply the concepts and compare the different configuration of various electron devices. | PO1 (3) | | | |
| CO3 | Analyze and interpret the characteristics of various electron devices. | PO2 (2) | | | |
| CO4 | Perform experiments to evaluate and compare the characteristics of electronic components. | PO2 (2)<br>PO4 (2) | | | |

| EC25C02 | Circuits and Network Analysis | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 0 | 2 | 4 |

**Course Objectives:**

- To impart the fundamental principles of circuit laws, network theorems, and analysis techniques for DC and AC circuits.
- To gain analytical and simulation skills for both steady-state and transient behaviors in AC and DC circuits.

**Circuit Laws and Network Theorems:** Basic electrical components, voltage, current, power, Network terminology- Node, Junction, Branch, Loop, Short and Open Circuits, DC and AC circuits, Ohm's Law, Kirchhoff's Laws, Resistors, inductors, and capacitors in series and parallel, voltage and current division rule, Mesh and Nodal Analysis for AC and DC circuits, Source transformation techniques, Star delta transformation techniques, principle of linearity, Thevenin's and Norton's theorems, Superposition theorem, Maximum power transfer theorem, Reciprocity theorem.

**Practical:**

1. Verifications of KVL & KCL.
2. Verification of Mesh and Nodal analysis of DC circuits
3. Verification of Thevenin's and Norton's theorems

**Steady-State and Transient Analysis of Ac and DC Circuits:** Components behavior (R, L, and C) in AC and DC, Characteristics of sinusoids, Phasor relationship for R, L, and C, Phasor diagram, Natural and forced response, Steady-state and Transient analysis of RL, RC, RLC circuits using Laplace Transform.

**Practical:**

1. Create a physical model of an RL, RC, or RLC circuit to observe its transient and steady-state behaviour using LTspice (open-source)

**Resonance and Coupled Circuits:** Natural frequency and Damping ratio, Series resonance, Parallel resonance, Quality factor (Q), Bandwidth, Selectivity, Effect of Q on bandwidth and selectivity. Self-inductance, Mutual inductance, Dot conversion, Ideal Transformer.

**Practical:**

1. Determination of Resonance Frequency of Series & Parallel RLC Circuits.
2. Transient analysis of RL and RC circuits.

**Linear Two-Port Network Analysis:** Introduction to two-port networks, Characterization in terms of impedance, admittance, hybrid, and transmission parameters, parameter conversions, Interconnection of two-port networks – Symmetry and Reciprocity.

**Practical:**

1. Measurement of Impedance Parameters (Z-Parameters)
2. Explore the behavior of two interconnected two-port networks and verify the principles of symmetry and reciprocity.

**Weightage:** Continuous Assessment: 50%, End Semester Examinations: 50%

**Assessment Methodology:** Quiz (5%), Assignments (20%), Flipped Class (5%), Practical (30%), Internal Examinations (40%)


1. Hayt, W. H., Kemmerly, J. E., & Durbin, S. M. (2024). *Engineering circuit analysis*. McGraw Hill Education.
2. Boylestad, R. L. (2014). *Introductory circuit analysis*. Pearson Education India.
3. Alexander, C. K., & Sadiku, M. N. O. (2017). *Fundamentals of electric circuits*. McGraw Hill Education.
4. Kuo, F. F. (2012). *Network analysis and synthesis*. Wiley India.


**E-Resources:**

1. https://nptel.ac.in/courses/108102042
2. https://nptel.ac.in/courses/108105159
3. https://archive.nptel.ac.in/courses/108/104/108104139/
4. https://archive.nptel.ac.in/courses/117/106/117106108/
5. https://www.ee.iitm.ac.in/videolectures/doku.php?id=ee2015_2017nk:start

| | CO Description | PO | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|
| CO1 | Explain basic circuit laws, network theorems, and the behavior of circuit components | --- | | | |
| CO2 | Apply network analysis methods, such as mesh analysis and nodal analysis, for solving DC circuits. | PO1 (2)<br>PO2 (3)<br>PO4 (2) | | | |
| CO3 | Analyze and evaluate the steady-state and transient behaviors of RL RC, RLC circuits and two-port networks. | PO2 (3)<br>PO3 (2)<br>PO4 (2) | | | |

| CS25C05 | Data Structures using C++ | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 0 | 2 | 4 |

**Course Objective:**

- This course aims to provide an understanding of object-oriented programming principles using C++.

**Data Abstraction & Overloading:** Overview of C++, Structures, Class Scope and Accessing Class Members, Reference Variables, Initialization, Constructors, Destructors, Member Functions and Classes, Friend Function, Dynamic Memory Allocation, Static Class Members, Container Classes and Integrators, Proxy Classes, Overloading: Function overloading and Operator Overloading.

**Practical:**

1. Program to Implement Constructors and Destructors.
2. Program to implement Member Functions, Classes and Friend Functions.
3. Program to Implement Dynamic Memory Allocation and Overloading.

**Inheritance & Polymorphism:** Base Classes and Derived Classes, Protected Members, Casting Class pointers and Member Functions, Overriding, Public, Protected and Private Inheritance–Constructors and Destructors in derived Classes, Implicit Derived, Class Object to Base, Class Object Conversion, Composition Vs. Inheritance, Virtual functions, This Pointer, Abstract Base Classes and Concrete Classes, Virtual Destructors, Dynamic Binding.

**Practical:**

1. Program to Implement various inheritances.
2. Program to Implement virtual functions and dynamic binding.
3. Implementation of method overriding and operator overloading.

**Linear Data Structures:** Asymptotic Notations: Big-Oh, Omega and Theta, Best, Worst and Average case Analysis: Definition and an example, Arrays and its representations, Stacks and Queues, Linked lists, Linked list based implementation of Stacks and Queues, Evaluation of Expressions, Linked list based polynomial addition.

**Practical:**

1. Program to implement various operations on arrays and linked lists.
2. Program to implement various operations on stacks and queues using array and linked list.
3. Program to evaluate the infix expressions by converting into prefix and postfix expressions

**Linear Data Structures:** Asymptotic Notations: Big-Oh, Omega and Theta, Best, Worst and Average case Analysis: Definition and an example – Arrays and its representations, Stacks and Queues, linked lists, linked list based implementation of Stacks and Queues, Evaluation of Expressions, linked list based polynomial addition.

**Practical:**

1. Program to Implement Various Operations on Arrays and Linked Lists.
2. Program to Implement Various Operations on Stacks and Queues using Array and Linked List.
3. Program to Evaluate the Infix Expressions by converting into Prefix and Postfix Expressions.

**Non-Linear Data Structures:** Trees, Binary Trees, Binary tree representation and traversals, Threaded binary trees, Binary tree representation of trees, Application of trees: Set representation and Union, Find operations, Graph and its representations, Graph Traversals, Connected components. Standard template library.

**Practical:**

1. Program to Implement Binary Tree Traversal and Graph Traversal Algorithm.
2. Program to Implement the Single Source Shortest Path Algorithm and All Pair Shortest Path Algorithm.
3. Program to find the Minimal Spanning Tree for a Graph.

**Searching, Sorting and Complexity Analysis:** Insertion sort, Merge sort, Quicksort, Heapsort, Linear Search, Binary Search.

**Practical:**

1. Program to Implement Linear Search and Binary Search Algorithms.
2. Program to Implement Insertion Sort, Merge Sort, Quick Sort and Heap Sort Algorithms.

**Weightage:** Continuous Assessment: 50%, End Semester Examinations: 50%

**Assessment Methodology:** Quiz (5%), Assignments (20%), Flipped Class (5%), Practical (30%), Internal Examinations (40%)

**References**


1. Deitel, P. J., & Deitel, H. M. (2005). *C++ how to program*. Pearson Education.
2. Ellis Horowitz, E., Sahni, S., & Mehta, D. (2007). *Fundamentals of data structures in C++*. Universities Press Pvt Ltd.
3. Weiss, M. A. (2007). *Data structures and algorithm analysis in C++*. Addison-Wesley.
4. Trivedi, B. (2010). *Programming with ANSI C++: A step-by-step approach*. Oxford University Press.
5. Goodrich, M. T., Tamassia, R., & Mount, D. (2004). *Data structures and algorithms in C++*. Wiley.


**E-Resources:**

1. https://nptel.ac.in/courses/106/106/106106143/
2. https://www.tutorialspoint.com/data_structures_algorithms/index.htm

| | CO Description | PO | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|
| CO1 | Explain the concepts and applications of Data Structure in various engineering applications | | | | |
| CO2 | Apply various Data Structure in real time | PO1(3) | | | |
| CO3 | Develop suitable and interrupt the data in real world applications | PO1(2) PO3(2) | | | |

| UC25A03 | Life Skills for Engineers – II | L | T | P | C |
|---|---|---|---|---|---|
| | | 1 | 0 | 2 | - |

**Course Objectives:**

- To impart and cultivate analytical reasoning, innovative thinking, effective collaboration, and ethical leadership to prepare students for complex challenges in professional and personal environments.

**Critical Thinking:** Creativity, Critical Thinking, Collaboration, Problem Solving, Decision Making, Imagination, Intuition, Experience, Sources of Creativity, Lateral Thinking, Myths of creativity, Critical thinking Vs Creative thinking, Convergent & Divergent Thinking, Critical reading & Multiple Intelligence.

**Activities:** Two-Brainstorm Method, “30 Circles” Challenge, “Desert Survival” Simulation, Lateral thinking riddles and puzzles, "What If?" Scenario Writing, Fast vs. Slow Thinking Game, Creativity Myth Busters

**Problem Solving:** Techniques, Six Thinking Hats, Mind Mapping, Forced Connections. Analytical Thinking, Numeric, symbolic, and graphic reasoning. Scientific temperament and Logical thinking.

**Activities:** Case study analysis, Escape Room challenge.

**Leadership:** Leadership Styles & Self-Assessment, Communication & Active Listening, Decision-Making & Responsibility, Teamwork & Delegation, Empathy, Integrity & Conflict Management, Vision, Motivation & Goal-Setting.

**Activities:** Crisis Leadership Simulation, Tower Challenge, Leadership Dilemmas Role-Play, Team Vision Board

**Weightage:** Continuous Assessment: 100%

**Assessment Methodology:** Assignments (20%), Flipped Class & Worksheets (10%), Practical (30%), Internal Examinations (40%)

**References:**


1. De Bono, E. (2017). *Six thinking hats*, Little, Brown Book Group.
2. Facione, P. A. (2015). *Critical thinking: What it is and why it counts*. Insight Assessment.
3. Kahneman, D. (2011). *Thinking, fast and slow*. Farrar, Straus and Giroux.
4. Whetten, D. A., & Cameron, K. S. (2016). *Developing management skills*. Pearson.

| | Description of CO | PO | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|
| CO1 | Explain the importance of leadership and management skills in life. | --- | | | |
| CO2 | Apply and demonstrate creative thinking techniques to generate innovative solutions. | PO7 (3) | | | |
| CO3 | Exhibit effective collaboration and communication skills through teamwork, active listening, and conflict resolution strategies. | PO8 (2) | | | |
| CO4 | Integrate scientific temperament and logical reasoning into c problem solving in engineering and real-world contexts. | PO11 (2) | | | |

| UC25A04 | Physical Education - II | L | T | P | C |
|---|---|---|---|---|---|
| | | 0 | 0 | 4 | 1 |

**Course Objectives:**

- To impart knowledge on gymnastic exercises and pressing needs for upskilling in a particular game.

**Basic gymnastics exercises:** Warming up, Suitable exercise, Lead up games, Safety education, Movement education, Balanced Walk, execution, floor exercise, tumbling/acrobatics, grip, release, swinging, parallel bar exercise, horizontal bar exercise, flic-flac-walk and pyramids.

**Upskilling in any one of the athletics:** Broad Jump, High Jump, Triple Jump, Relay Sprints, Javelin Throw, Discuss Throw, Shot Put, Short and Long-distance Running.

**Advance skills in any one of the indoor/outdoor games, which has been opted by the student in the I semester.**

**Weightage:** Continuous Assessment: 100%

**Assessment Methodology:** Attendance (60%), Quiz (10%), Participation in Sports and Games (20%) and Viva Voce (10%)

**References:**


1. Singh, A. (2008). Essentials of physical education. Kalyani Publishers.
2. Kamlesh, M. L. (2006). Psychology in physical education and sport (3rd ed.). Metropolitan Book Co.
3. Mangal, S. K. (2009). *Psychology of sports performance*. Sports Publication.
4. Kandappan, K. (2004). *Foundations of physical education*. Friends Publications.


**E-resources:**

1. **https://www.who.int/health-topics/physical-activity**

| | CO Description | PO | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|
| CO1 | Understand and explain the importance of physical activity for mental and physical health. | --- | | | |
| CO2 | Apply safety principles and methods during sports activities. | PO1(3) | | | |
| CO3 | Develop teamwork, discipline, and leadership through sports and group activities and collaborate effectively. | PO8 (3) | | | |
| CO4 | Demonstrate the advanced technical skills and strategic understanding in the game of their interest. | PO11(1) | | | |

| ME25C05 | Re-Engineering for Innovation | L | T | P | C |
|---|---|---|---|---|---|
| | | 0 | 0 | 4 | 2 |

**Course Objectives:**

- To cultivate foundational skills in prototyping, and automation for development of prototypes with real-world applications.
- To provide a comprehensive, hands-on exposure to product development through reverse engineering concepts.

**Bootcamp 1:** Introduction to Product Development, Reverse Engineering, Overview of the product lifecycle, Hands-on disassembly of simple products, Practice of basic measurements and sketching, Introduction to CAD modeling of disassembled parts, Virtual assembly of parts.

**Bootcamp 2:** Embedded System Programming (Open-source platforms), Practice of interfacing sensors, reading data, automation in home, healthcare and agriculture.

**Reverse Engineering:** Sketch and prototype alternative designs, Group brainstorming sessions, Manufacture prototype parts using 3D printing and / or workshop tools, Assemble prototype product.

**Weightage:** Continuous Assessment: 60%, End Semester Examinations: 40%

**Assessment Methodology:** Project (30%), Assignment (10%), Practical (30%), Internal Examinations (30%)

**References:**


1. Wang, W. (2010). Reverse engineering: Mechanisms, structures, systems & materials. CRC Press.
2. Margolis, M. (2020). Arduino cookbook: Recipes to begin, expand, and enhance your projects. O'Reilly Media.


**E-Resources:**

1. GrabCAD – https://grabcad.com/
2. GitHub – https://github.com/

| | Description of CO | PO | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|
| CO1 | Understand the product development lifecycle, including stages such as concept generation, design, prototyping, and testing. | --- | | | |
| CO2 | Apply reverse engineering techniques to analyze and document existing products. | PO1 (3)<br>PO2 (2) | | | |
| CO3 | Collaborate in teams to fabricate prototypes using appropriate tools. | PO5 (2)<br>PO8 (1)<br>PO9 (1) | | | |
| CO4 | Engage in independent learning and continuously adapt to emerging technologies in product design | PO11 (2) | | | |

## FOREIGN LANGUAGE^

| UC25F01 | Deutsch – I^ | L | T | P | C |
|---|---|---|---|---|---|
| | | 1 | 0 | 2 | - |

**Course Objectives:**

- To impart fundamentals of the Deutsch language, including reading, writing systems, pronunciation, and speaking.

**Basics & Introduction:** German alphabet and pronunciation, Basic greetings and farewells, Introducing yourself and others (Ich heiße…, Wer bist du?), Numbers 1–100 and days of the week, Personal pronouns (ich, du, er, sie…), Sentence structure (SVO word order).

**Activities:** Alphabet spelling game, short skits, Use color-coded cards for SVO sentences.

**Grammar Essentials & Everyday Vocabulary:** Present tense of regular verbs (spielen, arbeiten, machen…), Common irregular verbs: sein (to be), haben (to have), gehen, kommen, Articles and gender (der, die, das; ein, eine), Simple questions and negation (nicht, kein), Describing people and things: adjectives and colors, Family, school, food, and common objects vocabulary.

**Activities:** Conjugate regular and irregular verbs, “Question Chain” game, Create a simple family tree.

**Everyday Communication in German:** Asking for and giving directions, Telling the time and talking about schedules, Ordering food and drinks at a café or restaurant, Talking about hobbies, weather, and daily routines, Listening to short conversations and responding appropriately, Introduction to German culture and formal/informal language use (du vs Sie).

**Activities:** Ordering food and drinks, Give directions, Formal / Informal greetings, Do’s and Don’ts.

**Weightage:** Continuous Assessment: 100%

**Assessment Methodology:** Assignments (30%), Quiz (10%) and Internal Examinations 60%

**References:**

1. Funk, H., Kuhn, C., & Demme, S. (2015). *Menschen A1: Deutsch als Fremdsprache Kursbuch*. Hueber Verlag.

| | CO Description | PO | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|
| CO1 | Understand simple spoken Deutsch in everyday contexts. | --- | | | |
| CO2 | Communicate with widely used Deutsch words effectively. | PO9 (2) | | | |
| CO3 | Develop the skills necessary for self-directed learning and continuous improvement in Deutsch language. | PO11 (1) | | | |

| UC25F02 | Japanese – I^ | L | T | P | C |
|---|---|---|---|---|---|
| | | 1 | 0 | 2 | - |

**Course Objectives:**

- To impart fundamentals of the Japanese language, including reading, writing systems, pronunciation, and speaking.

**Writing Systems & Basic Communication:** Introduction to Hiragana: vowels, basic characters, reading & writing, Introduction to Katakana: basic characters and usage, Basic greetings and farewells (こんにちは, おはようございます, さようなら), Introducing yourself (名前、出身、年齢), Basic sentence structure: Subject–Object–Verb, Numbers 1–100, days of the week, classroom expressions.

**Activities:** Flashcard games and writing drills, Self-introduction, Numbers & date-matching, Greeting expressions, Listening to audio.

**Grammar & Everyday Vocabulary:** Particles: は (wa), を (wo), の (no), へ (e), に (ni), Present tense verbs: です, ます-form conjugation (たべます、のみます), Negative forms: ではありません, ません, Describing people and objects using adjectives (い and な), Question formation: なに、どこ、だれ、いつ, Vocabulary for family, food, colors, and basic actions.

**Activities:** Verb conjugation drills, Guessing game, Picture description, “Shopping” with food vocab and counters

**Conversation & Cultural Etiquette:** Talking about routines and schedules (daily verbs, time expressions), Asking and giving simple directions (～はどこですか？), Ordering food and making polite requests (～をください、～をおねがいします), Expressing likes and dislikes (すき・きらい), Listening to short conversations and identifying key phrases, Introduction to formal/informal speech and Japanese etiquette.

**Activities:** Skits and role-plays, daily schedule, beginner-level dialogue, Group discussion on etiquette.

**Activities:** Practice worksheets and flashcards for hiragana, Writing drills and reading simple katakana words, Dialogue practice for greetings and self-introduction, Sentence construction exercises with basic SOV structure, Particle usage exercises and short dialogues, Role-play scheduling, shopping, and telling time, Verb conjugation drills for common verbs, Descriptive sentence exercises using adjectives, Practice Q&A dialogues forming questions and negations, Kanji writing practice and quizzes for basic characters, Vocabulary tests and conversational practice on daily topics, Oral presentations and listening comprehension quizzes.

**Weightage:** Continuous Assessment: 100%

**Assessment Methodology:** Assignments (30%), Quiz (10%) and Internal Examinations 60%

**References:**


1. Banno, E., Ikeda, Y., Ohno, Y., Shinagawa, C., & Tokashiki, K. (2011). Genki I: An integrated course in elementary Japanese. The Japan Times.
2. The Japan Foundation. (2017). Marugoto Japanese language and culture starter (A1) course book for communicative language activities. Goyal Publishers.


| | CO Description | PO | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|
| CO1 | Understand simple spoken Japanese in everyday contexts. | --- | | | |
| CO2 | Communicate with widely used Japanese words effectively. | PO9 (2) | | | |
| CO3 | Develop the skills necessary for self-directed learning and continuous improvement in Japanese language. | PO11 (1) | | | |

| UC25F03 | Korean – I^ | L | T | P | C |
|---|---|---|---|---|---|
| | | 1 | 0 | 2 | - |

**Course Objectives:**

- To impart fundamentals of the Korean language, including reading, writing systems, pronunciation, and speaking.

**Fundamentals of Korean:** Introduction to Hangul: consonants and vowels, Basic pronunciation and syllable formation, Common greetings and self-introductions, Numbers (Sino-Korean and Native Korean basics), Basic sentence structure (Subject-Object-Verb), Simple expressions (e.g., 감사합니다, 안녕하세요).

**Activities:** Writing and reading Hangul practice sheets, Pronunciation drills and audio repetition, Dialogue practice for greetings and self-introduction, Counting and number exercises.

**Essential Grammar and Vocabulary:** Particles (은/는, 이/가, 을/를) and usage, Basic verbs and present tense conjugation, Sentence patterns: affirmative, negative, interrogative, Common adjectives and descriptive sentences, Expressing possession and location, Asking simple questions (어디, 뭐, 누구).

**Activities:** Verb conjugation and sentence formation drills, Role-play conversations for shopping and daily routines, Descriptive writing and speaking exercises, Question and answer practice.

**Everyday Korean Communication:** Polite speech levels and honorifics introduction, Talking about time, dates, and schedules, Ordering food, shopping phrases, counting objects, Simple directions and transportation vocabulary, Listening practice with short dialogues, Cultural notes on etiquette and communication.

**Activities:** Role-play ordering at a restaurant or buying items, Listening comprehension exercises, Giving and asking for directions practice, Group conversations and presentations.

**Weightage:** Continuous Assessment: 100%

**Assessment Methodology:** Assignments (30%), Quiz (10%) and Internal Examinations 60%

**References:**


1. King, R., Yeon, J., & Brown, A. (2015). Elementary Korean (2nd ed.). Tuttle Publishing.
2. Cho, Y., Lee, H., Schulz, C., Sohn, H.-M., & Sohn, S.-O. (2001). Integrated Korean: Beginning 1. University of Hawai'i Press.


| | CO Description | PO | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|
| CO1 | Understand simple spoken Korean in everyday contexts. | --- | | | |
| CO2 | Communicate with widely used Korean words effectively. | PO9 (2) | | | |
| CO3 | Develop the skills necessary for self-directed learning and continuous improvement in Korean language. | PO11 (1) | | | |

# ANNA UNIVERSITY, CHENNAI

## UNDERGRADUATE CURRICULUM (NON-AUTONOMOUS AFFILIATED INSTITUTIONS)

**Programme:** B.E., Electrical and Electronics Engineering **Regulations:** 2025

**Abbreviations:**

**HUM** – Humanities (Languages, Management, Heritage, and others)

**BS** – Basic Science (Mathematics, Physics, Chemistry)

**ES** – Engineering Science (General (**G**), Programme Core (**PC**), Programme Elective (**PE**) & Emerging Technology (**ET**))

**SD** – Skill Development

**SL** – Self Learning

**CDP** – Capstone Design Project

**OE** – Open Elective

**L** – Laboratory Course

**T** – Theory

**LIT** – Laboratory Integrated Theory

**PW** – Project Work

**IPW** – Internship cum Project Work

**DIC –** Department Introductory Course

**TCP –** Total Contact Period(s)

| **Semester – I** | | | | | | | |
|---|---|---|---|---|---|---|---|
| **S. No.** | **Course Code** | **Course Name** | **Course Type** | **Periods/Week** | | **Credits** | **Category** |
| | | | | **L-T-P** | **TCP** | | |
| 1. | MA25C01 | Applied Calculus | T | 3-1-0 | 4 | 4 | BS |
| 2. | EE25C03 | Fundamentals of Electrical and Electronics Engineering | T | 2-1-0 | 3 | 3 | ES (PC) – DIC |
| 3. | UC25H01 | தமிழர் மரபு / Heritage of Tamils | T | 1-0-0 | 1 | 1 | HUM |
| 4. | EN25C01 | English Essentials – I | T | 2-0-0 | 2 | 2 | HUM |
| 5. | PH25C01 | Applied Physics – I | LIT | 2-0-2 | 4 | 3 | BS |
| 6. | CY25C01 | Applied Chemistry – I | LIT | 2-0-2 | 4 | 3 | BS |
| 7. | CS25C01 | Computer Programming:C | LIT | 2-0-2 | 4 | 3 | ES (PC) |
| 8. | ME25C04 | Makerspace | L | 0-0-4 | 4 | 2 | SD |
| 9. | UC25A01 | Life Skills for Engineers – I* | --- | 1-0-2 | 3 | --- | HUM |
| 10. | UC25A02 | Physical Education – I* | --- | 0-0-4 | 4 | 1 | HUM |
| 11. | | NCC / NSS / NSO | --- | --- | --- | --- | --- |
| | | | | **Total Credits** | **33** | **22** | |

*Audit Course

| Semester– II | | | | | | | |
|---|---|---|---|---|---|---|---|
| S. No. | Course Code | Course Name | Course Type | Periods/Week | | Credits | Category |
| | | | | L-T-P | TCP | | |
| 1. | MA25C03 | Transforms and its Applications | T | 3-1-0 | 4 | 4 | BS |
| 2. | UC25H02 | தமிழர்களும் தொழில்நுட்பமும்/ Tamils and Technology | T | 1-0-0 | 1 | 1 | HUM |
| 3. | GE25C01 | Basic Civil and Mechanical Engineering | T | 3-0-0 | 3 | 3 | ES (G) |
| 4. | PH25C04 | Applied Physics (EE) – II | T | 2-1-0 | 3 | 3 | BS |
| 5. | ME25C01 | Engineering Drawing | LIT | 2-0-4 | 6 | 3 | ES (G) |
| 6. | EN25C02 | English Essentials – II | LIT | 1-0-2 | 3 | 2 | HUM |
| 7. | CS25C04 | Data Structures and Algorithms | LIT | 3-0-2 | 5 | 4 | ES (PC) |
| 8. | ME25C05 | Re-Engineering for Innovation | L | 0-0-4 | 4 | 2 | SD |
| 9. | UC25A03 | Life Skills for Engineers – II* | --- | 1-0-2 | 3 | --- | HUM |
| 10. | UC25A04 | Physical Education – II* | --- | 0-0-4 | 4 | 1 | HUM |
| 11. | | Foreign Language^ | L | 1-0-2 | 3 | -- | HUM |
| | | | **Total Credits** | | **39** | **23** | |

^ Deutsch / Japanese / Korean *Audit Course

| Semester – III | | | | | | | |
|---|---|---|---|---|---|---|---|
| S. No. | Course Code | Course Name | Course Type | Periods /Week | | Credits | Category |
| | | | | L-T-P | TCP | | |
| 1. | | Matrices for Engineers | T | 2-0-0 | 2 | 2 | BS |
| 2. | | Electromagnetic Theory | T | 3-1-0 | 4 | 4 | ES (PC) |
| 3. | | Digital Electronics | T | 3-0-0 | 3 | 3 | ES (PC) |
| 4. | | Electric Circuit Analysis | LIT | 3-0-2 | 5 | 4 | ES (PC) |
| 5. | | Electronic Devices & Circuits | LIT | 3-0-2 | 5 | 4 | ES (PC) |
| 6. | | Skill Development Course – I | LIT | 1-0-2 | 3 | 2 | SD |
| 7. | | English Communication Skills Laboratory – II | L | 0-0-2 | 2 | 1 | HUM |
| | | | **Total Credits** | | **24** | **20** | |

| Semester – IV | | | | | | | |
|---|---|---|---|---|---|---|---|
| **S. No.** | **Course Code** | **Course Name** | **Course Type** | **Periods / Week** | | **Credits** | **Category** |
| | | | | **L-T-P** | **TCP** | | |
| 1. | | Probability and Statistics | T | 3-0-0 | 3 | 3 | BS |
| 2. | | Power Generation, Transmission & Distribution | T | 3-0-0 | 3 | 3 | ES (PC) |
| 3. | | Control Systems | T | 3-0-0 | 3 | 3 | ES (PC) |
| 4. | | Applied Data Science | T | 3-0-0 | 3 | 3 | ES (ET) |
| 5. | | DC Machines and Transformers | T | 3-0-0 | 3 | 3 | ES (PC) |
| 6. | | Linear Integrated Circuits | T | 3-0-0 | 3 | 3 | ES (PC) |
| 7. | | Skill Development Course – II | LIT | 1-0-2 | 3 | 2 | SD |
| 8. | | English Communication Skills Laboratory – III | L | 0-0-2 | 2 | 1 | HUM |
| 9. | | DC Machines and Transformers Laboratory | L | 0-0-4 | 4 | 2 | ES (PC) |
| 10. | | Electronics Laboratory | L | 0-0-4 | 4 | 2 | ES (PC) |
| **Total Credits** | | | | | **31** | **25** | |

| Semester – V | | | | | | | |
|---|---|---|---|---|---|---|---|
| **S. No.** | **Course Code** | **Course Name** | **Course Type** | **Periods / Week** | | **Credits** | **Category** |
| | | | | **L-T- P** | **TCP** | | |
| 1. | | Programme Elective – I | T | 3-0-0 | 3 | 3 | ES (PE) |
| 2. | | Programme Elective – II | T | 3-0-0 | 3 | 3 | ES (PE) |
| 3. | | AC Machines | T | 3-0-0 | 3 | 3 | ES (PC) |
| 4. | | Power System Analysis | T | 3-0-0 | 3 | 3 | ES (PC) |
| 5. | | Measurements and Instrumentation | T | 3-0-0 | 3 | 3 | ES (PC) |
| 6. | | Skill Development Course – III | LIT | 1-0-2 | 3 | 2 | SD |
| 7. | | Industry Oriented Course – I | LIT | 1-0-2 | 3 | 1 | SD |
| 8. | | AC Machines Laboratory | L | 0-0-4 | 4 | 2 | ES (PC) |
| 9. | | Control and Instrumentation Laboratory | L | 0-0-4 | 4 | 2 | ES (PC) |
| **Total Credits** | | | | | **29** | **22** | |
| **For Honours Degree** | | | | | | | |
| 1. | | Capstone Design Project – Level I | CDP | 0-0-12 | 12 | 6 | SD |

# Semester I

| MA25C01 | Applied Calculus | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 1 | 0 | 4 |

**Course Objectives:**

- To provide technical competence of modelling engineering problems using calculus.
- To apply the calculus concepts in solving engineering problems using analytical methods and computational tools.

**Differential Calculus:** Functions, graph of functions, New functions from old functions, Limit of a function, Continuity, Limits at infinity, Derivative as a function, Maxima and Minima of functions of single variable, Mean value theorem, Effect of derivatives on the shape of a graph.

**Activities:** Visualization of the functions, Maxima and Minima of a function using open-source software, Solving of Competitive Examination questions (Ex. GATE).

**Functions of Several Variables:** Partial derivatives, Chain rule, Total derivative, Maxima and minima of functions of two variables, Method of Lagrange's Multipliers, Application problems in engineering.

**Activities:** Partial Derivatives with two or three variables, Maxima and Minima of a function using open-source software, Solving of Competitive Examination questions (Ex. GATE).

**Integral Calculus:** Fundamental theorem of Calculus, Indefinite integrals and the Net Change Theorem, Improper integrals, Arc Length, Area of Region, Area of surface of revolution.

**Activities:** Definite and Indefinite Integrals, Determination of Area, Solving of Competitive Examination questions (Ex. GATE).

**Multiple Integrals:** Iterated integrals and Fubini's theorem, Evaluation of double integrals, change of order of integration, change of variables between Cartesian and polar co-ordinates, evaluation of triple integrals-change of variables between Cartesian and cylindrical and spherical co-ordinates.

**Activities:** Double integrals and triple integrals using open-source software, Solving of Competitive Examination questions (Ex. GATE).

**Weightage:** Continuous Assessment: 40%, End Semester Examinations: 60%.

**Assessment Methodology:** Assignments (20%), Solution to application-oriented problems using software (20%), Solving of GATE questions (20%), Internal Examinations (40%).

**References:**

1. Anton, H., Bivens, I. C., & Davis, S. (2021). Calculus: Early transcendentals. John Wiley & Sons.
2. Ron Larson and David C. Falvo,(2013), Calculus: an Applied Approach. Cengage Learning.
3. Stewart, J., Clegg, D., & Watson, S. (2019). *Calculus: Early transcendentals*.
4. Thomas, G. B., Jr., Weir, M. D., Hass, J., & Heil, C. (2018). *Thomas' calculus: Early transcendentals*. Pearson.
5. Singh, K. (2019). *Engineering mathematics through applications*. Bloomsbury Publishing.
6. Grewal, B. S. (2012). *Higher engineering mathematics.* Khanna Publishers.

**E-resources:**

1. https://math.libretexts.org/Bookshelves/Calculus/Map%3A_Calculus__Early_Transcendentals_(Stewart)/
2. https://openstax.org/books/calculus-volume-1/
3. https://tutorial.math.lamar.edu/Classes/CalcII/CalcII.aspx
4. SCILAB, https://www.scilab.org/

| | Description of CO | PO | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|
| CO1 | Explain the meaning of derivative, integral, and their geometric and physical interpretations. | --- | | | |
| CO2 | Apply differentiation and integration techniques to compute maxima, minima, and area. | PO1(3) | | | |
| CO3 | Analyze the behavior of single and multivariable functions using derivatives and partial derivatives. | PO2(3) | | | |
| CO4 | Utilize modern computational software and online platforms to deepen understanding, perform complex calculations, and visualize mathematical concepts. | PO5(2)<br>PO11(1) | | | |

| EE25C03 | Fundamentals of Electrical and Electronics Engineering | L | T | P | C |
|---|---|---|---|---|---|
| | | 2 | 1 | 0 | 3 |

**Course Objective:**

- To impart the foundational concepts of electrical circuits and digital electronics in various applications

**DC Circuits:** DC Circuits: Circuit Components: Resistor, Inductor, Capacitor, Independent and Dependent Sources, Ohm's Law, Kirchhoff's Laws, Series and Parallel Circuits, Simple problems

**AC Circuits:** Introduction to AC Circuits (R, RL, RLC) and Parameters: Waveforms, Average value, RMS Value, Peak Value, Form Factor, Power factor.

**Magnetic Circuits:** Introduction to Magnetic Circuits, Types -Basic definitions, Flux Linkage, Inductance, fringing, Properties of Magnetic materials, AC excitation, Hysteresis and Eddy Current losses. Analysis of simple composite magnetic circuits-Simple Problems, Applications of Magnetic circuits

**Basics of Power Systems:** Introduction, Types of Distribution Systems, Generation: Hydro, Thermal, Atomic, Wind and Solar power plants (Qualitative Analysis) One-line diagram, Operating voltages in Power Systems.

**Domestic Wiring:** Types of Domestic wiring, Cleat, Wooden/PVC, Toughened Rubber Sheath and Conduit wiring. Specifications of Wires, Types of Cables, Earthing system, Fuses and HRC fuses, Conductor and Insulating Materials, Classification, Properties.

**Analog And Digital Electronics:** Operation and Characteristics of electronic devices: PN Junction Diodes, Zener Diode and BJT. Applications: Diode Bridge Rectifier and Shunt Regulator. Digital Electronics: Basics Logic Gates-Flip Flops.

**Weightage:** Continuous Assessment: 40%, End Semester Examinations: 60%

**Assessment Methodology:** Quiz (10%), Assignments (40%) and Internal Examinations (50%)

**References:**


1. Del Toro. (2022). *Electrical engineering fundamentals*. Pearson Education.
2. Ghosh, S. (2010). *Fundamentals of electrical and electronics engineering*.
3. Prasad, R. (2014). *Fundamentals of electrical engineering*. Prentice Hall of India.
4. Sharma, S. (2019). *Basics of electrical engineering*. Wiley.
5. Wadhwa, C. L. (2007). *Fundamentals of electrical engineering*. New Age International.
6. Mittal, V., & Mittal, A. (2017). *Basic electrical engineering*. McGraw Hill.


**E-resources:**https://archive.nptel.ac.in/courses/108/106/108106172/

| | Description of CO | PO | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|
| CO1 | Explain core electrical engineering concepts. | --- | | | |
| CO2 | Apply basic engineering calculations in electrical systems. | PO1(3) | | | |
| CO3 | Identify common various components and its applications in various electrical circuits | PO2 (3) | | | |

| UC25H01 | தமிழர் மரபு | L | T | P | C |
|---|---|---|---|---|---|
| | | 1 | 0 | 0 | 1 |

**மொழி மற்றும் இலக்கியம்:** இந்திய மொழிக் குடும்பங்கள், திராவிட மொழிகள், தமிழ் ஒரு செம்மொழி, தமிழ் செவ்விலக்கியங்கள், சங்க இலக்கியத்தின் சமயச் சார்பற்ற தன்மை, சங்க இலக்கியத்தில் பகிர்தல் அறம், திருக்குறளில் மேலாண்மைக் கருத்துக்கள், தமிழ்க் காப்பியங்கள், தமிழகத்தில் சமண பௌத்த சமயங்களின் தாக்கம், பக்தி இலக்கியம், ஆழ்வார்கள் மற்றும் நாயன்மார்கள், சிற்றிலக்கியங்கள், தமிழில் நவீன இலக்கியத்தின் வளர்ச்சி, தமிழ் இலக்கிய வளர்ச்சியில் பாரதியார் மற்றும் பாரதிதாசன் ஆகியோரின் பங்களிப்பு.

**மரபு – பாறை ஓவியங்கள் முதல் நவீன ஓவியங்கள் வரை – சிற்பக் கலை**:நடுகல் முதல் நவீன சிற்பங்கள் வரை, ஐம்பொன் சிலைகள், பழங்குடியினர் மற்றும் அவர்கள் தயாரிக்கும் கைவினைப் பொருட்கள், பொம்மைகள் , தேர் செய்யும் கலை, சுடுமண் சிற்பங்கள், நாட்டுப்புறத் தெய்வங்கள், குமரிமுனையில் திருவள்ளுவர் சிலை, இசைக் கருவிகள், மிருதங்கம், பறை, வீணை, யாழ், நாதஸ்வரம், தமிழர்களின் சமூக பொருளாதார வாழ்வில் கோவில்களின் பங்கு.

**நாட்டுப்புறக் கலைகள் மற்றும் வீர விளையாட்டுகள்:** தெருக்கூத்து, கரகாட்டம், வில்லுப்பாட்டு, கணியான் கூத்து, ஒயிலாட்டம், தோல்பாவைக் கூத்து, சிலம்பாட்டம், வளரி, புலியாட்டம், தமிழர்களின் விளையாட்டுகள்.

**தமிழர்களின் திணைக் கோட்பாடுகள்**: தமிழகத்தின் தாவரங்களும், விலங்குகளும், தொல்காப்பியம் மற்றும் சங்க இலக்கியத்தில் அகம் மற்றும் புறக் கோட்பாடுகள், தமிழர்கள் போற்றிய அறக்கோட்பாடு, சங்ககாலத்தில் தமிழகத்தில் எழுத்தறிவும், கல்வியும், சங்ககால நகரங்களும் துறை முகங்களும், சங்ககாலத்தில் ஏற்றுமதி மற்றும் இறக்குமதி, கடல்கடந்த நாடுகளில் சோழர்களின் வெற்றி.

**இந்திய தேசிய இயக்கம் மற்றும் இந்திய பண்பாட்டிற்குத் தமிழர்களின் பங்களிப்பு**: இந்திய விடுதலைப்போரில் தமிழர்களின் பங்கு, இந்தியாவின் பிறப்பகுதிகளில் தமிழ்ப் பண்பாட்டின் தாக்கம் , சுயமரியாதை இயக்கம் இந்திய மருத்துவத்தில், சித்த மருத்துவத்தின் பங்கு, கல்வெட்டுகள், கையெழுத்துப்படிகள், தமிழ்ப் புத்தகங்களின் அச்சு வரலாறு.

**References:**


1. தமிழக வரலாறு, மக்களும் பண்பாடும், கே.கே. பிள்ளை (வெளியீடு: தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்).
2. கணினித் தமிழ், முனைவர் இல. சுந்தரம். (விகடன் பிரசுரம்).
3. கீழடி, வைகை நதிக்கரையில் சங்ககால நகர நாகரிகம் (தொல்லியல் துறை வெளியீடு)
4. பொருநை, ஆற்றங்கரை நாகரிகம். (தொல்லியல் துறை வெளியீடு)
5. Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL – (in print)
6. Social Life of the Tamils - The Classical Period (Dr.S.Singaravelu) (Published by: International Institute of Tamil Studies.
7. Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thirunavukkarasu) (Published by: International Institute of Tamil Studies).
8. The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: International Institute of Tamil Studies.)
9. Keeladi - 'Sangam City C ivilization on the banks of river Vaigai' (Jointly Published by: Department ofArchaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
10. Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay) (Published by: The Author)
11. Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book

and Educational Services Corporation, Tamil Nadu)
12. Journey of Civilization Indus to Vaigai (R.Balakrishnan) (Published by: RMRL) – Reference Book.

| UC25H01 | Heritage of Tamils | L | T | P | C |
|---|---|---|---|---|---|
| | | 1 | 0 | 0 | 1 |

**Language and Literature:** Language Families in India, Dravidian Languages, Tamil as aClassical Language, Classical Literature in Tamil, Secular Nature of Sangam Literature, Distributive Justice in Sangam Literature, Management Principles in Thirukural, Tamil Epics and Impact of Buddhism & Jainism in Tamil Land, Bakthi Literature Azhwars and Nayanmars, Forms of minor Poetry - Development of Modern literature in Tamil - Contribution of Bharathiyar and Bharathidhasan.

**Heritage - Rock Art Paintings to Modern Art – Sculpture:** Hero stone to modern sculpture, Bronze icons, Tribes and their handicrafts, Art of temple car making, Massive Terracotta sculptures, Village deities, Thiruvalluvar Statue at Kanyakumari, Making of musical instruments, Mridhangam, Parai, Veenai, Yazh and Nadhaswaram, Role of Temples in Social and Economic Life of Tamils.

**Folk and Martial Arts:** Therukoothu, Karagattam, Villu Pattu, Kaniyan Koothu, Oyillattam, Leatherpuppetry, Silambattam, Valari, Tiger dance, Sports and Games of Tamils.

**Thinai Concept of Tamils:** Flora and Fauna of Tamils & Aham and Puram Concept from Tholkappiyam and Sangam Literature, Aram Concept of Tamils, Education and Literacy during Sangam Age, Ancient Cities and Ports of Sangam Age, Export and Import during Sangam Age, Overseas Conquest of Cholas.

**Contribution of Tamils to Indian National Movement and Indian Culture:**
Contribution of Tamils to Indian Freedom Struggle, The Cultural Influence of Tamils over the other parts of India, Self-Respect Movement, Role of Siddha Medicine in Indigenous Systems of Medicine, Inscriptions & Manuscripts, Print History of Tamil Books

**References:**


1. தமிழக வரலாறு, மக்களும் பண்பாடும், கே.கே. பிள்ளை (வெளியீடு: தமிழ்நாடு பாடநூல் மற்றும், கல்வியியல் பணிகள் கழகம்).
2. கணினித் தமிழ், முனைவர் இல. சுந்தரம். (விகடன் பிரசுரம்).
3. கீழடி, வைகை நதிக்கரையில் சங்ககால நகர நாகரிகம் (தொல்லியல் துறை வெளியீடு)
4. பொருநை, ஆற்றங்கரை நாகரிகம். (தொல்லியல் துறை வெளியீடு)
5. Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL – (in print)
6. Social Life of the Tamils, The Classical Period (Dr.S.Singaravelu) (Published by: International Institute of Tamil Studies.
7. Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thirunavukkarasu) (Published by: International Institute of Tamil Studies).
8. The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: International Institute of Tamil Studies.)
9. Keeladi, 'Sangam City C ivilization on the banks of river Vaigai' (Jointly Published by: Department ofArchaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
10. Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay) (Published

by: The Author)

11. Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
12. Journey of Civilization Indus to Vaigai (R.Balakrishnan) (Published by: RMRL), Reference Book.

| EN25C01 | English Essentials – I | L | T | P | C |
|---|---|---|---|---|---|
| | | 2 | 0 | 0 | 2 |

**Course Objectives:**

- To equip students with the skills to write clear, coherent, and grammatically correct texts for various purposes.
- To strengthen the ability to comprehend, interpret, and analyse written English across diverse contexts.

**Speaking Skills:** Parts of Speech, Articles, Tenses, Sentence Structure, Types of Sentences, Subject-Verb Agreement**,** Synonyms and Antonyms, Prefixes and Suffixes, Idioms and Phrases, Self-Introduction, Expressing Oneself, Everyday Conversations, Team Interactions, Emotions, agreeing & disagreeing

**Activities:** Self-Introduction, Just a Minute (JAM) Video recording, Brainstorming sessions, Situational role plays, Usage of Applications.

**Listening Skills:** Listening to Simple Conversations, Short Speeches / Stories, Extracting key information, Phonemes, Listening to Native Speakers, Listening to Various Accents.

**Activities:** Gap fill exercises, Understanding tone and intent, Listening and imitating, Spell Bee

**Reading Skills:** Reading Strategies, Skimming and Scanning, active reading with short passages.

**Activities:** Summarising, loud reading, Cloze reading, Reading comprehension, Reading newspaper articles, Reading Long passage and note making.

**Drafting Skills:** Sentence Formation, Word Substitution, Keywords Development, Writing Paragraphs, Emails and Letters.

**Activities:** Picture and poster interpretation, formal and informal letters, Official e-mails.

**Weightage:** Continuous Assessment: 40%, End Semester Examinations: 60%

**Assessment Methodology:** Quiz (10%), Assignments (20%), Speaking Task (10%), Reading Task (10%), Writing Task (10%), Internal Examinations (40%)

**References:**


1. Miller, K. Q., & Wahl, S. T. (2023). Business and Professional Communication: KEYS for Workplace Excellence (5th ed.). SAGE Publications.
2. Kumar, Sanjay & Pushpalatha. (2018). English Language and Communication Skills for Engineers. India: Oxford University Press.

3. Sharma, S., & Mishra, B. (2024). Communication Skills for Engineers and Scientists (2nd ed.). PHI Learning.

**E-Resources:**

1. Cambridge English – https://www.cambridgeenglish.org/learning-english/grammar-and-vocabulary/
2. Perfect English Grammar – https://www.perfect-english-grammar.com/
3. British Council – Learn English - https://learnenglish.britishcouncil.org/grammar
4. Speechling – https://speechling.com/
5. mePro by Pearson – https://mepro.pearson.com/
6. TED Talks – https://www.ted.com/

| | Description of CO | PO | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|
| CO1 | Comprehend spoken English, take and draft notes. | --- | | | |
| CO2 | Apply vocabulary, with appropriate ways to enhance drafting and communication. | PO1(3) | | | |
| CO3 | Analyze texts in different contexts using appropriate reading strategies. | PO2(2) | | | |
| CO4 | Communicate thoughts and ideas in both planned and unplanned situations. | PO9(2) | | | |
| CO5 | Continuously improving English communication skills relevant to engineering and scientific work. | PO11(1) | | | |

| PH25C01 | Applied Physics – I | L | T | P | C |
|---|---|---|---|---|---|
| | | 2 | 0 | 2 | 3 |

**Course Objective(s):**

- To impart knowledge and expose the essentials of physics in various engineering applications.

**Properties of Matter:** Elasticity, Cantilever, Young's modulus (non-uniform bending), Girders: Bridges and buildings, Viscosity: Stokes method, Surface tension: drop weight method, Thermal expansion, Thermal stress, Bimetallic strips, Expansion joints

**Practical**: Non-Uniform bending, Young's modulus of the material, Torsional pendulum, Rigidity modulus of the wire and moment of inertia of the disc.

**Activities:** Virtual demonstration of thermal stress.

**Oscillations:** Simple Harmonic motion, Torsional pendulum, Couple per unit twist, Damped and Forced Oscillation

**Waves:** Waves on a stretched string, Energy and Power, standing waves, Ultrasonics, piezo, electric method, Acoustic grating, Electromagnetic waves: Maxwell equation, Production of EM waves by dipole antenna, Propagation of EM waves in free space , wave equation, Cell phone reception

**Practical**: Melde's string experiment – Frequency of an electrically vibrating metal tip.

**Activities:** Virtual demonstration of propagation of EM waves

**Quantum Mechanics:** Black body radiation, Photoelectric effect, de Broglie hypothesis, Schrodinger Wave equation, Particle in a box (infinite potential well - three-dimensional box), Barrier penetration and quantum tunnelling.

**Practical**: Photo-electric effect, Determination of Planck's constant.

**Activities**: Virtual demonstration of Scanning Transmission Electron Microscope

**Applied Optics:** Interference: Air wedge, Michelson's Interferometer, Fiber optics: Structure of a fiber, Fiber Optic Communication System, Fiber Sensors (Virtual demo), Displacement, pressure sensor and Temperature sensor, Einstein Co-efficient, Nd:YAG laser, $CO_2$ laser (construction, functioning and applications), dye laser

**Practical**: Ruling width of Compact disc using Laser, Thickness of a thin sheet/wire using Air wedge Method.

**Activities**: Demonstration of sensors and applications of Lasers

**Weightage:** Continuous Assessment: 50%, End Semester Examinations: 50%

**Assessment Methodology:** Quiz (5%), Assignments (20%), Flipped Class (5%), Practical (30%), Internal Examinations (40%)

**References:**


1. Young, H. D., & Freedman, R. A. (2020). University physics with modern physics. Pearson.
2. Gaur, R. K., & Gupta, S. L. (2022). Engineering physics. Dhanpat Rai Publications.
3. Mathur, D. S. (2010). Elements of properties of matter. S. Chand Publishing.
4. Griffiths, D. J. (2018). Introduction to quantum mechanics. Cambridge University Press.
5. Silfvast, W. T. (2008). Laser fundamentals (2nd ed.). Cambridge University Press.


**E-Resources:**

1. Barrier penetration problem and Quantum tunnelling: https://archive.nptel.ac.in/courses/115/104/115104096/
2. EM waves and wireless channelling: https://onlinecourses.nptel.ac.in/noc24_ee31/preview
3. CO2 Laser: https://onlinecourses.nptel.ac.in/noc25_ph03/preview
4. Bimetallic Strips _ https://www.youtube.com/watch?v=WZQ8lvxdzDk
5. Cell phone Reception_ https://www.youtube.com/watch?v=1JZG9x_VOwA
6. Dipole Antenna_ https://www.youtube.com/watch?v=4xF1Fq2wB1I
7. Optical Sensors_ https://auece.digimat.in/nptel/courses/video/108106173/L02.html
8. Scanning Tunnelling Electron Microscope_ https://www.youtube.com/watch?v=XNYZYbXNWQA

| | Description of CO | PO | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|
| CO1 | Explain the physics concepts in various applications. | --- | | | |
| CO2 | Apply the principles of wave optics and laser physics in practical systems. | PO1(3) | | | |
| CO3 | Analyse the behaviour of materials under different conditions. | PO2(2) | | | |
| CO4 | Conduct experiments in groups and interpret the data. | PO4(3)<br>PO8(1) | | | |

| CY25C01 | Applied Chemistry – I | L | T | P | C |
|---|---|---|---|---|---|
| | | 2 | 0 | 2 | 3 |

**Course Objectives:**

- To provide students with a solid understanding of the chemical principles for engineering applications.
- To introduce the chemical properties of materials and how these properties influence the selection and use of materials in engineering systems.
- To impart practical applications of chemistry in commonly used engineering devices

**Water Technology:** Water quality parameters and standards. Industrial feed water, Remediation. Municipal water treatment. Desalination.

**Practical:** Analysis of alkalinity, hardness and dissolved oxygen.

**Activity:** Coagulation of water sample using Alum

**Nano-chemistry:** Classification, Size, dependent properties. Preparation of nanomaterials, Top-down and Botton-Up approaches, Applications (Flipped classroom).

**Practical:** Preparation of nanoparticles by Sol-Gel method.

**Electrochemistry:** Electrochemical cell, Electrode potential., Redox reaction. Conductivity of electrolytes, Factors.

**Practical:** Conductometric titrations

**Activity:** Electrochemical cell demonstration

**Corrosion & Control:** Chemical and electrochemical corrosions, galvanic series, factors influencing corrosion, Electrochemical protection. Organic and Inorganic coating.

**Practical:**

- Corrosion study by weight loss and salt spray method.
- Potentiometry/UV-visible spectrophotometer.

**Activities:** Case Study on Corrosion in Pipelines and Electronics, Control measures for a corroded metal

**Batteries:** Conventional, Contemporary and Emerging battery storage technologies, Primary & Secondary Batteries, Battery Pack, Battery Materials, Performance Parameters, Testing, Safety aspects.

**Practical:** Measurement of EMF, Internal Resistance, Charge and Discharge Characteristics.

**Activities:** Demonstration of battery pack in e-vehicles.

**Weightage:** Continuous Assessment: 50%, End Semester Examinations: 50%

**Assessment Methodology:** Quiz (5%), Assignments (20%), Flipped Class (5%), Practical (30%), Internal Examinations (40%)

**References:**


1. Jain, P. C., & Jain, M. (2015). Engineering Chemistry (17th ed.). Dhanpat Rai Publishing Company (P) Ltd.
2. Dara, S. S. (2004). A Textbook of Engineering Chemistry. Chand Publications.
3. Sachdeva, M. V. (2011). Basics of Nano Chemistry. Anmol Publications Pvt Ltd.
4. Friedrich, E. (2014). Engineering Chemistry. Medtech.


**E-Resources:**

1. Water and Wastewater Engineering (Prof. Ligy Philip, IIT Madras) – https://nptel.ac.in/courses/105106202.
2. Electrochemical Energy Systems (Prof. S. Mitra, IIT Madras) – https://nptel.ac.in/courses/113106028.
3. Corrosion (Prof. Kallol Mondal, IIT Kanpur) – https://nptel.ac.in/courses/112104088
4. Chemistry of Battery Systems (Prof. V. R. Marathe, IIT Madras) – https://nptel.ac.in/courses/115106130
5. Resource on all battery types, testing, and safety – https://batteryuniversity.com/articles

| | Description of CO | PO | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|
| CO1 | Understand the importance of chemistry applications with underlying mechanisms. | --- | | | |
| CO2 | Apply the chemistry concepts in widely used devices. | PO1(3) | | | |
| CO3 | Analyse the effect of various chemical parameters on performance of engineering systems. | PO2(2) | | | |
| CO4 | Perform experimentations as a group and interpret the results. | PO4(3)<br>PO8(1) | | | |
| CO5 | Communicate findings through case studies and reports | PO9(1) | | | |

| CS25C01 | Computer Programming: C | L | T | P | C |
|---|---|---|---|---|---|
| | | 2 | 0 | 2 | 3 |

**Course Objectives:**

- To equip engineering students with the foundational knowledge and practical skills in 'C' programming to analyse and solve computational problems effectively.
- To foster problem-solving, critical thinking, and modular programming skills essential for engineering domains.

**Introduction to C:** Problem Solving, Problem Analysis Chart, Developing an Algorithm, Flowchart and Pseudocode, program structure, Compilation & Execution process, Interactive and Script mode, Comments, Indentation, Error messages, Primitive data types, Constants, Variables, Reserved words, Arithmetic, Relational, Logical, Bitwise, Assignment, Conditional operators, Input/Output Functions, Built-in Functions.

**Practical:** Create Problem Analysis Charts, Flowcharts and Pseudocode for simple C programs (Minimum three).

**Control Structures:** if, if-else, nested if, switch-case, while, do-while, for, nested loops, Jump statements.

**Practical:** Usage of conditional logics in programs. (Minimum three)

**Functions:** Function Declaration, Definition and Calling, Function Parameters and Return Types, Call by Value and Call by Reference, Recursive Functions, Scope and Lifetime of Variables, Header files and Modular Programming.

**Practical:** Usage of functions in programs. (Minimum three)

**Strings & Pointers:** One-dimensional and Multi-dimensional Arrays, Array operations and traversals, String Handling: String declaration, input/output, string library functions, Pointer arithmetic, Pointers and Arrays, Pointers to function, Dynamic memory allocation.

**Practical:** Programs using pointers, dynamic memory, pointer arithmetic, string manipulations, array operations. (Minimum three)

**Structures & Unions:** Defining and using structures, Array of structures, Pointers to structures, Unions and their uses, Enumerations.

**Practical:** Program to use structures and unions

**File Operations:** Open, read, write, close file operations, Binary vs Text files, File pointers, Error handling in file operations.

**Practical:** Programs reading/writing data in text and binary files (Minimum three).

**Standard Libraries & Header Files:** Using standard libraries like stdio.h, stdlib.h, string.h, math.h, Creating and using user-defined header files and libraries.

**Practical:** Use of standard and user-defined libraries in solving problems. (Minimum three), Project (Minimum Two)

**Weightage:** Continuous Assessment: 50%, End Semester Examinations: 50%

**Assessment Methodology:** Quiz (5%), Project (15%), Assignment Programs (25%), Practical (25%), Internal Examinations (30%)

**References:**


1. Thareja, R. (2021). Programming in C . Oxford University Press.
2. Balagurusamy, E. (2019). Programming in ANSI C. McGraw Hill Education.
3. Kanetkar, Y. (2020). Let us C. BPB Publications.
4. Kalicharan, N. (2022). Learn to program with C: An introduction to programming using the C language. Apress.
5. Forouzan, B. A., & Afyouni, H. (2023). Computer science: A structured programming approach in C. Cengage.


**E-resources:**

1. Learn-C.org - https://www.learn-c.org/
2. GeeksforGeeks - C Programming - https://www.geeksforgeeks.org/c-programming-language/
3. GNU C Library Documentation - https://www.gnu.org/software/libc/manual/
4. “Introduction to C Programming”, Swayam MOOC Course, https://onlinecourses.swayam2.ac.in/imb25_mg71/

| | Description of CO | PO | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|
| CO1 | Explain the potential usage of ‘C’ in engineering applications | --- | | | |
| CO2 | To apply the concepts of ‘C’ in solving engineering problems and formulate new projects. | PO1 (2)<br>PO5 (2) | | | |
| CO3 | To interpret the data and effectively communicate in groups. | PO2 (3)<br>PO8 (1)<br>PO9 (1) | | | |
| CO4 | Adapt new programming concepts and technologies in the profession. | PO11 (1) | | | |

| ME25C04 | Makerspace | L | T | P | C |
|---|---|---|---|---|---|
| | | 0 | 0 | 4 | 2 |

**Course Objectives:**

1. To impart practical skills in the assembly, disassembly, and welding of components using appropriate tools and techniques.
2. To provide hands-on training in electrical wiring practices, and the use of electronic components, sensors, and actuators.

**List of Activities**

**(A). Dis-assembly & Assembly Practices**

i. Tools and its handling techniques.
ii. Dis-assembly and assembly of home appliances – Grinder Mixer Grinder, Ceiling Fan, Table Fan & Washing Machine.
iii. Dis-assembly and assembly of Air-Conditioners & Refrigerators.
iv. Dis-assembly and assembly of a Bicycle.

**(B). Welding Practices**

i. Welding Procedure, Selection & Safety Measures.
ii. Power source of Arc Welding – Gas Metal Arc Welding & Gas Tungsten Arc Welding processes.
iii. Hands-on session of preparing base material & Joint groove for welding.
iv. Hands-on session of MAW, GMAW, GTAW, on Carbon Steel & Stainless Stell plates / pipes, for fabrication of a simple part.

**(C). Electrical Wiring Practices**

i. Electrical Installation tools, equipment & safety measures.
ii. Hands-on session of basic electrical connections for Fuses, Miniature Circuit Breakers and Distribution Box.
iii. Hands-on session of electrical connections for Lightings, Fans, Calling Bells.
iv. Hands-on session of electrical connections for Motors & Uninterruptible Power Supply.

**(D). Electronics Components / Equipment Practices**

i. Electronic components, equipment & safety measures.
ii. Dis-assembly and assembly of Computers.
iii. Hands-on session of Soldering Practices in a Printed Circuit Board.
iv. Hands-on session of Bridge Rectifier, Op-Amp and Transimpedance amplifier.
v. Hands-on session of integration of sensors and actuators with a Microcontroller.

vi. Demonstration of Programmable Logic Control Circuit.

**(E). Contemporary Systems**

i. Demonstration of Solid Modelling of components.
ii. Demonstration of Assembly Modelling of components.
iii. Fabrication of simple components / parts using 3D Printers.
iv. Demonstration of cutting of wood / metal in different complex shapes using Laser Cutting Machine.

**References:**


1. Stephen Christena, Learn to Weld: Beginning MIG Welding and Metal Fabrication Basics, Crestline Books, 2014.
2. H. Lipson, Fabricated - The New World of 3D Printing, Wiley, 1st edition, 2013.
3. Code of Practice for Electrical Wiring Installations (IS 732:2019)


| | Description of CO | PO | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|
| CO1 | Demonstrate proper use and handling of basic hand and power tools. | --- | | | |
| CO2 | Carry out electrical wiring installations and repairs, applying safety measures in domestic applications. | PO1(3) | | | |
| CO3 | Develop solid innovative models through software. | PO5(2) | | | |
| CO4 | Adapt and follow safety protocols in the work environment. | PO11(2) | | | |

| UC25A01 | Life Skills for Engineers – I | L | T | P | C |
|---|---|---|---|---|---|
| | | 1 | 0 | 2 | - |

**Course Objectives**

- To equip engineering students with essential life skills encompassing personal and emotional development, effective management of time and stress, financial literacy, digital safety, and civic responsibility.
- To enhance self-awareness, interpersonal skills, and resilience to prepare students for the professional and personal challenges of engineering careers and life beyond academics**.**

**Personal and Emotional Development:** Self-Awareness & Personality, Emotional Intelligence & Empathy, Positive thinking, Right attitude, Stress & Anger Management, Goal-Setting & Time Management, Growth Mindset & Resilience.

**Activities:** Personality tests (MBTI, DISC), reflection journals, Empathy circle, role-playing difficult conversations, Guided mindfulness sessions, stress relief toolkit creation, Vision board creation, weekly time audit and planner, Group challenge scenarios, resilience journal.

**Management Skills:** Financial Literacy: Budgeting & Saving, Nutrition, Health, and Hygiene, Digital Literacy & Online Safety, Civic Responsibility & Ethics

**Activities**: Create a monthly budget, financial simulation game, Meal planning workshop, physical wellness challenge, Social media audit, privacy and safety scenarios, Community service, values debate.

**Weightage:** Continuous Assessment: 100%

**Assessment Methodology:** Assignments (20%), Flipped Class & Worksheets (10%), Practical (30%), Internal Examinations (40%)

**References:**


1. Khera, S. (2003). *You can win*. Macmillan.
2. Levesque, H. (n.d.). *Life skills 101: A practical guide to leaving home and living on your own*. (Publication year not specified)
3. Mitra, B. K. (2017). *Personality development & soft skills* (3rd impression). Oxford University Press.
4. ICT Academy of Kerala. (2016). *Life skills for engineers*. McGraw Hill Education (India) Private Ltd.

| | Description of CO | PO | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|
| CO1 | Understand personality traits and emotional intelligence, in interpersonal interactions. | --- | | | |
| CO2 | To work and execute as a team through successful implementation of set goals. | PO7 (1)<br>PO8 (2)<br>PO9 (2) | | | |
| CO3 | Develop and implement best practices in day-to-day life, in terms of planning and execution. | PO11 (3) | | | |

| UC25A02 | Physical Education - I | L | T | P | C |
|---|---|---|---|---|---|
| | | 0 | 0 | 4 | 1 |

**Course Objectives:**

- To impart the fundamentals of physical education for development of students' physical, mental, and social well-being.
- To instill a lifelong appreciation for physical activity towards the development of positive attitude and fostering values of team work and sportsmanship.

**Introduction to physical education:** Exercise for Good Posture – Conditioning and Calisthenics for Before start, Jogging, Bending, Twisting, Standing, Sitting and Relaxation, Training on First Aid Practices.

**Participation of athletic events:** Rules and regulations of important athletic events, Sprint, Jumps, Throws and Hurdles.

**Skill development in any one of the following outdoor games:** Basket Ball, Volley Ball, Ball Badminton, Football, Hockey, Kho-Kho, Kabaddi, Cricket, Hand ball and Tennis.

**Skill development in any one of the following indoor games:** Shuttle Badminton, Chess and Table Tennis.

**Weightage:** Continuous Assessment: 100%

**Assessment Methodology:** Attendance (60%), Quiz (10%), Participation in Sports and Games (20%) and Viva Voce (10%)

**References:**


1. Singh, A. (2008). Essentials of physical education. Kalyani Publishers.
2. Kamlesh, M. L. (2006). Psychology in physical education and sport (3rd ed.). Metropolitan Book Co.
3. Mangal, S. K. (2009). *Psychology of sports performance*. Sports Publication.


**E-resources:**

**https://www.who.int/health-topics/physical-activity**

| | CO Description | PO | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|
| CO1 | Understand and explain the importance of physical activity for mental and physical health. | --- | | | |
| CO2 | Apply basic principles of exercise science in the routine life. | PO1(3) | | | |
| CO3 | Develop teamwork, discipline, and leadership through sports and group activities and collaborate effectively. | PO8(3) | | | |
| CO4 | Demonstrate independent learning in health, nutrition, and fitness-related topics. | PO11(2) | | | |

# Semester II

| MA25C03 | Transforms and its Applications | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 1 | 0 | 4 |

**Course Objective:**

- To provide a strong foundation in Fourier Series, Laplace, Fourier and Z-Transforms.
- To develop the ability to analyze and solve engineering problems in continuous and discrete time domains using appropriate transform techniques.

**Laplace Transforms:** Existence conditions, Properties of Laplace transform, Laplace transform of standard functions, derivatives and integrals, Unit step function and Dirac delta function, Laplace transform of periodic functions; Inverse Laplace transform: Partial fraction technique, Convolution theorem.

Application: Solution of second order ordinary differential equations using Laplace transform.

Activities: Compute the Laplace transform of time-domain functions, Inverse Laplace transform, Solution of ordinary differential equations using Laplace transform.

**Z-Transform:** Z-transform of standard functions, properties; Inverse Z – transform: Standard functions, Partial fraction technique, Convolution theorem.

*Application:* Solution of difference equation using Z – transform.

*Activities:* Compute the Z-transform of a discrete-time signal, Solution of linear constant-coefficient difference equations using Z-transform.

**Fourier Series:** Dirichlet's conditions, General Fourier series, Convergence of Fourier series, Odd and even functions; Half range sine series, Half range cosine series, Root mean square value, Parseval's identity.

*Application:* Solution of one-dimensional wave and heat equation.

*Activities:* Compute Fourier coefficients, Reconstruct signal using Fourier series (Partial sum), Plot convergence of Fourier series.

**Fourier Transform:** Complex Fourier transform, Properties, Relation between Fourier and Laplace transform, Fourier sine and cosine transforms, Parseval's identity, Convolution theorem.

Application: Simple applications to solve partial differential equations using Fourier transform.

Activities: Compute the Fourier and inverse Fourier transform, Parseval's theorem validation.

**Weightage:** Continuous Assessment: 40%, End Semester Examinations: 60%.

**Assessment Methodology:** Assignment (20%), Software activity (20%), Quiz (10%),

Internal Examinations (50%).

**References:**


1. Kreyszig, G. E. (2018). *Advanced engineering mathematics*. John Wiley & Sons Ltd.
2. Grewal, B. S. (2021). *Higher engineering mathematics*. Khanna Publications.
3. Zill, D. G. (2022). *Advanced engineering mathematics*. Jones & Bartlett India Ltd.
4. Wylie, C. R., & Barrett, L. C. (2019). *Advanced engineering mathematics*. Tata McGraw-Hill.
5. Duffy, D. G. (2017). *Advanced engineering mathematics with MATLAB*. CRC Press.


**E-resources:**

1. Stanford Engineering Everywhere | EE261 - The Fourier Transform and its Applications
2. https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-003-signals-and-systems-fall-2011/
3. https://www.coursera.org/learn/mathematics-engineers-fourier-laplace-z-transforms
4. Transforms and Applications Handbook | Alexander D. Poularikas, Artyom

| | Description of CO | PO | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|
| CO1 | Explain the concept of various transform functions in engineering applications | --- | | | |
| CO2 | Apply Laplace and inverse Laplace transforms for solving differential equations. | PO1(3) | | | |
| CO3 | Apply Z-transform methods to solve problems and analyze the results | PO1(2)<br>PO2 (1)<br>PO5 (1) | | | |
| CO4 | Apply Fourier series to express functions and analyze the convergence behavior of the series. | PO1 (3)<br>PO2 (1)<br>PO5 (1) | | | |
| CO5 | Select and apply appropriate software for applying transform functions | PO1 (2)<br>PO2 (2)<br>PO5 (1) | | | |

| UC25H02 | தமிழர்களும் தொழில்நுட்பமும் | L | T | P | C |
|---|---|---|---|---|---|
| | | 1 | 0 | 0 | 1 |

**நெசவு மற்றும் பானைத் தொழில்நுட்பம்**: சங்க காலத்தில் நெசவுத் தொழில், பானைத் தொழில்நுட்பம், கருப்பு சிவப்பு பாண்டங்கள், பாண்டங்களில் கீறல் குறியீடுகள்.

**வடிவமைப்பு மற்றும் கட்டிடத் தொழில்நுட்பம்:** சங்க காலத்தில் வடிவமைப்பு மற்றும் கட்டுமானங்கள் & சங்க காலத்தில் வீட்டுப் பொருட்களில் வடிவமைப்பு, சங்க காலத்தில் கட்டுமான பொருட்களும் நடுகல்லும் – சிலப்பதிகாரத்தில் மேடை அமைப்பு பற்றிய விவரங்கள், மாமல்லபுரச் சிற்பங்களும், கோவில்களும், சோழர் காலத்துப் பெருங்கோயில்கள் மற்றும் பிற வழிபாட்டுத் தலங்கள் – நாயக்கர் காலக் கோயில்கள், மாதிரி கட்டமைப்புகள் பற்றி அறிதல், மதுரை மீனாட்சி அம்மன் ஆலயம் மற்றும் திருமலை நாயக்கர் மஹால் – செட்டிநாட்டு வீடுகள், பிரிட்டிஷ் காலத்தில் சென்னையில் இந்தோ, சாரோசெனிக் கட்டிடக் கலை.

**உற்பத்தித் தொழில் நுட்பம்:** கப்பல் கட்டும் கலை, உலோகவியல், இரும்புத் தொழிற்சாலை, இரும்பை உருக்குதல், எஃகு, வரலாற்றுச் சான்றுகளாக செம்பு மற்றும் தங்க நாணயங்கள், நாணயங்கள் அச்சடித்தல், மணி உருவாக்கும் தொழிற்சாலைகள், கல்மணிகள், கண்ணாடி மணிகள், சுடுமண் மணிகள், சங்கு மணிகள், எலும்புத்துண்டுகள், தொல்லியல் சான்றுகள், சிலப்பதிகாரத்தில் மணிகளின் வகைகள்.

**வேளாண்மை மற்றும் நீர்ப்பாசனத் தொழில் நுட்பம்:** அணை, ஏரி, குளங்கள், மதகு, சோழர்காலக் குமுழித் தூம்பின் முக்கியத்துவம், கால்நடை பராமரிப்பு, கால்நடைகளுக்காக வடிவமைக்கப்பட்ட கிணறுகள், வேளாண்மை மற்றும் வேளாண்மைச் சார்ந்த செயல்பாடுகள், கடல்சார் அறிவு, மீன்வளம், முத்து மற்றும் முத்துக்குளித்தல், பெருங்கடல் குறித்த பண்டைய அறிவு, அறிவுசார் சமூகம்.

**அறிவியல் தமிழ் மற்றும் கணித்தமிழ்:** அறிவியல் தமிழின் வளர்ச்சி, கணித்தமிழ் வளர்ச்சி, தமிழ் நூல்களை மின்பதிப்பு செய்தல், தமிழ் மென்பொருட்கள் உருவாக்கம், தமிழ் இணையக் கல்விக்கழகம், தமிழ் மின் நூலகம், இணையத்தில் தமிழ் அகராதிகள், சொற்குவைத் திட்டம்.

**References**


1. தமிழக வரலாறு, மக்களும் பண்பாடும், கே.கே. பிள்ளை (வெளியீடு: தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்).
2. கணினித் தமிழ் – முனைவர் இல. சுந்தரம். (விகடன் பிரசுரம்).
3. கீழடி – வைகை நதிக்கரையில் சங்ககால நகர நாகரிகம் (தொல்லியல் துறை வெளியீடு)
4. பொருநை, ஆற்றங்கரை நாகரிகம். (தொல்லியல் துறை வெளியீடு)
5. Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL – (in print)
6. Social Life of the Tamils – The Classical Period (Dr.S.Singaravelu) (Published by: International Institute of Tamil Studies.
7. Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thirunavukkarasu) (Published by: International Institute of Tamil Studies).
8. The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: International Institute of Tamil Studies.)
9. Keeladi – 'Sangam City C ivilization on the banks of river Vaigai' (Jointly Published by: Department ofArchaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
10. Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay) (Published by: The Author)
11. Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
12. Journey of Civilization Indus to Vaigai (R.Balakrishnan) (Published by: RMRL) – Reference Book.


| UC25H02 | Tamils and Technology | L | T | P | C |
|---|---|---|---|---|---|
| | | 1 | 0 | 0 | 1 |

**Weaving and Ceramic Technology:** Weaving Industry during Sangam Age, Ceramic technology, Black and Red Ware Potteries (BRW), Graffiti on Potteries.

**Design and Construction Technology:** Designing and Structural construction House & Designs in household materials during Sangam Age, Building materials and Hero stones of Sangam age, Details of Stage Constructions in Silappathikaram, Sculptures and Temples of Mamallapuram, Great Temples of Cholas and other worship places,Temples of Nayaka Period, Type study (Madurai Meenakshi Temple), Thirumalai Nayaka rMahal, Chetti Nadu Houses, Indo, Saracenic architecture at Madras during British Period.

**Manufacturing Technology:** Art of Ship Building , Metallurgical studies, Iron industry, Iron smelting, steel, Copper and gold Coins as source of history - Minting of Coins, Beads making, industries Stonebeads, Glass beads, Terracotta beads, Shell beads / bone beats, Archeological evidences, Gem stone types described in Silappathikaram.

**Agriculture and Irrigation Technology:** Dam, Tank, ponds, Sluice, Significance of Kumizhi Thoompuof Chola Period, Animal Husbandry - Wells designed for cattle use , Agriculture and Agro Processing -Knowledge of Sea -Fisheries, Pearl, Conche diving, Ancient Knowledge of Ocean -Knowledge Specific Society.

**Scientific Tamil & Tamil Computing:** Development of Scientific Tamil, Tamil computing, Digitalization of Tamil Books, Development of Tamil Software, Tamil Virtual Academy, Tamil Digital Library, Online Tamil Dictionaries, Sorkuvai Project.

**References**


1. தமிழக வரலாறு, மக்களும் பண்பாடும், கே.கே. பிள்ளை (வெளியீடு: தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்).
2. கணினித் தமிழ், முனைவர் இல. சுந்தரம். (விகடன் பிரசுரம்).
3. கீழடி, வைகை நதிக்கரையில் சங்ககால நகர நாகரிகம் (தொல்லியல் துறை வெளியீடு)
4. பொருநை, ஆற்றங்கரை நாகரிகம். (தொல்லியல் துறை வெளியீடு)
5. Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL – (in print)
6. Social Life of the Tamils, The Classical Period (Dr.S.Singaravelu) (Published by: International Institute of Tamil Studies.
7. Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thirunavukkarasu) (Published by: International Institute of Tamil Studies).
8. The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: International Institute of Tamil Studies.)
9. Keeladi , 'Sangam City C ivilization on the banks of river Vaigai' (Jointly Published by: Department ofArchaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
10. Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay) (Publishedby: The Author)
11. Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Bookand Educational Services Corporation, Tamil Nadu)
12. Journey of Civilization Indus to Vaigai (R. Balakrishnan) (Published by: RMRL) – Reference Book.

| GE25C01 | Basic Civil and Mechanical Engineering | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 0 | 0 | 3 |

**Course Objective:**

- To impart major fundamental concept of civil & mechanical engineering & provide the insight with regard to applications.

**Historical Evaluation of Engineering:** History, Structural, Construction, Geotechnical, Environmental, Transportation and Water Resources Engineering, Role for infrastructure development, Buildings, Types and Terminologies, Impact on environment.

**Activities:** Visit to construction sites, Energy consumption in building.

**Building Materials:** Types, selection criteria, Bricks and Blocks, Composition- Fly ash brick, FRP bricks, Types of Cements, Mortar, Thermal and Acoustic Insulating Materials, Decorative Panels, Water Proofing Materials.

**Activities:** Virtual demonstration of cement manufacturing, virtual demonstration of heat infiltration to the building.

**Building Components:** Foundations, Types, Bearing capacity and settlement, Brick masonry, Stone Masonry, Beams, Columns, Lintels and Rain Water Harvesting, concept of Green Buildings.

**Activities:** Virtual demonstration of foundations, Erection of transformers.

**Power Plants:** Classifications, Working principle of steam, Gas, Diesel, Hydro, electric and Nuclear Power plants. Renewable energy scenario.

**Activities:** Virtual demonstration of Power plants.

**Thermal systems:** Classifications, Working of IC Engines and its applications, Turbines and Pumps. Working of HVAC systems.

**Activities:** Virtual demonstration of IC Engines, Turbines and Pumps, Case study on energy consumption in Refrigeration systems.

**Manufacturing:** Welding, Machining, Forming and Additive manufacturing.

**Activities:** Virtual demonstration of any machining processes.

**Weightage:** Continuous Assessment: 40%, End Semester Examinations: 60%

**Assessment Methodology:** Quiz (10%), Assignments (40%) & Internal Examinations 50%)

**References:**

1. Shanmugam, G., & Palanichamy, M. S. (2015). Basic Civil and Mechanical Engineering. Tata McGraw Hill.

2. Ramesh Babu, V. (2010). Basic Civil and Mechanical Engineering. Scitech Publications.
3. Venugopal, K., & Prahu Raja, V. (2006). Basic Mechanical Engineering. Anuradha Publications.
4. Rangwala, S. C. (2008). Engineering Materials. Charotar Publishing House.

| | CO Description | PO | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|
| CO1 | Understand the scope and significance of civil and mechanical engineering in societal and industrial development. | --- | | | |
| CO2 | Apply basic technical knowledge in the field of civil and mechanical engineering. | PO1(3) | | | |
| CO3 | Develop an appreciation for interdisciplinary roles of civil and mechanical engineers in solving real-world problems. | PO11(1) | | | |

| PH25C04 | Applied Physics (EE) – II | L | T | P | C |
|---|---|---|---|---|---|
| | | 2 | 1 | 0 | 3 |

**Course Objectives:**

- To impart knowledge on physics concepts and explore the potential applications in the field of electrical engineering.

**Semiconductor Materials:** Intrinsic and Extrinsic Semiconductors, Carrier Concentration- Fermi level, Dependence on carrier-concentration and temperature, Carrier generation and recombination, Carrier transport: diffusion and drift, Hall Effect, Applications, Metal-semiconductor junction (Ohmic and Schottky)

**Activities:** Determination of Hall coefficient

**Dielectrics Materials:** Dielectric polarization under static fields - electronic, ionic and dipolar polarizations-internal fields in solid-Clausius-Mossotti equation, Behavior of dielectrics in alternating fields- Application of dielectrics in transformers- Capacitor materials, Ferro and piezo materials- Complex dielectric permittivity- dipolar relaxation- dielectric loss, Applications.

**Activities:** Measurement of Dielectric Constant of different materials

**Magnetic Materials:** Magnetic material parameters, Ferromagnetic materials, Ferrites - Soft and Hard magnetic materials, GMR sensors, magnetic disk memories, Principle of magnetic recording, Materials for magnetic data storage.

**Activities:** Determination of Hysteresis loop for a ferromagnetic material (B-H curve)

**Advanced Materials:** Thermocouple, bimetals, leads soldering and fuses Materials – their applications

**Activities:** Virtual demonstration of working of various types of thermocouples.

**Weightage:** Continuous Assessment: 40%, End Semester Examinations: 60%

**Assessment Methodology:** Quiz (10%), Assignments (30%), Flipped Class (10%), Internal Examinations (50%)

**References:**


1. Kasap, S. O. (2007). Principles of electronic materials and devices. McGraw-Hill Education.
2. Callister, W. D., & Rethwisch, D. G. (2014). Materials science and engineering. John Wiley & Sons.
3. Indulkar, C. S., & Thiruvengadam, S. (n.d.). An introduction to electrical engineering materials. S. Chand.


**E-Resources:**

1. The emergence of spin electronics in data storage -Claude Chappert, Albert Fert and Frédéric Nguyen Van Dau, Nature Publishing Group 2007

2. Hall Effect - https://ssp-amrt.vlabs.ac.in/exp/hall-effect-charge-carrier/simulation.html
3. Magnetic Susceptibility – https://em-amrt.vlabs.ac.in/exp/quinckes-method
4. NPTEL : NOC:Nanophotonics, Plasmonics, and Metamaterials.

| | **Description of CO** | **PO** | **PSO1** | **PSO2** | **PSO3** |
|---|---|---|---|---|---|
| CO1 | Explain the concepts of physics in electrical engineering stream. | --- | | | |
| CO2 | Apply appropriate techniques in physics to solve engineering problems. | PO1(3) | | | |
| CO3 | Analyse physical systems and interpret data from the virtual studies in the core branches in electrical engineering. | PO2(2) | | | |

| ME25C01 | Engineering Drawing | L | T | P | C |
|---|---|---|---|---|---|
| | | 2 | 0 | 4 | 4 |

**Course Objectives:**

- To impart knowledge on dimensions and drawing standards.
- To explore the orthographic projection of lines and solids.
- To provide the understanding of orthographic, isometric and perspective views.

**Fundamentals:** Drawing instruments, Drawing standards (BIS), Lettering in engineering, Sheet layout, elements of dimensioning, Systems of dimensioning. Free hand sketching of 2D & 3D objects, Conics – Ellipse, Parabola and Hyperbola.

**Activities:** Virtual Demonstration of Conics and Cycloids.

**Orthographic Projection:** First angle projection, Projection of points, straight lines and planes.

**Projection of Solids:** Simple Solids, Section of Solids, Development of Surfaces

**Activities:** Development of models of various solids and virtual demonstration of sectioning, CAD modelling of 2D objects.

**Isometric Projection:** Isometric Scale, Projection of Simple solids.

**Activities:** Conversion of 3D into 2D orthographic views, CAD modelling of 3D objects.

**Perspective Projection:** Simple solids projection

**Activities:** Virtual demonstration of perspective views.

**Project:** Development of 2D objects and 3D objects using CAD tools.

**Weightage:**
Continuous Assessment: 50%
End Semester Examinations: 50%

**Assessment Methodology:**
Project – 10%, Models - 5%, Assignments - 35% and Internal Examinations - 50%

**References:**


1. Venugopal, K., & Prabhu Raja, V. (2022). Engineering Drawing + AutoCAD. New Age International Publishers.
2. Natarajan, K. V. (2015). A Text Book of Engineering Graphics. Dhanalakshmi Publisher.


**E-Resources:**

1. CAD Software – https://www.freecadweb.org/
2. Engineering Drawing and Computer Graphics, Prof. Rajaram Lakkaraju (IIT Kharagpur) – https://onlinecourses.nptel.ac.in/noc22_me105/preview

3. MIT Design Handbook: Engineering Drawing and Sketching – https://ocw.mit.edu/courses/2-007-design-and-manufacturing-i-spring-2009/pages/related-resources/drawing_and_sketching/

| | CO Description | PO | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|
| CO1 | Explain the advantages of engineering drawing in engineering applications | --- | | | |
| CO2 | Apply the concepts of projections in formulating various solid parts in engineering systems. | PO1(3) | | | |
| CO3 | Analyse the various view and interpret the engineering drawings. | PO2(3) | | | |
| CO4 | Use CAD tools for creation of various models. | PO3(1) | | | |
| CO5 | Critically think and develop innovative models. | PO11(1) | | | |

| EN25C02 | English Essentials – II | L | T | P | C |
|---|---|---|---|---|---|
| | | 1 | 0 | 2 | 2 |

**Course Objectives:**

- To integrate vocabulary and functional grammar into communication tasks to improve fluency and accuracy.
- To articulate ideas clearly and effectively in formal and informal spoken interactions.
- To construct well-organised written documents including summaries, reports, and emails relevant to academic and workplace contexts

**Communication:** Types, Inter and Intra-personal, communication barriers, Summarising visuals, media terminology, rhetorical devices and TED Talks.

**Activities:** Short presentation, Media based responses and Speeches, Error detection, Welcome, Vote of Thanks and Formal Speeches, Listen and respond to short podcast, Worksheets.

**Correspondence:** Modal Verbs, Job Application Letters, Resume Writing, Statement of Purpose, Paraphrasing & Summarizing, Executive Summary.

**Activities:** Email writing, Submission of applications, Graphical summaries, Report on college events.

**Professional Writing:** Paraphrasing & Summarizing, Executive Summary, Proposal, Decision Making, Recommendations.

**Activities:** Report preparation and recommendation letters.

**Team Work:** Team Leader, Quality of Team leader, Leadership model, Negotiations.

**Activities:** SWOT Analysis, Mock meetings, Group discussions, Brainstorming sessions.

**Weightage:** Continuous Assessment: 50%, End Semester Examinations: 50%

**Assessment Methodology:** Worksheets (10%), Group Activity (20%), Report Writing (20%), Internal Examinations (50%)

**References:**


1. Koneru Aruna. (2020). English Language Skills for Engineers. McGraw Hill Education.
2. Taylor, Shirley & Chandra. V. (2010). Communication for Business A Practical Approach. India: Pearson Longman.
3. Ian Badger, et al., (2014). Listening: B2 (Collins English for Life: Skills), Collins.
4. Raymond Murphy (2019), Grammar in Use, Cambridge University Press.

**E-Resources:**

1. Communication for Business Success - https://open.umn.edu/opentextbooks/textbooks/8
2. TED Talks – https://www.ted.com/

| | Description of CO | PO | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|
| CO1 | Understand the importance of communication and drafting skills in engineering and technology. | --- | | | |
| CO2 | Apply listening strategies to comprehend spoken English in various contexts. | PO1(3) | | | |
| CO3 | Participate actively in group discussions by analysing critically from different views. | PO2(2)<br>PO8(1) | | | |
| CO4 | Create written reports coherently for various purposes. | PO9(2) | | | |
| CO5 | Adapt communication styles to global, multicultural environments. | PO11(1) | | | |

| CS25C04 | Data Structures and Algorithms | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 0 | 2 | 4 |

**Course Objective:**

- To provide the fundamentals of data organization and algorithms.

**Data Types:** Abstract Data Types (ADTs), ADTs and classes, introduction to OOP, Classes in Python, Inheritance, Namespaces, Shallow and Deep Copying.

**Practical**: Implement simple ADTs as Python classes

**Linear Structures:** List ADT, array-based implementations, linked list implementations, singly linked lists, circularly linked lists, doubly linked lists, Stack ADT, Queue ADT, double ended queues, applications

**Practical:** List ADT using Python arrays, Linked list, Stack and Queue ADTs and Applications.

**Tree Structures:** Tree ADT, Binary Tree ADT, tree traversals, binary search trees, AVL trees, heaps, multi-way search trees

**Practical:** Tree representation and traversal algorithms, Binary Search Trees, Heaps.

**Graph Structures:** Graph ADT, representations of graph, graph traversals, DAG, topological ordering, greedy algorithms, dynamic programming, shortest paths, minimum spanning trees, introduction to complexity classes and intractability

**Practical:** Graph representation and Traversal algorithms, Single source shortest path algorithm, Minimum spanning tree algorithms.

**Algorithm:** Analysis of algorithms, Asymptotic notations, Divide & Conquer, Recursion, Recursive Algorithms

**Practical:** Implement recursive algorithms in Python.

**Sorting and Searching**

Bubble sort, Selection sort, Insertion sort, Merge sort, Quick sort, Analysis of sorting algorithms, Linear & Binary search, Hashing, Hash functions, Collision handling, Load factors, Rehashing, and Efficiency

**Practical:** Sorting and searching algorithms, Hash tables.

**Weightage:** Continuous Assessment: 40%, End Semester Examinations: 60%

**Assessment Methodology:** Quiz (10%), Assignments (30%) Review of GATE questions (20%) and Internal Examinations (50%)

**References:**


1. Goodrich, M. T., Tamassia, R., & Goldwasser, M. H. (2021). *Data structures & algorithms in Python* (Indian adaptation). John Wiley & Sons Inc.
2. Lee, K. D., & Hubbard, S. (2015). *Data structures and algorithms with Python. Springer*.
3. Necaise, R. D. (2011). *Data structures and algorithms using Python*. John Wiley & Sons.
4. Cormen, T. H., Leiserson, C. E., Rivest, R. L., & Stein, C. (2002). *Introduction to algorithms*. McGraw-Hill.
5. Weiss, M. A. (2014). *Data structures and algorithm analysis in C++.* Pearson Education.


**E-Resource:** https://nptel.ac.in/courses/106106133

| | Description of CO | PO | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|
| CO1 | Explain fundamental concepts of data structures and Algorithms. | --- | | | |
| CO2 | Implement the data structures in different Applications. | PO1(3) | | | |
| CO3 | Evaluate and compare different searching and sorting algorithms | PO1 (3)<br>PO2 (1) | | | |
| CO4 | Demonstrate in continuous learning in interdisciplinary projects involving AI, ML, Data Science, or other technology domains. | PO11 (1) | | | |

| ME25C05 | Re-Engineering for Innovation | L | T | P | C |
|---|---|---|---|---|---|
| | | 0 | 0 | 4 | 2 |

**Course Objectives:**

- To cultivate foundational skills in prototyping, and automation for development of prototypes with real-world applications.
- To provide a comprehensive, hands-on exposure to product development through reverse engineering concepts.

**Bootcamp 1:** Introduction to Product Development, Reverse Engineering, Overview of the product lifecycle, Hands-on disassembly of simple products, Practice of basic measurements and sketching, Introduction to CAD modeling of disassembled parts, Virtual assembly of parts.

**Bootcamp 2:** Embedded System Programming (Open-source platforms), Practice of interfacing sensors, reading data, automation in home, healthcare and agriculture.

**Reverse Engineering:** Sketch and prototype alternative designs, Group brainstorming sessions, Manufacture prototype parts using 3D printing and / or workshop tools, Assemble prototype product.

**Weightage:** Continuous Assessment: 60%, End Semester Examinations: 40%

**Assessment Methodology:** Project (30%), Assignment (10%), Practical (30%), Internal Examinations (30%)

**References:**


1. Wang, W. (2010). Reverse engineering: Mechanisms, structures, systems & materials. CRC Press.
2. Margolis, M. (2020). Arduino cookbook: Recipes to begin, expand, and enhance your projects (3rd ed.). O'Reilly Media.


**E-resources:**

1. GrabCAD – https://grabcad.com/
2. GitHub – https://github.com/

| | Description of CO | PO | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|
| CO1 | Understand the product development lifecycle, including stages such as concept generation, design, prototyping, and testing. | --- | | | |
| CO2 | Apply reverse engineering techniques to analyze and document existing products. | PO1 (3)<br>PO2 (2) | | | |

| | Description of CO | PO | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|
| CO3 | Collaborate in teams to fabricate prototypes using appropriate tools. | PO5 (2)<br>PO8 (1)<br>PO9 (1) | | | |
| CO4 | Engage in independent learning and continuously adapt to emerging technologies in product design | PO11 (2) | | | |

| UC25A03 | Life Skills for Engineers – II | L | T | P | C |
|---|---|---|---|---|---|
| | | 1 | 0 | 2 | - |

**Course Objectives:**

- To impart and cultivate analytical reasoning, innovative thinking, effective collaboration, and ethical leadership to prepare students for complex challenges in professional and personal environments.

**Critical Thinking:** Creativity, Critical Thinking, Collaboration, Problem Solving, Decision Making, Imagination, Intuition, Experience, Sources of Creativity, Lateral Thinking, Myths of creativity, Critical thinking Vs Creative thinking, Convergent & Divergent Thinking, Critical reading & Multiple Intelligence.

**Activities:** Two-Brainstorm Method, “30 Circles” Challenge, “Desert Survival” Simulation, Lateral thinking riddles and puzzles, "What If?" Scenario Writing, Fast vs. Slow Thinking Game, Creativity Myth Busters

**Problem Solving:** Techniques, Six Thinking Hats, Mind Mapping, Forced Connections. Analytical Thinking, Numeric, symbolic, and graphic reasoning. Scientific temperament and Logical thinking.

**Activities:** Case study analysis, Escape Room challenge.

**Leadership:** Leadership Styles & Self-Assessment, Communication & Active Listening, Decision-Making & Responsibility, Teamwork & Delegation, Empathy, Integrity & Conflict Management, Vision, Motivation & Goal-Setting.

**Activities:** Crisis Leadership Simulation, Tower Challenge, Leadership Dilemmas Role-Play, Team Vision Board

**Weightage:** Continuous Assessment: 100%

**Assessment Methodology:** Assignments (20%), Flipped Class & Worksheets (10%), Practical (30%), Internal Examinations (40%)

**References:**


1. De Bono, E. (2017). *Six thinking hats*, Little, Brown Book Group.
2. Facione, P. A. (2015). *Critical thinking: What it is and why it counts*. Insight Assessment.
3. Kahneman, D. (2011). *Thinking, fast and slow*. Farrar, Straus and Giroux.
4. Whetten, D. A., & Cameron, K. S. (2016). *Developing management skills*. Pearson.

| | Description of CO | PO | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|
| CO1 | Explain the importance of leadership and management skills in life. | --- | | | |
| CO2 | Apply and demonstrate creative thinking techniques to generate innovative solutions. | PO7 (3) | | | |
| CO3 | Exhibit effective collaboration and communication skills through teamwork, active listening, and conflict resolution strategies. | PO8 (2) | | | |
| CO4 | Integrate scientific temperament and logical reasoning into c problem solving in engineering and real-world contexts. | PO11 (2) | | | |

| UC25A04 | Physical Education - II | L | T | P | C |
|---|---|---|---|---|---|
| | | 0 | 0 | 4 | 1 |

**Course Objectives:**

- To impart knowledge on gymnastic exercises and pressing needs for upskilling in a particular game.

**Basic gymnastics exercises:** Warming up, Suitable exercise, Lead up games, Safety education, Movement education, Balanced Walk, execution, floor exercise, tumbling/acrobatics, grip, release, swinging, parallel bar exercise, horizontal bar exercise, flic-flac-walk and pyramids.

**Upskilling in any one of the athletics:** Broad Jump, High Jump, Triple Jump, Relay Sprints, Javelin Throw, Discuss Throw, Shot Put, Short and Long-distance Running.

**Advance skills in any one of the indoor/outdoor games, which has been opted by the student in the I semester.**

**Weightage:** Continuous Assessment: 100%

**Assessment Methodology:** Attendance (60%), Quiz (10%), Participation in Sports and Games (20%) and Viva Voce (10%)

**References:**


1. Singh, A. (2008). Essentials of physical education. Kalyani Publishers.
2. Kamlesh, M. L. (2006). Psychology in physical education and sport (3rd ed.). Metropolitan Book Co.
3. Mangal, S. K. (2009). *Psychology of sports performance*. Sports Publication.
4. Kandappan, K. (2004). *Foundations of physical education*. Friends Publications.


**E-resources:**

**https://www.who.int/health-topics/physical-activity**

| | CO Description | PO | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|
| CO1 | Understand and explain the importance of physical activity for mental and physical health. | --- | | | |
| CO2 | Apply safety principles and methods during sports activities. | PO1(3) | | | |
| CO3 | Develop teamwork, discipline, and leadership through sports and group activities and collaborate effectively. | PO8 (3) | | | |
| CO4 | Demonstrate the advanced technical skills and strategic understanding in the game of their interest. | PO11(1) | | | |

**Foreign Language^**

| UC25F01 | Deutsch – I | L | T | P | C |
|---|---|---|---|---|---|
| | | 1 | 0 | 2 | - |

**Course Objectives:**

- To impart fundamentals of the Deutsch language, including reading, writing systems, pronunciation, and speaking.

**Basics & Introduction:** German alphabet and pronunciation, Basic greetings and farewells, Introducing yourself and others (Ich heiße…, Wer bist du?), Numbers 1–100 and days of the week, Personal pronouns (ich, du, er, sie…), Sentence structure (SVO word order).

**Activities:** Alphabet spelling game, short skits, Use color-coded cards for SVO sentences.

**Grammar Essentials & Everyday Vocabulary:** Present tense of regular verbs (spielen, arbeiten, machen…), Common irregular verbs: sein (to be), haben (to have), gehen, kommen, Articles and gender (der, die, das; ein, eine), Simple questions and negation (nicht, kein), Describing people and things: adjectives and colors, Family, school, food, and common objects vocabulary.

**Activities:** Conjugate regular and irregular verbs, “Question Chain” game, Create a simple family tree.

**Everyday Communication in German:** Asking for and giving directions, Telling the time and talking about schedules, Ordering food and drinks at a café or restaurant, Talking about hobbies, weather, and daily routines, Listening to short conversations and responding appropriately, Introduction to German culture and formal/informal language use (du vs Sie).

**Activities:** Ordering food and drinks, Give directions, Formal / Informal greetings, Do’s and Don’ts.

**Weightage:** Continuous Assessment: 100%

**Assessment Methodology:** Assignments (30%), Quiz (10%) and Internal Examinations 60%

**References:**

1. Funk, H., Kuhn, C., & Demme, S. (2015). Menschen A1: Deutsch als Fremdsprache Kursbuch. Hueber Verlag.

| | CO Description | PO | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|
| CO1 | Understand simple spoken Deutsch in everyday contexts. | --- | | | |
| CO2 | Communicate with widely used Deutsch words effectively. | PO9 (2) | | | |
| CO3 | Develop the skills necessary for self-directed learning and continuous improvement in Deutsch language. | PO11 (1) | | | |

| UC25F02 | Japanese – I | L | T | P | C |
|---|---|---|---|---|---|
| | | 1 | 0 | 2 | - |

**Course Objectives:**

- To impart fundamentals of the Japanese language, including reading, writing systems, pronunciation, and speaking.

**Writing Systems & Basic Communication:** Introduction to Hiragana: vowels, basic characters, reading & writing, Introduction to Katakana: basic characters and usage, Basic greetings and farewells (こんにちは, おはようございます, さようなら), Introducing yourself (名前、出身、年齢), Basic sentence structure: Subject–Object–Verb, Numbers 1–100, days of the week, classroom expressions.

**Activities:** Flashcard games and writing drills, Self-introduction, Numbers & date-matching, Greeting expressions, Listening to audio.

**Grammar & Everyday Vocabulary:** Particles: は (wa), を (wo), の (no), へ (e), に (ni), Present tense verbs: です, ます-form conjugation (たべます、のみます), Negative forms: ではありません, ません, Describing people and objects using adjectives (い and な), Question formation: なに、どこ、だれ、いつ, Vocabulary for family, food, colors, and basic actions.

**Activities:** Verb conjugation drills, Guessing game, Picture description, “Shopping” with food vocab and counters

**Conversation & Cultural Etiquette:** Talking about routines and schedules (daily verbs, time expressions), Asking and giving simple directions (〜はどこですか？), Ordering food and making polite requests (〜をください、〜をおねがいします), Expressing likes and dislikes (すき・きらい), Listening to short conversations and identifying key phrases, Introduction to formal/informal speech and Japanese etiquette.

**Activities:** Skits and role-plays, daily schedule, beginner-level dialogue, Group discussion on etiquette.

**Activities:** Practice worksheets and flashcards for hiragana, Writing drills and reading simple katakana words, Dialogue practice for greetings and self-introduction, Sentence construction exercises with basic SOV structure, Particle usage exercises and short dialogues, Role-play scheduling, shopping, and telling time, Verb conjugation drills for common verbs, Descriptive sentence exercises using adjectives, Practice Q&A dialogues forming questions and negations, Kanji writing practice and quizzes for basic characters, Vocabulary tests and conversational practice on daily topics, Oral presentations and listening comprehension quizzes.

**Weightage:** Continuous Assessment: 100%

**Assessment Methodology:** Assignments (30%), Quiz (10%) and Internal Examinations 60%

**References:**


1. Banno, E., Ikeda, Y., Ohno, Y., Shinagawa, C., & Tokashiki, K. (2011). Genki I: An integrated course in elementary Japanese. The Japan Times.
2. The Japan Foundation. (2017). Marugoto Japanese language and culture starter (A1) course book for communicative language activities. Goyal Publishers.


| | CO Description | PO | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|
| CO1 | Understand simple spoken Japanese in everyday contexts. | --- | | | |
| CO2 | Communicate with widely used Japanese words effectively. | PO9 (2) | | | |
| CO3 | Develop the skills necessary for self-directed learning and continuous improvement in Japanese language. | PO11 (1) | | | |

| UC25F03 | Korean – I | L | T | P | C |
|---|---|---|---|---|---|
| | | 1 | 0 | 2 | - |

**Course Objectives:**

- To impart fundamentals of the Korean language, including reading, writing systems, pronunciation, and speaking.

**Fundamentals of Korean:** Introduction to Hangul: consonants and vowels, Basic pronunciation and syllable formation, Common greetings and self-introductions, Numbers (Sino-Korean and Native Korean basics), Basic sentence structure (Subject-Object-Verb), Simple expressions (e.g., 감사합니다, 안녕하세요).

**Activities:** Writing and reading Hangul practice sheets, Pronunciation drills and audio repetition, Dialogue practice for greetings and self-introduction, Counting and number exercises.

**Essential Grammar and Vocabulary:** Particles (은/는, 이/가, 을/를) and usage, Basic verbs and present tense conjugation, Sentence patterns: affirmative, negative, interrogative, Common adjectives and descriptive sentences, Expressing possession and location, Asking simple questions (어디, 뭐, 누구).

**Activities:** Verb conjugation and sentence formation drills, Role-play conversations for shopping and daily routines, Descriptive writing and speaking exercises, Question and answer practice.

**Everyday Korean Communication:** Polite speech levels and honorifics introduction, Talking about time, dates, and schedules, Ordering food, shopping phrases, counting objects, Simple directions and transportation vocabulary, Listening practice with short dialogues, Cultural notes on etiquette and communication.

**Activities:** Role-play ordering at a restaurant or buying items, Listening comprehension exercises, Giving and asking for directions practice, Group conversations and presentations.

**Weightage:** Continuous Assessment: 100%

**Assessment Methodology:** Assignments (30%), Quiz (10%) and Internal Examinations 60%

**References:**


1. King, R., Yeon, J., & Brown, A. (2015). Elementary Korean (2nd ed.). Tuttle Publishing.
2. Cho, Y., Lee, H., Schulz, C., Sohn, H.-M., & Sohn, S.-O. (2001). Integrated Korean: Beginning 1. University of Hawai‘i Press.

| | CO Description | PO | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|
| CO1 | Understand simple spoken Korean in everyday contexts. | --- | | | |
| CO2 | Communicate with widely used Korean words effectively. | PO9 (2) | | | |
| CO3 | Develop the skills necessary for self-directed learning and continuous improvement in Korean language. | PO11 (1) | | | |

# ANNA UNIVERSITY, CHENNAI

## UNDERGRADUATE CURRICULUM (NON-AUTONOMOUS AFFILIATED INSTITUTIONS)

**Programme:** B.E., Mechanical Engineering **Regulations:** 2025

**Abbreviations:**

**HUM –** Humanities (Languages, Management, Heritage, and others)

**BS** – Basic Science (Mathematics, Physics, Chemistry)

**ES –** Engineering Science (General (**G**), Programme Core (**PC**), Programme Elective (**PE**) & Emerging Technology (**ET**))

**SD** – Skill Development

**SL** – Self Learning

**CDP** – Capstone Design Project

**OE** – Open Elective

**L** – Laboratory Course

**T** – Theory

**LIT** – Laboratory Integrated Theory

**PW** – Project Work

**IPW** – Internship cum Project Work

**DIC –** Department Introductory Course

**TCP –** Total Contact Period(s)

| **Semester – I** | | | | | | | |
|---|---|---|---|---|---|---|---|
| **S. No.** | **Course Code** | **Course Name** | **Course Type** | **Periods / Week** | | **Credits** | **Category** |
| | | | | **L-T- P** | **TCP** | | |
| 1. | MA25C01 | Applied Calculus | T | 3-1-0 | 4 | 4 | BS |
| 2. | ME25C03 | Introduction to Mechanical Engineering | T | 2-1-0 | 3 | 3 | ES (PC) – DIC |
| 3. | ME25C01 | Engineering Drawing | LIT | 2-0-4 | 6 | 4 | ES (G) |
| 4. | PH25C01 | Applied Physics – I | LIT | 2-0-2 | 4 | 3 | BS |
| 5. | CY25C01 | Applied Chemistry – I | LIT | 2-0-2 | 4 | 3 | BS |
| 6. | UC25H01 | தமிழர் மரபு / Heritage of Tamils | T | 1-0-0 | 1 | 1 | HUM |
| 7. | EN25C01 | English Essentials – I | L | 2-0-0 | 2 | 2 | HUM |
| 8. | CS25C02 | Computer Programming: Python | LIT | 2-0-2 | 4 | 3 | ES (PC) |
| 9. | ME25C04 | Makerspace | L | 0-0-4 | 4 | 2 | SD |
| 10 | UC25A01 | Life Skills for Engineers – I* | --- | 1-0-2 | 3 | --- | HUM |
| 11 | UC25A02 | Physical Education – I* | --- | 0-0-4 | 4 | 1 | HUM |
| 12 | | NCC / NSS / NSO | --- | --- | --- | --- | --- |
| | | | | **Total Credits** | **39** | **26** | |

*Audit Course

| Semester – II | | | | | | | |
|---|---|---|---|---|---|---|---|
| **S. No.** | **Course Code** | **Course Name** | **Course Type** | **Periods / Week** | | **Credits** | **Category** |
| | | | | **L-T- P** | **TCP** | | |
| 1. | MA25C02 | Linear Algebra | T | 3-1-0 | 4 | 4 | BS |
| 2. | ME25C02 | Engineering Mechanics | T | 3-1-0 | 4 | 4 | ES (G) |
| 3. | EE25C01 | Basic Electrical and Electronics Engineering | T | 3-0-0 | 3 | 3 | ES (G) |
| 4. | PH25C05 | Applied Physics (ME) – II | T | 2-1-0 | 3 | 3 | BS |
| 5. | CY25C03 | Applied Chemistry (ME) – II | T | 2-0-0 | 2 | 2 | BS |
| 6. | UC25H02 | தமிழர்களும் தொழில்நுட்பமும் / Tamils and Technology | T | 1-0-0 | 1 | 1 | HUM |
| 7. | ME25C05 | Re-Engineering for Innovation | L | 0-0-4 | 4 | 2 | SD |
| 8. | EN25C02 | English Essentials – II | LIT | 1-0-2 | 3 | 2 | HUM |
| 9. | UC25A03 | Life Skills for Engineers – II | --- | 1-0-2 | 3 | --- | HUM |
| 10. | UC25A04 | Physical Education – II* | --- | 0-0-4 | 4 | 1 | HUM |
| 11. | | Foreign Language^ | LIT | 1-0-2 | 3 | --- | HUM |
| | | | **Total Credits** | | **34** | **22** | |

^ Deutsch / Japanese / Korean *Audit Course

| Semester – III | | | | | | | |
|---|---|---|---|---|---|---|---|
| **S. No.** | **Course Code** | **Course Name** | **Course Type** | **Periods / Week** | | **Credits** | **Category** |
| | | | | **L-T- P** | **TCP** | | |
| 1. | | Computational Differential Equations | T | 3-1-0 | 4 | 4 | BS |
| 2. | | Applied Engineering Mechanics | T | 3-0-0 | 3 | 3 | ES (PC) |
| 3. | | Engineering Thermodynamics | T | 4-0-0 | 4 | 4 | ES (PC) |
| 4. | | Strength of Materials | LIT | 3-0-2 | 5 | 4 | ES (PC) |
| 5. | | Manufacturing Processes – I | LIT | 2-0-2 | 3 | 3 | ES (PC) |
| 6. | | Embedded Systems | T | 3-0-0 | 3 | 3 | ES (G) |
| 7. | | English Communication Skills Laboratory – II | L | 0-0-2 | 2 | 1 | HUM |
| 8. | | Skill Development Course – I | LIT | 1-0-2 | 3 | 2 | SD |
| | | | **Total Credits** | | **27** | **24** | |

| Semester – IV | | | | | | | |
|---|---|---|---|---|---|---|---|
| **S. No.** | **Course Code** | **Course Name** | **Course Type** | **Periods / Week** | | **Credits** | **Category** |
| | | | | **L-T- P** | **TCP** | | |
| 1. | | Applied Data Science | T | 3-0-0 | 3 | 3 | ES (ET) |
| 2. | | Kinematics and Dynamics of Machines | LIT | 3-0-2 | 3 | 3 | ES (PC) |
| 3. | | Fluid Mechanics & Machinery | LIT | 3-0-2 | 4 | 4 | ES (PC) |
| 4. | | Manufacturing Processes – II | LIT | 2-0-2 | 5 | 4 | ES (PC) |
| 5. | | Thermal Engineering – I | T | 3-0-0 | 3 | 3 | ES (PC) |
| 6. | | Power Generation Technologies | T | 3-0-0 | 3 | 3 | ES (PC) |
| 7. | | Standards in Mechanical Engineering | T | 1-0-0 | 2 | 1 | ES (PC) |
| 8. | | English Communication Skills Laboratory – III | L | 0-0-2 | 3 | 2 | HUM |
| 9. | | Skill Development Course – II | LIT | 1-0-2 | 4 | 4 | SD |
| | | | **Total Credits** | | **30** | **27** | |

| Semester – V | | | | | | | |
|---|---|---|---|---|---|---|---|
| **S. No.** | **Course Code** | **Course Name** | **Course Type** | **Periods / Week** | | **Credits** | **Category** |
| | | | | **L-T- P** | **TCP** | | |
| 1. | | Design of Machine Elements | T | 3-0-0 | 3 | 3 | ES (PC) |
| 2. | | Metallurgy and Materials Science | T | 3-0-0 | 3 | 3 | ES (PC) |
| 3. | | Thermal Engineering – II | LIT | 3-0-2 | 5 | 4 | ES (PC) |
| 4. | | Measurements and Instrumentation | LIT | 2-0-2 | 4 | 3 | ES (PC) |
| 5. | | Programme Elective - I | T | 3-0-0 | 3 | 3 | ES (PE) |
| 6. | | Open Elective | T | 3-0-0 | 3 | 3 | --- |
| 7. | | Skill Development Course – III | LIT | 1-0-2 | 3 | 2 | SD |
| 8. | | Industry Oriented Course – I | LIT | 1-0-2 | 3 | 1 | SD |
| | | | **Total Credits** | | **27** | **22** | |
| **For Honours Degree** | | | | | | | |
| 1. | | Capstone Design Project – Level I | CDP | 0-0-12 | 12 | 6 | SD |
| **OR** | | | | | | | |
| 1. | | Honours Elective – I | T | 3-0-0 | 3 | 3 | |
| 2. | | Honours Elective – II | T | 3-0-0 | 3 | 3 | |

# Semester I

| MA25C01 | Applied Calculus | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 1 | 0 | 4 |

**Course Objectives:**

- To provide technical competence of modelling engineering problems using calculus.
- To apply the calculus concepts in solving engineering problems using analytical methods and computational tools.

**Differential Calculus:** Functions, graph of functions, New functions from old functions, Limit of a function, Continuity, Limits at infinity, Derivative as a function, Maxima and Minima of functions of single variable, Mean value theorem, Effect of derivatives on the shape of a graph.

**Activities:** Visualization of the functions, Maxima and Minima of a function using open-source software, Solving of Competitive Examination questions (Ex. GATE).

**Functions of Several Variables:** Partial derivatives, Chain rule, Total derivative, Maxima and minima of functions of two variables, Method of Lagrange's Multipliers, Application problems in engineering.

**Activities:** Partial Derivatives with two or three variables, Maxima and Minima of a function using open-source software, Solving of Competitive Examination questions (Ex. GATE).

**Integral Calculus:** Fundamental theorem of Calculus, Indefinite integrals and the Net Change Theorem, Improper integrals, Arc Length, Area of Region, Area of surface of revolution.

**Activities:** Definite and Indefinite Integrals, Determination of Area, Solving of Competitive Examination questions (Ex. GATE).

**Multiple Integrals:** Iterated integrals and Fubini's theorem, Evaluation of double integrals, change of order of integration, change of variables between Cartesian and polar co-ordinates, evaluation of triple integrals-change of variables between Cartesian and cylindrical and spherical co-ordinates.

**Activities:** Double integrals and triple integrals using open-source software, Solving of Competitive Examination questions (Ex. GATE).

**Weightage:** Continuous Assessment: 40%, End Semester Examinations: 60%.

**Assessment Methodology:** Assignments (20%), Solution to application-oriented problems using software (20%), Solving of GATE questions (20%), Internal Examinations (40%).

**References:**

1. Anton, H., Bivens, I. C., & Davis, S. (2021). Calculus: Early transcendentals. John Wiley & Sons.

2. Ron Larson and David C. Falvo,(2013), Calculus: an Applied Approach. Cengage Learning.
3. Stewart, J., Clegg, D., & Watson, S. (2019). *Calculus: Early transcendentals*.
4. Thomas, G. B., Jr., Weir, M. D., Hass, J., & Heil, C. (2018). *Thomas' calculus: Early transcendentals*. Pearson.
5. Singh, K. (2019). *Engineering mathematics through applications*. Bloomsbury Publishing.
6. Grewal, B. S. (2012). *Higher engineering mathematics.* Khanna Publishers.

**E-resources:**

1. https://math.libretexts.org/Bookshelves/Calculus/Map%3A_Calculus__Early_Transcendentals_(Stewart)/
2. https://openstax.org/books/calculus-volume-1/
3. https://tutorial.math.lamar.edu/Classes/CalcII/CalcII.aspx
4. SCILAB, https://www.scilab.org/

| | **Description of CO** | **PO** | **PSO1** | **PSO2** | **PSO3** |
|---|---|---|---|---|---|
| CO1 | Explain the meaning of derivative, integral, and their geometric and physical interpretations. | --- | | | |
| CO2 | Apply differentiation and integration techniques to compute maxima, minima, and area. | PO1(3) | | | |
| CO3 | Analyze the behavior of single and multivariable functions using derivatives and partial derivatives. | PO2(3) | | | |
| CO4 | Utilize modern computational software and online platforms to deepen understanding, perform complex calculations, and visualize mathematical concepts. | PO5(2) PO11(1) | | | |

| ME25C03 | Introduction to Mechanical Engineering | L | T | P | C |
|---|---|---|---|---|---|
| | | 2 | 1 | 0 | 3 |

**Course Objectives:**

- To impart the fundamental concepts and principles of various fields such as Manufacturing, Materials, Mechanics, thermal engineering in Mechanical Engineering.

**Engineering:** History and evolution of mechanical engineering, Basic mechanical engineering principles (force, motion, energy, work, power), Units and dimensions, SI system, Ethics and professionalism in engineering.

**Activities:** Interactive quiz, Conversion between SI and other unit systems.

**Mechanics of Materials and Structures:** Stress and strain, types of stresses (tensile, compressive, shear), Elasticity and plasticity, Mechanical properties of materials (strength, toughness, hardness), Introduction to bending, torsion, and axial loading, Simple structural analysis and design concepts.

**Activities:** Demonstration of Simple truss or beam problems solved using software.

**Energy Interactions:** System, Energy Transfer, Conduction, convection, and radiation, Working principle of Heat Engines, Refrigeration and HVAC systems.

**Activities:** Demonstration of working model of internal combustion engine & refrigerator, Virtual demonstration of Thermodynamic cycles.

**Machine Elements:** Gears, bearings, shafts, fasteners, couplings, Selection of machine components, Quality control and safety in mechanical engineering.

**Activities:** Demonstration of working of Gears, bearings, etc. in a mechanical system.

**Manufacturing Processes:** Casting, forming, machining & joining processes, CNC and additive manufacturing, overview of smart manufacturing.

**Activities:** Demonstration of various machining processes, 3D printing of simple parts.

**Weightage:** Continuous Assessment: 40%, End Semester Examinations: 60%

**Assessment Methodology:** Quiz (10%), Assignments (40%) and Internal Examinations (50%)

**References:**


1. Wickert, J., & Lewis, K. (2016). An Introduction to Mechanical Engineering. Cengage Learning.
2. Rajput, R. K., (2017). Fundamentals of Mechanical Engineering, Laxmi Publications.

**E-resources:**

1. MIT OpenCourseWare – Mechanical Engineering https://ocw.mit.edu
2. PhET Simulations – University of Colorado Boulder https://phet.colorado.edu
3. LibreTexts Engineering https://eng.libretexts.org

| | CO Description | PO | PSO 1 | PSO 2 | PSO 3 |
|---|---|---|---|---|---|
| CO1 | Explain core mechanical engineering concepts. | --- | | | |
| CO2 | Apply basic engineering calculations in mechanical systems. | PO1(3) | | | |
| CO3 | Identify common manufacturing processes for engineering applications. | PO2(2) | | | |

| ME25C01 | Engineering Drawing | L | T | P | C |
|---|---|---|---|---|---|
| | | 2 | 0 | 4 | 4 |

**Course Objectives:**

- To impart knowledge on dimensions and drawing standards.
- To explore the orthographic projection of lines and solids.
- To provide the understanding of orthographic, isometric and perspective views.

**Fundamentals:** Drawing instruments, Drawing standards (BIS), Lettering in engineering, Sheet layout, elements of dimensioning, Systems of dimensioning. Free hand sketching of 2D & 3D objects, Conics – Ellipse, Parabola and Hyperbola.

**Activities:** Virtual Demonstration of Conics and Cycloids.

**Orthographic Projection:** First angle projection, Projection of points, straight lines and planes.

**Projection of Solids:** Simple Solids, Section of Solids, Development of Surfaces

**Activities:** Development of models of various solids and virtual demonstration of sectioning, CAD modelling of 2D objects.

**Isometric Projection:** Isometric Scale, Projection of Simple solids.

**Activities:** Conversion of 3D into 2D orthographic views, CAD modelling of 3D objects.

**Perspective Projection:** Simple solids projection

**Activities:** Virtual demonstration of perspective views.

**Project:** Development of 2D objects and 3D objects using CAD tools.

**Weightage:**
Continuous Assessment: 50%
End Semester Examinations: 50%

**Assessment Methodology:**
Project – 10%, Models - 5%, Assignments - 35% and Internal Examinations - 50%

**References:**


1. Venugopal, K., & Prabhu Raja, V. (2022). Engineering Drawing + AutoCAD. New Age International Publishers.
2. Natarajan, K. V. (2015). A Text Book of Engineering Graphics. Dhanalakshmi Publisher.


**E-Resources:**

1. CAD Software – https://www.freecadweb.org/
2. Engineering Drawing and Computer Graphics, Prof. Rajaram Lakkaraju (IIT Kharagpur) – https://onlinecourses.nptel.ac.in/noc22_me105/preview

3. MIT Design Handbook: Engineering Drawing and Sketching – https://ocw.mit.edu/courses/2-007-design-and-manufacturing-i-spring-2009/pages/related-resources/drawing_and_sketching/

| | CO Description | PO | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|
| CO1 | Explain the advantages of engineering drawing in engineering applications | --- | | | |
| CO2 | Apply the concepts of projections in formulating various solid parts in engineering systems. | PO1(3) | | | |
| CO3 | Analyse the various view and interpret the engineering drawings. | PO2(3) | | | |
| CO4 | Use CAD tools for creation of various models. | PO3(1) | | | |
| CO5 | Critically think and develop innovative models. | PO11(1) | | | |

| PH25C01 | Applied Physics – I | L | T | P | C |
|---|---|---|---|---|---|
| | | 2 | 0 | 2 | 3 |

**Course Objective(s):**

- To impart knowledge and expose the essentials of physics in various engineering applications.

**Properties of Matter:** Elasticity, Cantilever, Young's modulus (non-uniform bending), Girders: Bridges and buildings, Viscosity: Stokes method, Surface tension: drop weight method, Thermal expansion, Thermal stress, Bimetallic strips, Expansion joints

**Practical**: Non-Uniform bending, Young's modulus of the material, Torsional pendulum, Rigidity modulus of the wire and moment of inertia of the disc.

**Activities:** Virtual demonstration of thermal stress.

**Oscillations:** Simple Harmonic motion, Torsional pendulum, Couple per unit twist, Damped and Forced Oscillation

**Waves:** Waves on a stretched string, Energy and Power, standing waves, Ultrasonics, piezo, electric method, Acoustic grating, Electromagnetic waves: Maxwell equation, Production of EM waves by dipole antenna, Propagation of EM waves in free space , wave equation, Cell phone reception

**Practical**: Melde's string experiment – Frequency of an electrically vibrating metal tip.

**Activities:** Virtual demonstration of propagation of EM waves

**Quantum Mechanics:** Black body radiation, Photoelectric effect, de Broglie hypothesis, Schrodinger Wave equation, Particle in a box (infinite potential well - three-dimensional box), Barrier penetration and quantum tunnelling.

**Practical**: Photo-electric effect, Determination of Planck's constant.

**Activities**: Virtual demonstration of Scanning Transmission Electron Microscope

**Applied Optics:** Interference: Air wedge, Michelson's Interferometer, Fiber optics: Structure of a fiber, Fiber Optic Communication System, Fiber Sensors (Virtual demo), Displacement, pressure sensor and Temperature sensor, Einstein Co-efficient, Nd:YAG laser, $CO_2$ laser (construction, functioning and applications), dye laser

**Practical**: Ruling width of Compact disc using Laser, Thickness of a thin sheet/wire using Air wedge Method.

**Activities**: Demonstration of sensors and applications of Lasers

**Weightage:** Continuous Assessment: 50%, End Semester Examinations: 50%

**Assessment Methodology:** Quiz (5%), Assignments (20%), Flipped Class (5%), Practical (30%), Internal Examinations (40%)

**References:**


1. Young, H. D., & Freedman, R. A. (2020). University physics with modern physics. Pearson.
2. Gaur, R. K., & Gupta, S. L. (2022). Engineering physics. Dhanpat Rai Publications.
3. Mathur, D. S. (2010). Elements of properties of matter. S. Chand Publishing.
4. Griffiths, D. J. (2018). Introduction to quantum mechanics. Cambridge University Press.
5. Silfvast, W. T. (2008). Laser fundamentals (2nd ed.). Cambridge University Press.


**E-Resources:**

1. Barrier penetration problem and Quantum tunnelling: https://archive.nptel.ac.in/courses/115/104/115104096/
2. EM waves and wireless channelling: https://onlinecourses.nptel.ac.in/noc24_ee31/preview
3. CO2 Laser: https://onlinecourses.nptel.ac.in/noc25_ph03/preview
4. Bimetallic Strips _ https://www.youtube.com/watch?v=WZQ8lvxdzDk
5. Cell phone Reception_ https://www.youtube.com/watch?v=1JZG9x_VOwA
6. Dipole Antenna_ https://www.youtube.com/watch?v=4xF1Fq2wB1I
7. Optical Sensors_ https://auece.digimat.in/nptel/courses/video/108106173/L02.html
8. Scanning Tunnelling Electron Microscope_ https://www.youtube.com/watch?v=XNYZYbXNWQA

| | Description of CO | PO | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|
| CO1 | Explain the physics concepts in various applications. | --- | | | |
| CO2 | Apply the principles of wave optics and laser physics in practical systems. | PO1(3) | | | |
| CO3 | Analyse the behaviour of materials under different conditions. | PO2(2) | | | |
| CO4 | Conduct experiments in groups and interpret the data. | PO4(3) PO8(1) | | | |

| CY25C01 | Applied Chemistry – I | L | T | P | C |
|---|---|---|---|---|---|
| | | 2 | 0 | 2 | 3 |

**Course Objectives:**

- To provide students with a solid understanding of the chemical principles for engineering applications.
- To introduce the chemical properties of materials and how these properties influence the selection and use of materials in engineering systems.
- To impart practical applications of chemistry in commonly used engineering devices

**Water Technology:** Water quality parameters and standards. Industrial feed water, Remediation. Municipal water treatment. Desalination.

**Practical:** Analysis of alkalinity, hardness and dissolved oxygen.

**Activity:** Coagulation of water sample using Alum

**Nano-chemistry:** Classification, Size, dependent properties. Preparation of nanomaterials, Top-down and Botton-Up approaches, Applications (Flipped classroom).

**Practical:** Preparation of nanoparticles by Sol-Gel method.

**Electrochemistry:** Electrochemical cell, Electrode potential., Redox reaction. Conductivity of electrolytes, Factors.

**Practical:** Conductometric titrations

**Activity:** Electrochemical cell demonstration

**Corrosion & Control:** Chemical and electrochemical corrosions, galvanic series, factors influencing corrosion, Electrochemical protection. Organic and Inorganic coating.

**Practical:**

- Corrosion study by weight loss and salt spray method.
- Potentiometry/UV-visible spectrophotometer.

**Activities:** Case Study on Corrosion in Pipelines and Electronics, Control measures for a corroded metal

**Batteries:** Conventional, Contemporary and Emerging battery storage technologies, Primary & Secondary Batteries, Battery Pack, Battery Materials, Performance Parameters, Testing, Safety aspects.

**Practical:** Measurement of EMF, Internal Resistance, Charge and Discharge Characteristics.

**Activities:** Demonstration of battery pack in e-vehicles.

**Weightage:** Continuous Assessment: 50%, End Semester Examinations: 50%

**Assessment Methodology:** Quiz (5%), Assignments (20%), Flipped Class (5%),

Practical (30%), Internal Examinations (40%)

**References:**


1. Jain, P. C., & Jain, M. (2015). Engineering Chemistry (17th ed.). Dhanpat Rai Publishing Company (P) Ltd.
2. Dara, S. S. (2004). A Textbook of Engineering Chemistry. Chand Publications.
3. Sachdeva, M. V. (2011). Basics of Nano Chemistry. Anmol Publications Pvt Ltd.
4. Friedrich, E. (2014). Engineering Chemistry. Medtech.


**E-Resources:**

1. Water and Wastewater Engineering (Prof. Ligy Philip, IIT Madras) – https://nptel.ac.in/courses/105106202.
2. Electrochemical Energy Systems (Prof. S. Mitra, IIT Madras) – https://nptel.ac.in/courses/113106028.
3. Corrosion (Prof. Kallol Mondal, IIT Kanpur) – https://nptel.ac.in/courses/112104088
4. Chemistry of Battery Systems (Prof. V. R. Marathe, IIT Madras) – https://nptel.ac.in/courses/115106130
5. Resource on all battery types, testing, and safety – https://batteryuniversity.com/articles

| | **Description of CO** | **PO** | **PSO1** | **PSO2** | **PSO3** |
|---|---|---|---|---|---|
| CO1 | Understand the importance of chemistry applications with underlying mechanisms. | --- | | | |
| CO2 | Apply the chemistry concepts in widely used devices. | PO1(3) | | | |
| CO3 | Analyse the effect of various chemical parameters on performance of engineering systems. | PO2(2) | | | |
| CO4 | Perform experimentations as a group and interpret the results. | PO4(3)<br>PO8(1) | | | |
| CO5 | Communicate findings through case studies and reports | PO9(1) | | | |

| UC25H01 | தமிழர் மரபு | L | T | P | C |
|---|---|---|---|---|---|
| | | 1 | 0 | 0 | 1 |

**மொழி மற்றும் இலக்கியம்:** இந்திய மொழிக் குடும்பங்கள், திராவிட மொழிகள், தமிழ் ஒரு செம்மொழி, தமிழ் செவ்விலக்கியங்கள், சங்க இலக்கியத்தின் சமயச் சார்பற்ற தன்மை, சங்க இலக்கியத்தில் பகிர்தல் அறம், திருக்குறளில் மேலாண்மைக் கருத்துக்கள், தமிழ்க் காப்பியங்கள், தமிழகத்தில் சமண பௌத்த சமயங்களின் தாக்கம், பக்தி இலக்கியம், ஆழ்வார்கள் மற்றும் நாயன்மார்கள், சிற்றிலக்கியங்கள், தமிழில் நவீன இலக்கியத்தின் வளர்ச்சி, தமிழ் இலக்கிய வளர்ச்சியில் பாரதியார் மற்றும் பாரதிதாசன் ஆகியோரின் பங்களிப்பு.

**மரபு – பாறை ஓவியங்கள் முதல் நவீன ஓவியங்கள் வரை – சிற்பக் கலை**:நடுகல் முதல் நவீன சிற்பங்கள் வரை, ஐம்பொன் சிலைகள், பழங்குடியினர் மற்றும் அவர்கள் தயாரிக்கும் கைவினைப் பொருட்கள், பொம்மைகள் , தேர் செய்யும் கலை, சுடுமண் சிற்பங்கள், நாட்டுப்புறத் தெய்வங்கள், குமரிமுனையில் திருவள்ளுவர் சிலை, இசைக் கருவிகள், மிருதங்கம், பறை, வீணை, யாழ், நாதஸ்வரம், தமிழர்களின் சமூக பொருளாதார வாழ்வில் கோவில்களின் பங்கு.

**நாட்டுப்புறக் கலைகள் மற்றும் வீர விளையாட்டுகள்:** தெருக்கூத்து, கரகாட்டம், வில்லுப்பாட்டு, கணியான் கூத்து, ஒயிலாட்டம், தோல்பாவைக் கூத்து, சிலம்பாட்டம், வளரி, புலியாட்டம், தமிழர்களின் விளையாட்டுகள்.

**தமிழர்களின் திணைக் கோட்பாடுகள்**: தமிழகத்தின் தாவரங்களும், விலங்குகளும், தொல்காப்பியம் மற்றும் சங்க இலக்கியத்தில் அகம் மற்றும் புறக் கோட்பாடுகள், தமிழர்கள் போற்றிய அறக்கோட்பாடு, சங்ககாலத்தில் தமிழகத்தில் எழுத்தறிவும், கல்வியும், சங்ககால நகரங்களும் துறை முகங்களும், சங்ககாலத்தில் ஏற்றுமதி மற்றும் இறக்குமதி, கடல்கடந்த நாடுகளில் சோழர்களின் வெற்றி.

**இந்திய தேசிய இயக்கம் மற்றும் இந்திய பண்பாட்டிற்குத் தமிழர்களின் பங்களிப்பு**: இந்திய விடுதலைப்போரில் தமிழர்களின் பங்கு, இந்தியாவின் பிறப்பகுதிகளில் தமிழ்ப் பண்பாட்டின் தாக்கம் , சுயமரியாதை இயக்கம் இந்திய மருத்துவத்தில், சித்த மருத்துவத்தின் பங்கு, கல்வெட்டுகள், கையெழுத்துப்படிகள், தமிழ்ப் புத்தகங்களின் அச்சு வரலாறு.

**References:**


1. தமிழக வரலாறு, மக்களும் பண்பாடும், கே.கே. பிள்ளை (வெளியீடு: தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்).
2. கணினித் தமிழ், முனைவர் இல. சுந்தரம். (விகடன் பிரசுரம்).
3. கீழடி, வைகை நதிக்கரையில் சங்ககால நகர நாகரிகம் (தொல்லியல் துறை வெளியீடு)
4. பொருநை, ஆற்றங்கரை நாகரிகம். (தொல்லியல் துறை வெளியீடு)
5. Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL – (in print)
6. Social Life of the Tamils - The Classical Period (Dr.S.Singaravelu) (Published by: International Institute of Tamil Studies.
7. Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thirunavukkarasu) (Published by: International Institute of Tamil Studies).
8. The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: International Institute of Tamil Studies.)
9. Keeladi - 'Sangam City C ivilization on the banks of river Vaigai' (Jointly Published by: Department ofArchaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
10. Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay) (Publishedby: The Author)
11. Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Bookand Educational Services Corporation, Tamil Nadu)
12. Journey of Civilization Indus to Vaigai (R.Balakrishnan) (Published by: RMRL) – Reference Book.

| UC25H01 | Heritage of Tamils | L | T | P | C |
|---|---|---|---|---|---|
| | | 1 | 0 | 0 | 1 |

**Language and Literature:** Language Families in India, Dravidian Languages, Tamil as aClassical Language, Classical Literature in Tamil, Secular Nature of Sangam Literature, Distributive Justice in Sangam Literature, Management Principles in Thirukural, Tamil Epics and Impact of Buddhism & Jainism in Tamil Land, Bakthi Literature Azhwars and Nayanmars, Forms of minor Poetry - Development of Modern literature in Tamil - Contribution of Bharathiyar and Bharathidhasan.

**Heritage - Rock Art Paintings to Modern Art – Sculpture:** Hero stone to modern sculpture, Bronze icons, Tribes and their handicrafts, Art of temple car making, Massive Terracotta sculptures, Village deities, Thiruvalluvar Statue at Kanyakumari, Making of musical instruments, Mridhangam, Parai, Veenai, Yazh and Nadhaswaram, Role of Temples in Social and Economic Life of Tamils.

**Folk and Martial Arts:** Therukoothu, Karagattam, Villu Pattu, Kaniyan Koothu, Oyillattam, Leatherpuppetry, Silambattam, Valari, Tiger dance, Sports and Games of Tamils.

**Thinai Concept of Tamils:** Flora and Fauna of Tamils & Aham and Puram Concept from Tholkappiyam and Sangam Literature, Aram Concept of Tamils, Education and Literacy during Sangam Age, Ancient Cities and Ports of Sangam Age, Export and Import during Sangam Age, Overseas Conquest of Cholas.

**Contribution of Tamils to Indian National Movement and Indian Culture:**

Contribution of Tamils to Indian Freedom Struggle, The Cultural Influence of Tamils over the other parts of India, Self-Respect Movement, Role of Siddha Medicine in Indigenous Systems of Medicine, Inscriptions & Manuscripts, Print History of Tamil Books

**References:**


1. தமிழக வரலாறு, மக்களும் பண்பாடும், கே.கே. பிள்ளை (வெளியீடு: தமிழ்நாடு பாடநூல் மற்றும், கல்வியியல் பணிகள் கழகம்).
2. கணினித் தமிழ், முனைவர் இல. சுந்தரம். (விகடன் பிரசுரம்).
3. கீழடி, வைகை நதிக்கரையில் சங்ககால நகர நாகரிகம் (தொல்லியல் துறை வெளியீடு)
4. பொருநை, ஆற்றங்கரை நாகரிகம். (தொல்லியல் துறை வெளியீடு)
5. Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL – (in print)
6. Social Life of the Tamils, The Classical Period (Dr.S.Singaravelu) (Published by: International Institute of Tamil Studies.
7. Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thirunavukkarasu) (Published by: International Institute of Tamil Studies).
8. The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: International Institute of Tamil Studies.)
9. Keeladi, 'Sangam City C ivilization on the banks of river Vaigai' (Jointly Published by: Department ofArchaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
10. Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay) (Publishedby: The Author)
11. Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Bookand Educational Services Corporation, Tamil Nadu)
12. Journey of Civilization Indus to Vaigai (R.Balakrishnan) (Published by: RMRL), Reference Book.

| EN25C01 | English Essentials – I | L | T | P | C |
|---|---|---|---|---|---|
| | | 2 | 0 | 0 | 2 |

**Course Objectives:**

- To equip students with the skills to write clear, coherent, and grammatically correct texts for various purposes.
- To strengthen the ability to comprehend, interpret, and analyse written English across diverse contexts.

**Speaking Skills:** Parts of Speech, Articles, Tenses, Sentence Structure, Types of Sentences, Subject-Verb Agreement**,** Synonyms and Antonyms, Prefixes and Suffixes, Idioms and Phrases, Self-Introduction, Expressing Oneself, Everyday Conversations, Team Interactions, Emotions, agreeing & disagreeing

**Activities:** Self-Introduction, Just a Minute (JAM) Video recording, Brainstorming sessions, Situational role plays, Usage of Applications.

**Listening Skills:** Listening to Simple Conversations, Short Speeches / Stories, Extracting key information, Phonemes, Listening to Native Speakers, Listening to Various Accents.

**Activities:** Gap fill exercises, Understanding tone and intent, Listening and imitating, Spell Bee

**Reading Skills:** Reading Strategies, Skimming and Scanning, active reading with short passages.

**Activities:** Summarising, loud reading, Cloze reading, Reading comprehension, Reading newspaper articles, Reading Long passage and note making.

**Drafting Skills:** Sentence Formation, Word Substitution, Keywords Development, Writing Paragraphs, Emails and Letters.

**Activities:** Picture and poster interpretation, formal and informal letters, Official e-mails.

**Weightage:** Continuous Assessment: 40%, End Semester Examinations: 60%

**Assessment Methodology:** Quiz (10%), Assignments (20%), Speaking Task (10%), Reading Task (10%), Writing Task (10%), Internal Examinations (40%)

**References:**


1. Miller, K. Q., & Wahl, S. T. (2023). Business and Professional Communication: KEYS for Workplace Excellence (5th ed.). SAGE Publications.
2. Kumar, Sanjay & Pushpalatha. (2018). English Language and Communication Skills for Engineers. India: Oxford University Press.
3. Sharma, S., & Mishra, B. (2024). Communication Skills for Engineers and Scientists (2nd ed.). PHI Learning.

**E-Resources:**

1. Cambridge English – https://www.cambridgeenglish.org/learning-english/grammar-and-vocabulary/
2. Perfect English Grammar – https://www.perfect-english-grammar.com/
3. British Council – Learn English - https://learnenglish.britishcouncil.org/grammar
4. Speechling – https://speechling.com/
5. mePro by Pearson – https://mepro.pearson.com/
6. TED Talks – https://www.ted.com/

| | Description of CO | PO | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|
| CO1 | Comprehend spoken English, take and draft notes. | --- | | | |
| CO2 | Apply vocabulary, with appropriate ways to enhance drafting and communication. | PO1(3) | | | |
| CO3 | Analyze texts in different contexts using appropriate reading strategies. | PO2(2) | | | |
| CO4 | Communicate thoughts and ideas in both planned and unplanned situations. | PO9(2) | | | |
| CO5 | Continuously improving English communication skills relevant to engineering and scientific work. | PO11(1) | | | |

| CS25C02 | Computer Programming: Python | L | T | P | C |
|---|---|---|---|---|---|
| | | 2 | 0 | 2 | 3 |

**Course Objectives:**

- To equip engineering students with the foundational knowledge and practical skills in Python programming to analyse and solve computational problems effectively.
- To foster problem-solving, critical thinking, and modular programming skills essential for engineering domains.

**Introduction to Python:** Problem Solving, Problem Analysis Chart, Developing an Algorithm, Flowchart and Pseudocode, Interactive and Script Mode, Indentation, Comments, Error messages, Variables, Reserved Words, Data Types, Arithmetic operators and expressions, Built-in Functions, Importing from Packages.

**Practical:** Problem Analysis Chart, Flowchart and Pseudocode Practices. (Minimum three)

**Control Structures:** if, if-else, nested if, multi-way if-elif statements, while loop, for loop, nested loops, pass statements.

**Practical:** Usage of conditional logics in programs. (Minimum three)

**Functions:** Hiding redundancy, complexity; Parameters, arguments and return values; formal vs actual arguments, named arguments, Recursive & Lambda Functions.

**Practical:** Usage of functions in programs. (Minimum three)

**Strings & Collections:** String Comparison, Formatting, Slicing, Splitting, Stripping, Lists, tuples, and dictionaries, basic list operators, searching and sorting lists; dictionary literals, adding and removing keys, accessing and replacing values.

**Practical:** String manipulations and operations on lists, tuples, sets, and dictionaries. (Minimum three)

**File Operations:** Create, Open, Read, Write, Append and Close files. Manipulating directories, OS and Sys modules, reading/writing text and numbers, from/to a file; creating and reading a formatted file (csv, tab-separated, etc.).

**Practical:** Opening, closing, reading and writing in formatted file format and sort data. (Minimum three)

**Packages:** Built-in modules, User-Defined modules, Numpy, SciPy, Pandas, Scikit-learn**.**

**Practical:** Usage of modules and packages to solve problems. (Minimum three), Project (Minimum Two)

**Weightage:** Continuous Assessment: 50%, End Semester Examinations: 50%

**Assessment Methodology:** Quiz (5%), Project (15%), Assignment Programs (25%), Practical (25%), Internal Examinations (30%)

**References:**


1. Matthes, E. (2019). *Python crash course: A hands-on, project-based introduction to programming* (2nd ed.). No Starch Press.
2. Brown, M. C. (2018). *Python: The complete reference* (4th ed.). McGraw Hill Publishers.
3. Guttag, J. V. (2016). *Introduction to computation and programming using Python: With applications to understanding data* (2nd ed.). MIT Press.
4. McKinney, W. (2017). *Python for data analysis: Data wrangling with pandas, NumPy, and IPython*. Shroff/O'Reilly.


**E-Resources:**

1. Official Python Documentation – https://docs.python.org/3/
2. Python Tutorials – https://www.w3schools.com/python/
3. NumPy – https://numpy.org/doc/
4. SciPy – https://scipy.org/
5. Google's Python class – https://developers.google.com/edu/python/

| | Description of CO | PO | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|
| CO1 | Explain the potential usage of Python in engineering applications | --- | | | |
| CO2 | To apply the concepts of Python in solving engineering problems and formulate new projects. | PO1 (2)<br>PO5 (2) | | | |
| CO3 | To interpret the data and effectively communicate in groups. | PO2 (3)<br>PO8 (1)<br>PO9 (1) | | | |
| CO4 | Adapt new programming concepts and technologies in the profession. | PO11 (1) | | | |

| ME25C04 | Makerspace | L | T | P | C |
|---|---|---|---|---|---|
| | | 0 | 0 | 4 | 2 |

**Course Objectives:**

1. To impart practical skills in the assembly, disassembly, and welding of components using appropriate tools and techniques.
2. To provide hands-on training in electrical wiring practices, and the use of electronic components, sensors, and actuators.

**List of Activities**

**(A). Dis-assembly & Assembly Practices**

i. Tools and its handling techniques.
ii. Dis-assembly and assembly of home appliances – Grinder Mixer Grinder, Ceiling Fan, Table Fan & Washing Machine.
iii. Dis-assembly and assembly of Air-Conditioners & Refrigerators.
iv. Dis-assembly and assembly of a Bicycle.

**(B). Welding Practices**

i. Welding Procedure, Selection & Safety Measures.
ii. Power source of Arc Welding – Gas Metal Arc Welding & Gas Tungsten Arc Welding processes.
iii. Hands-on session of preparing base material & Joint groove for welding.
iv. Hands-on session of MAW, GMAW, GTAW, on Carbon Steel & Stainless Stell plates / pipes, for fabrication of a simple part.

**(C). Electrical Wiring Practices**

i. Electrical Installation tools, equipment & safety measures.
ii. Hands-on session of basic electrical connections for Fuses, Miniature Circuit Breakers and Distribution Box.
iii. Hands-on session of electrical connections for Lightings, Fans, Calling Bells.
iv. Hands-on session of electrical connections for Motors & Uninterruptible Power Supply.

**(D). Electronics Components / Equipment Practices**

i. Electronic components, equipment & safety measures.
ii. Dis-assembly and assembly of Computers.
iii. Hands-on session of Soldering Practices in a Printed Circuit Board.
iv. Hands-on session of Bridge Rectifier, Op-Amp and Transimpedance amplifier.
v. Hands-on session of integration of sensors and actuators with a Microcontroller.
vi. Demonstration of Programmable Logic Control Circuit.

**(E). Contemporary Systems**

i. Demonstration of Solid Modelling of components.
ii. Demonstration of Assembly Modelling of components.
iii. Fabrication of simple components / parts using 3D Printers.
iv. Demonstration of cutting of wood / metal in different complex shapes using Laser Cutting Machine.

**References:**


1. Stephen Christena, Learn to Weld: Beginning MIG Welding and Metal Fabrication Basics, Crestline Books, 2014.
2. H. Lipson, Fabricated - The New World of 3D Printing, Wiley, 1st edition, 2013.
3. Code of Practice for Electrical Wiring Installations (IS 732:2019)


| | Description of CO | PO | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|
| CO1 | Demonstrate proper use and handling of basic hand and power tools. | --- | | | |
| CO2 | Carry out electrical wiring installations and repairs, applying safety measures in domestic applications. | PO1(3) | | | |
| CO3 | Develop solid innovative models through software. | PO5(2) | | | |
| CO4 | Adapt and follow safety protocols in the work environment. | PO11(2) | | | |

| UC25A01 | Life Skills for Engineers – I | L | T | P | C |
|---|---|---|---|---|---|
| | | 1 | 0 | 2 | - |

**Course Objectives**

- To equip engineering students with essential life skills encompassing personal and emotional development, effective management of time and stress, financial literacy, digital safety, and civic responsibility.
- To enhance self-awareness, interpersonal skills, and resilience to prepare students for the professional and personal challenges of engineering careers and life beyond academics**.**

**Personal and Emotional Development:** Self-Awareness & Personality, Emotional Intelligence & Empathy, Positive thinking, Right attitude, Stress & Anger Management, Goal-Setting & Time Management, Growth Mindset & Resilience.

**Activities:** Personality tests (MBTI, DISC), reflection journals, Empathy circle, role-playing difficult conversations, Guided mindfulness sessions, stress relief toolkit creation, Vision board creation, weekly time audit and planner, Group challenge scenarios, resilience journal.

**Management Skills:** Financial Literacy: Budgeting & Saving, Nutrition, Health, and Hygiene, Digital Literacy & Online Safety, Civic Responsibility & Ethics

**Activities**: Create a monthly budget, financial simulation game, Meal planning workshop, physical wellness challenge, Social media audit, privacy and safety scenarios, Community service, values debate.

**Weightage:** Continuous Assessment: 100%

**Assessment Methodology:** Assignments (20%), Flipped Class & Worksheets (10%), Practical (30%), Internal Examinations (40%)

**References:**


1. Khera, S. (2003). *You can win*. Macmillan.
2. Levesque, H. (n.d.). *Life skills 101: A practical guide to leaving home and living on your own*. (Publication year not specified)
3. Mitra, B. K. (2017). *Personality development & soft skills* (3rd impression). Oxford University Press.
4. ICT Academy of Kerala. (2016). *Life skills for engineers*. McGraw Hill Education (India) Private Ltd.

| | Description of CO | PO | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|
| CO1 | Understand personality traits and emotional intelligence, in interpersonal interactions. | --- | | | |
| CO2 | To work and execute as a team through successful implementation of set goals. | PO7 (1)<br>PO8 (2)<br>PO9 (2) | | | |
| CO3 | Develop and implement best practices in day-to-day life, in terms of planning and execution. | PO11 (3) | | | |

| UC25A02 | Physical Education - I | L | T | P | C |
|---|---|---|---|---|---|
| | | 0 | 0 | 4 | 1 |

**Course Objectives:**

- To impart the fundamentals of physical education for development of students' physical, mental, and social well-being.
- To instill a lifelong appreciation for physical activity towards the development of positive attitude and fostering values of team work and sportsmanship.

**Introduction to physical education:** Exercise for Good Posture – Conditioning and Calisthenics for Before start, Jogging, Bending, Twisting, Standing, Sitting and Relaxation, Training on First Aid practices.

**Participation of athletic events:** Rules and regulations of important athletic events, Sprint, Jumps, Throws and Hurdles.

**Skill development in any one of the following outdoor games:** Basket Ball, Volley Ball, Ball Badminton, Football, Hockey, Kho-Kho, Kabaddi, Cricket, Hand ball and Tennis.

**Skill development in any one of the following indoor games:** Shuttle Badminton, Chess and Table Tennis.

**Weightage:** Continuous Assessment: 100%

**Assessment Methodology:** Attendance (60%), Quiz (10%), Participation in Sports and Games (20%) and Viva Voce (10%)

**References:**


1. Singh, A. (2008). Essentials of physical education. Kalyani Publishers.
2. Kamlesh, M. L. (2006). Psychology in physical education and sport (3rd ed.). Metropolitan Book Co.
3. Mangal, S. K. (2009). *Psychology of sports performance*. Sports Publication.


**E-resources:**

1. **https://www.who.int/health-topics/physical-activity**

| | CO Description | PO | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|
| CO1 | Understand and explain the importance of physical activity for mental and physical health. | --- | | | |
| CO2 | Apply basic principles of exercise science in the routine life. | PO1(3) | | | |
| CO3 | Develop teamwork, discipline, and leadership through sports and group activities and collaborate effectively. | PO8(3) | | | |
| CO4 | Demonstrate independent learning in health, nutrition, and fitness-related topics. | PO11(2) | | | |

# Semester II

| MA25C02 | Linear Algebra | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 1 | 0 | 4 |

**Course Objectives:**

- To impart foundational knowledge in linear algebra essential for analysing and solving problems in engineering applications.
- To provide the knowledge on computation using software and interpret key linear algebra concepts using software.

**Vector Spaces** Introduction to Vector Spaces, Examples, Subspaces, Linear Combinations, Span, Generating Sets, Linear Dependence and Independence, Basis and Dimension, Dimension of Subspaces.

**Activities:** Open-Source software, exercises to test linear dependence and independence using rank, compute span and basis of a set of vectors, determine the dimension of subspaces, and illustrate the concept of subspace and basis in $\boldsymbol{R^2}/\boldsymbol{R^3}$ with visualization.

**Linear Transformations and Diagonalization:** Null space, Range, Dimension Theorem (statement only), Matrix representation of a linear transformation, Eigenvalues & Eigenvectors, Diagonalizability.

**Activities:** Open-Source software, exercises to compute the matrix representation of a linear transformation, find the null space and range of a matrix, and compute eigenvalues and eigenvectors of a matrix.

**Inner Product Spaces:** Inner product, Norms, Cauchy, Schwarz inequality, Gram, Schmidt orthogonalization, Simple problems (up to $\boldsymbol{R^3}$).

**Activities:** Open-Source software, exercises to compute inner products and vector norms.

**Matrix Decomposition:** Orthogonal transformation of a symmetric matrix to diagonal form - Positive definite matrices, QR decomposition, Singular Value Decomposition (SVD), Least squares solutions- simple problems (up to $3 \times 3\ matrices$).

**Activities:** Open-Source software, exercises to check if a matrix is positive definite, perform QR decomposition and SVD using built-in functions.

**Weightage:** Continuous Assessment: 40%, End Semester Examinations: 60%.

**Assessment Methodology:** Assignment (20%), Software activity (20%), Quiz (20%), Internal Examinations (50%).

**References:**


1. Friedberg, S. H., Insel, A. J., & Spence, L. E. (2022). *Linear algebra*. Pearson.
2. Lay, D. C., Lay, S. R., & McDonald, J. J. (2020). *Linear algebra and its applications with MATLAB*. Pearson.
3. Bronson, R. (2011). *Schaum's outline of matrix operations*. McGraw-Hill Education.

4. Strang, G., & Thomson, R. (2005). *Linear algebra and its applications*. Brooks/Cole.
5. Lipschutz, S., & Lipson, M. (2009). *Schaum's outline of linear algebra*. McGraw-Hill.
6. Kreyszig, E. (2018). *Advanced engineering mathematics*. Wiley India.

| | **Description of CO** | **PO** | **PSO1** | **PSO2** | **PSO3** |
|---|---|---|---|---|---|
| CO1 | Explain the fundamental concepts of Linear Algebra. | --- | | | |
| CO2 | Compute and interpret eigenvalues and eigenvectors. | PO1(3) | | | |
| CO3 | Apply inner product concepts and perform orthogonalization. | PO1 (3) | | | |
| CO4 | Compute least squares solutions of linear system of equations. | PO1 (2)<br>PO2 (2) | | | |
| CO5 | Use MATLAB to implement and validate key linear algebra concepts | PO5 (1)<br>PO11 (1) | | | |

| ME25C02 | Engineering Mechanics | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 1 | 0 | 4 |

**Course Objectives:**

- To introduce the fundamental concepts and principles of statics related to forces acting on particles and rigid bodies.
- To develop the ability to formulate and apply equilibrium equations for particles and rigid bodies in two and three dimensions.
- To enable students to analyse force systems through vector resolution and calculation of moments and couples.

**Statics of Particles:** Resultant of forces in a plane, Equilibrium of a particle in a plane, Addition of concurrent forces in space, Equilibrium of a particle in space.

**Activities:** Assignments and Quiz on resultant forces, Solving of GATE questions.

**Statics of Rigid Bodies:** Concept of Free Body Diagram, Equivalent systems of forces, Transmissibility, Moment of a force about a point and an axis, Couples and force-couple systems, Equilibrium of rigid bodies in two and three dimensions, Principle of virtual work.

**Activities:** Virtual demonstration of rigid bodies, Solving of GATE questions.

**Moments of Inertia:** First moments of areas and lines, Centroids of composite areas and lines, Theorems of Pappus-Guldinus, Second moment of area, Parallel axis theorem, Rectangular and Polar Moments of inertia of composite areas, Radius of Gyration, Product of Inertia, Principal Axes and Principal Moments of Inertia, Mass moments of inertia of thin plates.

**Activities:** Virtual Simulation of Moment of Inertia, Principal Axes Determination, Solving of GATE questions.

**Friction:** Laws of friction, Coefficients of Friction, Angles of Friction, Types of Friction Problems, Wedges and Ladder friction, Belt friction.

**Activities:** Virtual Demonstration of Friction in belts and pulleys, Solving of GATE questions

**Weightage:**

Continuous Assessment: 40%
End Semester Examinations: 60%

**Assessment Methodology:**

Quiz - 10%, Assignments - 20%, Solving of GATE questions (20%) and Internal Examinations - 50%

**References:**

1. Beer, F. P., Johnston Jr., E. R., DeWolf, J. T., & Mazurek, D. F. (2015). Mechanics of Materials. McGraw-Hill Education.

2. Meriam, J. L., & Kraige, L. G. (2018). *Engineering Mechanics: Statics and Dynamics*. Wiley.

3. Pytel, A., & Kiusalaas, J. (2014). Engineering Mechanics (Indian Edition). Cengage Learning India.

**E-resources:**

1. Moment of Inertia Calculator – https://skyciv.com/free-moment-of-inertia-calculator/
2. OpenStax – University Physics Volume 1 – https://openstax.org/books/university-physics-volume-1/pages/10-4-moment-of-inertia-and-rotational-kinetic-energy
3. Engineering Mechanics, Dr. Dwarakish. G. S. – https://onlinecourses.swayam2.ac.in/ntr24_ed75/preview

| | CO Description | PO | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|
| CO1 | Explain the principles of statics in determination of forces acting on particles and rigid bodies. | --- | | | |
| CO2 | Apply equilibrium conditions to predict the behaviour of particles and rigid bodies under various force configurations | PO1(3) | | | |
| CO3 | Analyse various systems through resolution of forces and moments. | PO2(2) | | | |
| CO4 | Demonstrate the ability to engage in adapting new techniques in the analysis of force and moments in a system. | PO11(1) | | | |

| EE25C01 | Basic Electrical and Electronics Engineering | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 0 | 0 | 3 |

**Course Objectives:**

- To impart foundational knowledge in principles and applications of electrical and electronics engineering.

**DC Fundamentals:** Current and Voltage sources, Resistance, Inductance and Capacitance; Ohm's law, Kirchhoff's law, Series parallel combination of R, L and C components, Voltage Divider and Current Divider Rules.

**Activities:** Virtual Demonstration of electrical laws & circuits, Hands-on Breadboarding, Solving GATE questions.

**AC Fundamentals:** Faraday's Laws of Electro-magnetic Induction, Definition of Self and Mutual Inductances, Generation of sinusoidal voltage, Instantaneous & RMS values of sinusoidal signals, Introduction to 3-phase systems, Electrical Safety, Fuses and Earthing.

**Activities:** Virtual Demonstration of electromagnetic induction, Measurement of instantaneous and RMS values of AC signals, Solving GATE questions.

**Electric Machines:** DC Machines, Transformers, Star and delta Connections, Three phase Induction motors, Synchronous Generators, Single Phase Induction Motors, Stepper Motor, Universal Motor and BLDC motor.

**Activities:** Virtual demonstration of step-up and step-down transformers, Virtual working models of Universal and BLDC motors, Solving GATE questions.

**Semiconductor Devices:** PN junction diodes, Zener Diode, Voltage regulator, BJT & FET Transistors, Timers, Operational Amplifiers.

**Activities:** Virtual demonstration of V-I characteristics of PN junction and Zener diodes using simulation, inverting/non-inverting amplifiers, Solving GATE questions.

**Digital Electronics:** Boolean algebra, Basic and Universal Gates, adders, multiplexers, demultiplexers and flip-flops.

**Activity:** Online logic gate simulators, Solving GATE questions.

**Microcontrollers:** Introduction, Architecture, Potential Applications.

**Activities:** Physical demonstration of a microcontroller and online simulation of microcontroller.

**Weightage:** Continuous Assessment: 40%, End Semester Examinations: 60%

**Assessment Methodology:** Quiz (5%), Assignments (25%), GATE Questions (20%), Internal Examinations (50%)

**E-resources:**

1. https://archive.nptel.ac.in/courses/108/106/108106172/
2. Circuit Simulator – https://www.falstad.com/circuit/

| | Description of CO | PO | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|
| CO1 | Understand and explain basic electrical and electronic concepts. | --- | | | |
| CO2 | Apply and analyse electrical circuits in real-time applications. | PO1 (3)<br>PO2 (1) | | | |
| CO3 | Identify and utilise key electronic devices used in engineering applications | PO2 (2) | | | |

| PH25C05 | Applied Physics (ME) – II | L | T | P | C |
|---|---|---|---|---|---|
| | | 2 | 1 | 0 | 3 |

**Course Objective(s):**

- To impart fundamental knowledge of rigid body dynamics, thermal physics, phase transitions, and functional materials.
- To provide analytical abilities for evaluating physical phenomena in mechanical engineering applications.

**Rigid Body Dynamics:** Centre of mass – Moment of inertia (circular disc, solid cylinder, hollow cylinder, solid sphere, hollow sphere), Gear, shaft, gyroscope

**Activities:** Demonstration of moment of inertia of Gear, shafts and Gyroscopes.

**Thermal Physics:** Thermal conductivity –Transient plane source method, Transient Line Source method- Forbe's method - conduction through compound media, Laws of Thermodynamics .

**Activities:** Demonstration of thermal conductivity of insulators

**Phase Transitions:** Solid solutions - single component system, binary phase diagrams - iron-carbon equilibrium diagram, T-T-T-diagram - heat treatment of steels – hardening techniques

**Activities:** Demonstration of Hardening of steels

**Functional Materials:** Ceramics – Composites, Fiber Reinforced Plastics, Metallic Glasses, LED Characteristics

**Activities:** Demonstration of LED working and its characteristics.

**Weightage:** Continuous Assessment: 40%, End Semester Examinations: 60%

**Assessment Methodology:** Quiz (10%), Assignments (30%), Flipped Class (10%), Internal Examinations (50%)

**References:**


1. Mathur, D. S. (2008). *Elements of properties of matter*. S. Chand.
2. Brij Lal, & Subramaniyan, N. (2018). *Heat, thermodynamics and statistical physics*. S. Chand.
3. Raghavan, V. (2009). *Physical metallurgy: Principles and practice*. PHI Learning.
4. Askeland, D. (2010). *Materials science and engineering*. Brooks/Cole.


**E-resources:**

1. Moment of Inertia: https://youtu.be/fDJeVR0o__w
2. Conduction: http://kcl.digimat.in/nptel/courses/video/112106155/L32.html
3. Iron –Carbon phase diagram - https://archive.nptel.ac.in/courses/113/104/113104068/
4. Gyroscope_ https://www.youtube.com/watch?v=FydJu1A1oeM gyroscope-131127011945-phpapp02.pdf
5. Hardening Techniques_ https://www.youtube.com/watch?v=ckCN9jGsdUY
6. LED Characteristics - https://youtu.be/IgapvczVyXs

| | Description of CO | PO | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|
| CO1 | Explain the concepts of physics in mechanical engineering stream. | --- | | | |
| CO2 | Apply appropriate techniques in physics to solve engineering problems. | PO1(3) | | | |
| CO3 | Analyse physical systems and interpret data from the virtual studies in the core branches in mechanical engineering. | PO2(2) | | | |

| CY25C03 | Applied Chemistry (ME) – II | L | T | P | C |
|---|---|---|---|---|---|
| | | 2 | 0 | 0 | 2 |

**Course Objective(s):**

- To impart knowledge and expose to applications of chemistry in mechanical engineering stream.
- To explore the mechanisms and working principles of smart materials and coatings with real-world applications.

**Functional Materials:** Types, Smart coatings, Mechanisms, Sustainable energy materials.

**Activities:** Seminar on recent development in functional materials (e.g., smart coatings, self-cleaning surfaces), Infographic Design of functional nanomaterials.

**Fuels:** Classification, Chemical Composition, natural resources, Calorific Value - Alternative Fuels - Natural gas benefits.

**Activities:** Comparison of efficiency and emissions in fuels.

**Composites**: Matrix materials – Reinforcements, Hybrid composites, Engineering applications.

**Activities:** Design of a simple composite structure for a real engineering application (e.g., lightweight bike frame).

**Lubricants**: Types, Functions. Key properties, Synthetic lubricants, Mechanisms, Emerging lubricants.

**Activities:** Collection of lubricants used in real-world engineering systems (e.g., gears, engines, bearings), Virtual demonstration of lubricant viscosity testing.

**Combustion**: Reaction Kinetics, Stoichiometric combustion and air-fuel ratio calculations, Knocking and Anti-knocking agents, Hydrogen combustion, Flue Gas analysis.

**Activities:** Virtual simulation of flue gas analysis and gas composition, Calculation of air-fuel ratio.

**Adhesives:** Adhesion Mechanisms, Classification, Bond strength, Industrial adhesives.

**Activities:** Adhesion of thermal pads on different Integrated circuits, Industrial adhesives.

**Weightage:** Continuous Assessment: 40%, End Semester Examinations: 60%

**Assessment Methodology:** Quiz (5%), Seminar (5%), Assignments (30%), Flipped Class (10%), Internal Examinations (50%)

**References:**


1. Palanna, O. G. (2009). *Engineering chemistry*. McGraw-Hill Education (India) Pvt. Ltd.
2. Cheong, K. Y., Impellizzeri, G., & Fraga, M. A. (2018). *Emerging materials for energy conversion and storage*. Elsevier.
3. Jain, P. C., & Jain, M. (2013). *Engineering chemistry*. Dhanpat Rai Publishing Company (P) Ltd.

Sharma, S. C. (2000). *Composite materials*. Narosa Publishing House


| | Description of CO | PO | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|
| CO1 | Explain the major concepts of chemistry with regard to applications in mechanical systems. | --- | | | |
| CO2 | Apply the chemistry principles and evaluate the engineering materials in mechanical systems. | PO1(3) | | | |
| CO3 | Analyse and evaluate the performance and efficiency of mechanical systems. | PO2(3)<br>PO3(1) | | | |
| CO5 | Propose innovative solutions for real-world applications and challenges. | PO9(1) | | | |

| UC25H02 | தமிழர்களும் தொழில்நுட்பமும் / Tamils and Technology | L | T | P | C |
|---|---|---|---|---|---|
| | | 1 | 0 | 0 | 1 |

**நெசவு மற்றும் பானைத் தொழில்நுட்பம்**: சங்க காலத்தில் நெசவுத் தொழில், பானைத் தொழில்நுட்பம், கருப்பு சிவப்பு பாண்டங்கள், பாண்டங்களில் கீறல் குறியீடுகள்.

**வடிவமைப்பு மற்றும் கட்டிடத் தொழில்நுட்பம்:** சங்க காலத்தில் வடிவமைப்பு மற்றும் கட்டுமானங்கள் & சங்க காலத்தில் வீட்டுப் பொருட்களில் வடிவமைப்பு, சங்க காலத்தில் கட்டுமான பொருட்களும் நடுகல்லும் – சிலப்பதிகாரத்தில் மேடை அமைப்பு பற்றிய விவரங்கள், மாமல்லபுரச் சிற்பங்களும், கோவில்களும், சோழர் காலத்துப் பெருங்கோயில்கள் மற்றும் பிற வழிபாட்டுத் தலங்கள் – நாயக்கர் காலக் கோயில்கள், மாதிரி கட்டமைப்புகள் பற்றி அறிதல், மதுரை மீனாட்சி அம்மன் ஆலயம் மற்றும் திருமலை நாயக்கர் மஹால் – செட்டிநாட்டு வீடுகள், பிரிட்டிஷ் காலத்தில் சென்னையில் இந்தோ, சாரோசெனிக் கட்டிடக் கலை.

**உற்பத்தித் தொழில் நுட்பம்:** கப்பல் கட்டும் கலை, உலோகவியல், இரும்புத் தொழிற்சாலை, இரும்பை உருக்குதல், எஃகு, வரலாற்றுச் சான்றுகளாக செம்பு மற்றும் தங்க நாணயங்கள், நாணயங்கள் அச்சடித்தல், மணி உருவாக்கும் தொழிற்சாலைகள், கல்மணிகள், கண்ணாடி மணிகள், சுடுமண் மணிகள், சங்கு மணிகள், எலும்புத்துண்டுகள், தொல்லியல் சான்றுகள், சிலப்பதிகாரத்தில் மணிகளின் வகைகள்.

**வேளாண்மை மற்றும் நீர்ப்பாசனத் தொழில் நுட்பம்:** அணை, ஏரி, குளங்கள், மதகு, சோழர்காலக் குமுழித் தூம்பின் முக்கியத்துவம், கால்நடை பராமரிப்பு, கால்நடைகளுக்காக வடிவமைக்கப்பட்ட கிணறுகள், வேளாண்மை மற்றும் வேளாண்மைச் சார்ந்த செயல்பாடுகள், கடல்சார் அறிவு, மீன்வளம், முத்து மற்றும் முத்துக்குளித்தல், பெருங்கடல் குறித்த பண்டைய அறிவு, அறிவுசார் சமூகம்.

**அறிவியல் தமிழ் மற்றும் கணித்தமிழ்:** அறிவியல் தமிழின் வளர்ச்சி, கணித்தமிழ் வளர்ச்சி, தமிழ் நூல்களை மின்பதிப்பு செய்தல், தமிழ் மென்பொருட்கள் உருவாக்கம், தமிழ் இணையக் கல்விக்கழகம், தமிழ் மின் நூலகம், இணையத்தில் தமிழ் அகராதிகள், சொற்குவைத் திட்டம்.

**Text-Cum-Reference Books**


1. தமிழக வரலாறு, மக்களும் பண்பாடும், கே.கே. பிள்ளை (வெளியீடு: தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்).
2. கணினித் தமிழ் – முனைவர் இல. சுந்தரம். (விகடன் பிரசுரம்).
3. கீழடி – வைகை நதிக்கரையில் சங்ககால நகர நாகரிகம் (தொல்லியல் துறை வெளியீடு)
4. பொருநை, ஆற்றங்கரை நாகரிகம். (தொல்லியல் துறை வெளியீடு)
5. Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL – (in print)
6. Social Life of the Tamils – The Classical Period (Dr.S.Singaravelu) (Published by: InternationalInstitute of Tamil Studies.
7. Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thirunavukkarasu) (Published by: International Institute of Tamil Studies).
8. The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: International Institute of Tamil Studies.)
9. Keeladi – 'Sangam City C ivilization on the banks of river Vaigai' (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
10. Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay) (Publishedby: The Author)
11. Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Bookand Educational Services Corporation, Tamil Nadu)
12. Journey of Civilization Indus to Vaigai (R.Balakrishnan) (Published by: RMRL) – Reference Book.

| UC25H02 | Tamils and Technology | L | T | P | C |
|---|---|---|---|---|---|
| | | 1 | 0 | 0 | 1 |

**Weaving and Ceramic Technology:** Weaving Industry during Sangam Age, Ceramic technology, Black and Red Ware Potteries (BRW), Graffiti on Potteries.

**Design and Construction Technology:** Designing and Structural construction House & Designs in household materials during Sangam Age, Building materials and Hero stones of Sangam age, Details of Stage Constructions in Silappathikaram, Sculptures and Temples of Mamallapuram, Great Temples of Cholas and other worship places,Temples of Nayaka Period, Type study (Madurai Meenakshi Temple), Thirumalai Nayaka rMahal, Chetti Nadu Houses, Indo, Saracenic architecture at Madras during British Period.

**Manufacturing Technology:** Art of Ship Building , Metallurgical studies, Iron industry, Iron smelting, steel, Copper and gold Coins as source of history - Minting of Coins, Beads making, industries Stonebeads, Glass beads, Terracotta beads, Shell beads / bone beats, Archeological evidences, Gem stone types described in Silappathikaram.

**Agriculture and Irrigation Technology:** Dam, Tank, ponds, Sluice, Significance of Kumizhi Thoompuof Chola Period, Animal Husbandry - Wells designed for cattle use , Agriculture and Agro Processing -Knowledge of Sea -Fisheries, Pearl, Conche diving, Ancient Knowledge of Ocean -Knowledge Specific Society.

**Scientific Tamil & Tamil Computing:** Development of Scientific Tamil, Tamil computing, Digitalization of Tamil Books, Development of Tamil Software, Tamil Virtual Academy, Tamil Digital Library, Online Tamil Dictionaries, Sorkuvai Project.

**Text-Cum-Reference Books**


1. தமிழக வரலாறு, மக்களும் பண்பாடும், கே.கே. பிள்ளை (வெளியீடு: தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்).
2. கணினித் தமிழ், முனைவர் இல. சுந்தரம். (விகடன் பிரசுரம்).
3. கீழடி, வைகை நதிக்கரையில் சங்ககால நகர நாகரிகம் (தொல்லியல் துறை வெளியீடு)
4. பொருநை, ஆற்றங்கரை நாகரிகம். (தொல்லியல் துறை வெளியீடு)
5. Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL – (in print)
6. Social Life of the Tamils, The Classical Period (Dr.S.Singaravelu) (Published by: International Institute of Tamil Studies.
7. Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thirunavukkarasu) (Published by: International Institute of Tamil Studies).
8. The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: International Institute of Tamil Studies.)
9. Keeladi , 'Sangam City C ivilization on the banks of river Vaigai' (Jointly Published by: Department ofArchaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
10. Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay) (Publishedby: The Author)
11. Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Bookand Educational Services Corporation, Tamil Nadu)
12. Journey of Civilization Indus to Vaigai (R.Balakrishnan) (Published by: RMRL) – Reference Book.

| ME25C05 | Re-Engineering for Innovation | L | T | P | C |
|---|---|---|---|---|---|
| | | 0 | 0 | 4 | 2 |

**Course Objectives:**

- To cultivate foundational skills in prototyping, and automation for development of prototypes with real-world applications.
- To provide a comprehensive, hands-on exposure to product development through reverse engineering concepts.

**Bootcamp 1:** Introduction to Product Development, Reverse Engineering, Overview of the product lifecycle, Hands-on disassembly of simple products, Practice of basic measurements and sketching, Introduction to CAD modeling of disassembled parts, Virtual assembly of parts.

**Bootcamp 2:** Embedded System Programming (Open-source platforms), Practice of interfacing sensors, reading data, automation in home, healthcare and agriculture.

**Reverse Engineering:** Sketch and prototype alternative designs, Group brainstorming sessions, Manufacture prototype parts using 3D printing and / or workshop tools, Assemble prototype product.

**Weightage:** Continuous Assessment: 60%, End Semester Examinations: 40%

**Assessment Methodology:** Project (30%), Assignment (10%), Practical (30%), Internal Examinations (30%)

**References:**


1. Wang, W. (2010). Reverse engineering: Mechanisms, structures, systems & materials. CRC Press.
2. Margolis, M. (2020). Arduino cookbook: Recipes to begin, expand, and enhance your projects (3rd ed.). O'Reilly Media.


**E-resources:**

1. GrabCAD – https://grabcad.com/
2. GitHub – https://github.com/

| | Description of CO | PO | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|
| CO1 | Understand the product development lifecycle, including stages such as concept generation, design, prototyping, and testing. | --- | | | |
| CO2 | Apply reverse engineering techniques to analyze and document existing products. | PO1 (3)<br>PO2 (2) | | | |
| CO3 | Collaborate in teams to fabricate prototypes using appropriate tools. | PO5 (2)<br>PO8 (1)<br>PO9 (1) | | | |

| | Description of CO | PO | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|
| CO4 | Engage in independent learning and continuously adapt to emerging technologies in product design | PO11 (2) | | | |

| EN25C02 | English Essentials – II | L | T | P | C |
|---|---|---|---|---|---|
| | | 1 | 0 | 2 | 2 |

**Course Objectives:**

- To integrate vocabulary and functional grammar into communication tasks to improve fluency and accuracy.
- To articulate ideas clearly and effectively in formal and informal spoken interactions.
- To construct well-organised written documents including summaries, reports, and emails relevant to academic and workplace contexts

**Communication:** Types, Inter and Intra-personal, communication barriers, Summarising visuals, media terminology, rhetorical devices and TED Talks.

**Activities:** Short presentation, Media based responses and Speeches, Error detection, Welcome, Vote of Thanks and Formal Speeches, Listen and respond to short podcast, Worksheets.

**Correspondence:** Modal Verbs, Job Application Letters, Resume Writing, Statement of Purpose, Paraphrasing & Summarizing, Executive Summary.

**Activities:** Email writing, Submission of applications, Graphical summaries, Report on college events.

**Professional Writing:** Paraphrasing & Summarizing, Executive Summary, Proposal, Decision Making, Recommendations.

**Activities:** Report preparation and recommendation letters.

**Team Work:** Team Leader, Quality of Team leader, Leadership model, Negotiations.

**Activities:** SWOT Analysis, Mock meetings, Group discussions, Brainstorming sessions.

**Weightage:** Continuous Assessment: 50%, End Semester Examinations: 50%

**Assessment Methodology:** Worksheets (10%), Group Activity (20%), Report Writing (20%), Internal Examinations (50%)

**References:**


1. Koneru Aruna. (2020). English Language Skills for Engineers. McGraw Hill Education.
2. Taylor, Shirley & Chandra .V. (2010). Communication for Business A Practical Approach. India: Pearson Longman.
3. Ian Badger, et al., (2014). Listening: B2 (Collins English for Life: Skills), Collins.
4. Raymond Murphy (2019), Grammar in Use, Cambridge University Press.

**E-Resources:**

1. Communication for Business Success - https://open.umn.edu/opentextbooks/textbooks/8
2. TED Talks – https://www.ted.com/

| | Description of CO | PO | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|
| CO1 | Understand the importance of communication and drafting skills in engineering and technology. | --- | | | |
| CO2 | Apply listening strategies to comprehend spoken English in various contexts. | PO1(3) | | | |
| CO3 | Participate actively in group discussions by analysing critically from different views. | PO2(2)<br>PO8(1) | | | |
| CO4 | Create written reports coherently for various purposes. | PO9(2) | | | |
| CO5 | Adapt communication styles to global, multicultural environments. | PO11(1) | | | |

| UC25A03 | Life Skills for Engineers – II | L | T | P | C |
|---|---|---|---|---|---|
| | | 1 | 0 | 2 | - |

**Course Objectives:**

- To impart and cultivate analytical reasoning, innovative thinking, effective collaboration, and ethical leadership to prepare students for complex challenges in professional and personal environments.

**Critical Thinking:** Creativity, Critical Thinking, Collaboration, Problem Solving, Decision Making, Imagination, Intuition, Experience, Sources of Creativity, Lateral Thinking, Myths of creativity, Critical thinking Vs Creative thinking, Convergent & Divergent Thinking, Critical reading & Multiple Intelligence.

**Activities:** Two-Brainstorm Method, “30 Circles” Challenge, “Desert Survival” Simulation, Lateral thinking riddles and puzzles, "What If?" Scenario Writing, Fast vs. Slow Thinking Game, Creativity Myth Busters

**Problem Solving:** Techniques, Six Thinking Hats, Mind Mapping, Forced Connections. Analytical Thinking, Numeric, symbolic, and graphic reasoning. Scientific temperament and Logical thinking.

**Activities:** Case study analysis, Escape Room challenge.

**Leadership:** Leadership Styles & Self-Assessment, Communication & Active Listening, Decision-Making & Responsibility, Teamwork & Delegation, Empathy, Integrity & Conflict Management, Vision, Motivation & Goal-Setting.

**Activities:** Crisis Leadership Simulation, Tower Challenge, Leadership Dilemmas Role-Play, Team Vision Board

**Weightage:** Continuous Assessment: 100%

**Assessment Methodology:** Assignments (20%), Flipped Class & Worksheets (10%), Practical (30%), Internal Examinations (40%)

**References:**


1. De Bono, E. (2017). *Six thinking hats*, Little, Brown Book Group.
2. Facione, P. A. (2015). *Critical thinking: What it is and why it counts*. Insight Assessment.
3. Kahneman, D. (2011). *Thinking, fast and slow*. Farrar, Straus and Giroux.
4. Whetten, D. A., & Cameron, K. S. (2016). *Developing management skills*. Pearson.

| | Description of CO | PO | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|
| CO1 | Explain the importance of leadership and management skills in life. | --- | | | |
| CO2 | Apply and demonstrate creative thinking techniques to generate innovative solutions. | PO7 (3) | | | |
| CO3 | Exhibit effective collaboration and communication skills through teamwork, active listening, and conflict resolution strategies. | PO8 (2) | | | |
| CO4 | Integrate scientific temperament and logical reasoning into c problem solving in engineering and real-world contexts. | PO11 (2) | | | |

| UC25A04 | Physical Education - II | L | T | P | C |
|---|---|---|---|---|---|
| | | 0 | 0 | 4 | 1 |

**Course Objectives:**

- To impart knowledge on gymnastic exercises and pressing needs for upskilling in a particular game.

**Basic gymnastics exercises:** Warming up, Suitable exercise, Lead up games, Safety education, Movement education, Balanced Walk, execution, floor exercise, tumbling/acrobatics, grip, release, swinging, parallel bar exercise, horizontal bar exercise, flic-flac-walk and pyramids.

**Upskilling in any one of the athletics:** Broad Jump, High Jump, Triple Jump, Relay Sprints, Javelin Throw, Discuss Throw, Shot Put, Short and Long-distance Running.

**Advance skills in any one of the indoor/outdoor games, which has been opted by the student in the I semester.**

**Weightage:** Continuous Assessment: 100%

**Assessment Methodology:** Attendance (60%), Quiz (10%), Participation in Sports and Games (20%) and Viva Voce (10%)

**References:**


1. Singh, A. (2008). Essentials of physical education. Kalyani Publishers.
2. Kamlesh, M. L. (2006). Psychology in physical education and sport (3rd ed.). Metropolitan Book Co.
3. Mangal, S. K. (2009). *Psychology of sports performance*. Sports Publication.
4. Kandappan, K. (2004). *Foundations of physical education*. Friends Publications.


**E-resources:**

1. **https://www.who.int/health-topics/physical-activity**

| | CO Description | PO | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|
| CO1 | Understand and explain the importance of physical activity for mental and physical health. | --- | | | |
| CO2 | Apply safety principles and methods during sports activities. | PO1(3) | | | |
| CO3 | Develop teamwork, discipline, and leadership through sports and group activities and collaborate effectively. | PO8 (3) | | | |
| CO4 | Demonstrate the advanced technical skills and strategic understanding in the game of their interest. | PO11(1) | | | |

## Foreign Language^

| UC25F01 | Deutsch – I | L | T | P | C |
|---|---|---|---|---|---|
| | | 1 | 0 | 2 | - |

**Course Objectives:**

- To impart fundamentals of the Deutsch language, including reading, writing systems, pronunciation, and speaking.

**Basics & Introduction:** German alphabet and pronunciation, Basic greetings and farewells, Introducing yourself and others (Ich heiße…, Wer bist du?), Numbers 1–100 and days of the week, Personal pronouns (ich, du, er, sie…), Sentence structure (SVO word order).

**Activities:** Alphabet spelling game, short skits, Use color-coded cards for SVO sentences.

**Grammar Essentials & Everyday Vocabulary:** Present tense of regular verbs (spielen, arbeiten, machen…), Common irregular verbs: sein (to be), haben (to have), gehen, kommen, Articles and gender (der, die, das; ein, eine), Simple questions and negation (nicht, kein), Describing people and things: adjectives and colors, Family, school, food, and common objects vocabulary.

**Activities:** Conjugate regular and irregular verbs, “Question Chain” game, Create a simple family tree.

**Everyday Communication in German:** Asking for and giving directions, Telling the time and talking about schedules, Ordering food and drinks at a café or restaurant, Talking about hobbies, weather, and daily routines, Listening to short conversations and responding appropriately, Introduction to German culture and formal/informal language use (du vs Sie).

**Activities:** Ordering food and drinks, Give directions, Formal / Informal greetings, Do’s and Don’ts.

**Weightage:** Continuous Assessment: 100%

**Assessment Methodology:** Assignments (30%), Quiz (10%) and Internal Examinations 60%

**References:**

1. Funk, H., Kuhn, C., & Demme, S. (2015). Menschen A1: Deutsch als Fremdsprache Kursbuch. Hueber Verlag.

| | CO Description | PO | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|
| CO1 | Understand simple spoken Deutsch in everyday contexts. | --- | | | |
| CO2 | Communicate with widely used Deutsch words effectively. | PO9 (2) | | | |
| CO3 | Develop the skills necessary for self-directed learning and continuous improvement in Deutsch language. | PO11 (1) | | | |

| UC25F02 | Japanese – I | L | T | P | C |
|---|---|---|---|---|---|
| | | 1 | 0 | 2 | - |

**Course Objectives:**

- To impart fundamentals of the Japanese language, including reading, writing systems, pronunciation, and speaking.

**Writing Systems & Basic Communication:** Introduction to Hiragana: vowels, basic characters, reading & writing, Introduction to Katakana: basic characters and usage, Basic greetings and farewells (こんにちは, おはようございます, さようなら), Introducing yourself (名前、出身、年齢), Basic sentence structure: Subject–Object–Verb, Numbers 1–100, days of the week, classroom expressions.

**Activities:** Flashcard games and writing drills, Self-introduction, Numbers & date-matching, Greeting expressions, Listening to audio.

**Grammar & Everyday Vocabulary:** Particles: は (wa), を (wo), の (no), へ (e), に (ni), Present tense verbs: です, ます-form conjugation (たべます、のみます), Negative forms: ではありません, ません, Describing people and objects using adjectives (い and な), Question formation: なに、どこ、だれ、いつ, Vocabulary for family, food, colors, and basic actions.

**Activities:** Verb conjugation drills, Guessing game, Picture description, “Shopping” with food vocab and counters

**Conversation & Cultural Etiquette:** Talking about routines and schedules (daily verbs, time expressions), Asking and giving simple directions (〜はどこですか？), Ordering food and making polite requests (〜をください、〜をおねがいします), Expressing likes and dislikes (すき・きらい), Listening to short conversations and identifying key phrases, Introduction to formal/informal speech and Japanese etiquette.

**Activities:** Skits and role-plays, daily schedule, beginner-level dialogue, Group discussion on etiquette.

**Activities:** Practice worksheets and flashcards for hiragana, Writing drills and reading simple katakana words, Dialogue practice for greetings and self-introduction, Sentence construction exercises with basic SOV structure, Particle usage exercises and short dialogues, Role-play scheduling, shopping, and telling time, Verb conjugation drills for common verbs, Descriptive sentence exercises using adjectives, Practice Q&A dialogues forming questions and negations, Kanji writing practice and quizzes for basic characters, Vocabulary tests and conversational practice on daily topics, Oral presentations and listening comprehension quizzes.

| |
|---|
| **Weightage:** Continuous Assessment: 100% |
| **Assessment Methodology:** Assignments (30%), Quiz (10%) and Internal Examinations 60% |
| **References:**<br>1. Banno, E., Ikeda, Y., Ohno, Y., Shinagawa, C., & Tokashiki, K. (2011). Genki I: An integrated course in elementary Japanese. The Japan Times.<br>2. The Japan Foundation. (2017). Marugoto Japanese language and culture starter (A1) course book for communicative language activities. Goyal Publishers. |

| | CO Description | PO | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|
| CO1 | Understand simple spoken Japanese in everyday contexts. | --- | | | |
| CO2 | Communicate with widely used Japanese words effectively. | PO9 (2) | | | |
| CO3 | Develop the skills necessary for self-directed learning and continuous improvement in Japanese language. | PO11 (1) | | | |

| UC25F03 | Korean – I | L | T | P | C |
|---|---|---|---|---|---|
| | | 1 | 0 | 2 | - |

**Course Objectives:**

- To impart fundamentals of the Korean language, including reading, writing systems, pronunciation, and speaking.

**Fundamentals of Korean:** Introduction to Hangul: consonants and vowels, Basic pronunciation and syllable formation, Common greetings and self-introductions, Numbers (Sino-Korean and Native Korean basics), Basic sentence structure (Subject-Object-Verb), Simple expressions (e.g., 감사합니다, 안녕하세요).

**Activities:** Writing and reading Hangul practice sheets, Pronunciation drills and audio repetition, Dialogue practice for greetings and self-introduction, Counting and number exercises.

**Essential Grammar and Vocabulary:** Particles (은/는, 이/가, 을/를) and usage, Basic verbs and present tense conjugation, Sentence patterns: affirmative, negative, interrogative, Common adjectives and descriptive sentences, Expressing possession and location, Asking simple questions (어디, 뭐, 누구).

**Activities:** Verb conjugation and sentence formation drills, Role-play conversations for shopping and daily routines, Descriptive writing and speaking exercises, Question and answer practice.

**Everyday Korean Communication:** Polite speech levels and honorifics introduction, Talking about time, dates, and schedules, Ordering food, shopping phrases, counting objects, Simple directions and transportation vocabulary, Listening practice with short dialogues, Cultural notes on etiquette and communication.

**Activities:** Role-play ordering at a restaurant or buying items, Listening comprehension exercises, Giving and asking for directions practice, Group conversations and presentations.

**Weightage:** Continuous Assessment: 100%

**Assessment Methodology:** Assignments (30%), Quiz (10%) and Internal Examinations 60%

**References:**


1. King, R., Yeon, J., & Brown, A. (2015). Elementary Korean (2nd ed.). Tuttle Publishing.
2. Cho, Y., Lee, H., Schulz, C., Sohn, H.-M., & Sohn, S.-O. (2001). Integrated Korean: Beginning 1. University of Hawai‘i Press.

| | CO Description | PO | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|
| CO1 | Understand simple spoken Korean in everyday contexts. | --- | | | |
| CO2 | Communicate with widely used Korean words effectively. | PO9 (2) | | | |
| CO3 | Develop the skills necessary for self-directed learning and continuous improvement in Korean language. | PO11 (1) | | | |

# ANNA UNIVERSITY, CHENNAI

## UNDERGRADUATE CURRICULUM (NON-AUTONOMOUS AFFILIATED INSTITUTIONS)

**Programme:** B.E., Mechatronics Engineering **Regulations:** 2025

**Abbreviations:**

**HUM –** Humanities (Languages, Management, Heritage, and others)

**BS** – Basic Science (Mathematics, Physics, Chemistry)

**ES –** Engineering Science (General (**G**), Programme Core (**PC**), Programme Elective (**PE**) & Emerging Technology (**ET**))

**SD** – Skill Development

**SL** – Self Learning

**CDP** – Capstone Design Project

**OE** – Open Elective

**L** – Laboratory Course

**T** – Theory

**LIT** – Laboratory Integrated Theory

**PW** – Project Work

**IPW** – Internship cum Project Work

**DIC –** Department Introductory Course

**TCP –** Total Contact Period(s)

| **Semester – I** | | | | | | | |
|---|---|---|---|---|---|---|---|
| **S. No.** | **Course Code** | **Course Name** | **Course Type** | **Periods / Week** | | **Credits** | **Category** |
| | | | | **L-T- P** | **TCP** | | |
| 1. | MA25C01 | Applied Calculus | T | 3-1-0 | 4 | 4 | BS |
| 2. | ME25C03 | Introduction to Mechanical Engineering | T | 2-1-0 | 3 | 3 | ES (PC) – DIC |
| 3. | ME25C01 | Engineering Drawing | LIT | 2-0-4 | 6 | 4 | ES (G) |
| 4. | PH25C01 | Applied Physics – I | LIT | 2-0-2 | 4 | 3 | BS |
| 5. | CY25C01 | Applied Chemistry – I | LIT | 2-0-2 | 4 | 3 | BS |
| 6. | UC25H01 | தமிழர் மரபு / Heritage of Tamils | T | 1-0-0 | 1 | 1 | HUM |
| 7. | EN25C01 | English Essentials – I | L | 2-0-0 | 2 | 2 | HUM |
| 8. | CS25C02 | Computer Programming: Python | LIT | 2-0-2 | 4 | 3 | ES (PC) |
| 9. | ME25C04 | Makerspace | L | 0-0-4 | 4 | 2 | SD |
| 10 | UC25A01 | Life Skills for Engineers – I* | --- | 1-0-2 | 3 | --- | HUM |
| 11 | UC25A02 | Physical Education – I* | --- | 0-0-4 | 4 | 1 | HUM |
| 12 | | NCC / NSS / NSO | --- | --- | --- | --- | --- |
| | | | **Total Credits** | | **39** | **26** | |

*Audit Course

| Semester – II | | | | | | | |
|---|---|---|---|---|---|---|---|
| **S. No.** | **Course Code** | **Course Name** | **Course Type** | **Periods / Week** | | **Credits** | **Category** |
| | | | | **L-T- P** | **TCP** | | |
| 1. | MA25C02 | Linear Algebra | T | 3-1-0 | 4 | 4 | BS |
| 2. | ME25C02 | Engineering Mechanics | T | 3-1-0 | 4 | 4 | ES (G) |
| 3. | EE25C01 | Basic Electrical and Electronics Engineering | T | 3-0-0 | 3 | 3 | ES (G) |
| 4. | PH25C05 | Applied Physics (ME) – II | T | 2-1-0 | 3 | 3 | BS |
| 5. | CY25C03 | Applied Chemistry (ME) – II | T | 2-0-0 | 2 | 2 | BS |
| 6. | UC25H02 | தமிழர்களும் தொழில்நுட்பமும் / Tamils and Technology | T | 1-0-0 | 1 | 1 | HUM |
| 7. | ME25C05 | Re-Engineering for Innovation | L | 0-0-4 | 4 | 2 | SD |
| 8. | EN25C02 | English Essentials – II | LIT | 1-0-2 | 3 | 2 | HUM |
| 9. | UC25A03 | Life Skills for Engineers – II* | --- | 1-0-2 | 3 | --- | HUM |
| 10. | UC25A04 | Physical Education – II* | --- | 0-0-4 | 4 | 1 | HUM |
| 11. | | Foreign Language^ | LIT | 1-0-2 | 3 | --- | HUM |
| | | | | **Total Credits** | **34** | **22** | |

^ Deutsch / Japanese / Korean *Audit Course

| Semester – III | | | | | | | |
|---|---|---|---|---|---|---|---|
| **S. No.** | **Course Code** | **Course Name** | **Course Type** | **Periods / Week** | | **Credits** | **Category** |
| | | | | **L-T- P** | **TCP** | | |
| 1. | | Computational Differential Equations | T | 3-1-0 | 4 | 4 | BS |
| 2. | | Applied Thermodynamics | T | 3-0-0 | 3 | 3 | ES (PC) |
| 3. | | Hydraulics and pneumatics | LIT | 3-0-2 | 5 | 4 | ES (PC) |
| 4. | | Manufacturing Processes | LIT | 2-0-2 | 3 | 3 | ES (PC) |
| 5. | | Digital Electronics | LIT | 3-0-2 | 5 | 4 | ES (PC) |
| 6. | | English Communication Skills Laboratory – II | L | 0-0-2 | 1 | 1 | HUM |
| 7. | | Skill Development Course – I | LIT | 1-0-2 | 3 | 2 | SD |
| | | | | **Total Credits** | **24** | **21** | |

| Semester – IV | | | | | | | |
|---|---|---|---|---|---|---|---|
| **S. No.** | **Course Code** | **Course Name** | **Course Type** | **Periods / Week** | | **Credits** | **Category** |
| | | | | **L-T- P** | **TCP** | | |
| 1. | | Applied Data Science | T | 3-0-0 | 3 | 3 | ES (ET) |
| 2. | | Kinematics & Dynamics of Machines | T | 3-0-2 | 5 | 4 | ES (PC) |
| 3. | | Electronics Drives and Actuators | T | 3-0-0 | 3 | 3 | ES (PC) |
| 4. | | Mechanical Instrumentation | LIT | 3-0-2 | 5 | 4 | ES (PC) |
| 5. | | Design of Machine Elements | T | 3-0-0 | 3 | 3 | ES (PC) |
| 6. | | Standards in Mechanical Engineering | T | 1-0-0 | 1 | 1 | ES (PC) |
| 7. | | English Communication Skills Laboratory – III | L | 0-0-2 | 1 | 1 | HUM |
| 8. | | Skill Development Course – II | LIT | 1-0-2 | 3 | 2 | SD |
| | | | **Total Credits** | | **24** | **21** | |

| Semester – V | | | | | | | |
|---|---|---|---|---|---|---|---|
| **S. No.** | **Course Code** | **Course Name** | **Course Type** | **Periods / Week** | | **Credits** | **Category** |
| | | | | **L-T- P** | **TCP** | | |
| 1. | | Control Systems | T | 3-0-0 | 3 | 3 | ES (PC) |
| 2. | | Embedded Systems Design | LIT | 3-0-2 | 5 | 4 | ES (G) |
| 3. | | Digital Signal Processing | LIT | 2-0-3 | 3 | 3 | ES (PC) |
| 4. | | Industrial Automation | LIT | 2-0-2 | 4 | 3 | ES (PC) |
| 5. | | Open Elective | T | 3-0-0 | 3 | 3 | --- |
| 6. | | Programme Elective – I | T | 3-0-0 | 3 | 3 | ES (PE) |
| 7. | | Skill Development Course – III | LIT | 1-0-2 | 3 | 2 | SD |
| 8. | | Industry Oriented Course - I | LIT | 1-0-2 | 3 | 1 | SD |
| | | | | **Total Credits** | **27** | **22** | |
| **For Honours Degree** | | | | | | | |
| 1. | | Capstone Design Project – Level I | CDP | 0-0-12 | 12 | 6 | SD |
| **OR** | | | | | | | |
| 1. | | Honours Elective – I | T | 3-0-0 | 3 | 3 | |
| 2. | | Honours Elective – II | T | 3-0-0 | 3 | 3 | |

# Semester I

| MA25C01 | Applied Calculus | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 1 | 0 | 4 |

**Course Objectives:**

- To provide technical competence of modelling engineering problems using calculus.
- To apply the calculus concepts in solving engineering problems using analytical methods and computational tools.

**Differential Calculus:** Functions, graph of functions, New functions from old functions, Limit of a function, Continuity, Limits at infinity, Derivative as a function, Maxima and Minima of functions of single variable, Mean value theorem, Effect of derivatives on the shape of a graph.

**Activities:** Visualization of the functions, Maxima and Minima of a function using open-source software, Solving of Competitive Examination questions (Ex. GATE).

**Functions of Several Variables:** Partial derivatives, Chain rule, Total derivative, Maxima and minima of functions of two variables, Method of Lagrange's Multipliers, Application problems in engineering.

**Activities:** Partial Derivatives with two or three variables, Maxima and Minima of a function using open-source software, Solving of Competitive Examination questions (Ex. GATE).

**Integral Calculus:** Fundamental theorem of Calculus, Indefinite integrals and the Net Change Theorem, Improper integrals, Arc Length, Area of Region, Area of surface of revolution.

**Activities:** Definite and Indefinite Integrals, Determination of Area, Solving of Competitive Examination questions (Ex. GATE).

**Multiple Integrals:** Iterated integrals and Fubini's theorem, Evaluation of double integrals, change of order of integration, change of variables between Cartesian and polar co-ordinates, evaluation of triple integrals-change of variables between Cartesian and cylindrical and spherical co-ordinates.

**Activities:** Double integrals and triple integrals using open-source software, Solving of Competitive Examination questions (Ex. GATE).

**Weightage:** Continuous Assessment: 40%, End Semester Examinations: 60%.

**Assessment Methodology:** Assignments (20%), Solution to application-oriented problems using software (20%), Solving of GATE questions (20%), Internal Examinations (40%).

**References:**

1. Anton, H., Bivens, I. C., & Davis, S. (2021). Calculus: Early transcendentals. John Wiley & Sons.
2. Ron Larson and David C. Falvo,(2013), Calculus: an Applied Approach. Cengage Learning.
3. Stewart, J., Clegg, D., & Watson, S. (2019). *Calculus: Early transcendentals*.
4. Thomas, G. B., Jr., Weir, M. D., Hass, J., & Heil, C. (2018). *Thomas' calculus: Early transcendentals*. Pearson.
5. Singh, K. (2019). *Engineering mathematics through applications*. Bloomsbury Publishing.
6. Grewal, B. S. (2012). *Higher engineering mathematics.* Khanna Publishers.

**E-resources:**

1. https://math.libretexts.org/Bookshelves/Calculus/Map%3A_Calculus__Early_Transcendentals_(Stewart)/
2. https://openstax.org/books/calculus-volume-1/
3. https://tutorial.math.lamar.edu/Classes/CalcII/CalcII.aspx
4. SCILAB, https://www.scilab.org/

| | **Description of CO** | **PO** | **PSO1** | **PSO2** | **PSO3** |
|---|---|---|---|---|---|
| CO1 | Explain the meaning of derivative, integral, and their geometric and physical interpretations. | --- | | | |
| CO2 | Apply differentiation and integration techniques to compute maxima, minima, and area. | PO1(3) | | | |
| CO3 | Analyze the behavior of single and multivariable functions using derivatives and partial derivatives. | PO2(3) | | | |
| CO4 | Utilize modern computational software and online platforms to deepen understanding, perform complex calculations, and visualize mathematical concepts. | PO5(2) PO11(1) | | | |

| ME25C03 | Introduction to Mechanical Engineering | L | T | P | C |
|---|---|---|---|---|---|
| | | 2 | 1 | 0 | 3 |

**Course Objectives:**

- To impart the fundamental concepts and principles of various fields such as Manufacturing, Materials, Mechanics, thermal engineering in Mechanical Engineering.

**Engineering:** History and evolution of mechanical engineering, Basic mechanical engineering principles (force, motion, energy, work, power), Units and dimensions, SI system, Ethics and professionalism in engineering.

**Activities:** Interactive quiz, Conversion between SI and other unit systems.

**Mechanics of Materials and Structures:** Stress and strain, types of stresses (tensile, compressive, shear), Elasticity and plasticity, Mechanical properties of materials (strength, toughness, hardness), Introduction to bending, torsion, and axial loading, Simple structural analysis and design concepts.

**Activities:** Demonstration of Simple truss or beam problems solved using software.

**Energy Interactions:** System, Energy Transfer, Conduction, convection, and radiation, Working principle of Heat Engines, Refrigeration and HVAC systems.

**Activities:** Demonstration of working model of internal combustion engine & refrigerator, Virtual demonstration of Thermodynamic cycles.

**Machine Elements:** Gears, bearings, shafts, fasteners, couplings, Selection of machine components, Quality control and safety in mechanical engineering.

**Activities:** Demonstration of working of Gears, bearings, etc. in a mechanical system.

**Manufacturing Processes:** Casting, forming, machining & joining processes, CNC and additive manufacturing, overview of smart manufacturing.

**Activities:** Demonstration of various machining processes, 3D printing of simple parts.

**Weightage:** Continuous Assessment: 40%, End Semester Examinations: 60%

**Assessment Methodology:** Quiz (10%), Assignments (40%) and Internal Examinations (50%)

**References:**


1. Wickert, J., & Lewis, K. (2016). An Introduction to Mechanical Engineering. Cengage Learning.
2. Rajput, R. K., (2017). Fundamentals of Mechanical Engineering, Laxmi Publications.


**E-resources:**

1. MIT OpenCourseWare – Mechanical Engineering https://ocw.mit.edu
2. PhET Simulations – University of Colorado Boulder https://phet.colorado.edu
3. LibreTexts Engineering https://eng.libretexts.org

| | CO Description | PO | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|
| CO1 | Explain core mechanical engineering concepts. | --- | | | |
| CO2 | Apply basic engineering calculations in mechanical systems. | PO1(3) | | | |
| CO3 | Identify common manufacturing processes for engineering applications. | PO2(2) | | | |

| ME25C01 | Engineering Drawing | L | T | P | C |
|---|---|---|---|---|---|
| | | 2 | 0 | 4 | 4 |

**Course Objectives:**

- To impart knowledge on dimensions and drawing standards.
- To explore the orthographic projection of lines and solids.
- To provide the understanding of orthographic, isometric and perspective views.

**Fundamentals:** Drawing instruments, Drawing standards (BIS), Lettering in engineering, Sheet layout, elements of dimensioning, Systems of dimensioning. Free hand sketching of 2D & 3D objects, Conics – Ellipse, Parabola and Hyperbola.

**Activities:** Virtual Demonstration of Conics and Cycloids.

**Orthographic Projection:** First angle projection, Projection of points, straight lines and planes.

**Projection of Solids:** Simple Solids, Section of Solids, Development of Surfaces

**Activities:** Development of models of various solids and virtual demonstration of sectioning, CAD modelling of 2D objects.

**Isometric Projection:** Isometric Scale, Projection of Simple solids.

**Activities:** Conversion of 3D into 2D orthographic views, CAD modelling of 3D objects.

**Perspective Projection:** Simple solids projection

**Activities:** Virtual demonstration of perspective views.

**Project:** Development of 2D objects and 3D objects using CAD tools.

**Weightage:**
Continuous Assessment: 50%
End Semester Examinations: 50%

**Assessment Methodology:**
Project – 10%, Models - 5%, Assignments - 35% and Internal Examinations - 50%

**References:**


1. Venugopal, K., & Prabhu Raja, V. (2022). Engineering Drawing + AutoCAD. New Age International Publishers.
2. Natarajan, K. V. (2015). A Text Book of Engineering Graphics. Dhanalakshmi Publisher.


**E-Resources:**

1. CAD Software – https://www.freecadweb.org/
2. Engineering Drawing and Computer Graphics, Prof. Rajaram Lakkaraju (IIT Kharagpur) – https://onlinecourses.nptel.ac.in/noc22_me105/preview

3. MIT Design Handbook: Engineering Drawing and Sketching – https://ocw.mit.edu/courses/2-007-design-and-manufacturing-i-spring-2009/pages/related-resources/drawing_and_sketching/

| | CO Description | PO | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|
| CO1 | Explain the advantages of engineering drawing in engineering applications | --- | | | |
| CO2 | Apply the concepts of projections in formulating various solid parts in engineering systems. | PO1(3) | | | |
| CO3 | Analyse the various view and interpret the engineering drawings. | PO2(3) | | | |
| CO4 | Use CAD tools for creation of various models. | PO3(1) | | | |
| CO5 | Critically think and develop innovative models. | PO11(1) | | | |

| PH25C01 | Applied Physics – I | L | T | P | C |
|---|---|---|---|---|---|
| | | 2 | 0 | 2 | 3 |

**Course Objective(s):**

- To impart knowledge and expose the essentials of physics in various engineering applications.

**Properties of Matter:** Elasticity, Cantilever, Young's modulus (non-uniform bending), Girders: Bridges and buildings, Viscosity: Stokes method, Surface tension: drop weight method, Thermal expansion, Thermal stress, Bimetallic strips, Expansion joints

**Practical**: Non-Uniform bending, Young's modulus of the material, Torsional pendulum, Rigidity modulus of the wire and moment of inertia of the disc.

**Activities:** Virtual demonstration of thermal stress.

**Oscillations:** Simple Harmonic motion, Torsional pendulum, Couple per unit twist, Damped and Forced Oscillation

**Waves:** Waves on a stretched string, Energy and Power, standing waves, Ultrasonics, piezo, electric method, Acoustic grating, Electromagnetic waves: Maxwell equation, Production of EM waves by dipole antenna, Propagation of EM waves in free space , wave equation, Cell phone reception

**Practical**: Melde's string experiment – Frequency of an electrically vibrating metal tip.

**Activities:** Virtual demonstration of propagation of EM waves

**Quantum Mechanics:** Black body radiation, Photoelectric effect, de Broglie hypothesis, Schrodinger Wave equation, Particle in a box (infinite potential well - three-dimensional box), Barrier penetration and quantum tunnelling.

**Practical**: Photo-electric effect, Determination of Planck's constant.

**Activities**: Virtual demonstration of Scanning Transmission Electron Microscope

**Applied Optics:** Interference: Air wedge, Michelson's Interferometer, Fiber optics: Structure of a fiber, Fiber Optic Communication System, Fiber Sensors (Virtual demo), Displacement, pressure sensor and Temperature sensor, Einstein Co-efficient, Nd:YAG laser, $CO_2$ laser (construction, functioning and applications), dye laser

**Practical**: Ruling width of Compact disc using Laser, Thickness of a thin sheet/wire using Air wedge Method.

**Activities**: Demonstration of sensors and applications of Lasers

**Weightage:** Continuous Assessment: 50%, End Semester Examinations: 50%

**Assessment Methodology:** Quiz (5%), Assignments (20%), Flipped Class (5%), Practical (30%), Internal Examinations (40%)

**References:**


1. Young, H. D., & Freedman, R. A. (2020). University physics with modern physics. Pearson.
2. Gaur, R. K., & Gupta, S. L. (2022). Engineering physics. Dhanpat Rai Publications.
3. Mathur, D. S. (2010). Elements of properties of matter. S. Chand Publishing.
4. Griffiths, D. J. (2018). Introduction to quantum mechanics. Cambridge University Press.
5. Silfvast, W. T. (2008). Laser fundamentals (2nd ed.). Cambridge University Press.


**E-Resources:**

1. Barrier penetration problem and Quantum tunnelling: https://archive.nptel.ac.in/courses/115/104/115104096/
2. EM waves and wireless channelling: https://onlinecourses.nptel.ac.in/noc24_ee31/preview
3. CO2 Laser: https://onlinecourses.nptel.ac.in/noc25_ph03/preview
4. Bimetallic Strips _ https://www.youtube.com/watch?v=WZQ8lvxdzDk
5. Cell phone Reception_ https://www.youtube.com/watch?v=1JZG9x_VOwA
6. Dipole Antenna_ https://www.youtube.com/watch?v=4xF1Fq2wB1I
7. Optical Sensors_ https://auece.digimat.in/nptel/courses/video/108106173/L02.html
8. Scanning Tunnelling Electron Microscope_ https://www.youtube.com/watch?v=XNYZYbXNWQA

| | **Description of CO** | **PO** | **PSO1** | **PSO2** | **PSO3** |
|---|---|---|---|---|---|
| CO1 | Explain the physics concepts in various applications. | --- | | | |
| CO2 | Apply the principles of wave optics and laser physics in practical systems. | PO1(3) | | | |
| CO3 | Analyse the behaviour of materials under different conditions. | PO2(2) | | | |
| CO4 | Conduct experiments in groups and interpret the data. | PO4(3)<br>PO8(1) | | | |

| CY25C01 | Applied Chemistry – I | L | T | P | C |
|---|---|---|---|---|---|
| | | 2 | 0 | 2 | 3 |

**Course Objectives:**

- To provide students with a solid understanding of the chemical principles for engineering applications.
- To introduce the chemical properties of materials and how these properties influence the selection and use of materials in engineering systems.
- To impart practical applications of chemistry in commonly used engineering devices

**Water Technology:** Water quality parameters and standards. Industrial feed water, Remediation. Municipal water treatment. Desalination.

**Practical:** Analysis of alkalinity, hardness and dissolved oxygen.

**Activity:** Coagulation of water sample using Alum

**Nano-chemistry:** Classification, Size, dependent properties. Preparation of nanomaterials, Top-down and Botton-Up approaches, Applications (Flipped classroom).

**Practical:** Preparation of nanoparticles by Sol-Gel method.

**Electrochemistry:** Electrochemical cell, Electrode potential., Redox reaction. Conductivity of electrolytes, Factors.

**Practical:** Conductometric titrations

**Activity:** Electrochemical cell demonstration

**Corrosion & Control:** Chemical and electrochemical corrosions, galvanic series, factors influencing corrosion, Electrochemical protection. Organic and Inorganic coating.

**Practical:**

- Corrosion study by weight loss and salt spray method.
- Potentiometry/UV-visible spectrophotometer.

**Activities:** Case Study on Corrosion in Pipelines and Electronics, Control measures for a corroded metal

**Batteries:** Conventional, Contemporary and Emerging battery storage technologies, Primary & Secondary Batteries, Battery Pack, Battery Materials, Performance Parameters, Testing, Safety aspects.

**Practical:** Measurement of EMF, Internal Resistance, Charge and Discharge Characteristics.

**Activities:** Demonstration of battery pack in e-vehicles.

**Weightage:** Continuous Assessment: 50%, End Semester Examinations: 50%

**Assessment Methodology:** Quiz (5%), Assignments (20%), Flipped Class (5%), Practical (30%), Internal Examinations (40%)

**References:**


1. Jain, P. C., & Jain, M. (2015). Engineering Chemistry (17th ed.). Dhanpat Rai Publishing Company (P) Ltd.
2. Dara, S. S. (2004). A Textbook of Engineering Chemistry. Chand Publications.
3. Sachdeva, M. V. (2011). Basics of Nano Chemistry. Anmol Publications Pvt Ltd.
4. Friedrich, E. (2014). Engineering Chemistry. Medtech.


**E-Resources:**

1. Water and Wastewater Engineering (Prof. Ligy Philip, IIT Madras) – https://nptel.ac.in/courses/105106202.
2. Electrochemical Energy Systems (Prof. S. Mitra, IIT Madras) – https://nptel.ac.in/courses/113106028.
3. Corrosion (Prof. Kallol Mondal, IIT Kanpur) – https://nptel.ac.in/courses/112104088
4. Chemistry of Battery Systems (Prof. V. R. Marathe, IIT Madras) – https://nptel.ac.in/courses/115106130
5. Resource on all battery types, testing, and safety – https://batteryuniversity.com/articles

| | **Description of CO** | **PO** | **PSO1** | **PSO2** | **PSO3** |
|---|---|---|---|---|---|
| CO1 | Understand the importance of chemistry applications with underlying mechanisms. | --- | | | |
| CO2 | Apply the chemistry concepts in widely used devices. | PO1(3) | | | |
| CO3 | Analyse the effect of various chemical parameters on performance of engineering systems. | PO2(2) | | | |
| CO4 | Perform experimentations as a group and interpret the results. | PO4(3)<br>PO8(1) | | | |
| CO5 | Communicate findings through case studies and reports | PO9(1) | | | |

| UC25H01 | தமிழர் மரபு | L | T | P | C |
|---|---|---|---|---|---|
| | | 1 | 0 | 0 | 1 |

**மொழி மற்றும் இலக்கியம்:** இந்திய மொழிக் குடும்பங்கள், திராவிட மொழிகள், தமிழ் ஒரு செம்மொழி, தமிழ் செவ்விலக்கியங்கள், சங்க இலக்கியத்தின் சமயச் சார்பற்ற தன்மை, சங்க இலக்கியத்தில் பகிர்தல் அறம், திருக்குறளில் மேலாண்மைக் கருத்துக்கள், தமிழ்க் காப்பியங்கள், தமிழகத்தில் சமண பௌத்த சமயங்களின் தாக்கம், பக்தி இலக்கியம், ஆழ்வார்கள் மற்றும் நாயன்மார்கள், சிற்றிலக்கியங்கள், தமிழில் நவீன இலக்கியத்தின் வளர்ச்சி, தமிழ் இலக்கிய வளர்ச்சியில் பாரதியார் மற்றும் பாரதிதாசன் ஆகியோரின் பங்களிப்பு.

**மரபு – பாறை ஓவியங்கள் முதல் நவீன ஓவியங்கள் வரை – சிற்பக் கலை**:நடுகல் முதல் நவீன சிற்பங்கள் வரை, ஐம்பொன் சிலைகள், பழங்குடியினர் மற்றும் அவர்கள் தயாரிக்கும் கைவினைப் பொருட்கள், பொம்மைகள் , தேர் செய்யும் கலை, சுடுமண் சிற்பங்கள், நாட்டுப்புறத் தெய்வங்கள், குமரிமுனையில் திருவள்ளுவர் சிலை, இசைக் கருவிகள், மிருதங்கம், பறை, வீணை, யாழ், நாதஸ்வரம், தமிழர்களின் சமூக பொருளாதார வாழ்வில் கோவில்களின் பங்கு.

**நாட்டுப்புறக் கலைகள் மற்றும் வீர விளையாட்டுகள்:** தெருக்கூத்து, கரகாட்டம், வில்லுப்பாட்டு, கணியான் கூத்து, ஒயிலாட்டம், தோல்பாவைக் கூத்து, சிலம்பாட்டம், வளரி, புலியாட்டம், தமிழர்களின் விளையாட்டுகள்.

**தமிழர்களின் திணைக் கோட்பாடுகள்**: தமிழகத்தின் தாவரங்களும், விலங்குகளும், தொல்காப்பியம் மற்றும் சங்க இலக்கியத்தில் அகம் மற்றும் புறக் கோட்பாடுகள், தமிழர்கள் போற்றிய அறக்கோட்பாடு, சங்ககாலத்தில் தமிழகத்தில் எழுத்தறிவும், கல்வியும், சங்ககால நகரங்களும் துறை முகங்களும், சங்ககாலத்தில் ஏற்றுமதி மற்றும் இறக்குமதி, கடல்கடந்த நாடுகளில் சோழர்களின் வெற்றி.

**இந்திய தேசிய இயக்கம் மற்றும் இந்திய பண்பாட்டிற்குத் தமிழர்களின் பங்களிப்பு**: இந்திய விடுதலைப்போரில் தமிழர்களின் பங்கு, இந்தியாவின் பிறப்பகுதிகளில் தமிழ்ப் பண்பாட்டின் தாக்கம் , சுயமரியாதை இயக்கம் இந்திய மருத்துவத்தில், சித்த மருத்துவத்தின் பங்கு, கல்வெட்டுகள், கையெழுத்துப்படிகள், தமிழ்ப் புத்தகங்களின் அச்சு வரலாறு.

## References:


1. தமிழக வரலாறு, மக்களும் பண்பாடும், கே.கே. பிள்ளை (வெளியீடு: தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்).
2. கணினித் தமிழ், முனைவர் இல. சுந்தரம். (விகடன் பிரசுரம்).
3. கீழடி, வைகை நதிக்கரையில் சங்ககால நகர நாகரிகம் (தொல்லியல் துறை வெளியீடு)
4. பொருநை, ஆற்றங்கரை நாகரிகம். (தொல்லியல் துறை வெளியீடு)
5. Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL – (in print)
6. Social Life of the Tamils - The Classical Period (Dr.S.Singaravelu) (Published by: International Institute of Tamil Studies.
7. Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thirunavukkarasu) (Published by: International Institute of Tamil Studies).
8. The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: International Institute of Tamil Studies.)
9. Keeladi - 'Sangam City C ivilization on the banks of river Vaigai' (Jointly Published by: Department ofArchaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
10. Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay) (Publishedby: The Author)
11. Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Bookand Educational Services Corporation, Tamil Nadu)
12. Journey of Civilization Indus to Vaigai (R.Balakrishnan) (Published by: RMRL) – Reference Book.

| UC25H01 | Heritage of Tamils | L | T | P | C |
|---|---|---|---|---|---|
| | | 1 | 0 | 0 | 1 |

**Language and Literature:** Language Families in India, Dravidian Languages, Tamil as aClassical Language, Classical Literature in Tamil, Secular Nature of Sangam Literature, Distributive Justice in Sangam Literature, Management Principles in Thirukural, Tamil Epics and Impact of Buddhism & Jainism in Tamil Land, Bakthi Literature Azhwars and Nayanmars, Forms of minor Poetry - Development of Modern literature in Tamil - Contribution of Bharathiyar and Bharathidhasan.

**Heritage - Rock Art Paintings to Modern Art – Sculpture:** Hero stone to modern sculpture, Bronze icons, Tribes and their handicrafts, Art of temple car making, Massive Terracotta sculptures, Village deities, Thiruvalluvar Statue at Kanyakumari, Making of musical instruments, Mridhangam, Parai, Veenai, Yazh and Nadhaswaram, Role of Temples in Social and Economic Life of Tamils.

**Folk and Martial Arts:** Therukoothu, Karagattam, Villu Pattu, Kaniyan Koothu, Oyillattam, Leatherpuppetry, Silambattam, Valari, Tiger dance, Sports and Games of Tamils.

**Thinai Concept of Tamils:** Flora and Fauna of Tamils & Aham and Puram Concept from Tholkappiyam and Sangam Literature, Aram Concept of Tamils, Education and Literacy during Sangam Age, Ancient Cities and Ports of Sangam Age, Export and Import during Sangam Age, Overseas Conquest of Cholas.

**Contribution of Tamils to Indian National Movement and Indian Culture:**

Contribution of Tamils to Indian Freedom Struggle, The Cultural Influence of Tamils over the other parts of India, Self-Respect Movement, Role of Siddha Medicine in Indigenous Systems of Medicine, Inscriptions & Manuscripts, Print History of Tamil Books.

**References:**


1. தமிழக வரலாறு, மக்களும் பண்பாடும், கே.கே. பிள்ளை (வெளியீடு: தமிழ்நாடு பாடநூல் மற்றும், கல்வியியல் பணிகள் கழகம்).
2. கணினித் தமிழ், முனைவர் இல. சுந்தரம். (விகடன் பிரசுரம்).
3. கீழடி, வைகை நதிக்கரையில் சங்ககால நகர நாகரிகம் (தொல்லியல் துறை வெளியீடு)
4. பொருநை, ஆற்றங்கரை நாகரிகம். (தொல்லியல் துறை வெளியீடு)
5. Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL – (in print)
6. Social Life of the Tamils, The Classical Period (Dr.S.Singaravelu) (Published by: International Institute of Tamil Studies.
7. Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thirunavukkarasu) (Published by: International Institute of Tamil Studies).
8. The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: International Institute of Tamil Studies.)
9. Keeladi, 'Sangam City Civilization on the banks of river Vaigai' (Jointly Published by: Department ofArchaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
10. Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay) (Publishedby: The Author)
11. Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Bookand Educational Services Corporation, Tamil Nadu)
12. Journey of Civilization Indus to Vaigai (R.Balakrishnan) (Published by: RMRL), Reference Book.

| EN25C01 | English Essentials – I | L | T | P | C |
|---|---|---|---|---|---|
| | | 2 | 0 | 0 | 2 |

**Course Objectives:**

- To equip students with the skills to write clear, coherent, and grammatically correct texts for various purposes.
- To strengthen the ability to comprehend, interpret, and analyse written English across diverse contexts.

**Speaking Skills:** Parts of Speech, Articles, Tenses, Sentence Structure, Types of Sentences, Subject-Verb Agreement**,** Synonyms and Antonyms, Prefixes and Suffixes, Idioms and Phrases, Self-Introduction, Expressing Oneself, Everyday Conversations, Team Interactions, Emotions, agreeing & disagreeing

**Activities:** Self-Introduction, Just a Minute (JAM) Video recording, Brainstorming sessions, Situational role plays, Usage of Applications.

**Listening Skills:** Listening to Simple Conversations, Short Speeches / Stories, Extracting key information, Phonemes, Listening to Native Speakers, Listening to Various Accents.

**Activities:** Gap fill exercises, Understanding tone and intent, Listening and imitating, Spell Bee

**Reading Skills:** Reading Strategies, Skimming and Scanning, active reading with short passages.

**Activities:** Summarising, loud reading, Cloze reading, Reading comprehension, Reading newspaper articles, Reading Long passage and note making.

**Drafting Skills:** Sentence Formation, Word Substitution, Keywords Development, Writing Paragraphs, Emails and Letters.

**Activities:** Picture and poster interpretation, formal and informal letters, Official e-mails.

**Weightage:** Continuous Assessment: 40%, End Semester Examinations: 60%

**Assessment Methodology:** Quiz (10%), Assignments (20%), Speaking Task (10%), Reading Task (10%), Writing Task (10%), Internal Examinations (40%)

**References:**


1. Miller, K. Q., & Wahl, S. T. (2023). Business and Professional Communication: KEYS for Workplace Excellence (5th ed.). SAGE Publications.
2. Kumar, Sanjay & Pushpalatha. (2018). English Language and Communication Skills for Engineers. India: Oxford University Press.

3. Sharma, S., & Mishra, B. (2024). Communication Skills for Engineers and Scientists (2nd ed.). PHI Learning.

**E-Resources:**

1. Cambridge English – https://www.cambridgeenglish.org/learning-english/grammar-and-vocabulary/
2. Perfect English Grammar – https://www.perfect-english-grammar.com/
3. British Council – Learn English - https://learnenglish.britishcouncil.org/grammar
4. Speechling – https://speechling.com/
5. mePro by Pearson – https://mepro.pearson.com/
6. TED Talks – https://www.ted.com/

| | **Description of CO** | **PO** | **PSO1** | **PSO2** | **PSO3** |
|---|---|---|---|---|---|
| CO1 | Comprehend spoken English, take and draft notes. | --- | | | |
| CO2 | Apply vocabulary, with appropriate ways to enhance drafting and communication. | PO1(3) | | | |
| CO3 | Analyze texts in different contexts using appropriate reading strategies. | PO2(2) | | | |
| CO4 | Communicate thoughts and ideas in both planned and unplanned situations. | PO9(2) | | | |
| CO5 | Continuously improving English communication skills relevant to engineering and scientific work. | PO11(1) | | | |

| CS25C02 | Computer Programming: Python | L | T | P | C |
|---|---|---|---|---|---|
| | | 2 | 0 | 2 | 3 |

**Course Objectives:**

- To equip engineering students with the foundational knowledge and practical skills in Python programming to analyse and solve computational problems effectively.
- To foster problem-solving, critical thinking, and modular programming skills essential for engineering domains.

**Introduction to Python:** Problem Solving, Problem Analysis Chart, Developing an Algorithm, Flowchart and Pseudocode, Interactive and Script Mode, Indentation, Comments, Error messages, Variables, Reserved Words, Data Types, Arithmetic operators and expressions, Built-in Functions, Importing from Packages.

**Practical:** Problem Analysis Chart, Flowchart and Pseudocode Practices. (Minimum three)

**Control Structures:** if, if-else, nested if, multi-way if-elif statements, while loop, for loop, nested loops, pass statements.

**Practical:** Usage of conditional logics in programs. (Minimum three)

**Functions:** Hiding redundancy, complexity; Parameters, arguments and return values; formal vs actual arguments, named arguments, Recursive & Lambda Functions.

**Practical:** Usage of functions in programs. (Minimum three)

**Strings & Collections:** String Comparison, Formatting, Slicing, Splitting, Stripping, Lists, tuples, and dictionaries, basic list operators, searching and sorting lists; dictionary literals, adding and removing keys, accessing and replacing values.

**Practical:** String manipulations and operations on lists, tuples, sets, and dictionaries. (Minimum three)

**File Operations:** Create, Open, Read, Write, Append and Close files. Manipulating directories, OS and Sys modules, reading/writing text and numbers, from/to a file; creating and reading a formatted file (csv, tab-separated, etc.).

**Practical:** Opening, closing, reading and writing in formatted file format and sort data. (Minimum three)

**Packages:** Built-in modules, User-Defined modules, Numpy, SciPy, Pandas, Scikit-learn**.**

**Practical:** Usage of modules and packages to solve problems. (Minimum three), Project (Minimum Two)

**Weightage:** Continuous Assessment: 50%, End Semester Examinations: 50%

**Assessment Methodology:** Quiz (5%), Project (15%), Assignment Programs (25%), Practical (25%), Internal Examinations (30%)

**References:**


1. Matthes, E. (2019). *Python crash course: A hands-on, project-based introduction to programming* (2nd ed.). No Starch Press.
2. Brown, M. C. (2018). *Python: The complete reference* (4th ed.). McGraw Hill Publishers.
3. Guttag, J. V. (2016). *Introduction to computation and programming using Python: With applications to understanding data* (2nd ed.). MIT Press.
4. McKinney, W. (2017). *Python for data analysis: Data wrangling with pandas, NumPy, and IPython*. Shroff/O'Reilly.


**E-Resources:**

1. Official Python Documentation – https://docs.python.org/3/
2. Python Tutorials – https://www.w3schools.com/python/
3. NumPy – https://numpy.org/doc/
4. SciPy – https://scipy.org/
5. Google's Python class – https://developers.google.com/edu/python/

| | Description of CO | PO | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|
| CO1 | Explain the potential usage of Python in engineering applications | --- | | | |
| CO2 | To apply the concepts of Python in solving engineering problems and formulate new projects. | PO1 (2)<br>PO5 (2) | | | |
| CO3 | To interpret the data and effectively communicate in groups. | PO2 (3)<br>PO8 (1)<br>PO9 (1) | | | |
| CO4 | Adapt new programming concepts and technologies in the profession. | PO11 (1) | | | |

| ME25C04 | Makerspace | L | T | P | C |
|---|---|---|---|---|---|
| | | 0 | 0 | 4 | 2 |

**Course Objectives:**

1. To impart practical skills in the assembly, disassembly, and welding of components using appropriate tools and techniques.
2. To provide hands-on training in electrical wiring practices, and the use of electronic components, sensors, and actuators.

**List of Activities**

**(A). Dis-assembly & Assembly Practices**

i. Tools and its handling techniques.
ii. Dis-assembly and assembly of home appliances – Grinder Mixer Grinder, Ceiling Fan, Table Fan & Washing Machine.
iii. Dis-assembly and assembly of Air-Conditioners & Refrigerators.
iv. Dis-assembly and assembly of a Bicycle.

**(B). Welding Practices**

i. Welding Procedure, Selection & Safety Measures.
ii. Power source of Arc Welding – Gas Metal Arc Welding & Gas Tungsten Arc Welding processes.
iii. Hands-on session of preparing base material & Joint groove for welding.
iv. Hands-on session of MAW, GMAW, GTAW, on Carbon Steel & Stainless Stell plates / pipes, for fabrication of a simple part.

**(C). Electrical Wiring Practices**

i. Electrical Installation tools, equipment & safety measures.
ii. Hands-on session of basic electrical connections for Fuses, Miniature Circuit Breakers and Distribution Box.
iii. Hands-on session of electrical connections for Lightings, Fans, Calling Bells.
iv. Hands-on session of electrical connections for Motors & Uninterruptible Power Supply.

**(D). Electronics Components / Equipment Practices**

i. Electronic components, equipment & safety measures.
ii. Dis-assembly and assembly of Computers.
iii. Hands-on session of Soldering Practices in a Printed Circuit Board.
iv. Hands-on session of Bridge Rectifier, Op-Amp and Transimpedance amplifier.
v. Hands-on session of integration of sensors and actuators with a Microcontroller.
vi. Demonstration of Programmable Logic Control Circuit.

**(E). Contemporary Systems**

i. Demonstration of Solid Modelling of components.
ii. Demonstration of Assembly Modelling of components.
iii. Fabrication of simple components / parts using 3D Printers.
iv. Demonstration of cutting of wood / metal in different complex shapes using Laser Cutting Machine.

**References:**


1. Stephen Christena, Learn to Weld: Beginning MIG Welding and Metal Fabrication Basics, Crestline Books, 2014.
2. H. Lipson, Fabricated - The New World of 3D Printing, Wiley, 1st edition, 2013.
3. Code of Practice for Electrical Wiring Installations (IS 732:2019)


| | Description of CO | PO | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|
| CO1 | Demonstrate proper use and handling of basic hand and power tools. | --- | | | |
| CO2 | Carry out electrical wiring installations and repairs, applying safety measures in domestic applications. | PO1(3) | | | |
| CO3 | Develop solid innovative models through software. | PO5(2) | | | |
| CO4 | Adapt and follow safety protocols in the work environment. | PO11(2) | | | |

| UC25A01 | Life Skills for Engineers – I | L | T | P | C |
|---|---|---|---|---|---|
| | | 1 | 0 | 2 | - |

**Course Objectives**

- To equip engineering students with essential life skills encompassing personal and emotional development, effective management of time and stress, financial literacy, digital safety, and civic responsibility.
- To enhance self-awareness, interpersonal skills, and resilience to prepare students for the professional and personal challenges of engineering careers and life beyond academics**.**

**Personal and Emotional Development:** Self-Awareness & Personality, Emotional Intelligence & Empathy, Positive thinking, Right attitude, Stress & Anger Management, Goal-Setting & Time Management, Growth Mindset & Resilience.

**Activities:** Personality tests (MBTI, DISC), reflection journals, Empathy circle, role-playing difficult conversations, Guided mindfulness sessions, stress relief toolkit creation, Vision board creation, weekly time audit and planner, Group challenge scenarios, resilience journal.

**Management Skills:** Financial Literacy: Budgeting & Saving, Nutrition, Health, and Hygiene, Digital Literacy & Online Safety, Civic Responsibility & Ethics

**Activities**: Create a monthly budget, financial simulation game, Meal planning workshop, physical wellness challenge, Social media audit, privacy and safety scenarios, Community service, values debate.

**Weightage:** Continuous Assessment: 100%

**Assessment Methodology:** Assignments (20%), Flipped Class & Worksheets (10%), Practical (30%), Internal Examinations (40%)

**References:**


1. Khera, S. (2003). *You can win*. Macmillan.
2. Levesque, H. (n.d.). *Life skills 101: A practical guide to leaving home and living on your own*. (Publication year not specified)
3. Mitra, B. K. (2017). *Personality development & soft skills* (3rd impression). Oxford University Press.
4. ICT Academy of Kerala. (2016). *Life skills for engineers*. McGraw Hill Education (India) Private Ltd.

| | Description of CO | PO | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|
| CO1 | Understand personality traits and emotional intelligence, in interpersonal interactions. | --- | | | |
| CO2 | To work and execute as a team through successful implementation of set goals. | PO7 (1)<br>PO8 (2)<br>PO9 (2) | | | |
| CO3 | Develop and implement best practices in day-to-day life, in terms of planning and execution. | PO11 (3) | | | |

| UC25A02 | Physical Education - I | L | T | P | C |
|---|---|---|---|---|---|
| | | 0 | 0 | 4 | 1 |

**Course Objectives:**

- To impart the fundamentals of physical education for development of students' physical, mental, and social well-being.
- To instill a lifelong appreciation for physical activity towards the development of positive attitude and fostering values of team work and sportsmanship.

**Introduction to physical education:** Exercise for Good Posture – Conditioning and Calisthenics for Before start, Jogging, Bending, Twisting, Standing, Sitting and Relaxation, Training on First Aid practices.

**Participation of athletic events:** Rules and regulations of important athletic events, Sprint, Jumps, Throws and Hurdles.

**Skill development in any one of the following outdoor games:** Basket Ball, Volley Ball, Ball Badminton, Football, Hockey, Kho-Kho, Kabaddi, Cricket, Hand ball and Tennis.

**Skill development in any one of the following indoor games:** Shuttle Badminton, Chess and Table Tennis.

**Weightage:** Continuous Assessment: 100%

**Assessment Methodology:** Attendance (60%), Quiz (10%), Participation in Sports and Games (20%) and Viva Voce (10%)

**References:**


1. Singh, A. (2008). Essentials of physical education. Kalyani Publishers.
2. Kamlesh, M. L. (2006). Psychology in physical education and sport (3rd ed.). Metropolitan Book Co.
3. Mangal, S. K. (2009). *Psychology of sports performance*. Sports Publication.


**E-resources:**

1. https://www.who.int/health-topics/physical-activity

| | CO Description | PO | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|
| CO1 | Understand and explain the importance of physical activity for mental and physical health. | --- | | | |
| CO2 | Apply basic principles of exercise science in the routine life. | PO1(3) | | | |
| CO3 | Develop teamwork, discipline, and leadership through sports and group activities and collaborate effectively. | PO8(3) | | | |
| CO4 | Demonstrate independent learning in health, nutrition, and fitness-related topics. | PO11(2) | | | |

# Semester II

| MA25C02 | Linear Algebra | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 1 | 0 | 4 |

**Course Objectives:**

- To impart foundational knowledge in linear algebra essential for analysing and solving problems in engineering applications.
- To provide the knowledge on computation using software and interpret key linear algebra concepts using software.

**Vector Spaces** Introduction to Vector Spaces, Examples, Subspaces, Linear Combinations, Span, Generating Sets, Linear Dependence and Independence, Basis and Dimension, Dimension of Subspaces.

**Activities:** Open-Source software, exercises to test linear dependence and independence using rank, compute span and basis of a set of vectors, determine the dimension of subspaces, and illustrate the concept of subspace and basis in $\boldsymbol{R^2}/\boldsymbol{R^3}$ with visualization.

**Linear Transformations and Diagonalization:** Null space, Range, Dimension Theorem (statement only), Matrix representation of a linear transformation, Eigenvalues & Eigenvectors, Diagonalizability.

**Activities:** Open-Source software, exercises to compute the matrix representation of a linear transformation, find the null space and range of a matrix, and compute eigenvalues and eigenvectors of a matrix.

**Inner Product Spaces:** Inner product, Norms, Cauchy, Schwarz inequality, Gram, Schmidt orthogonalization, Simple problems (up to $\boldsymbol{R^3}$).

**Activities:** Open-Source software, exercises to compute inner products and vector norms.

**Matrix Decomposition:** Orthogonal transformation of a symmetric matrix to diagonal form - Positive definite matrices, QR decomposition, Singular Value Decomposition (SVD), Least squares solutions- simple problems (up to $3 \times 3\ matrices$).

**Activities:** Open-Source software, exercises to check if a matrix is positive definite, perform QR decomposition and SVD using built-in functions.

**Weightage:** Continuous Assessment: 40%, End Semester Examinations: 60%.

**Assessment Methodology:** Assignment (20%), Software activity (20%), Quiz (20%), Internal Examinations (50%).

**References:**


1. Friedberg, S. H., Insel, A. J., & Spence, L. E. (2022). *Linear algebra*. Pearson.
2. Lay, D. C., Lay, S. R., & McDonald, J. J. (2020). *Linear algebra and its applications with MATLAB*. Pearson.
3. Bronson, R. (2011). *Schaum's outline of matrix operations*. McGraw-Hill Education.

4. Strang, G., & Thomson, R. (2005). *Linear algebra and its applications*. Brooks/Cole.
5. Lipschutz, S., & Lipson, M. (2009). *Schaum's outline of linear algebra*. McGraw-Hill.
6. Kreyszig, E. (2018). *Advanced engineering mathematics*. Wiley India.

| | **Description of CO** | **PO** | **PSO1** | **PSO2** | **PSO3** |
|---|---|---|---|---|---|
| CO1 | Explain the fundamental concepts of Linear Algebra. | --- | | | |
| CO2 | Compute and interpret eigenvalues and eigenvectors. | PO1(3) | | | |
| CO3 | Apply inner product concepts and perform orthogonalization. | PO1 (3) | | | |
| CO4 | Compute least squares solutions of linear system of equations. | PO1 (2)<br>PO2 (2) | | | |
| CO5 | Use MATLAB to implement and validate key linear algebra concepts | PO5 (1)<br>PO11 (1) | | | |

| ME25C02 | Engineering Mechanics | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 1 | 0 | 4 |

**Course Objectives:**

- To introduce the fundamental concepts and principles of statics related to forces acting on particles and rigid bodies.
- To develop the ability to formulate and apply equilibrium equations for particles and rigid bodies in two and three dimensions.
- To enable students to analyse force systems through vector resolution and calculation of moments and couples.

**Statics of Particles:** Resultant of forces in a plane, Equilibrium of a particle in a plane, Addition of concurrent forces in space, Equilibrium of a particle in space.

**Activities:** Assignments and Quiz on resultant forces, Solving of GATE questions.

**Statics of Rigid Bodies:** Concept of Free Body Diagram, Equivalent systems of forces, Transmissibility, Moment of a force about a point and an axis, Couples and force-couple systems, Equilibrium of rigid bodies in two and three dimensions, Principle of virtual work.

**Activities:** Virtual demonstration of rigid bodies, Solving of GATE questions.

**Moments of Inertia:** First moments of areas and lines, Centroids of composite areas and lines, Theorems of Pappus-Guldinus, Second moment of area, Parallel axis theorem, Rectangular and Polar Moments of inertia of composite areas, Radius of Gyration, Product of Inertia, Principal Axes and Principal Moments of Inertia, Mass moments of inertia of thin plates.

**Activities:** Virtual Simulation of Moment of Inertia, Principal Axes Determination, Solving of GATE questions.

**Friction:** Laws of friction, Coefficients of Friction, Angles of Friction, Types of Friction Problems, Wedges and Ladder friction, Belt friction.

**Activities:** Virtual Demonstration of Friction in belts and pulleys, Solving of GATE questions

**Weightage:** Continuous Assessment: 40%, End Semester Examinations: 60%

**Assessment Methodology:** Quiz - 10%, Assignments - 20%, Solving of GATE questions (20%) and Internal Examinations - 50%

**References:**


1. Beer, F. P., Johnston Jr., E. R., DeWolf, J. T., & Mazurek, D. F. (2015). Mechanics of Materials. McGraw-Hill Education.
2. Meriam, J. L., & Kraige, L. G. (2018). *Engineering Mechanics: Statics and Dynamics*. Wiley.

3. Pytel, A., & Kiusalaas, J. (2014). Engineering Mechanics (Indian Edition). Cengage Learning India.

**E-resources:**

1. Moment of Inertia Calculator – https://skyciv.com/free-moment-of-inertia-calculator/
2. OpenStax – University Physics Volume 1 – https://openstax.org/books/university-physics-volume-1/pages/10-4-moment-of-inertia-and-rotational-kinetic-energy
3. Engineering Mechanics, Dr. Dwarakish. G. S. – https://onlinecourses.swayam2.ac.in/ntr24_ed75/preview

| | CO Description | PO | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|
| CO1 | Explain the principles of statics in determination of forces acting on particles and rigid bodies. | --- | | | |
| CO2 | Apply equilibrium conditions to predict the behaviour of particles and rigid bodies under various force configurations | PO1(3) | | | |
| CO3 | Analyse various systems through resolution of forces and moments. | PO2(2) | | | |
| CO4 | Demonstrate the ability to engage in adapting new techniques in the analysis of force and moments in a system. | PO11(1) | | | |

| EE25C01 | Basic Electrical and Electronics Engineering | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 0 | 0 | 3 |

**Course Objectives:**

- To impart foundational knowledge in principles and applications of electrical and electronics engineering.

**DC Fundamentals:** Current and Voltage sources, Resistance, Inductance and Capacitance; Ohm's law, Kirchhoff's law, Series parallel combination of R, L and C components, Voltage Divider and Current Divider Rules.

**Activities:** Virtual Demonstration of electrical laws & circuits, Hands-on Breadboarding, Solving GATE questions.

**AC Fundamentals:** Faraday's Laws of Electro-magnetic Induction, Definition of Self and Mutual Inductances, Generation of sinusoidal voltage, Instantaneous & RMS values of sinusoidal signals, Introduction to 3-phase systems, Electrical Safety, Fuses and Earthing.

**Activities:** Virtual Demonstration of electromagnetic induction, Measurement of instantaneous and RMS values of AC signals, Solving GATE questions.

**Electric Machines:** DC Machines, Transformers, Star and delta Connections, Three phase Induction motors, Synchronous Generators, Single Phase Induction Motors, Stepper Motor, Universal Motor and BLDC motor.

**Activities:** Virtual demonstration of step-up and step-down transformers, Virtual working models of Universal and BLDC motors, Solving GATE questions.

**Semiconductor Devices:** PN junction diodes, Zener Diode, Voltage regulator, BJT & FET Transistors, Timers, Operational Amplifiers.

**Activities:** Virtual demonstration of V-I characteristics of PN junction and Zener diodes using simulation, inverting/non-inverting amplifiers, Solving GATE questions.

**Digital Electronics:** Boolean algebra, Basic and Universal Gates, adders, multiplexers, demultiplexers and flip-flops.

**Activity:** Online logic gate simulators, Solving GATE questions.

**Microcontrollers:** Introduction, Architecture, Potential Applications.

**Activities:** Physical demonstration of a microcontroller and online simulation of microcontroller.

**Weightage:** Continuous Assessment: 40%, End Semester Examinations: 60%

**Assessment Methodology:** Quiz (5%), Assignments (25%), GATE Questions (20%), Internal Examinations (50%)

**E-resources:**

1. https://archive.nptel.ac.in/courses/108/106/108106172/
2. Circuit Simulator – https://www.falstad.com/circuit/

| | Description of CO | PO | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|
| CO1 | Understand and explain basic electrical and electronic concepts. | --- | | | |
| CO2 | Apply and analyse electrical circuits in real-time applications. | PO1 (3)<br>PO2 (1) | | | |
| CO3 | Identify and utilise key electronic devices used in engineering applications | PO2 (2) | | | |

| PH25C05 | Applied Physics (ME) – II | L | T | P | C |
|---|---|---|---|---|---|
| | | 2 | 1 | 0 | 3 |

**Course Objective(s):**

- To impart fundamental knowledge of rigid body dynamics, thermal physics, phase transitions, and functional materials.
- To provide analytical abilities for evaluating physical phenomena in mechanical engineering applications.

**Rigid Body Dynamics:** Centre of mass – Moment of inertia (circular disc, solid cylinder, hollow cylinder, solid sphere, hollow sphere), Gear, shaft, gyroscope

**Activities:** Demonstration of moment of inertia of Gear, shafts and Gyroscopes.

**Thermal Physics:** Thermal conductivity –Transient plane source method, Transient Line Source method- Forbe's method - conduction through compound media, Laws of Thermodynamics .

**Activities:** Demonstration of thermal conductivity of insulators

**Phase Transitions:** Solid solutions - single component system, binary phase diagrams - iron-carbon equilibrium diagram, T-T-T-diagram - heat treatment of steels – hardening techniques

**Activities:** Demonstration of Hardening of steels

**Functional Materials:** Ceramics – Composites, Fiber Reinforced Plastics, Metallic Glasses, LED Characteristics

**Activities:** Demonstration of LED working and its characteristics.

**Weightage:** Continuous Assessment: 40%, End Semester Examinations: 60%

**Assessment Methodology:** Quiz (10%), Assignments (30%), Flipped Class (10%), Internal Examinations (50%)

**References:**


1) Mathur, D. S. (2008). *Elements of properties of matter*. S. Chand.
2) Brij Lal, & Subramaniyan, N. (2018). *Heat, thermodynamics and statistical physics*. S. Chand.
3) Raghavan, V. (2009). *Physical metallurgy: Principles and practice*. PHI Learning.
4) Askeland, D. (2010). *Materials science and engineering*. Brooks/Cole.


**E-resources:**

1. Moment of Inertia: https://youtu.be/fDJeVR0o__w
2. Conduction: http://kcl.digimat.in/nptel/courses/video/112106155/L32.html

3. Iron –Carbon phase diagram - https://archive.nptel.ac.in/courses/113/104/113104068/
4. Gyroscope_ https://www.youtube.com/watch?v=FydJu1A1oeM gyroscope-131127011945-phpapp02.pdf
5. Hardening Techniques_ https://www.youtube.com/watch?v=ckCN9jGsdUY
6. LED Characteristics - https://youtu.be/IgapvczVyXs

| | **Description of CO** | **PO** | **PSO1** | **PSO2** | **PSO3** |
|---|---|---|---|---|---|
| CO1 | Explain the concepts of physics in mechanical engineering stream. | --- | | | |
| CO2 | Apply appropriate techniques in physics to solve engineering problems. | PO1(3) | | | |
| CO3 | Analyse physical systems and interpret data from the virtual studies in the core branches in mechanical engineering. | PO2(2) | | | |

| CY25C03 | Applied Chemistry (ME) – II | L | T | P | C |
|---|---|---|---|---|---|
| | | 2 | 0 | 0 | 2 |

**Course Objective(s):**

- To impart knowledge and expose to applications of chemistry in mechanical engineering stream.
- To explore the mechanisms and working principles of smart materials and coatings with real-world applications.

**Functional Materials:** Types, Smart coatings, Mechanisms, Sustainable energy materials.

**Activities:** Seminar on recent development in functional materials (e.g., smart coatings, self-cleaning surfaces), Infographic Design of functional nanomaterials.

**Fuels:** Classification, Chemical Composition, natural resources, Calorific Value - Alternative Fuels - Natural gas benefits.
**Activities:** Comparison of efficiency and emissions in fuels.

**Composites**: Matrix materials – Reinforcements, Hybrid composites, Engineering applications.

**Activities:** Design of a simple composite structure for a real engineering application (e.g., lightweight bike frame).

**Lubricants**: Types, Functions. Key properties, Synthetic lubricants, Mechanisms, Emerging lubricants.

**Activities:** Collection of lubricants used in real-world engineering systems (e.g., gears, engines, bearings), Virtual demonstration of lubricant viscosity testing.

**Combustion**: Reaction Kinetics, Stoichiometric combustion and air-fuel ratio calculations, Knocking and Anti-knocking agents, Hydrogen combustion, Flue Gas analysis.

**Activities:** Virtual simulation of flue gas analysis and gas composition, Calculation of air-fuel ratio.

**Adhesives:** Adhesion Mechanisms, Classification, Bond strength, Industrial adhesives.

**Activities:** Adhesion of thermal pads on different Integrated circuits, Industrial adhesives.

**Weightage:** Continuous Assessment: 40%, End Semester Examinations: 60%

**Assessment Methodology:** Quiz (5%), Seminar (5%), Assignments (30%), Flipped Class (10%), Internal Examinations (50%)

**References:**


1. Palanna, O. G. (2009). *Engineering chemistry*. McGraw-Hill Education (India) Pvt. Ltd.
2. Cheong, K. Y., Impellizzeri, G., & Fraga, M. A. (2018). *Emerging materials for energy conversion and storage*. Elsevier.
3. Jain, P. C., & Jain, M. (2013). *Engineering chemistry*. Dhanpat Rai Publishing Company (P) Ltd.

Sharma, S. C. (2000). *Composite materials*. Narosa Publishing House


| | **Description of CO** | **PO** | **PSO1** | **PSO2** | **PSO3** |
|---|---|---|---|---|---|
| CO1 | Explain the major concepts of chemistry with regard to applications in mechanical systems. | --- | | | |
| CO2 | Apply the chemistry principles and evaluate the engineering materials in mechanical systems. | PO1(3) | | | |
| CO3 | Analyse and evaluate the performance and efficiency of mechanical systems. | PO2(3)<br>PO3(1) | | | |
| CO5 | Propose innovative solutions for real-world applications and challenges. | PO9(1) | | | |

| UC25H02 | தமிழர்களும் தொழில்நுட்பமும் / Tamils and Technology | L | T | P | C |
|---|---|---|---|---|---|
| | | 1 | 0 | 0 | 1 |

**நெசவு மற்றும் பானைத் தொழில்நுட்பம்**: சங்க காலத்தில் நெசவுத் தொழில், பானைத் தொழில்நுட்பம், கருப்பு சிவப்பு பாண்டங்கள், பாண்டங்களில் கீறல் குறியீடுகள்.

**வடிவமைப்பு மற்றும் கட்டிடத் தொழில்நுட்பம்:** சங்க காலத்தில் வடிவமைப்பு மற்றும் கட்டுமானங்கள் & சங்க காலத்தில் வீட்டுப் பொருட்களில் வடிவமைப்பு, சங்க காலத்தில் கட்டுமான பொருட்களும் நடுகல்லும் – சிலப்பதிகாரத்தில் மேடை அமைப்பு பற்றிய விவரங்கள், மாமல்லபுரச் சிற்பங்களும், கோவில்களும், சோழர் காலத்துப் பெருங்கோயில்கள் மற்றும் பிற வழிபாட்டுத் தலங்கள் – நாயக்கர் காலக் கோயில்கள், மாதிரி கட்டமைப்புகள் பற்றி அறிதல், மதுரை மீனாட்சி அம்மன் ஆலயம் மற்றும் திருமலை நாயக்கர் மஹால் – செட்டிநாட்டு வீடுகள், பிரிட்டிஷ் காலத்தில் சென்னையில் இந்தோ, சாரோசெனிக் கட்டிடக் கலை.

**உற்பத்தித் தொழில் நுட்பம்:** கப்பல் கட்டும் கலை, உலோகவியல், இரும்புத் தொழிற்சாலை, இரும்பை உருக்குதல், எஃகு, வரலாற்றுச் சான்றுகளாக செம்பு மற்றும் தங்க நாணயங்கள், நாணயங்கள் அச்சடித்தல், மணி உருவாக்கும் தொழிற்சாலைகள், கல்மணிகள், கண்ணாடி மணிகள், சுடுமண் மணிகள், சங்கு மணிகள், எலும்புத்துண்டுகள், தொல்லியல் சான்றுகள், சிலப்பதிகாரத்தில் மணிகளின் வகைகள்.

**வேளாண்மை மற்றும் நீர்ப்பாசனத் தொழில் நுட்பம்:** அணை, ஏரி, குளங்கள், மதகு, சோழர்காலக் குமுழித் தூம்பின் முக்கியத்துவம், கால்நடை பராமரிப்பு, கால்நடைகளுக்காக வடிவமைக்கப்பட்ட கிணறுகள், வேளாண்மை மற்றும் வேளாண்மைச் சார்ந்த செயல்பாடுகள், கடல்சார் அறிவு, மீன்வளம், முத்து மற்றும் முத்துக்குளித்தல், பெருங்கடல் குறித்த பண்டைய அறிவு, அறிவுசார் சமூகம்.

**அறிவியல் தமிழ் மற்றும் கணித்தமிழ்:** அறிவியல் தமிழின் வளர்ச்சி, கணித்தமிழ் வளர்ச்சி, தமிழ் நூல்களை மின்பதிப்பு செய்தல், தமிழ் மென்பொருட்கள் உருவாக்கம், தமிழ் இணையக் கல்விக்கழகம், தமிழ் மின் நூலகம், இணையத்தில் தமிழ் அகராதிகள், சொற்குவைத் திட்டம்.

**Text-Cum-Reference Books**


1. தமிழக வரலாறு, மக்களும் பண்பாடும், கே.கே. பிள்ளை (வெளியீடு: தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்).
2. கணினித் தமிழ் – முனைவர் இல. சுந்தரம். (விகடன் பிரசுரம்).
3. கீழடி – வைகை நதிக்கரையில் சங்ககால நகர நாகரிகம் (தொல்லியல் துறை வெளியீடு)
4. பொருநை, ஆற்றங்கரை நாகரிகம். (தொல்லியல் துறை வெளியீடு)
5. Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL – (in print)
6. Social Life of the Tamils – The Classical Period (Dr.S.Singaravelu) (Published by: International Institute of Tamil Studies.
7. Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thirunavukkarasu) (Published by: International Institute of Tamil Studies).
8. The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: International Institute of Tamil Studies.)
9. Keeladi – 'Sangam City C ivilization on the banks of river Vaigai' (Jointly Published by: Department ofArchaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
10. Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay) (Publishedby: The Author)
11. Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Bookand Educational Services Corporation, Tamil Nadu)
12. Journey of Civilization Indus to Vaigai (R.Balakrishnan) (Published by: RMRL) – Reference Book.

| UC25H02 | Tamils and Technology | L | T | P | C |
|---|---|---|---|---|---|
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**Weaving and Ceramic Technology:** Weaving Industry during Sangam Age, Ceramic technology, Black and Red Ware Potteries (BRW), Graffiti on Potteries.

**Design and Construction Technology:** Designing and Structural construction House & Designs in household materials during Sangam Age, Building materials and Hero stones of Sangam age, Details of Stage Constructions in Silappathikaram, Sculptures and Temples of Mamallapuram, Great Temples of Cholas and other worship places,Temples of Nayaka Period, Type study (Madurai Meenakshi Temple), Thirumalai Nayaka rMahal, Chetti Nadu Houses, Indo, Saracenic architecture at Madras during British Period.

**Manufacturing Technology:** Art of Ship Building , Metallurgical studies, Iron industry, Iron smelting, steel, Copper and gold Coins as source of history - Minting of Coins, Beads making, industries Stonebeads, Glass beads, Terracotta beads, Shell beads / bone beats, Archeological evidences, Gem stone types described in Silappathikaram.

**Agriculture and Irrigation Technology:** Dam, Tank, ponds, Sluice, Significance of Kumizhi Thoompuof Chola Period, Animal Husbandry - Wells designed for cattle use , Agriculture and Agro Processing -Knowledge of Sea -Fisheries, Pearl, Conche diving, Ancient Knowledge of Ocean -Knowledge Specific Society.

**Scientific Tamil & Tamil Computing:** Development of Scientific Tamil, Tamil computing, Digitalization of Tamil Books, Development of Tamil Software, Tamil Virtual Academy, Tamil Digital Library, Online Tamil Dictionaries, Sorkuvai Project.

**Text-Cum-Reference Books**


1. தமிழக வரலாறு, மக்களும் பண்பாடும், கே.கே. பிள்ளை (வெளியீடு: தமிழ்நாடு பாடநூல் மற்றும்
   கல்வியியல் பணிகள் கழகம்).
2. கணினித் தமிழ், முனைவர் இல. சுந்தரம். (விகடன் பிரசுரம்).
3. கீழடி, வைகை நதிக்கரையில் சங்ககால நகர நாகரிகம் (தொல்லியல் துறை வெளியீடு)
4. பொருநை, ஆற்றங்கரை நாகரிகம். (தொல்லியல் துறை வெளியீடு)
5. Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL – (in print)
6. Social Life of the Tamils, The Classical Period (Dr.S.Singaravelu) (Published by: International Institute of Tamil Studies.
7. Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thirunavukkarasu) (Published by: International Institute of Tamil Studies).
8. The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: International Institute of Tamil Studies.)
9. Keeladi , 'Sangam City C ivilization on the banks of river Vaigai' (Jointly Published by: Department ofArchaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
10. Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay) (Publishedby: The Author)
11. Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Bookand Educational Services Corporation, Tamil Nadu)
12. Journey of Civilization Indus to Vaigai (R.Balakrishnan) (Published by: RMRL) – Reference Book.

| ME25C05 | Re-Engineering for Innovation | L | T | P | C |
|---|---|---|---|---|---|
| | | 0 | 0 | 4 | 2 |

**Course Objectives:**

- To cultivate foundational skills in prototyping, and automation for development of prototypes with real-world applications.
- To provide a comprehensive, hands-on exposure to product development through reverse engineering concepts.

**Bootcamp 1:** Introduction to Product Development, Reverse Engineering, Overview of the product lifecycle, Hands-on disassembly of simple products, Practice of basic measurements and sketching, Introduction to CAD modeling of disassembled parts, Virtual assembly of parts.

**Bootcamp 2:** Embedded System Programming (Open-source platforms), Practice of interfacing sensors, reading data, automation in home, healthcare and agriculture.

**Reverse Engineering:** Sketch and prototype alternative designs, Group brainstorming sessions, Manufacture prototype parts using 3D printing and / or workshop tools, Assemble prototype product.

**Weightage:** Continuous Assessment: 60%, End Semester Examinations: 40%

**Assessment Methodology:** Project (30%), Assignment (10%), Practical (30%), Internal Examinations (30%)

**References:**


1. Wang, W. (2010). Reverse engineering: Mechanisms, structures, systems & materials. CRC Press.
2. Margolis, M. (2020). Arduino cookbook: Recipes to begin, expand, and enhance your projects (3rd ed.). O'Reilly Media.


**E-resources:**

1. GrabCAD – https://grabcad.com/
2. GitHub – https://github.com/

| | Description of CO | PO | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|
| CO1 | Understand the product development lifecycle, including stages such as concept generation, design, prototyping, and testing. | --- | | | |
| CO2 | Apply reverse engineering techniques to analyze and document existing products. | PO1 (3)<br>PO2 (2) | | | |
| CO3 | Collaborate in teams to fabricate prototypes using appropriate tools. | PO5 (2)<br>PO8 (1)<br>PO9 (1) | | | |

| | Description of CO | PO | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|
| CO4 | Engage in independent learning and continuously adapt to emerging technologies in product design | PO11 (2) | | | |

| EN25C02 | English Essentials – II | L | T | P | C |
|---|---|---|---|---|---|
| | | 1 | 0 | 2 | 2 |

**Course Objectives:**

- To integrate vocabulary and functional grammar into communication tasks to improve fluency and accuracy.
- To articulate ideas clearly and effectively in formal and informal spoken interactions.
- To construct well-organised written documents including summaries, reports, and emails relevant to academic and workplace contexts

**Communication:** Types, Inter and Intra-personal, communication barriers, Summarising visuals, media terminology, rhetorical devices and TED Talks.

**Activities:** Short presentation, Media based responses and Speeches, Error detection, Welcome, Vote of Thanks and Formal Speeches, Listen and respond to short podcast, Worksheets.

**Correspondence:** Modal Verbs, Job Application Letters, Resume Writing, Statement of Purpose, Paraphrasing & Summarizing, Executive Summary.

**Activities:** Email writing, Submission of applications, Graphical summaries, Report on college events.

**Professional Writing:** Paraphrasing & Summarizing, Executive Summary, Proposal, Decision Making, Recommendations.

**Activities:** Report preparation and recommendation letters.

**Team Work:** Team Leader, Quality of Team leader, Leadership model, Negotiations.

**Activities:** SWOT Analysis, Mock meetings, Group discussions, Brainstorming sessions.

**Weightage:** Continuous Assessment: 50%, End Semester Examinations: 50%

**Assessment Methodology:** Worksheets (10%), Group Activity (20%), Report Writing (20%), Internal Examinations (50%)

**References:**


1. Koneru Aruna. (2020). English Language Skills for Engineers. McGraw Hill Education.
2. Taylor, Shirley & Chandra .V. (2010). Communication for Business A Practical Approach. India: Pearson Longman.
3. Ian Badger, et al., (2014). Listening: B2 (Collins English for Life: Skills), Collins.
4. Raymond Murphy (2019), Grammar in Use, Cambridge University Press.


**E-Resources:**

1. Communication for Business Success - https://open.umn.edu/opentextbooks/textbooks/8
2. TED Talks – https://www.ted.com/

| | Description of CO | PO | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|
| CO6 | Understand the importance of communication and drafting skills in engineering and technology. | --- | | | |
| CO7 | Apply listening strategies to comprehend spoken English in various contexts. | PO1(3) | | | |
| CO8 | Participate actively in group discussions by analysing critically from different views. | PO2(2)<br>PO8(1) | | | |
| CO9 | Create written reports coherently for various purposes. | PO9(2) | | | |
| CO10 | Adapt communication styles to global, multicultural environments. | PO11(1) | | | |

| UC25A03 | Life Skills for Engineers – II | L | T | P | C |
|---|---|---|---|---|---|
| | | 1 | 0 | 2 | - |

**Course Objectives:**

- To impart and cultivate analytical reasoning, innovative thinking, effective collaboration, and ethical leadership to prepare students for complex challenges in professional and personal environments.

**Critical Thinking:** Creativity, Critical Thinking, Collaboration, Problem Solving, Decision Making, Imagination, Intuition, Experience, Sources of Creativity, Lateral Thinking, Myths of creativity, Critical thinking Vs Creative thinking, Convergent & Divergent Thinking, Critical reading & Multiple Intelligence.

**Activities:** Two-Brainstorm Method, “30 Circles” Challenge, “Desert Survival” Simulation, Lateral thinking riddles and puzzles, "What If?" Scenario Writing, Fast vs. Slow Thinking Game, Creativity Myth Busters

**Problem Solving:** Techniques, Six Thinking Hats, Mind Mapping, Forced Connections. Analytical Thinking, Numeric, symbolic, and graphic reasoning. Scientific temperament and Logical thinking.

**Activities:** Case study analysis, Escape Room challenge.

**Leadership:** Leadership Styles & Self-Assessment, Communication & Active Listening, Decision-Making & Responsibility, Teamwork & Delegation, Empathy, Integrity & Conflict Management, Vision, Motivation & Goal-Setting.

**Activities:** Crisis Leadership Simulation, Tower Challenge, Leadership Dilemmas Role-Play, Team Vision Board

**Weightage:** Continuous Assessment: 100%

**Assessment Methodology:** Assignments (20%), Flipped Class & Worksheets (10%), Practical (30%), Internal Examinations (40%)

**References:**


1. De Bono, E. (2017). *Six thinking hats*, Little, Brown Book Group.
2. Facione, P. A. (2015). *Critical thinking: What it is and why it counts*. Insight Assessment.
3. Kahneman, D. (2011). *Thinking, fast and slow*. Farrar, Straus and Giroux.
4. Whetten, D. A., & Cameron, K. S. (2016). *Developing management skills*. Pearson.

| | Description of CO | PO | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|
| CO1 | Explain the importance of leadership and management skills in life. | --- | | | |
| CO2 | Apply and demonstrate creative thinking techniques to generate innovative solutions. | PO7 (3) | | | |
| CO3 | Exhibit effective collaboration and communication skills through teamwork, active listening, and conflict resolution strategies. | PO8 (2) | | | |
| CO4 | Integrate scientific temperament and logical reasoning into c problem solving in engineering and real-world contexts. | PO11 (2) | | | |

| UC25A04 | Physical Education - II | L | T | P | C |
|---|---|---|---|---|---|
| | | 0 | 0 | 4 | 1 |

**Course Objectives:**

- To impart knowledge on gymnastic exercises and pressing needs for upskilling in a particular game.

**Basic gymnastics exercises:** Warming up, Suitable exercise, Lead up games, Safety education, Movement education, Balanced Walk, execution, floor exercise, tumbling/acrobatics, grip, release, swinging, parallel bar exercise, horizontal bar exercise, flic-flac-walk and pyramids.

**Upskilling in any one of the athletics:** Broad Jump, High Jump, Triple Jump, Relay Sprints, Javelin Throw, Discuss Throw, Shot Put, Short and Long-distance Running.

**Advance skills in any one of the indoor/outdoor games, which has been opted by the student in the I semester.**

**Weightage:** Continuous Assessment: 100%

**Assessment Methodology:** Attendance (60%), Quiz (10%), Participation in Sports and Games (20%) and Viva Voce (10%)

**References:**


1. Singh, A. (2008). Essentials of physical education. Kalyani Publishers.
2. Kamlesh, M. L. (2006). Psychology in physical education and sport (3rd ed.). Metropolitan Book Co.
3. Mangal, S. K. (2009). *Psychology of sports performance*. Sports Publication.
4. Kandappan, K. (2004). *Foundations of physical education*. Friends Publications.


**E-resources:**

1. **https://www.who.int/health-topics/physical-activity**

| | CO Description | PO | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|
| CO1 | Understand and explain the importance of physical activity for mental and physical health. | --- | | | |
| CO2 | Apply safety principles and methods during sports activities. | PO1(3) | | | |
| CO3 | Develop teamwork, discipline, and leadership through sports and group activities and collaborate effectively. | PO8 (3) | | | |
| CO4 | Demonstrate the advanced technical skills and strategic understanding in the game of their interest. | PO11(1) | | | |

## Foreign Language^

| UC25F01 | Deutsch – I | L | T | P | C |
|---|---|---|---|---|---|
| | | 1 | 0 | 2 | - |

**Course Objectives:**

- To impart fundamentals of the Deutsch language, including reading, writing systems, pronunciation, and speaking.

**Basics & Introduction:** German alphabet and pronunciation, Basic greetings and farewells, Introducing yourself and others (Ich heiße…, Wer bist du?), Numbers 1–100 and days of the week, Personal pronouns (ich, du, er, sie…), Sentence structure (SVO word order).

**Activities:** Alphabet spelling game, short skits, Use color-coded cards for SVO sentences.

**Grammar Essentials & Everyday Vocabulary:** Present tense of regular verbs (spielen, arbeiten, machen…), Common irregular verbs: sein (to be), haben (to have), gehen, kommen, Articles and gender (der, die, das; ein, eine), Simple questions and negation (nicht, kein), Describing people and things: adjectives and colors, Family, school, food, and common objects vocabulary.

**Activities:** Conjugate regular and irregular verbs, “Question Chain” game, Create a simple family tree.

**Everyday Communication in German:** Asking for and giving directions, Telling the time and talking about schedules, Ordering food and drinks at a café or restaurant, Talking about hobbies, weather, and daily routines, Listening to short conversations and responding appropriately, Introduction to German culture and formal/informal language use (du vs Sie).

**Activities:** Ordering food and drinks, Give directions, Formal / Informal greetings, Do’s and Don’ts.

**Weightage:** Continuous Assessment: 100%

**Assessment Methodology:** Assignments (30%), Quiz (10%) and Internal Examinations 60%

**References:**

1. Funk, H., Kuhn, C., & Demme, S. (2015). Menschen A1: Deutsch als Fremdsprache Kursbuch. Hueber Verlag.

| | CO Description | PO | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|
| CO1 | Understand simple spoken Deutsch in everyday contexts. | --- | | | |
| CO2 | Communicate with widely used Deutsch words effectively. | PO9 (2) | | | |
| CO3 | Develop the skills necessary for self-directed learning and continuous improvement in Deutsch language. | PO11 (1) | | | |

| UC25F02 | **Japanese – I** | L | T | P | C |
|---|---|---|---|---|---|
| | | 1 | 0 | 2 | - |

**Course Objectives:**

- To impart fundamentals of the Japanese language, including reading, writing systems, pronunciation, and speaking.

**Writing Systems & Basic Communication:** Introduction to Hiragana: vowels, basic characters, reading & writing, Introduction to Katakana: basic characters and usage, Basic greetings and farewells (こんにちは, おはようございます, さようなら), Introducing yourself (名前、出身、年齢), Basic sentence structure: Subject–Object–Verb, Numbers 1–100, days of the week, classroom expressions.

**Activities:** Flashcard games and writing drills, Self-introduction, Numbers & date-matching, Greeting expressions, Listening to audio.

**Grammar & Everyday Vocabulary:** Particles: は (wa), を (wo), の (no), へ (e), に (ni), Present tense verbs: です, ます-form conjugation (たべます、のみます), Negative forms: ではありません, ません, Describing people and objects using adjectives (い and な), Question formation: なに、どこ、だれ、いつ, Vocabulary for family, food, colors, and basic actions.

**Activities:** Verb conjugation drills, Guessing game, Picture description, “Shopping” with food vocab and counters

**Conversation & Cultural Etiquette:** Talking about routines and schedules (daily verbs, time expressions), Asking and giving simple directions (〜はどこですか？), Ordering food and making polite requests (〜をください、〜をおねがいします), Expressing likes and dislikes (すき・きらい), Listening to short conversations and identifying key phrases, Introduction to formal/informal speech and Japanese etiquette.

**Activities:** Skits and role-plays, daily schedule, beginner-level dialogue, Group discussion on etiquette.

**Activities:** Practice worksheets and flashcards for hiragana, Writing drills and reading simple katakana words, Dialogue practice for greetings and self-introduction, Sentence construction exercises with basic SOV structure, Particle usage exercises and short dialogues, Role-play scheduling, shopping, and telling time, Verb conjugation drills for common verbs, Descriptive sentence exercises using adjectives, Practice Q&A dialogues forming questions and negations, Kanji writing practice and quizzes for basic characters, Vocabulary tests and conversational practice on daily topics, Oral presentations and listening comprehension quizzes.

| |
|---|
| **Weightage:** Continuous Assessment: 100% |
| **Assessment Methodology:** Assignments (30%), Quiz (10%) and Internal Examinations 60% |
| **References:**<br>1. Banno, E., Ikeda, Y., Ohno, Y., Shinagawa, C., & Tokashiki, K. (2011). Genki I: An integrated course in elementary Japanese. The Japan Times.<br>2. The Japan Foundation. (2017). Marugoto Japanese language and culture starter (A1) course book for communicative language activities. Goyal Publishers. |

| | CO Description | PO | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|
| CO1 | Understand simple spoken Japanese in everyday contexts. | --- | | | |
| CO2 | Communicate with widely used Japanese words effectively. | PO9 (2) | | | |
| CO3 | Develop the skills necessary for self-directed learning and continuous improvement in Japanese language. | PO11 (1) | | | |

| UC25F03 | Korean – I | L | T | P | C |
|---|---|---|---|---|---|
| | | 1 | 0 | 2 | - |

**Course Objectives:**

- To impart fundamentals of the Korean language, including reading, writing systems, pronunciation, and speaking.

**Fundamentals of Korean:** Introduction to Hangul: consonants and vowels, Basic pronunciation and syllable formation, Common greetings and self-introductions, Numbers (Sino-Korean and Native Korean basics), Basic sentence structure (Subject-Object-Verb), Simple expressions (e.g., 감사합니다, 안녕하세요).

**Activities:** Writing and reading Hangul practice sheets, Pronunciation drills and audio repetition, Dialogue practice for greetings and self-introduction, Counting and number exercises.

**Essential Grammar and Vocabulary:** Particles (은/는, 이/가, 을/를) and usage, Basic verbs and present tense conjugation, Sentence patterns: affirmative, negative, interrogative, Common adjectives and descriptive sentences, Expressing possession and location, Asking simple questions (어디, 뭐, 누구).

**Activities:** Verb conjugation and sentence formation drills, Role-play conversations for shopping and daily routines, Descriptive writing and speaking exercises, Question and answer practice.

**Everyday Korean Communication:** Polite speech levels and honorifics introduction, Talking about time, dates, and schedules, Ordering food, shopping phrases, counting objects, Simple directions and transportation vocabulary, Listening practice with short dialogues, Cultural notes on etiquette and communication.

**Activities:** Role-play ordering at a restaurant or buying items, Listening comprehension exercises, Giving and asking for directions practice, Group conversations and presentations.

**Weightage:** Continuous Assessment: 100%

**Assessment Methodology:** Assignments (30%), Quiz (10%) and Internal Examinations 60%

**References:**


1. King, R., Yeon, J., & Brown, A. (2015). Elementary Korean (2nd ed.). Tuttle Publishing.
2. Cho, Y., Lee, H., Schulz, C., Sohn, H.-M., & Sohn, S.-O. (2001). Integrated Korean: Beginning 1. University of Hawai‘i Press.

| | CO Description | PO | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|
| CO1 | Understand simple spoken Korean in everyday contexts. | --- | | | |
| CO2 | Communicate with widely used Korean words effectively. | PO9 (2) | | | |
| CO3 | Develop the skills necessary for self-directed learning and continuous improvement in Korean language. | PO11 (1) | | | |

## ANNA UNIVERSITY, CHENNAI

**UNDERGRADUATE CURRICULUM (NON-AUTONOMOUS AFFILIATED INSTITUTIONS)**

**Programme:** B.Tech., Artificial Intelligence and Data Science **Regulations:** 2025

**Abbreviations:**

**HUM –** Humanities (Languages, Management, Heritage, and others)

**BS** – Basic Science (Mathematics, Physics, Chemistry)

**ES –** Engineering Science (General (**G**), Programme Core (**PC**), Programme Elective (**PE**) & Emerging Technology (**ET**))

**SD** – Skill Development

**SL** – Self Learning

**CDP** – Capstone Design Project

**OE** – Open Elective

**L** – Laboratory Course

**T** – Theory

**LIT** – Laboratory Integrated Theory

**PW** – Project Work

**IPW** – Internship cum Project Work

**DIC –** Department Introductory Course

**TCP –** Total Contact Period(s)

| Semester – I | | | | | | | |
|---|---|---|---|---|---|---|---|
| **S. No.** | **Course Code** | **Course Name** | **Course Type** | **Periods/ Week** | | **Credits** | **Category** |
| | | | | **L-T-P** | **TCP** | | |
| 1. | MA25C01 | Applied Calculus | T | 3-1-0 | 4 | 4 | BS |
| 2. | EN25C01 | English Essentials – I | T | 2-0-0 | 2 | 2 | HUM |
| 3. | UC25H01 | தமிழர் மரபு / Heritage of Tamils | T | 1-0-0 | 1 | 1 | HUM |
| 4. | PH25C01 | Applied Physics – I | LIT | 2-0-2 | 4 | 3 | BS |
| 5. | CY25C01 | Applied Chemistry – I | LIT | 2-0-2 | 4 | 3 | BS |
| 6. | CS25C01 | Computer Programming: C | LIT | 2-0-2 | 4 | 3 | ES (PC) |
| 7. | CS25C03 | Essentials of Computing | LIT | 2-0-2 | 4 | 3 | ES (PC)-DIC |
| 8. | ME25C04 | Makerspace | L | 0-0-4 | 4 | 2 | SD |
| 9. | UC25A01 | Life Skills for Engineers – I* | --- | 1-0-2 | 3 | --- | HUM |
| 10. | UC25A02 | Physical Education – I* | --- | 0-0-4 | 4 | 1 | HUM |
| 11. | | NCC / NSS / NSO | --- | --- | --- | --- | --- |
| | | | | **Total Credits** | **34** | **22** | |

*Audit Course

| Semester – II | | | | | | | |
|---|---|---|---|---|---|---|---|
| S. No. | Course Code | Course Name | Course Type | Periods/ Week | | Credits | Category |
| | | | | L-T-P | TCP | | |
| 1. | MA25C02 | Linear Algebra | T | 3-1-0 | 4 | 4 | BS |
| 2. | EE25C01 | Basic Electrical and Electronics Engineering | T | 3-0-0 | 3 | 3 | ES (G) |
| 3. | CS25C06 | Digital Principles and Computer Organization | T | 3-1-0 | 4 | 4 | ES (PC) |
| 4. | UC25H02 | தமிழர்களும் தொழில்நுட்பமும் / Tamils and Technology | T | 1-0-0 | 1 | 1 | HUM |
| 5. | PH25C03 | Applied Physics (CSIE) – II | T | 2-1-0 | 3 | 3 | BS |
| 6. | AD25201 | Python for Data Science | LIT | 3-0-2 | 5 | 4 | ES (PC) |
| 7. | EN25C02 | English Essentials – II | LIT | 1-0-2 | 3 | 2 | HUM |
| 8. | ME25C05 | Re-Engineering for Innovation | L | 0-0-4 | 4 | 2 | SD |
| 9. | UC25A03 | Life Skills for Engineers – II* | --- | 1-0-2 | 3 | --- | HUM |
| 10. | UC25A04 | Physical Education – II* | --- | 0-0-4 | 4 | 1 | HUM |
| 11. | | Foreign Language^ | LIT | 1-0-2 | 3 | --- | HUM |
| | | | | **Total Credits** | **37** | **24** | |

^ Deutsch / Japanese / Korean *Audit Course

| Semester – III | | | | | | | |
|---|---|---|---|---|---|---|---|
| S. No. | Course Code | Course Name | Course Type | Periods/Week | | Credits | Category |
| | | | | L-T- P | TCP | | |
| 1. | | Discrete Mathematics | T | 3-1-0 | 4 | 4 | BS |
| 2. | | Data Structures | LIT | 3-0-4 | 7 | 5 | ES (PC) |
| 3. | | Java Programming | LIT | 3-0-4 | 7 | 5 | ES (PC) |
| 4. | | Exploratory Data Analysis | LIT | 3-0-2 | 5 | 4 | ES (PC) |
| 5. | | Operating Systems | LIT | 3-0-2 | 5 | 4 | ES (PC) |
| 6. | | Skill Development Course – I | LIT | 1-0-2 | 3 | 2 | SD |
| 7. | | English Communication Skills Laboratory – II | LIT | 0-0-2 | 2 | 1 | HUM |
| | | | | **Total Credits** | **33** | **25** | |

| Semester – IV | | | | | | | |
|---|---|---|---|---|---|---|---|
| **S. No.** | **Course Code** | **Course Name** | **Course Type** | **Periods/Week** | | **Credits** | **Category** |
| | | | | **L-T- P** | **TCP** | | |
| 1. | | Probability and Statistics | T | 3-0-0 | 3 | 3 | BS |
| 2. | | Algorithms | T | 3-0-0 | 3 | 3 | ES (PC) |
| 3. | | Artificial Intelligence Essentials | T | 3-0-0 | 3 | 3 | ES (PC) |
| 4. | | Data Privacy and Security | T | 3-0-0 | 3 | 3 | ES (PC) |
| 5. | | Standards in Artificial Intelligence | T | 1-0-0 | 1 | 3 | ES (PC) |
| 6. | | Database Management Systems | LIT | 3-0-4 | 7 | 3 | ES (PC) |
| 7. | | Skill Development Course – II | LIT | 1-0-2 | 3 | 3 | SD |
| 8. | | English Communication Skills Laboratory – III | LIT | 0-0-2 | 2 | 1 | HUM |
| | | | **Total Credits** | | **25** | **22** | |

| Semester – V | | | | | | | |
|---|---|---|---|---|---|---|---|
| **S. No.** | **Course Code** | **Course Name** | **Course Type** | **Periods/Week** | | **Credits** | **Category** |
| | | | | **L-T- P** | **TCP** | | |
| 1. | | Optimisation Techniques | T | 2-0-0 | 2 | 2 | BS |
| 2. | | Natural Language Processing | T | 3-0-0 | 3 | 3 | ES (PC) |
| 3. | | Programme Elective – I | T | 3-0-0 | 3 | 3 | ES (PE) |
| 4. | | Programme Elective – II | T | 3-0-0 | 3 | 3 | ES (PE) |
| 5. | | Machine Learning | LIT | 3-0-2 | 5 | 4 | ES (PC) |
| 6. | | Computer Networks | LIT | 3-0-2 | 5 | 4 | ES (PC) |
| 7. | | Internet of Things | LIT | 2-0-2 | 4 | 3 | ES (PC) |
| 8. | | Skill Development Course – III | LIT | 1-0-2 | 3 | 2 | SD |
| 9. | | Industry Oriented Course – I | LIT | 1-0-2 | 3 | 1 | SD |
| | | | | **Total Credits** | **31** | **25** | |
| **For Honours Degree** | | | | | | | |
| 1. | | Capstone Design Project - Level I | CDP | 0-0-12 | 12 | 6 | SD |
| **OR** | | | | | | | |
| 1. | | Honours Elective – I | T | 3-0-0 | 3 | 3 | |
| 2. | | Honours Elective – II | T | 3-0-0 | 3 | 3 | |
| **For Minor Degree** | | | | | | | |
| 1. | | Minor Elective – I | T | 3-0-0 | 3 | 3 | |
| 2. | | Minor Elective – II | T | 3-0-0 | 3 | 3 | |

# Semester I

| MA25C01 | Applied Calculus | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 1 | 0 | 4 |

**Course Objectives:**

- To provide technical competence of modelling engineering problems using calculus.
- To apply the calculus concepts in solving engineering problems using analytical methods and computational tools.

**Differential Calculus:** Functions, graph of functions, New functions from old functions, Limit of a function, Continuity, Limits at infinity, Derivative as a function, Maxima and Minima of functions of single variable, Mean value theorem, Effect of derivatives on the shape of a graph.

**Activities:** Visualization of the functions, Maxima and Minima of a function using open-source software, Solving of Competitive Examination questions (Ex. GATE).

**Functions of Several Variables:** Partial derivatives, Chain rule, Total derivative, Maxima and minima of functions of two variables, Method of Lagrange's Multipliers, Application problems in engineering.

**Activities:** Partial Derivatives with two or three variables, Maxima and Minima of a function using open-source software, Solving of Competitive Examination questions (Ex. GATE).

**Integral Calculus:** Fundamental theorem of Calculus, Indefinite integrals and the Net Change Theorem, Improper integrals, Arc Length, Area of Region, Area of surface of revolution.

**Activities:** Definite and Indefinite Integrals, Determination of Area, Solving of Competitive Examination questions (Ex. GATE).

**Multiple Integrals:** Iterated integrals and Fubini's theorem, Evaluation of double integrals, change of order of integration, change of variables between Cartesian and polar co-ordinates, evaluation of triple integrals-change of variables between Cartesian and cylindrical and spherical co-ordinates.

**Activities:** Double integrals and triple integrals using open-source software, Solving of Competitive Examination questions (Ex. GATE).

**Weightage:** Continuous Assessment: 40%, End Semester Examinations: 60%.

**Assessment Methodology:** Assignments (20%), Solution to application-oriented problems using software (20%), Solving of GATE questions (20%), Internal Examinations (40%).

**References:**

1. Anton, H., Bivens, I. C., & Davis, S. (2021). Calculus: Early transcendentals. John Wiley & Sons.

2. Ron Larson and David C. Falvo, (2013), Calculus: an Applied Approach. Cengage Learning.
3. Stewart, J., Clegg, D., & Watson, S. (2019). Calculus: Early transcendentals.
4. Thomas, G. B., Jr., Weir, M. D., Hass, J., & Heil, C. (2018). Thomas' calculus: Early transcendentals. Pearson.
5. Singh, K. (2019). Engineering mathematics through applications. Bloomsbury Publishing.
6. Grewal, B. S. (2012). Higher engineering mathematics. Khanna Publishers.

**E-resources:**

1. https://math.libretexts.org/Bookshelves/Calculus/Map%3A_Calculus__Early_Transcendentals_(Stewart)/
2. https://openstax.org/books/calculus-volume-1/
3. https://tutorial.math.lamar.edu/Classes/CalcII/CalcII.aspx
4. SCILAB, https://www.scilab.org/

| | Description of CO | PO | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|
| CO1 | Explain the meaning of derivative, integral, and their geometric and physical interpretations. | --- | | | |
| CO2 | Apply differentiation and integration techniques to compute maxima, minima, and area. | PO1(3) | | | |
| CO3 | Analyze the behavior of single and multivariable functions using derivatives and partial derivatives. | PO2(3) | | | |
| CO4 | Utilize modern computational software and online platforms to deepen understanding, perform complex calculations, and visualize mathematical concepts. | PO5(2) PO11(1) | | | |

| EN25C01 | English Essentials – I | L | T | P | C |
|---|---|---|---|---|---|
| | | 2 | 0 | 0 | 2 |

**Course Objectives:**

- To equip students with the skills to write clear, coherent, and grammatically correct texts for various purposes.
- To strengthen the ability to comprehend, interpret, and analyse written English across diverse contexts.

**Speaking Skills:** Parts of Speech, Articles, Tenses, Sentence Structure, Types of Sentences, Subject-Verb Agreement**,** Synonyms and Antonyms, Prefixes and Suffixes, Idioms and Phrases, Self-Introduction, Expressing Oneself, Everyday Conversations, Team Interactions, Emotions, agreeing & disagreeing

**Activities:** Self-Introduction, Just a Minute (JAM) Video recording, Brainstorming sessions, Situational role plays, Usage of Applications.

**Listening Skills:** Listening to Simple Conversations, Short Speeches / Stories, Extracting key information, Phonemes, Listening to Native Speakers, Listening to Various Accents.

**Activities:** Gap fill exercises, Understanding tone and intent, Listening and imitating, Spell Bee

**Reading Skills:** Reading Strategies, Skimming and Scanning, active reading with short passages.

**Activities:** Summarising, loud reading, Cloze reading, Reading comprehension, Reading newspaper articles, Reading Long passage and note making.

**Drafting Skills:** Sentence Formation, Word Substitution, Keywords Development, Writing Paragraphs, Emails and Letters.

**Activities:** Picture and poster interpretation, formal and informal letters, Official e-mails.

**Weightage:** Continuous Assessment: 40%, End Semester Examinations: 60%

**Assessment Methodology:** Quiz (10%), Assignments (20%), Speaking Task (10%), Reading Task (10%), Writing Task (10%), Internal Examinations (40%)

**References:**


1. Miller, K. Q., & Wahl, S. T. (2023). Business and Professional Communication: KEYS for Workplace Excellence. SAGE Publications.
2. Kumar, Sanjay & Pushpalatha. (2018). English Language and Communication Skills for Engineers. India: Oxford University Press.
3. Sharma, S., & Mishra, B. (2024). Communication Skills for Engineers and Scientists. PHI Learning.

**E-Resources:**

1. Cambridge English – https://www.cambridgeenglish.org/learning-english/grammar-and-vocabulary/
2. Perfect English Grammar – https://www.perfect-english-grammar.com/
3. British Council – Learn English - https://learnenglish.britishcouncil.org/grammar
4. Speechling – https://speechling.com/
5. mePro by Pearson – https://mepro.pearson.com/
6. TED Talks – https://www.ted.com/

| | Description of CO | PO | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|
| CO1 | Comprehend spoken English, take and draft notes. | --- | | | |
| CO2 | Apply vocabulary, with appropriate ways to enhance drafting and communication. | PO1(3) | | | |
| CO3 | Analyze texts in different contexts using appropriate reading strategies. | PO2(2) | | | |
| CO4 | Communicate thoughts and ideas in both planned and unplanned situations. | PO9(2) | | | |
| CO5 | Continuously improving English communication skills relevant to engineering and scientific work. | PO11(1) | | | |

| UC25H01 | தமிழர் மரபு | L | T | P | C |
|---|---|---|---|---|---|
| | | 1 | 0 | 0 | 1 |

**மொழி மற்றும் இலக்கியம்**: இந்திய மொழிக் குடும்பங்கள், திராவிட மொழிகள், தமிழ் ஒரு செம்மொழி, தமிழ் செவ்விலக்கியங்கள், சங்க இலக்கியத்தின் சமயச் சார்பற்ற தன்மை, சங்க இலக்கியத்தில் பகிர்தல் அறம், திருக்குறளில் மேலாண்மைக் கருத்துக்கள், தமிழ்க் காப்பியங்கள், தமிழகத்தில் சமண பௌத்த சமயங்களின் தாக்கம், பக்தி இலக்கியம், ஆழ்வார்கள் மற்றும் நாயன்மார்கள், சிற்றிலக்கியங்கள், தமிழில் நவீன இலக்கியத்தின் வளர்ச்சி, தமிழ் இலக்கிய வளர்ச்சியில் பாரதியார் மற்றும் பாரதிதாசன் ஆகியோரின் பங்களிப்பு.

**மரபு – பாறை ஓவியங்கள் முதல் நவீன ஓவியங்கள் வரை – சிற்பக்கலை**: நடுகல் முதல் நவீன சிற்பங்கள் வரை, ஐம்பொன் சிலைகள், பழங்குடியினர் மற்றும் அவர்கள் தயாரிக்கும் கைவினைப் பொருட்கள், பொம்மைகள் , தேர் செய்யும் கலை, சுடுமண் சிற்பங்கள், நாட்டுப்புறத் தெய்வங்கள், குமரிமுனையில் திருவள்ளுவர் சிலை, இசைக் கருவிகள், மிருதங்கம், பறை, வீணை, யாழ், நாதஸ்வரம், தமிழர்களின் சமூக பொருளாதார வாழ்வில் கோவில்களின் பங்கு.

**நாட்டுப்புறக் கலைகள் மற்றும் வீர விளையாட்டுகள்**: தெருக்கூத்து, கரகாட்டம், வில்லுப்பாட்டு, கணியான் கூத்து, ஒயிலாட்டம், தோல்பாவைக் கூத்து, சிலம்பாட்டம், வளரி, புலியாட்டம், தமிழர்களின் விளையாட்டுகள்.

**தமிழர்களின் திணைக் கோட்பாடுகள்**: தமிழகத்தின் தாவரங்களும், விலங்குகளும், தொல்காப்பியம் மற்றும் சங்க இலக்கியத்தில் அகம் மற்றும் புறக் கோட்பாடுகள், தமிழர்கள் போற்றிய அறக்கோட்பாடு, சங்ககாலத்தில் தமிழகத்தில் எழுத்தறிவும், கல்வியும், சங்ககால நகரங்களும் துறை முகங்களும், சங்ககாலத்தில் ஏற்றுமதி மற்றும் இறக்குமதி, கடல்கடந்த நாடுகளில் சோழர்களின் வெற்றி.

**இந்திய தேசிய இயக்கம் மற்றும் இந்திய பண்பாட்டிற்குத் தமிழர்களின் பங்களிப்பு:** இந்திய விடுதலைப்போரில் தமிழர்களின் பங்கு, இந்தியாவின் பிறப்பகுதிகளில் தமிழ்ப் பண்பாட்டின் தாக்கம் , சுயமரியாதை இயக்கம் இந்திய மருத்துவத்தில், சித்த மருத்துவத்தின் பங்கு, கல்வெட்டுகள், கையெழுத்துப்படிகள், தமிழ்ப் புத்தகங்களின் அச்சு வரலாறு.

**References:**


1. தமிழக வரலாறு, மக்களும் பண்பாடும், கே.கே. பிள்ளை (வெளியீடு: தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்).
2. கணினித் தமிழ், முனைவர் இல. சுந்தரம். (விகடன் பிரசுரம்).
3. கீழடி, வைகை நதிக்கரையில் சங்ககால நகர நாகரிகம் (தொல்லியல் துறை வெளியீடு)
4. பொருநை, ஆற்றங்கரை நாகரிகம். (தொல்லியல் துறை வெளியீடு)
5. Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL – (in print)
6. Social Life of the Tamils - The Classical Period (Dr.S.Singaravelu) (Published by: International Institute of Tamil Studies.
7. Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thirunavukkarasu) (Published by: International Institute of Tamil Studies).
8. The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: International Institute of Tamil Studies.)
9. Keeladi - 'Sangam City C ivilization on the banks of river Vaigai' (Jointly Published by: Department ofArchaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
10. Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay) (Published by: The Author)
11. Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
12. Journey of Civilization Indus to Vaigai (R.Balakrishnan) (Published by: RMRL) – Reference Book.

| UC25H01 | Heritage of Tamils | L | T | P | C |
|---|---|---|---|---|---|
| | | 1 | 0 | 0 | 1 |

**Language and Literature:** Language Families in India, Dravidian Languages, Tamil as a Classical Language, Classical Literature in Tamil – Secular Nature of Sangam Literature, Distributive Justice in Sangam Literature, Management Principles in Thirukural, Tamil Epics and Impact of Buddhism & Jainism in Tamil Land, Bakthi Literature Azhwars and Nayanmars - Forms of minor Poetry - Development of Modern literature in Tamil, Contribution of Bharathiyar and Bharathidhasan.

**Heritage - Rock art Paintings to Modern Art** – **Sculpture:** Hero stone to modern sculpture, Bronze icons, Tribes and their handicrafts, Art of temple car making, Massive Terracotta sculptures, Village deities, Thiruvalluvar Statue at Kanyakumari, Making of musical instruments, Mridhangam, Parai, Veenai, Yazh and Nadhaswaram, Role of Temples in Social and Economic Life of Tamils.

**Folk and Martial Arts:** Therukoothu, Karagattam, Villu Pattu, Kaniyan Koothu, Oyillattam, Leather puppetry, Silambattam, Valari, Tiger dance - Sports and Games of Tamils

**Thinai Concept of Tamils:** Flora and Fauna of Tamils & Aham and Puram Concept from Tholkappiyam and Sangam Literature, Aram Concept of Tamils, Education and Literacy during Sangam Age - Ancient Cities and Ports of Sangam Age, Export and Import during Sangam Age - Overseas Conquest of Cholas.

**Contribution of Tamils to Indian National Movement and Indian Culture:** Contribution of Tamils to Indian Freedom Struggle, The Cultural Influence of Tamils over the other parts of India, Self-Respect Movement, Role of Siddha Medicine in Indigenous Systems of Medicine, Inscriptions & Manuscripts, Print History of Tamil Books.

**References**:


1. தமிழக வரலாறு – மக்களும் பண்பாடும் – கே.கே. பிள்ளை (வெளியீடு: தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்).
2. கணினித் தமிழ் – முனைவர் இல. சுந்தரம். (விகடன் பிரசுரம்).
3. கீழடி – வைகை நதிக்கரையில் சங்ககால நகர நாகரிகம் (தொல்லியல் துறை வெளியீடு)
4. பொருநை – ஆற்றங்கரை நாகரிகம். (தொல்லியல் துறை வெளியீடு)
5. Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL – (in print)
6. Social Life of the Tamils - The Classical Period (Dr.S.Singaravelu) (Published by: International Institute of Tamil Studies.
7. Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thirunavukkarasu) (Published by: International Institute of Tamil Studies).
8. The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: International Institute of Tamil Studies.)
9. Keeladi - 'Sangam City C ivilization on the banks of river Vaigai' (Jointly Published by: Department ofArchaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
10. Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay) (Publishedby: The Author)
11. Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Bookand Educational Services Corporation, Tamil Nadu)
12. Journey of Civilization Indus to Vaigai (R.Balakrishnan) (Published by: RMRL) – Reference Book.

| PH25C01 | Applied Physics – I | L | T | P | C |
|---|---|---|---|---|---|
| | | 2 | 0 | 2 | 3 |

**Course Objective(s):**

- To impart knowledge and expose the essentials of physics in various engineering applications.

**Properties of Matter:** Elasticity, Cantilever, Young's modulus (non-uniform bending), Girders: Bridges and buildings, Viscosity: Stokes method, Surface tension: drop weight method, Thermal expansion, Thermal stress, Bimetallic strips, Expansion joints

**Practical**: Non-Uniform bending, Young's modulus of the material, Torsional pendulum, Rigidity modulus of the wire and moment of inertia of the disc.

**Activities:** Virtual demonstration of thermal stress.

**Oscillations:** Simple Harmonic motion, Torsional pendulum, Couple per unit twist, Damped and Forced Oscillation

**Waves:** Waves on a stretched string, Energy and Power, standing waves, Ultrasonics, piezo, electric method, Acoustic grating, Electromagnetic waves: Maxwell equation, Production of EM waves by dipole antenna, Propagation of EM waves in free space , wave equation, Cell phone reception

**Practical**: Melde's string experiment – Frequency of an electrically vibrating metal tip.

**Activities:** Virtual demonstration of propagation of EM waves

**Quantum Mechanics:** Black body radiation, Photoelectric effect, de Broglie hypothesis, Schrodinger Wave equation, Particle in a box (infinite potential well - three-dimensional box), Barrier penetration and quantum tunnelling.

**Practical**: Photo-electric effect, Determination of Planck's constant.

**Activities**: Virtual demonstration of Scanning Transmission Electron Microscope

**Applied Optics:** Interference: Air wedge, Michelson's Interferometer, Fiber optics: Structure of a fiber, Fiber Optic Communication System, Fiber Sensors (Virtual demo), Displacement, pressure sensor and Temperature sensor, Einstein Co-efficient, Nd:YAG laser, $CO_2$ laser (construction, functioning and applications), dye laser

**Practical**: Ruling width of Compact disc using Laser, Thickness of a thin sheet/wire using Air wedge Method.

**Activities**: Demonstration of sensors and applications of Lasers

**Weightage:** Continuous Assessment: 50%, End Semester Examinations: 50%

**Assessment Methodology:** Quiz (5%), Assignments (20%), Flipped Class (5%), Practical (30%), Internal Examinations (40%)

**References:**


1. Young, H. D., & Freedman, R. A. (2020). University physics with modern physics. Pearson.
2. Gaur, R. K., & Gupta, S. L. (2022). Engineering physics. Dhanpat Rai Publications.
3. Mathur, D. S. (2010). Elements of properties of matter. S. Chand Publishing.
4. Griffiths, D. J. (2018). Introduction to quantum mechanics. Cambridge University Press.

Silfvast, W. T. (2008). Laser fundamentals (2nd ed.). Cambridge University Press.


**E-Resources:**

1. Barrier penetration problem and Quantum tunnelling: https://archive.nptel.ac.in/courses/115/104/115104096/
2. EM waves and wireless channelling: https://onlinecourses.nptel.ac.in/noc24_ee31/preview
3. CO2 Laser: https://onlinecourses.nptel.ac.in/noc25_ph03/preview
4. Bimetallic Strips _ https://www.youtube.com/watch?v=WZQ8lvxdzDk
5. Cell phone Reception_ https://www.youtube.com/watch?v=1JZG9x_VOwA
6. Dipole Antenna_ https://www.youtube.com/watch?v=4xF1Fq2wB1I
7. Optical Sensors_ https://auece.digimat.in/nptel/courses/video/108106173/L02.html
8. Scanning Tunnelling Electron Microscope_ https://www.youtube.com/watch?v=XNYZYbXNWQA

| | Description of CO | PO | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|
| CO1 | Explain the physics concepts in various applications. | --- | | | |
| CO2 | Apply the principles of wave optics and laser physics in practical systems. | PO1(3) | | | |
| CO3 | Analyse the behaviour of materials under different conditions. | PO2(2) | | | |
| CO4 | Conduct experiments in groups and interpret the data. | PO4(3)<br>PO8(1) | | | |

| CY25C01 | Applied Chemistry – I | L | T | P | C |
|---|---|---|---|---|---|
| | | 2 | 0 | 2 | 3 |

**Course Objectives:**

- To provide students with a solid understanding of the chemical principles for engineering applications.
- To introduce the chemical properties of materials and how these properties influence the selection and use of materials in engineering systems.
- To impart practical applications of chemistry in commonly used engineering devices

**Water Technology:** Water quality parameters and standards. Industrial feed water, Remediation. Municipal water treatment. Desalination.

**Practical:** Analysis of alkalinity, hardness and dissolved oxygen.

**Activity:** Coagulation of water sample using Alum

**Nano-chemistry:** Classification, Size, dependent properties. Preparation of nanomaterials, Top-down and Botton-Up approaches, Applications (Flipped classroom).

**Practical:** Preparation of nanoparticles by Sol-Gel method.

**Electrochemistry:** Electrochemical cell, Electrode potential., Redox reaction. Conductivity of electrolytes, Factors.

**Practical:** Conductometric titrations

**Activity:** Electrochemical cell demonstration

**Corrosion & Control:** Chemical and electrochemical corrosions, galvanic series, factors influencing corrosion, Electrochemical protection. Organic and Inorganic coating.

**Practical:**

- Corrosion study by weight loss and salt spray method.
- Potentiometry/UV-visible spectrophotometer.

**Activities:** Case Study on Corrosion in Pipelines and Electronics, Control measures for a corroded metal

**Batteries**

Conventional, Contemporary and Emerging battery storage technologies, Primary & Secondary Batteries, Battery Pack, Battery Materials, Performance Parameters, Testing, Safety aspects.

**Practical:** Measurement of EMF, Internal Resistance, Charge and Discharge Characteristics.

**Activities:** Demonstration of battery pack in e-vehicles.

**Weightage:** Continuous Assessment: 50%, End Semester Examinations: 50%

**Assessment Methodology:** Quiz (5%), Assignments (20%), Flipped Class (5%), Practical (30%), Internal Examinations (40%)

**References:**


1. Jain, P. C., & Jain, M. (2015). Engineering Chemistry. Dhanpat Rai Publishing Company (P) Ltd.
2. Dara, S. S. (2004). A Textbook of Engineering Chemistry. Chand Publications.
3. Sachdeva, M. V. (2011). Basics of Nano Chemistry. Anmol Publications Pvt Ltd.
4. Friedrich, E. (2014). Engineering Chemistry. Medtech.


**E-Resources:**

1. Water and Wastewater Engineering (Prof. Ligy Philip, IIT Madras) – https://nptel.ac.in/courses/105106202.
2. Electrochemical Energy Systems (Prof. S. Mitra, IIT Madras) – https://nptel.ac.in/courses/113106028.
3. Corrosion (Prof. Kallol Mondal, IIT Kanpur) – https://nptel.ac.in/courses/112104088
4. Chemistry of Battery Systems (Prof. V. R. Marathe, IIT Madras) – https://nptel.ac.in/courses/115106130
5. Resource on all battery types, testing, and safety – https://batteryuniversity.com/articles

| | Description of CO | PO | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|
| CO1 | Understand the importance of chemistry applications with underlying mechanisms. | --- | | | |
| CO2 | Apply the chemistry concepts in widely used devices. | PO1(3) | | | |
| CO3 | Analyse the effect of various chemical parameters on performance of engineering systems. | PO2(2) | | | |
| CO4 | Perform experimentations as a group and interpret the results. | PO4(3)<br>PO8(1) | | | |
| CO5 | Communicate findings through case studies and reports | PO9(1) | | | |

| CS25C01 | Computer Programming: C | L | T | P | C |
|---|---|---|---|---|---|
| | | 2 | 0 | 2 | 3 |

**Course Objectives:**

- To equip engineering students with the foundational knowledge and practical skills in 'C' programming to analyse and solve computational problems effectively.
- To foster problem-solving, critical thinking, and modular programming skills essential for engineering domains.

**Introduction to C:** Problem Solving, Problem Analysis Chart, Developing an Algorithm, Flowchart and Pseudocode, program structure, Compilation & Execution process, Interactive and Script mode, Comments, Indentation, Error messages, Primitive data types, Constants, Variables, Reserved words, Arithmetic, Relational, Logical, Bitwise, Assignment, Conditional operators, Input/Output Functions, Built-in Functions.

**Practical:** Create Problem Analysis Charts, Flowcharts and Pseudocode for simple C programs (Minimum three).

**Control Structures:** if, if-else, nested if, switch-case, while, do-while, for, nested loops, Jump statements.

**Practical:** Usage of conditional logics in programs. (Minimum three)

**Functions:** Function Declaration, Definition and Calling, Function Parameters and Return Types, Call by Value and Call by Reference, Recursive Functions, Scope and Lifetime of Variables, Header files and Modular Programming.

**Practical:** Usage of functions in programs. (Minimum three)

**Strings & Pointers:** One-dimensional and Multi-dimensional Arrays, Array operations and traversals, String Handling: String declaration, input/output, string library functions, Pointer arithmetic, Pointers and Arrays, Pointers to function, Dynamic memory allocation.

**Practical:** Programs using pointers, dynamic memory, pointer arithmetic, string manipulations, array operations. (Minimum three)

**Structures & Unions:** Defining and using structures, Array of structures, Pointers to structures, Unions and their uses, Enumerations.

**Practical:** Program to use structures and unions

**File Operations:** Open, read, write, close file operations, Binary vs Text files, File pointers, Error handling in file operations.

**Practical:** Programs reading/writing data in text and binary files (Minimum three).

**Standard Libraries & Header Files:** Using standard libraries like stdio.h, stdlib.h, string.h, math.h, Creating and using user-defined header files and libraries.

| |
|---|
| **Practical:** Use of standard and user-defined libraries in solving problems. (Minimum three), Project (Minimum Two) |
| **Weightage:** Continuous Assessment: 50%, End Semester Examinations: 50% |
| **Assessment Methodology:** Quiz (5%), Project (15%), Assignment Programs (25%), Practical (25%), Internal Examinations (30%) |
| **References:**<br>1. Thareja, R. (2021). Programming in C . Oxford University Press.<br>2. Balagurusamy, E. (2019). Programming in ANSI C. McGraw Hill Education.<br>3. Kanetkar, Y. (2020). Let us C. BPB Publications.<br>4. Kalicharan, N. (2022). Learn to program with C: An introduction to programming using the C language. Apress.<br>5. Forouzan, B. A., & Afyouni, H. (2023). Computer science: A structured programming approach in C. Cengage. |
| **E-resources:**<br>1. Learn-C.org - https://www.learn-c.org/<br>2. GeeksforGeeks - C Programming - https://www.geeksforgeeks.org/c-programming-language/<br>3. GNU C Library Documentation - https://www.gnu.org/software/libc/manual/<br>4. “Introduction to C Programming”, Swayam MOOC Course, https://onlinecourses.swayam2.ac.in/imb25_mg71/ |

| | Description of CO | PO | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|
| CO1 | Explain the potential usage of ‘C’ in engineering applications | --- | | | |
| CO2 | To apply the concepts of ‘C’ in solving engineering problems and formulate new projects. | PO1 (2)<br>PO5 (2) | | | |
| CO3 | To interpret the data and effectively communicate in groups. | PO2 (3)<br>PO8 (1)<br>PO9 (1) | | | |
| CO4 | Adapt new programming concepts and technologies in the profession. | PO11 (1) | | | |

| CS25C03 | Essentials of Computing | L | T | P | C |
|---|---|---|---|---|---|
| | | 2 | 0 | 2 | 3 |

**Course Objectives:**

1. To introduce the basic components and operations of computers.
2. To develop problem-solving and computational thinking skills.
3. To enable learners to design simple solutions using algorithms and flowcharts.
4. To provide hands-on experience in visual programming and basic app development.

**Computers:** Computer, Characteristics of Computers, History of Computers, Classification of Computers, Applications of Computers, Basic Organization of a Computer. Data Representation, Using spread sheets for basic operations on data and visualize the data.

**Practical:**

1. Office Software for documentation and presentation
2. Spread sheets for calculations and data. Visualization

**Computational Thinking:** What is Computational Thinking, Decomposition, Abstraction, Real World Information to Computable Data, Number Systems, Conversions among Number systems, what is Logic, Boolean Logic, Applications of Propositional Logic.

**Activities:**

1. Solving problems based on number systems and logics.
2. Virtual Demonstration of Computational thinking

**Problem Solving Basics:** Problem Definition, Logical Reasoning, Decomposition, Software Design Concept of an Algorithm, Algorithm Representation – Algorithm Discovery – Iterative Structures – Recursive Structures – Efficiency and Correctness - Implementation of Algorithms - Fundamental Algorithms: Exchanging the values of two variables, Counting, Summation of a set of numbers, Factorial computation, Generation of Fibonacci Sequence, Reversing the digits of an Integer, Base Conversion.

**Activities:** Algorithm Development for simple mathematical problems

**Programming Languages:** Program Development Life Cycle, Program Design Tools, Algorithms, Flowcharts, Pseudocodes, Role of Algorithms, Programming Languages, Programming Paradigms Traditional Programming Concepts, Procedural Units, Language Implementation, Declarative Programming.

**Activities:** Flowchart design for simple mathematical problems

**Scratch Programming:** What is Scratch, Scratch Programming Environment, Paint Editor, Scratch Blocks, Arithmetic Operators and Functions, Use Motion Commands, Pen Commands and Easy Draw, Looks Palette, Sound Palette, Power of Repeat, Data Types, Variables, Getting Input from Users.

Making Decisions, Comparison Operators, Decision Structures, Logical Operators, Repetition, Loop Blocks, Stop Commands, Counters, Nested Loops, Recursion, String Processing, String Manipulation, Lists, Dynamic Lists, Numerical Lists, Searching and Sorting Lists.

**Activities:**

1. Creation of Functional Block for simple mathematical problems
2. Drawing and Painting operations
3. Scratch Animation for understanding Conditional and Loop statements.
4. Draw artistic, geometric patterns and create games.
5. Scratch Programs for applied scientific computing and data manipulations

**App Development:** Building Apps using problem, solving techniques on any app development platform, Modeling, incremental and iterative, reuse, modularization, algorithmic thinking, abstracting and modularizing, decomposition, testing and debugging.

**Activities:** Sample App Developments for societal problems.

**Weightage:** Continuous Assessment: 40%, End Semester Examinations: 60%

**Assessment Methodology:** Assignments (10%), Quiz (5%), Project based learning (20%), Flipped Classroom (5%), Review of GATE questions (10%) & Internal Assessment: 50%

**References:**


1. Thareja, R. (2020). Fundamentals of computers. Oxford University Press.
2. Rajaraman, V., & Adabala, N. (2014). Fundamentals of computers. PHI Learning.
3. Brookshear, J. G., & Brylow, D. (2015). Computer science: An overview. Pearson.
4. Dromey, R. G. (1982). How to solve it by computer. Prentice Hall International.
5. Marji, M. (2014). Learn to program with Scratch: A visual introduction to programming with games, art, science and math. No Starch Press.
6. Riley, D. D., & Hunt, K. A. (2014). Computational thinking for the modern problem solver. CRC Press.
7. Venkatesh, G., & Mukund, M. (2021). Computational thinking. Notion Press.

**E-Resources:**

1. Brennan and Resnick's CT Framework 2012: https://scratched.gse.harvard.edu/ct/files/AERA2012.pdf
2. CS50X 2025 Scratch YouTube lectures by Prof. David J Malan, Harvard University: https://www.youtube.com/watch?v=2WtPyqwTLKM
3. https://teachinglondoncomputing.org/resources/developing-computational-thinking/
4. Scratch software: https://scratch.mit.edu/
5. MIT APP INVENTOR software: https://appinventor.mit.edu/
6. app.diagrams.net

| | Description of CO | PO | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|
| CO1 | Describe the basic components and functioning of computers, number systems, and data representation. | | | | |
| CO2 | Apply computational thinking and problem-solving techniques to design simple algorithms for real-world problems | PO1(3) | | | |
| CO3 | Design and represent solutions using flowcharts, pseudocode, and basic visual programming tools. | PO2 (2) | | | |
| CO4 | Demonstrate the ability to independently learn new computing tools and practices essential for life-long learning | PO11(1) | | | |

| ME25C04 | Makerspace | L | T | P | C |
|---|---|---|---|---|---|
| | | 0 | 0 | 4 | 2 |

**Course Objectives:**

1. To impart practical skills in the assembly, disassembly, and welding of components using appropriate tools and techniques.
2. To provide hands-on training in electrical wiring practices, and the use of electronic components, sensors, and actuators.

**List of Activities**

**(A). Dis-assembly & Assembly Practices**

i. Tools and its handling techniques.
ii. Dis-assembly and assembly of home appliances – Grinder Mixer Grinder, Ceiling Fan, Table Fan & Washing Machine.
iii. Dis-assembly and assembly of Air-Conditioners & Refrigerators.
iv. Dis-assembly and assembly of a Bicycle.

**(B). Welding Practices**

i. Welding Procedure, Selection & Safety Measures.
ii. Power source of Arc Welding – Gas Metal Arc Welding & Gas Tungsten Arc Welding processes.
iii. Hands-on session of preparing base material & Joint groove for welding.
iv. Hands-on session of MAW, GMAW, GTAW, on Carbon Steel & Stainless Stell plates / pipes, for fabrication of a simple part.

**(C). Electrical Wiring Practices**

i. Electrical Installation tools, equipment & safety measures.
ii. Hands-on session of basic electrical connections for Fuses, Miniature Circuit Breakers and Distribution Box.
iii. Hands-on session of electrical connections for Lightings, Fans, Calling Bells.
iv. Hands-on session of electrical connections for Motors & Uninterruptible Power Supply.

**(D). Electronics Components / Equipment Practices**

i. Electronic components, equipment & safety measures.
ii. Dis-assembly and assembly of Computers.
iii. Hands-on session of Soldering Practices in a Printed Circuit Board.
iv. Hands-on session of Bridge Rectifier, Op-Amp and Transimpedance amplifier.
v. Hands-on session of integration of sensors and actuators with a Microcontroller.
vi. Demonstration of Programmable Logic Control Circuit.

**(E). Contemporary Systems**

i. Demonstration of Solid Modelling of components.
ii. Demonstration of Assembly Modelling of components.
iii. Fabrication of simple components / parts using 3D Printers.
iv. Demonstration of cutting of wood / metal in different complex shapes using Laser Cutting Machine.

**References:**


1. Stephen Christena, Learn to Weld: Beginning MIG Welding and Metal Fabrication Basics, Crestline Books, 2014.
2. H. Lipson, Fabricated - The New World of 3D Printing, Wiley, 1st edition, 2013.
3. Code of Practice for Electrical Wiring Installations (IS 732:2019)


**Course Outcomes:**

| | Description of CO | PO | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|
| CO1 | Demonstrate proper use and handling of basic hand and power tools. | --- | | | |
| CO2 | Carry out electrical wiring installations and repairs, applying safety measures in domestic applications. | PO1(3) | | | |
| CO3 | Develop solid innovative models through software. | PO5(2) | | | |
| CO4 | Adapt and follow safety protocols in the work environment. | PO11(2) | | | |

| UC25A01 | Life Skills for Engineers – I | L | T | P | C |
|---|---|---|---|---|---|
| | | 1 | 0 | 2 | - |

**Course Objectives:**

- To equip engineering students with essential life skills encompassing personal and emotional development, effective management of time and stress, financial literacy, digital safety, and civic responsibility.
- To enhance self-awareness, interpersonal skills, and resilience to prepare students for the professional and personal challenges of engineering careers and life beyond academics**.**

**Personal and Emotional Development:** Self-Awareness & Personality, Emotional Intelligence & Empathy, Positive thinking, Right attitude, Stress & Anger Management, Goal-Setting & Time Management, Growth Mindset & Resilience.

**Activities:** Personality tests (MBTI, DISC), reflection journals, Empathy circle, role-playing difficult conversations, Guided mindfulness sessions, stress relief toolkit creation, Vision board creation, weekly time audit and planner, Group challenge scenarios, resilience journal

**Management Skills:** Financial Literacy: Budgeting & Saving, Nutrition, Health, and Hygiene, Digital Literacy & Online Safety, Civic Responsibility & Ethics

Activities: Create a monthly budget, financial simulation game, Meal planning workshop, physical wellness challenge, Social media audit, privacy and safety scenarios, Community service, values debate.

**Weightage: Continuous Assessment: 100%**

**Assessment Methodology:** Assignments (20%), Flipped Class & Worksheets (10%), Practical (30%), Internal Examinations (40%)

**References:**


1. Khera, S. (2003). You can win. Macmillan.
2. Levesque, H. (n.d.). Life skills 101: A practical guide to leaving home and living on your own. (Publication year not specified)
3. Mitra, B. K. (2017). Personality development & soft skills (3rd impression). Oxford University Press.
4. ICT Academy of Kerala. (2016). Life skills for engineers. McGraw Hill Education (India) Private Ltd.

| | Description of CO | PO | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|
| CO1 | Understand personality traits and emotional intelligence, in interpersonal interactions. | --- | | | |
| CO2 | To work and execute as a team through successful implementation of set goals. | PO7 (1)<br>PO8 (2)<br>PO9 (2) | | | |
| CO3 | Develop and implement best practices in day-to-day life, in terms of planning and execution. | PO11 (3) | | | |

| UC25A02 | Physical Education - I | L | T | P | C |
|---|---|---|---|---|---|
| | | 0 | 0 | 4 | 1 |

**Course Objectives:**

- To impart the fundamentals of physical education for development of students' physical, mental, and social well-being.
- To instill a lifelong appreciation for physical activity towards the development of positive attitude and fostering values of team work and sportsmanship.

**Introduction to physical education:** Exercise for Good Posture – Conditioning and Calisthenics for Before start, Jogging, Bending, Twisting, Standing, Sitting and Relaxation, Training on First Aid Practices.

**Participation of athletic events:** Rules and regulations of important athletic events, Sprint, Jumps, Throws and Hurdles.

**Skill development in any one of the following outdoor games:** Basket Ball, Volley Ball, Ball Badminton, Football, Hockey, Kho-Kho, Kabaddi, Cricket, Hand ball and Tennis.

**Skill development in any one of the following indoor games:** Shuttle Badminton, Chess and Table Tennis.

**Weightage:** Continuous Assessment: 100%

**Assessment Methodology:** Attendance (60%), Quiz (10%), Participation in Sports and Games (20%) and Viva Voce (10%)

**References:**


1. Singh, A. (2008). Essentials of physical education. Kalyani Publishers.
2. Kamlesh, M. L. (2006). Psychology in physical education and sport (3rd ed.). Metropolitan Book Co.
3. Mangal, S. K. (2009). *Psychology of sports performance*. Sports Publication.


**E-resources:**

**https://www.who.int/health-topics/physical-activity**

| | CO Description | PO | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|
| CO1 | Understand and explain the importance of physical activity for mental and physical health. | --- | | | |
| CO2 | Apply basic principles of exercise science in the routine life. | PO1(3) | | | |
| CO3 | Develop teamwork, discipline, and leadership through sports and group activities and collaborate effectively. | PO8(3) | | | |
| CO4 | Demonstrate independent learning in health, nutrition, and fitness-related topics. | PO11(2) | | | |

# Semester II

| MA25C02 | Linear Algebra | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 1 | 0 | 4 |

**Course Objectives:**

- To impart foundational knowledge in linear algebra essential for analysing and solving problems in engineering applications.
- To provide the knowledge on computation using software and interpret key linear algebra concepts using software.

**Vector Spaces** Introduction to Vector Spaces, Examples, Subspaces, Linear Combinations, Span, Generating Sets, Linear Dependence and Independence, Basis and Dimension, Dimension of Subspaces.

**Activities:** Open-Source software, exercises to test linear dependence and independence using rank, compute span and basis of a set of vectors, determine the dimension of subspaces, and illustrate the concept of subspace and basis in $\boldsymbol{R^2}/\boldsymbol{R^3}$ with visualization.

**Linear Transformations and Diagonalization:** Null space, Range, Dimension Theorem (statement only), Matrix representation of a linear transformation, Eigenvalues & Eigenvectors, Diagonalizability.

**Activities:** Open-Source software, exercises to compute the matrix representation of a linear transformation, find the null space and range of a matrix, and compute eigenvalues and eigenvectors of a matrix.

**Inner Product Spaces:** Inner product, Norms, Cauchy, Schwarz inequality, Gram, Schmidt orthogonalization, Simple problems (up to $\boldsymbol{R^3}$).

**Activities:** Open-Source software, exercises to compute inner products and vector norms.

**Matrix Decomposition:** Orthogonal transformation of a symmetric matrix to diagonal form - Positive definite matrices, QR decomposition, Singular Value Decomposition (SVD), Least squares solutions- simple problems (up to $3 \times 3\ matrices$).

**Activities:** Open-Source software, exercises to check if a matrix is positive definite, perform QR decomposition and SVD using built-in functions.

**Weightage:** Continuous Assessment: 40%, End Semester Examinations: 60%.

**Assessment Methodology:** Assignment (20%), Software activity (20%), Quiz (20%), Internal Examinations (50%).

**References:**


1. Friedberg, S. H., Insel, A. J., & Spence, L. E. (2022). Linear algebra. Pearson.
2. Lay, D. C., Lay, S. R., & McDonald, J. J. (2020). Linear algebra and its applications with MATLAB. Pearson.
3. Bronson, R. (2011). Schaum's outline of matrix operations. McGraw-Hill Education.
4. Strang, G., & Thomson, R. (2005). Linear algebra and its applications. Brooks/Cole.
5. Lipschutz, S., & Lipson, M. (2009). Schaum's outline of linear algebra. McGraw-Hill.
6. Kreyszig, E. (2018). Advanced engineering mathematics. Wiley India.


| | **Description of CO** | **PO** | **PSO1** | **PSO2** | **PSO3** |
|---|---|---|---|---|---|
| CO1 | Explain the fundamental concepts of Linear Algebra. | --- | | | |
| CO2 | Compute and interpret eigenvalues and eigenvectors. | PO1(3) | | | |
| CO3 | Apply inner product concepts and perform orthogonalization. | PO1 (3) | | | |
| CO4 | Compute least squares solutions of linear system of equations. | PO1 (2)<br>PO2 (2) | | | |
| CO5 | Use MATLAB to implement and validate key linear algebra concepts | PO5 (1)<br>PO11 (1) | | | |

| EE25C01 | Basic Electrical and Electronics Engineering | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 0 | 0 | 3 |

**Course Objectives:**

- To impart foundational knowledge in principles and applications of electrical and electronics engineering.

**DC Fundamentals:** Current and Voltage sources, Resistance, Inductance and Capacitance; Ohm's law, Kirchhoff's law, Series parallel combination of R, L and C components, Voltage Divider and Current Divider Rules.

**Activities:** Virtual Demonstration of electrical laws & circuits, Hands-on Breadboarding, Solving GATE questions.

**AC Fundamentals:** Faraday's Laws of Electro-magnetic Induction, Definition of Self and Mutual Inductances, Generation of sinusoidal voltage, Instantaneous & RMS values of sinusoidal signals, Introduction to 3-phase systems, Electrical Safety, Fuses and Earthing.

**Activities:** Virtual Demonstration of electromagnetic induction, Measurement of instantaneous and RMS values of AC signals, Solving GATE questions.

**Electric Machines:** DC Machines, Transformers, Star and delta Connections, Three phase Induction motors, Synchronous Generators, Single Phase Induction Motors, Stepper Motor, Universal Motor and BLDC motor.

**Activities:** Virtual demonstration of step-up and step-down transformers, Virtual working models of Universal and BLDC motors, Solving GATE questions.

**Semiconductor Devices:** PN junction diodes, Zener Diode, Voltage regulator, BJT & FET Transistors, Timers, Operational Amplifiers.

**Activities:** Virtual demonstration of V-I characteristics of PN junction and Zener diodes using simulation, inverting/non-inverting amplifiers, Solving GATE questions.

**Digital Electronics:** Boolean algebra, Basic and Universal Gates, adders, multiplexers, demultiplexers and flip-flops.

**Activity:** Online logic gate simulators, Solving GATE questions.

**Microcontrollers:** Introduction, Architecture, Potential Applications.

**Activities:** Physical demonstration of a microcontroller and online simulation of microcontroller.

**Weightage:** Continuous Assessment: 40%, End Semester Examinations: 60%

**Assessment Methodology:** Quiz (5%), Assignments (25%), GATE Questions (20%), Internal Examinations (50%)

**References:**


1. Del Toro, V. (2022). Electrical engineering fundamentals. Pearson Education.
2. Hambley, A. R. (Year). Electrical engineering: Principles and applications (Edition if known). Publisher.
   (Note: Please provide the year and edition for complete citation)
3. Mehta, V. K., & Mehta, R. (2006). Principles of electrical engineering and electronics. S. Chand Publishing.


**E-resources:**

1. https://archive.nptel.ac.in/courses/108/106/108106172/
2. Circuit Simulator – https://www.falstad.com/circuit/

| | Description of CO | PO | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|
| CO1 | Understand and explain basic electrical and electronic concepts. | --- | | | |
| CO2 | Apply and analyse electrical circuits in real-time applications. | PO1 (3)<br>PO2 (1) | | | |
| CO3 | Identify and utilise key electronic devices used in engineering applications | PO2 (2) | | | |

| CS25C06 | Digital Principles and Computer Organization | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 1 | 0 | 4 |

**Course Objective:**

- To impart knowledge on digital logic and provide functional concepts of computer systems with necessary illustrations.

**Digital Logic:** Digital Systems, Integer Arithmetic, Addition and Subtraction of Signed Numbers, Boolean Algebra, Theorems and Postulates, Functions, Truth Table, Canonical and Standard Forms, Simplification using K-Maps, Digital Logic Gates, Universal gates, Implementation of Logic Gates, Integrated Circuits.

**Activities:**

- Assignment on Karnaugh Map.
- Build logic circuits.
- Virtual demonstration of logical gates.

**Computer System:** Basic structure of a computer, Classes of Computer, Functional units - Interconnection of components, Von Neumann architecture and Harvard architecture - Instruction execution cycle, Performance metrics: MIPS, MFLOPS, CPI, throughput.

**Activities:**

- MIPS, MFLOPS, and CPI calculations.
- Preparations of report on comparison of two CPU from different manufacturing.

**Arithmetic and Logic Unit:** Combinational Circuits: Adders, Binary Adder, Binary Parallel Adder, Subtractor, Multiplexers, Decoders, Design of Fast Adder, Multiplication of Signed and Unsigned Numbers, Fast Multiplication - Integer Division, Floating Point Numbers and Operations, Booth's algorithm for signed multiplication, Sequential Circuits: Flip-Flops, Registers, Counters.

**Activities:**

- Virtual demonstration on Binary adder.
- Build a parallel order.

**Processing and Pipelining:** Instruction Set Architecture: RISC vs CISC, Addressing modes, Hardwired control and Micro programmed control unit, Concepts of Pipelining, Pipeline stages and Timing diagram, Hazards: Structural, Data and Control Hazards, Instruction-level parallelism, Parallel processing concepts: SIMD, MIMD, Superscalar processors, Vector and Array Processor.

**Activities:**

- Comparison of RISC-V and x86 ISAs; present findings on their relevance to AI accelerators.
- Spot and resolve different types of pipeline hazards in given scenarios.

**Memory:** Memory hierarchy: Registers, Cache, Main Memory- RAM- ROM: PROM, EPROM, EEPROM-Secondary storage, HDD, SSD, Cache Organization, Cache replacement policies, NUMA- DMA- ECC.

**I/O Systems:** I/O Techniques: Programmed, Interrupt-Driven, DMA, I/O Devices and Interface Standards: PCI, USB, SATA, Interrupt Types and Priority Handling, Buses and Bus Arbitration, Peripheral Communication.

**Activities:**

- Virtual demonstration of DMA.
- I/O in Real AI Systems.

**Weightage:** Continuous Assessment: 40%, End Semester Examinations: 60%

**Assessment Methodology:** Quiz (5%), Assignments (10%), Flipped Classroom (5%), Project (20%), Review of GATE questions (10%) & Internal Assessment (50%).

**References:**


1. Mano, M. M., & Ciletti, M. D. (2018). Digital design: With an introduction to the Verilog HDL, VHDL, and System Verilog. Pearson.
2. Patterson, D. A., & Hennessy, J. L. (2012). Computer organization and design: The hardware/software interface. Morgan Kaufmann.
3. Stallings, W. (2015). Computer organization and architecture: Designing for performance. Pearson.


**E resources/E materials:**

1. NPTEL Courses (Indian MOOCs – Free & Government Certified):
    a. Computer Architecture: Computer Architecture - Course
    b. Computer Architecture and Organization: Computer Architecture and Organization - Course
2. Digital Circuit Simulator: CircuitVerse - Online Digital Logic Circuit Simulator
3. Cloud environment: https://www.cloudbus.org/cloudsim/

| | Description of CO | PO | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|
| CO1 | Identify basic digital components and their functions in a computer system | --- | | | |
| CO2 | Apply Boolean algebra and number systems to design simple digital circuits and simulate them using tools | PO1 (3) | | | |
| CO3 | Analyze instruction sets, arithmetic units, and performance metrics to evaluate processor design | PO2 (2) | | | |
| CO4 | Engage in continuous learning to update with advancements through evolving computing trends. | PO11 (1) | | | |

| UC25H02 | தமிழர்களும் தொழில்நுட்பமும் | L | T | P | C |
|---|---|---|---|---|---|
| | | 1 | 0 | 0 | 1 |

**நெசவு மற்றும் பானைத் தொழில்நுட்பம்**: சங்க காலத்தில் நெசவுத் தொழில், பானைத் தொழில்நுட்பம், கருப்பு சிவப்பு பாண்டங்கள், பாண்டங்களில் கீறல் குறியீடுகள்.

**வடிவமைப்பு மற்றும் கட்டிடத் தொழில்நுட்பம்**: சங்க காலத்தில் வடிவமைப்பு மற்றும் கட்டுமானங்கள் & சங்க காலத்தில் வீட்டுப் பொருட்களில் வடிவமைப்பு- சங்க காலத்தில் கட்டுமான பொருட்களும் நடுகல்லும், சிலப்பதிகாரத்தில் மேடை அமைப்பு பற்றிய விவரங்கள், மாமல்லபுரச் சிற்பங்களும், கோவில்களும், சோழர் காலத்துப் பெருங்கோயில்கள் மற்றும் பிற வழிபாட்டுத் தலங்கள், நாயக்கர் காலக் கோயில்கள், மாதிரி கட்டமைப்புகள் பற்றி அறிதல், மதுரை மீனாட்சி அம்மன் ஆலயம் மற்றும் திருமலை நாயக்கர் மஹால், செட்டிநாட்டு வீடுகள், பிரிட்டிஷ் காலத்தில் சென்னையில் இந்தோ-சாரோசெனிக் கட்டிடக் கலை.

**உற்பத்தித் தொழில் நுட்பம்**: கப்பல் கட்டும் கலை, உலோகவியல், இரும்புத் தொழிற்சாலை, இரும்பை உருக்குதல், எஃகு, வரலாற்றுச் சான்றுகளாக செம்பு மற்றும் தங்க நாணயங்கள், நாணயங்கள் அச்சடித்தல், மணி உருவாக்கும் தொழிற்சாலைகள், கல்மணிகள், கண்ணாடி மணிகள், சுடுமண் மணிகள், சங்கு மணிகள், எலும்புத்துண்டுகள், தொல்லியல் சான்றுகள், சிலப்பதிகாரத்தில் மணிகளின் வகைகள்.

**வேளாண்மை மற்றும் நீர்ப்பாசனத் தொழில் நுட்பம்**: அணை, ஏரி, குளங்கள், மதகு, சோழர்காலக் குமுழித் தூம்பின் முக்கியத்துவம், கால்நடை பராமரிப்பு, கால்நடைகளுக்காக வடிவமைக்கப்பட்ட கிணறுகள், வேளாண்மை மற்றும் வேளாண்மைச் சார்ந்த செயல்பாடுகள், கடல்சார் அறிவு, மீன்வளம், முத்து மற்றும் முத்துக்குளித்தல், பெருங்கடல் குறித்த பண்டைய அறிவு, அறிவுசார் சமூகம்.

**அறிவியல் தமிழ் மற்றும் கணித்தமிழ்**: அறிவியல் தமிழின் வளர்ச்சி, கணித்தமிழ் வளர்ச்சி, தமிழ் நூல்களை மின்பதிப்பு செய்தல், தமிழ் மென்பொருட்கள் உருவாக்கம், தமிழ் இணையக் கல்விக்கழகம் – தமிழ் மின் நூலகம், இணையத்தில் தமிழ் அகராதிகள், சொற்குவைத் திட்டம்.

## References:


1. தமிழக வரலாறு – மக்களும் பண்பாடும் – கே.கே. பிள்ளை (வெளியீடு: தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்).
2. கணினித் தமிழ் – முனைவர் இல. சுந்தரம். (விகடன் பிரசுரம்).
3. கீழடி – வைகை நதிக்கரையில் சங்ககால நகர நாகரிகம் (தொல்லியல் துறை வெளியீடு)
4. பொருநை – ஆற்றங்கரை நாகரிகம். (தொல்லியல் துறை வெளியீடு)
5. Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL – (in print)
6. Social Life of the Tamils – The Classical Period (Dr.S.Singaravelu) (Published by: International Institute of Tamil Studies.
7. Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thirunavukkarasu) (Published by: International Institute of Tamil Studies).
8. The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: International Institute of Tamil Studies.)
9. Keeladi – 'Sangam City C ivilization on the banks of river Vaigai' (Jointly Published by: Department ofArchaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
10. Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay) (Publishedby: The Author)
11. Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Bookand Educational Services Corporation, Tamil Nadu)
12. Journey of Civilization Indus to Vaigai (R.Balakrishnan) (Published by: RMRL) – Reference Book.

| UC25H02 | Tamils and Technology | L | T | P | C |
|---|---|---|---|---|---|
| | | 1 | 0 | 0 | 1 |

**Weaving and Ceramic Technology:** Weaving Industry during Sangam Age, Ceramic technology, Black and Red Ware Potteries (BRW), Graffiti on Potteries.

**Design and Construction Technology:** Designing and Structural construction House & Designs in household materials during Sangam Age, Building materials and Hero stones of Sangam age, Details of Stage Constructions in Silappathikaram, Sculptures and Temples of Mamallapuram, Great Temples of Cholas and other worship places - Temples of Nayaka Period -Type study (Madurai Meenakshi Temple), Thirumalai Nayakar Mahal -Chetti Nadu Houses, Indo-Saracenic architecture at Madras during British Period.

**Manufacturing Technology:** Art of Ship Building - Metallurgical studies, Iron industry, Iron smelting, steel -Copper and gold- Coins as source of history - Minting of Coins, Beads making-industries Stonebeads, Glass beads, Terracotta beads -Shell beads/ bone beats, Archeological evidences - Gem stone types described in Silappathikaram.

**Agriculture and Irrigation Technology:** Dam, Tank, ponds, Sluice, Significance of Kumizhi Thoompuof Chola Period, Animal Husbandry - Wells designed for cattle use - Agriculture and Agro Processing -Knowledge of Sea, Fisheries, Pearl, Conche diving - Ancient Knowledge of Ocean -Knowledge Specific Society.

**Scientific Tamil & Tamil Computing:** Development of Scientific Tamil, Tamil computing, Digitalization of Tamil Books, Development of Tamil Software, Tamil Virtual Academy, Tamil Digital Library, Online Tamil Dictionaries, Sorkuvai Project.

**References:**


1. தமிழக வரலாறு – மக்களும் பண்பாடும் – கே.கே. பிள்ளை (வெளியீடு: தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்).
2. கணினித் தமிழ் – முனைவர் இல. சுந்தரம். (விகடன் பிரசுரம்).
3. கீழடி – வைகை நதிக்கரையில் சங்ககால நகர நாகரிகம் (தொல்லியல் துறை வெளியீடு)
4. பொருநை – ஆற்றங்கரை நாகரிகம். (தொல்லியல் துறை வெளியீடு)
5. Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL – (in print)
6. Social Life of the Tamils – The Classical Period (Dr.S.Singaravelu) (Published by: International Institute of Tamil Studies.
7. Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thirunavukkarasu) (Published by: International Institute of Tamil Studies).
8. The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: International Institute of Tamil Studies.)
9. Keeladi – 'Sangam City C ivilization on the banks of river Vaigai' (Jointly Published by: Department ofArchaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
10. Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay) (Publishedby: The Author)
11. Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Bookand Educational Services Corporation, Tamil Nadu)
12. Journey of Civilization Indus to Vaigai (R.Balakrishnan) (Published by: RMRL) – Reference Book.

| PH25C03 | Applied Physics (CSIE) – II | L | T | P | C |
|---|---|---|---|---|---|
| | | 2 | 1 | 0 | 3 |

**Course Objectives:**

- To provide a comprehensive understanding of physics concepts in computer science and engineering applications.

**Magnetic Materials:** Parameters, Ferromagnetic materials, Ferrites, Soft and Hard magnetic materials, GMR sensors - magnetic disk memories, Principle of magnetic recording, Magnetic data storage.

**Activities:** Determination of Hysteresis loop for ferromagnetic materials.

**Logic Gates:** Conversion of Binary to decimal - decimal to binary, binary coded decimal code-logic gates (OR, AND, NOT, NAND and NOR), Exclusive OR gate-simplification based on basic Boolean theorems (sum of products, product of sums expression), simplification by Karnaugh Map method (don't care conditions).

**Activities:** Virtual demonstration of Logic Gates.

**Nano-Devices:** Introduction, electron density in bulk material, size dependence of Fermi energy-quantum confinement, quantum structures: quantum wells, wires and dots, band gap of nanomaterials. Tunneling, Coulomb blockade, single electron transistor, resonant-tunneling diode- Carbon nanotubes: Properties and applications.

**Activities:** Virtual demonstration of single electron transistor

**Quantum Computing:** Quantum system for information processing, quantum states, classical bits, quantum bits or qubits, Bloch sphere, CNOT gate, Single and multiple qubits, quantum gates (Pauli – X- Y and Z Gates, Hadamard Gate- Phase gate, T gate .CNOT Gate ), advantage of quantum computing over classical computing.

**Activities:** Virtual demonstration of quantum computing

**Weightage:** Continuous Assessment: 40%, End Semester Examinations: 60%

**Assessment Methodology:** Quiz (10%), Assignments (30%), Flipped Class (10%), Internal Examinations (50%)

**References:**


1. Kasap S. O. (2007). Principles of electronic materials and devices. McGraw-Hill Education.
2. Bernhardt- C. (2019). Quantum computing for everyone. MIT Press.
3. Hanson- G. W. (2009). Fundamentals of nanoelectronics. Pearson Education.


**E-Resources:**

1. Single electron Transistor: https://youtu.be/MTT729LtB-

o?si=RGaEhGgmyWJWcZib

2. Basics of quantum computing- https://lab.quantumflytrap.com
3. Single electron transistor - http://vlabs.iitkgp.ac.in/tcad
4. Quantum Computing: http://www.digimat.in/nptel/courses/video/106106232/L01.html
5. Review article: Claude Chappert- Albert Fert and Frédéric Nguyen Van Dau- "The emergence of spin electronics in data storage" Nature Publishing 2007

| | Description of CO | PO | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|
| CO1 | Explain the concepts of physics in computer science stream. | --- | | | |
| CO2 | Apply appropriate techniques in physics to solve engineering problems. | PO1(3) | | | |
| CO3 | Analyse physical systems and interpret data from the virtual studies in the core branches in computer science and engineering. | PO2(2) | | | |

| AD25201 | Python for Data Science | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 0 | 2 | 4 |

**Course Objectives:**

- To impart knowledge on Python programming and how it can be used for solving problems.
- To illustrate how to handle, clean, and analyze data using Python libraries
- To make use of Python tools and open datasets for real-world data science applications.

**Basics of Python:** What is Python, Python Interpreter, Python language basics: Language Semantics, Data Types, Variables, Basic Functions, Operators, Flow Control Statements, Data Structures and Sequences: List, Tuple, Set, Dictionaries.

**Practical:**

1. Programs using conditional and looping constructs
2. Programs using different data frames like list, tuple, set and dictionary.

**Functions and Files:** Defining a Function, Passing Arguments, Return Values, Passing a List, Creating and Using a Class, Strings: Working with Strings, String Methods, Files: Reading from a File, Writing to a File, Exceptions, Python Libraries: Importing libraries.

**Practical:**

1. Programs using functions and classes.
2. Programs using strings and files

**Foundations of Data Science:** Introduction to Data Science- Applications of Data Science - Data Science Process: Overview, Defining Research Goals, Retrieving Data - Data Preparation: Data Wrangling- Handling Missing Data- Data Transformation, Outlier/Noise and Anomalies, Exploratory Data Analysis, Build the Model, Present Findings, Data Mining, Data Warehousing.

**Practical:**

1. Data Creation and Mathematical operations.
2. Graphs and Plotting.

**Descriptive Analytics:** Facets of Data, Types of Variables, Statistical Description of Data, Describing Data with Tables and Graphs, Describing Data with Averages, Describing Variability, Normal Distributions and Standard (z) Scores, Correlation, Scatter plots, correlation coefficient for quantitative data –computational formula for correlation coefficient, Regression, Regression line, least squares regression line.

**Practical:**

1. Statistical description of data without libraries
2. Generation of correlation coefficient.
3. Linear regression model.

**Numpy and Pandas Libraries:** Creating Arrays, attributes, Numpy Arrays objects, Basic operations (Array Join- split- search- sort), Indexing, Slicing and Iterating, Copying Arrays, Arrays shape Manipulation, Identity Array, eye function. Exploring Data using Series- Exploring Data using Data Frames, Index objects- reindex, Drop Entry, Selecting Entries- Data Alignment, Rank and Sort, Summary Statistics, Index Hierarchy.

**Practical:**

1. Creation of 1D, 2D, and 3D NumPy arrays
2. Array Slicing and Indexing operations
3. Reindexing, and aligning data across multiple Data Frames.

**Data Visualization:** Introduction to Matplotlib, Plots, making subplots, Controlling axes, Ticks, Labels and legends, Annotations and drawing on subplots, Saving plots to files, Seaborn library, Making sense of data through advanced visualization, Controlling the properties of Chart, Scatter plot, Line plot, Bar plot, Histogram, Box plot, Pair plot, Styling your plot, 3D plot of surface.

**Practical:**

1. Line plot, bar plot, histogram, and box plot.
2. Seaborn plots, plot styling and customization

**Weightage:** Continuous Assessment: 40%, End Semester Examinations: 60%

**Assessment Methodology:** Assignments (10%), Quiz (5%), Project based learning (20%), Flipped Classroom (5%), Review of GATE questions (10%) & Internal Assessment: 50%

**References:**


1. Grus, J. (2019). Data science from scratch (2nd ed.). O'Reilly Media, Inc.
2. McKinney, W. (2018). Python for data analysis: Data wrangling with pandas, NumPy, and IPython. O'Reilly Media, Inc.
3. VanderPlas, J. T. (2017). Python data science handbook: Essential tools for working with data. O'Reilly Media, Inc.

Thereja, R. (2022). Data science and machine learning using Python (1st ed.). Tata McGraw Hill.


**E-Resources:**

1. https://numpy.org/doc/
2. https://pandas.pydata.org/docs/
3. NPTEL course in Python for Data Science by Prof. Ragunathan Rengasamy- IIT Madras. https://onlinecourses.nptel.ac.in/noc22_cs32/preview.
4. Coursera course in Python for Data Science by Fractal Analytics. https://www.coursera.org/learn/python-data-science.
5. Coursera course in Introduction to Data Science in Python by Christopher Brooks. https://www.coursera.org/learn/python-data-analysis.

| | Description of CO | PO | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|
| CO1 | Understand basic Python syntax and write simple programs | --- | | | |
| CO2 | Apply Python functions, file handling, and object-oriented programming to solve structured problems. | PO1 (3), | | | |
| CO3 | Design and analyze data-driven solutions using NumPy, Pandas, and Matplotlib. | PO2 (2), PO3 (2) | | | |
| CO4 | Develop continuous learning skills to use open-source tools and public datasets for data science tasks. | PO11(3) | | | |

| EN25C02 | English Essentials – II | L | T | P | C |
|---|---|---|---|---|---|
| | | 1 | 0 | 2 | 2 |

**Course Objectives:**

- To integrate vocabulary and functional grammar into communication tasks to improve fluency and accuracy.
- To articulate ideas clearly and effectively in formal and informal spoken interactions.
- To construct well-organised written documents including summaries- reports- and emails relevant to academic and workplace contexts.

**Communication:** Types - Inter and Intra-personal- communication barriers- Summarising visuals- media terminology- rhetorical devices and TED Talks.

**Activities:** Short presentation- Media based responses and Speeches- Error detection- Welcome- Vote of Thanks and Formal Speeches- Listen and respond to short podcast- Worksheets.

**Correspondence:** Modal Verbs- Job Application Letters- Resume Writing- Statement of Purpose- Paraphrasing & Summarizing- Executive Summary.

**Activities:** Email writing- Submission of applications- Graphical summaries- Report on college events.

**Professional Writing:** Paraphrasing & Summarizing- Executive Summary- Proposal- Decision Making- Recommendations.

**Activities:** Report preparation and recommendation letters.

**Team Work:** Team Leader- Quality of Team leader- Leadership model- Negotiations.

**Activities:** SWOT Analysis- Mock meetings- Group discussions- Brainstorming sessions.

**Weightage:** Continuous Assessment: 50%- End Semester Examinations: 50%

**Assessment Methodology:** Worksheets (10%)- Group Activity (20%)- Report Writing (20%)- Internal Examinations (50%)

**References:**


1. Koneru Aruna. (2020*).* English Language Skills for Engineers. McGraw Hill Education.
2. Taylor- Shirley & Chandra.V. (2010). Communication for Business A Practical Approach. India: Pearson Longman.
3. Ian Badger- et al.- (2014). Listening: B2 (Collins English for Life: Skills)- Collins.
4. Raymond Murphy (2019)- Grammar in Use- Cambridge University Press.


**E-Resources:**

1. Communication for Business Success- https://open.umn.edu/opentextbooks/textbooks/8
2. TED Talks – https://www.ted.com/

| | Description of CO | PO | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|
| CO1 | Understand the importance of communication and drafting skills in engineering and technology. | --- | | | |
| CO2 | Apply listening strategies to comprehend spoken English in various contexts. | PO1(3) | | | |
| CO3 | Participate actively in group discussions by analysing critically from different views. | PO2(2)<br>PO8(1) | | | |
| CO4 | Create written reports coherently for various purposes. | PO9(2) | | | |
| CO5 | Adapt communication styles to global-multicultural environments. | PO11(1) | | | |

| ME25C05 | Re-Engineering for Innovation | L | T | P | C |
|---|---|---|---|---|---|
| | | 0 | 0 | 4 | 2 |

**Course Objectives:**

- To cultivate foundational skills in prototyping- and automation for development of prototypes with real-world applications.
- To provide a comprehensive- hands-on exposure to product development through reverse engineering concepts.

**Bootcamp 1:** Introduction to Product Development- Reverse Engineering- Overview of the product lifecycle- Hands-on disassembly of simple products- Practice of basic measurements and sketching- Introduction to CAD modeling of disassembled parts- Virtual assembly of parts.

**Bootcamp 2:** Embedded System Programming (Open-source platforms)- Practice of interfacing sensors- reading data- automation in home- healthcare and agriculture.

**Reverse Engineering:** Sketch and prototype alternative designs- Group brainstorming sessions- Manufacture prototype parts using 3D printing and / or workshop tools- Assemble prototype product.

**Weightage:** Continuous Assessment: 60%- End Semester Examinations: 40%

**Assessment Methodology:** Project (30%)- Assignment (10%)- Practical (30%)- Internal Examinations (30%)

**References:**


1. Wang- W. (2010). Reverse engineering: Mechanisms- structures- systems & materials. CRC Press.
2. Margolis- M. (2020). Arduino cookbook: Recipes to begin- expand- and enhance your projects. O'Reilly Media.


**E-Resources:**

1. GrabCAD – https://grabcad.com/
2. GitHub – https://github.com/

| | Description of CO | PO | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|
| CO1 | Understand the product development lifecycle- including stages such as concept generation- design- prototyping- and testing. | --- | | | |
| CO2 | Apply reverse engineering techniques to analyze and document existing products. | PO1 (3)<br>PO2 (2) | | | |
| CO3 | Collaborate in teams to fabricate prototypes using appropriate tools. | PO5 (2)<br>PO8 (1)<br>PO9 (1) | | | |
| CO4 | Engage in independent learning and continuously adapt to emerging technologies in product design | PO11(2) | | | |

| UC25A03 | Life Skills for Engineers – II | L | T | P | C |
|---|---|---|---|---|---|
| | | 1 | 0 | 2 | - |

**Course Objectives:**

- To impart and cultivate analytical reasoning- innovative thinking- effective collaboration- and ethical leadership to prepare students for complex challenges in professional and personal environments.

**Critical Thinking:** Creativity- Critical Thinking- Collaboration- Problem Solving- Decision Making- Imagination- Intuition- Experience- Sources of Creativity- Lateral Thinking- Myths of creativity- Critical thinking Vs Creative thinking- Convergent & Divergent Thinking- Critical reading & Multiple Intelligence.

**Activities:** Two-Brainstorm Method- “30 Circles” Challenge- “Desert Survival” Simulation- Lateral thinking riddles and puzzles- "What If?" Scenario Writing- Fast vs. Slow Thinking Game- Creativity Myth Busters

**Problem Solving:** Techniques- Six Thinking Hats- Mind Mapping- Forced Connections. Analytical Thinking- Numeric- symbolic- and graphic reasoning. Scientific temperament and Logical thinking.

**Activities:** Case study analysis- Escape Room challenge.

**Leadership:** Leadership Styles & Self-Assessment- Communication & Active Listening- Decision-Making & Responsibility- Teamwork & Delegation- Empathy- Integrity & Conflict Management- Vision- Motivation & Goal-Setting.

**Activities:** Crisis Leadership Simulation- Tower Challenge- Leadership Dilemmas Role-Play- Team Vision Board

**Weightage:** Continuous Assessment: 100%

**Assessment Methodology:** Assignments (20%)- Flipped Class & Worksheets (10%)- Practical (30%)- Internal Examinations (40%)

**References:**


1. De Bono- E. (2017). Six thinking hats- Little- Brown Book Group.
2. Facione- P. A. (2015). Critical thinking: What it is and why it counts. Insight Assessment.
3. Kahneman- D. (2011). Thinking- fast and slow. Farrar- Straus and Giroux.
4. Whetten- D. A.- & Cameron- K. S. (2016). Developing management skills. Pearson.

| | Description of CO | PO | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|
| CO1 | Explain the importance of leadership and management skills in life. | --- | | | |
| CO2 | Apply and demonstrate creative thinking techniques to generate innovative solutions. | PO7 (3) | | | |
| CO3 | Exhibit effective collaboration and communication skills through teamwork- active listening- and conflict resolution strategies. | PO8 (2) | | | |
| CO4 | Integrate scientific temperament and logical reasoning into c problem solving in engineering and real-world contexts. | PO11 (2) | | | |

| UC25A04 | Physical Education - II | L | T | P | C |
|---|---|---|---|---|---|
| | | 0 | 0 | 4 | 1 |

**Course Objectives:**

- To impart knowledge on gymnastic exercises and pressing needs for upskilling in a particular game.

**Basic gymnastics exercises:** Warming up, Suitable exercise, Lead up games, Safety education, Movement education, Balanced Walk, execution, floor exercise, tumbling/acrobatics, grip, release, swinging, parallel bar exercise, horizontal bar exercise, flic-flac-walk and pyramids.

**Upskilling in any one of the athletics:** Broad Jump, High Jump, Triple Jump, Relay Sprints, Javelin Throw, Discuss Throw, Shot Put, Short and Long-distance Running.

**Advance skills in any one of the indoor/outdoor games, which has been opted by the student in the I semester.**

**Weightage:** Continuous Assessment: 100%

**Assessment Methodology:** Attendance (60%), Quiz (10%), Participation in Sports and Games (20%) and Viva Voce (10%)

**References:**


1. Singh, A. (2008). Essentials of physical education. Kalyani Publishers.
2. Kamlesh, M. L. (2006). Psychology in physical education and sport (3rd ed.). Metropolitan Book Co.
3. Mangal, S. K. (2009). *Psychology of sports performance*. Sports Publication.
4. Kandappan, K. (2004). *Foundations of physical education*. Friends Publications.


**E-resources:**

**https://www.who.int/health-topics/physical-activity**

| | CO Description | PO | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|
| CO1 | Understand and explain the importance of physical activity for mental and physical health. | --- | | | |
| CO2 | Apply safety principles and methods during sports activities. | PO1(3) | | | |
| CO3 | Develop teamwork, discipline, and leadership through sports and group activities and collaborate effectively. | PO8 (3) | | | |
| CO4 | Demonstrate the advanced technical skills and strategic understanding in the game of their interest. | PO11(1) | | | |

## Foreign Language^

| UC25F01 | Deutsch – I | L | T | P | C |
|---|---|---|---|---|---|
| | | 1 | 0 | 2 | - |

**Course Objectives:**

- To impart fundamentals of the Deutsch language- including reading- writing systems- pronunciation- and speaking.

**Basics & Introduction:** German alphabet and pronunciation- Basic greetings and farewells- Introducing yourself and others (Ich heiße…- Wer bist du?)- Numbers 1–100 and days of the week- Personal pronouns (ich- du- er- sie…)- Sentence structure (SVO word order).

**Activities:** Alphabet spelling game- short skits- Use color-coded cards for SVO sentences.

**Grammar Essentials & Everyday Vocabulary:** Present tense of regular verbs (spielen- arbeiten- machen…)- Common irregular verbs: sein (to be)- haben (to have)- gehen- kommen- Articles and gender (der- die- das; ein- eine)- Simple questions and negation (nicht- kein)- Describing people and things: adjectives and colors- Family- school- food- and common objects vocabulary.

**Activities:** Conjugate regular and irregular verbs- “Question Chain” game- Create a simple family tree.

**Everyday Communication in German:** Asking for and giving directions- Telling the time and talking about schedules- Ordering food and drinks at a café or restaurant- Talking about hobbies- weather- and daily routines- Listening to short conversations and responding appropriately- Introduction to German culture and formal/informal language use (du vs Sie).

**Activities:** Ordering food and drinks- Give directions- Formal / Informal greetings- Do’s and Don’ts.

**Weightage:** Continuous Assessment: 100%

**Assessment Methodology:** Assignments (30%)- Quiz (10%) and Internal Examinations 60%

**References:**

1. Funk- H.- Kuhn- C.- & Demme- S. (2015). Menschen A1: Deutsch als Fremdsprache Kursbuch. Hueber Verlag.

| | CO Description | PO | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|
| CO1 | Understand simple spoken Deutsch in everyday contexts. | --- | | | |
| CO2 | Communicate with widely used Deutsch words effectively. | PO9 (2) | | | |
| CO3 | Develop the skills necessary for self-directed learning and continuous improvement in Deutsch language. | PO11 (1) | | | |

| UC25F02 | Japanese – I | L | T | P | C |
|---|---|---|---|---|---|
| | | 1 | 0 | 2 | - |

**Course Objectives:**

- To impart fundamentals of the Japanese language- including reading- writing systems- pronunciation- and speaking.

**Writing Systems & Basic Communication:** Introduction to Hiragana: vowels- basic characters- reading & writing- Introduction to Katakana: basic characters and usage- Basic greetings and farewells (こんにちは- おはようございます- さようなら)- Introducing yourself (名前、出身、年齢)- Basic sentence structure: Subject–Object–Verb- Numbers 1–100- days of the week- classroom expressions.

**Activities:** Flashcard games and writing drills- Self-introduction- Numbers & date-matching- Greeting expressions- Listening to audio.

**Grammar & Everyday Vocabulary:** Particles: は (wa)- を (wo)- の (no)- へ (e)- に (ni)- Present tense verbs: です- ます-form conjugation (たべます、のみます)- Negative forms: ではありません- ません- Describing people and objects using adjectives (い and な)- Question formation: なに、どこ、だれ、いつ- Vocabulary for family- food- colors- and basic actions.

**Activities:** Verb conjugation drills- Guessing game- Picture description- “Shopping” with food vocab and counters

**Conversation & Cultural Etiquette:** Talking about routines and schedules (daily verbs- time expressions)- Asking and giving simple directions (〜はどこですか？)- Ordering food and making polite requests (〜をください、〜をおねがいします)- Expressing likes and dislikes (すき・きらい)- Listening to short conversations and identifying key phrases- Introduction to formal/informal speech and Japanese etiquette.

**Activities:** Skits and role-plays- daily schedule- beginner-level dialogue- Group discussion on etiquette.

**Activities:** Practice worksheets and flashcards for hiragana- Writing drills and reading simple katakana words- Dialogue practice for greetings and self-introduction- Sentence construction exercises with basic SOV structure- Particle usage exercises and short dialogues- Role-play scheduling- shopping- and telling time- Verb conjugation drills for common verbs- Descriptive sentence exercises using adjectives- Practice Q&A dialogues forming questions and negations- Kanji writing practice and quizzes for basic characters- Vocabulary tests and conversational practice on daily topics- Oral presentations and listening comprehension quizzes.

**Weightage:** Continuous Assessment: 100%

**Assessment Methodology:** Assignments (30%)- Quiz (10%) and Internal Examinations 60%

**References:**


1. Banno- E.- Ikeda- Y.- Ohno- Y.- Shinagawa- C.- & Tokashiki- K. (2011). Genki I: An integrated course in elementary Japanese. The Japan Times.
2. The Japan Foundation. (2017). Marugoto Japanese language and culture starter (A1) course book for communicative language activities. Goyal Publishers.


| | CO Description | PO | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|
| CO1 | Understand simple spoken Japanese in everyday contexts. | --- | | | |
| CO2 | Communicate with widely used Japanese words effectively. | PO9 (2) | | | |
| CO3 | Develop the skills necessary for self-directed learning and continuous improvement in Japanese language. | PO11 (1) | | | |

| UC25F03 | Korean – I | L | T | P | C |
|---|---|---|---|---|---|
| | | 1 | 0 | 2 | - |

**Course Objectives:**

- To impart fundamentals of the Korean language- including reading- writing systems- pronunciation- and speaking.

**Fundamentals of Korean:** Introduction to Hangul: consonants and vowels- Basic pronunciation and syllable formation- Common greetings and self-introductions- Numbers (Sino-Korean and Native Korean basics)- Basic sentence structure (Subject-Object-Verb)- Simple expressions (e.g.- 감사합니다- 안녕하세요).

**Activities:** Writing and reading Hangul practice sheets- Pronunciation drills and audio repetition- Dialogue practice for greetings and self-introduction- Counting and number exercises.

**Essential Grammar and Vocabulary:** Particles (은/는- 이/가- 을/를) and usage- Basic verbs and present tense conjugation- Sentence patterns: affirmative- negative- interrogative- Common adjectives and descriptive sentences- Expressing possession and location- Asking simple questions (어디- 뭐- 누구).

**Activities:** Verb conjugation and sentence formation drills- Role-play conversations for shopping and daily routines- Descriptive writing and speaking exercises- Question and answer practice.

**Everyday Korean Communication:** Polite speech levels and honorifics introduction- Talking about time- dates- and schedules- Ordering food- shopping phrases- counting objects- Simple directions and transportation vocabulary- Listening practice with short dialogues- Cultural notes on etiquette and communication.

**Activities:** Role-play ordering at a restaurant or buying items- Listening comprehension exercises- Giving and asking for directions practice- Group conversations and presentations.

**Weightage:** Continuous Assessment: 100%

**Assessment Methodology:** Assignments (30%)- Quiz (10%) and Internal Examinations 60%

**References:**


1. King- R.- Yeon- J.- & Brown- A. (2015). Elementary Korean (2nd ed.). Tuttle Publishing.
2. Cho- Y.- Lee- H.- Schulz- C.- Sohn- H.-M.- & Sohn- S.-O. (2001). Integrated Korean: Beginning 1. University of Hawai‘i Press.

| | CO Description | PO | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|
| CO1 | Understand simple spoken Korean in everyday contexts. | --- | | | |
| CO2 | Communicate with widely used Korean words effectively. | PO9 (2) | | | |
| CO3 | Develop the skills necessary for self-directed learning and continuous improvement in Korean language. | PO11 (1) | | | |

# ANNA UNIVERSITY, CHENNAI

## (UNDERGRADUATE CURRICULUM (NON-AUTONOMOUS AFFILIATED INSTITUTIONS)

**Programme:** B.Tech. Computer Science and Business Systems **Regulations:** 2025

**Abbreviations:**

**HUM –** Humanities (Languages, Management, Heritage, and others)

**BS** – Basic Science (Mathematics, Physics, Chemistry)

**ES –** Engineering Science (General (**G**), Programme Core (**PC**), Programme Elective (**PE**) & Emerging Technology (**ET**))

**SD** – Skill Development

**SL** – Self Learning

**CDP** – Capstone Design Project

**OE** – Open Elective

**L** – Laboratory Course

**T** – Theory

**LIT** – Laboratory Integrated Theory

**PW** – Project Work

**IPW** – Internship cum Project Work

**DIC –** Department Introductory Course

**TCP –** Total Contact Period(s)

| Semester – I | | | | | | | |
|---|---|---|---|---|---|---|---|
| **S. No.** | **Course Code** | **Course Name** | **Course Type** | **Periods/ Week** | | **Credits** | **Category** |
| | | | | **L-T-P** | **TCP** | | |
| 1. | MA25C01 | Applied Calculus | T | 3-1-0 | 4 | 4 | BS |
| 2. | EN25C01 | English Essentials – I | T | 2-0-0 | 2 | 2 | HUM |
| 3. | UC25H01 | தமிழர் மரபு / Heritage of Tamils | T | 1-0-0 | 1 | 1 | HUM |
| 4. | PH25C01 | Applied Physics – I | LIT | 2-0-2 | 4 | 3 | BS |
| 5. | CY25C01 | Applied Chemistry – I | LIT | 2-0-2 | 4 | 3 | BS |
| 6. | CS25C01 | Computer Programming: C | LIT | 2-0-2 | 4 | 3 | ES (PC) |
| 7. | CS25C03 | Essentials of Computing | LIT | 2-0-2 | 4 | 3 | ES (PC)-DIC |
| 8. | ME25C04 | Makerspace | L | 0-0-4 | 4 | 2 | SD |
| 9. | UC25A01 | Life Skills for Engineers – I* | --- | 1-0-2 | 3 | --- | HUM |
| 10. | UC25A02 | Physical Education – I* | --- | 0-0-4 | 4 | 1 | HUM |
| 11. | | NCC / NSS / NSO | --- | --- | --- | --- | --- |
| | | | | **Total Credits** | **34** | **22** | |

*Audit Course

| Semester – II | | | | | | | |
|---|---|---|---|---|---|---|---|
| **S. No.** | **Course Code** | **Course Name** | **Course Type** | **Periods/ Week** | | **Credits** | **Category** |
| | | | | **L-T-P** | **TCP** | | |
| 1. | MA25C02 | Linear Algebra | T | 3-1-0 | 4 | 4 | BS |
| 2. | EE25C01 | Basic Electrical and Electronics Engineering | T | 3-0-0 | 3 | 3 | ES (G) |
| 3. | CW25201 | Computer Organization and Architecture | T | 3-1-0 | 4 | 4 | ES (PC) |
| 4. | UC25H02 | தமிழர்களும் தொழில்நுட்பமும் / Tamils and Technology | T | 1-0-0 | 1 | 1 | HUM |
| 5. | PH25C03 | Applied Physics (CSIE) – II | T | 2-1-0 | 3 | 3 | BS |
| 6. | CS25C07 | Object Oriented Programming | LIT | 3-0-4 | 7 | 5 | ES (PC) |
| 7. | EN25C02 | English Essentials – II | LIT | 1-0-2 | 3 | 2 | HUM |
| 8. | ME25C05 | Re-Engineering for Innovation | L | 0-0-4 | 4 | 2 | SD |
| 9. | UC25A03 | Life Skills for Engineers– II* | --- | 1-0-2 | 3 | --- | HUM |
| 10. | UC25A04 | Physical Education – II* | --- | 0-0-4 | 4 | 1 | HUM |
| 11. | | Foreign Language^ | L | 1-0-2 | 3 | --- | HUM |
| | | | **Total Credits** | | **39** | **25** | |

^ Deutsch / Japanese / Korean *Audit Course

| Semester – III | | | | | | | |
|---|---|---|---|---|---|---|---|
| **S. No.** | **Course Code** | **Course Name** | **Course Type** | **Periods/Week** | | **Credits** | **Category** |
| | | | | **L-T- P** | **TCP** | | |
| 1. | | Discrete Mathematics | T | 3-1-0 | 4 | 4 | BS |
| 2. | | Managerial Economics | T | 3-0-0 | 3 | 3 | ES (PC) |
| 3. | | Data Structures | LIT | 3-0-4 | 7 | 5 | ES (PC) |
| 4. | | Java Programming | LIT | 3-0-4 | 7 | 5 | ES (PC) |
| 5. | | Skill Development Course – I | LIT | 1-0-2 | 3 | 2 | SD |
| 6. | | English Communication Skills Laboratory – II | LIT | 0-0-2 | 2 | 1 | HUM |
| | | | **Total Credits** | | **26** | **20** | |

| Semester – IV | | | | | | | |
|---|---|---|---|---|---|---|---|
| **S. No.** | **Course Code** | **Course Name** | **Course Type** | **Periods/Week** | | **Credits** | **Category** |
| | | | | **L-T- P** | **TCP** | | |
| 1. | | Probability and Statistics | T | 3-0-0 | 3 | 3 | BS |
| 2. | | Financial and Cost accounting | T | 3-0-0 | 3 | 3 | ES (PC) |
| 3. | | Standards in Computer Science | T | 1-0-0 | 1 | 1 | ES (PC) |
| 4. | | Database Management Systems | LIT | 3-0-4 | 7 | 5 | ES (PC) |
| 5. | | Full Stack Web Development | LIT | 3-0-2 | 5 | 4 | ES (PC) |
| 6. | | Operating Systems | LIT | 3-0-2 | 5 | 4 | ES (PC) |
| 7. | | Python for Data Science | LIT | 3-0-2 | 5 | 4 | ES (PC) |
| 8. | | Skill Development Course – II | LIT | 1-0-2 | 3 | 2 | SD |
| 9. | | English Communication Skills Laboratory – III | LIT | 0-0-2 | 2 | 1 | HUM |
| | | | | **Total Credits** | **34** | **27** | |

| Semester – V | | | | | | | |
|---|---|---|---|---|---|---|---|
| **S. No.** | **Course Code** | **Course Name** | **Course Type** | **Periods/ Week** | | **Credits** | **Category** |
| | | | | **L-T-P** | **TCP** | | |
| 1. | | Theory of Computation | T | 3-1-0 | 4 | 4 | ES (PC) |
| 2. | | Business Analytics | T | 3-0-0 | 3 | 3 | ES (PC) |
| 3. | | Programme Elective – I | T | 3-0-0 | 3 | 3 | ES (PE) |
| 4. | | Programme Elective – II | T | 3-0-0 | 3 | 3 | ES (PE) |
| 5. | | Artificial Intelligence and Machine Learning | LIT | 3-0-2 | 5 | 4 | ES (PC) |
| 6. | | Computer Networks | LIT | 3-0-2 | 5 | 4 | ES (PC) |
| 7. | | Embedded Systems and IoT | LIT | 2-0-2 | 4 | 3 | ES (PC) |
| 8. | | Skill Development Course- III | LIT | 1-0-2 | 3 | 2 | SD |
| 9. | | Industry Oriented Course - I | LIT | 1-0-2 | 3 | 1 | SD |
| | | | | **Total Credits** | **33** | **27** | |
| **For Honours Degree** | | | | | | | |
| 1. | | Capstone Design Project – Level I | CDP | 0-0-12 | 12 | 6 | SD |
| **OR** | | | | | | | |
| 1. | | Honours Elective – I | T | 3-0-0 | 3 | 3 | |
| 2. | | Honours Elective – II | T | 3-0-0 | 3 | 3 | |
| **For Minor Degree** | | | | | | | |
| 1. | | Minor Elective – I | T | 3-0-0 | 3 | 3 | |
| 2. | | Minor Elective – II | T | 3-0-0 | 3 | 3 | |

# Semester I

| MA25C01 | Applied Calculus | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 1 | 0 | 4 |

**Course Objectives:**

- To provide technical competence of modelling engineering problems using calculus.
- To apply the calculus concepts in solving engineering problems using analytical methods and computational tools.

**Differential Calculus:** Functions, graph of functions, New functions from old functions, Limit of a function, Continuity, Limits at infinity, Derivative as a function, Maxima and Minima of functions of single variable, Mean value theorem, Effect of derivatives on the shape of a graph.

**Activities:** Visualization of the functions, Maxima and Minima of a function using open-source software, Solving of Competitive Examination questions (Ex. GATE).

**Functions of Several Variables:** Partial derivatives, Chain rule, Total derivative, Maxima and minima of functions of two variables, Method of Lagrange's Multipliers, Application problems in engineering.

**Activities:** Partial Derivatives with two or three variables, Maxima and Minima of a function using open-source software, Solving of Competitive Examination questions (Ex. GATE).

**Integral Calculus:** Fundamental theorem of Calculus, Indefinite integrals and the Net Change Theorem, Improper integrals, Arc Length, Area of Region, Area of surface of revolution.

**Activities:** Definite and Indefinite Integrals, Determination of Area, Solving of Competitive Examination questions (Ex. GATE).

**Multiple Integrals:** Iterated integrals and Fubini's theorem, Evaluation of double integrals, change of order of integration, change of variables between Cartesian and polar co-ordinates, evaluation of triple integrals-change of variables between Cartesian and cylindrical and spherical co-ordinates.

**Activities:** Double integrals and triple integrals using open-source software, Solving of Competitive Examination questions (Ex. GATE).

**Weightage:** Continuous Assessment: 40%, End Semester Examinations: 60%.

**Assessment Methodology:** Assignments (20%), Solution to application-oriented problems using software (20%), Solving of GATE questions (20%), Internal Examinations (40%).

**References:**


1. Anton, H., Bivens, I. C., & Davis, S. (2021). Calculus: Early transcendentals. John Wiley & Sons.
2. Ron Larson and David C. Falvo, (2013), Calculus: an Applied Approach. Cengage Learning.
3. Stewart, J., Clegg, D., & Watson, S. (2019). Calculus: Early transcendentals.

4. Thomas, G. B., Jr., Weir, M. D., Hass, J., & Heil, C. (2018). Thomas' calculus: Early transcendentals. Pearson.
5. Singh, K. (2019). Engineering mathematics through applications. Bloomsbury Publishing.
6. Grewal, B. S. (2012). Higher engineering mathematics. Khanna Publishers.

**E-resources:**

1. https://math.libretexts.org/Bookshelves/Calculus/Map%3A_Calculus__Early_Transcendentals_(Stewart)/
2. https://openstax.org/books/calculus-volume-1/
3. https://tutorial.math.lamar.edu/Classes/CalcII/CalcII.aspx
4. SCILAB, https://www.scilab.org/

| | Description of CO | PO | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|
| CO1 | Explain the meaning of derivative, integral, and their geometric and physical interpretations. | --- | | | |
| CO2 | Apply differentiation and integration techniques to compute maxima, minima, and area. | PO1(3) | | | |
| CO3 | Analyze the behavior of single and multivariable functions using derivatives and partial derivatives. | PO2(3) | | | |
| CO4 | Utilize modern computational software and online platforms to deepen understanding, perform complex calculations, and visualize mathematical concepts. | PO5(2) PO11(1) | | | |

| EN25C01 | English Essentials – I | L | T | P | C |
|---|---|---|---|---|---|
| | | 2 | 0 | 0 | 2 |

**Course Objectives:**

- To equip students with the skills to write clear, coherent, and grammatically correct texts for various purposes.
- To strengthen the ability to comprehend, interpret, and analyse written English across diverse contexts.

**Speaking Skills:** Parts of Speech, Articles, Tenses, Sentence Structure, Types of Sentences, Subject-Verb Agreement**,** Synonyms and Antonyms, Prefixes and Suffixes, Idioms and Phrases, Self-Introduction, Expressing Oneself, Everyday Conversations, Team Interactions, Emotions, agreeing & disagreeing

**Activities:** Self-Introduction, Just a Minute (JAM) Video recording, Brainstorming sessions, Situational role plays, Usage of Applications.

**Listening Skills:** Listening to Simple Conversations, Short Speeches / Stories, Extracting key information, Phonemes, Listening to Native Speakers, Listening to Various Accents.

**Activities:** Gap fill exercises, Understanding tone and intent, Listening and imitating, Spell Bee

**Reading Skills:** Reading Strategies, Skimming and Scanning, active reading with short passages.

**Activities:** Summarising, loud reading, Cloze reading, Reading comprehension, Reading newspaper articles, Reading Long passage and note making.

**Drafting Skills:** Sentence Formation, Word Substitution, Keywords Development, Writing Paragraphs, Emails and Letters.

**Activities:** Picture and poster interpretation, formal and informal letters, Official e-mails.

**Weightage:** Continuous Assessment: 40%, End Semester Examinations: 60%

**Assessment Methodology:** Quiz (10%), Assignments (20%), Speaking Task (10%), Reading Task (10%), Writing Task (10%), Internal Examinations (40%)

**References:**


1. Miller, K. Q., & Wahl, S. T. (2023). Business and Professional Communication: KEYS for Workplace Excellence (5th ed.). SAGE Publications.
2. Kumar, Sanjay & Pushpalatha. (2018). English Language and Communication Skills for Engineers. India: Oxford University Press.
3. Sharma, S., & Mishra, B. (2024). Communication Skills for Engineers and Scientists . PHI Learning.


**E-Resources:**

1. Cambridge English – https://www.cambridgeenglish.org/learning-english/grammar-and-vocabulary/
2. Perfect English Grammar – https://www.perfect-english-grammar.com/
3. British Council – Learn English - https://learnenglish.britishcouncil.org/grammar

4. Speechling – https://speechling.com/
5. mePro by Pearson – https://mepro.pearson.com/
6. TED Talks – https://www.ted.com/

| | Description of CO | PO | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|
| CO1 | Comprehend spoken English, take and draft notes. | --- | | | |
| CO2 | Apply vocabulary, with appropriate ways to enhance drafting and communication. | PO1(3) | | | |
| CO3 | Analyze texts in different contexts using appropriate reading strategies. | PO2(2) | | | |
| CO4 | Communicate thoughts and ideas in both planned and unplanned situations. | PO9(2) | | | |
| CO5 | Continuously improving English communication skills relevant to engineering and scientific work. | PO11(1) | | | |

| UC25H01 | தமிழர் மரபு | L | T | P | C |
|---|---|---|---|---|---|
| | | 1 | 0 | 0 | 1 |

**மொழி மற்றும் இலக்கியம்**: இந்திய மொழிக் குடும்பங்கள், திராவிட மொழிகள், தமிழ் ஒரு செம்மொழி, தமிழ் செவ்விலக்கியங்கள், சங்க இலக்கியத்தின் சமயச் சார்பற்ற தன்மை, சங்க இலக்கியத்தில் பகிர்தல் அறம், திருக்குறளில் மேலாண்மைக் கருத்துக்கள், தமிழ்க் காப்பியங்கள், தமிழகத்தில் சமண பௌத்த சமயங்களின் தாக்கம், பக்தி இலக்கியம், ஆழ்வார்கள் மற்றும் நாயன்மார்கள், சிற்றிலக்கியங்கள், தமிழில் நவீன இலக்கியத்தின் வளர்ச்சி, தமிழ் இலக்கிய வளர்ச்சியில் பாரதியார் மற்றும் பாரதிதாசன் ஆகியோரின் பங்களிப்பு.

**மரபு – பாறை ஓவியங்கள் முதல் நவீன ஓவியங்கள் வரை – சிற்பக்கலை**: நடுகல் முதல் நவீன சிற்பங்கள் வரை, ஐம்பொன் சிலைகள், பழங்குடியினர் மற்றும் அவர்கள் தயாரிக்கும் கைவினைப் பொருட்கள், பொம்மைகள் , தேர் செய்யும் கலை, சுடுமண் சிற்பங்கள், நாட்டுப்புறத் தெய்வங்கள், குமரிமுனையில் திருவள்ளுவர் சிலை, இசைக் கருவிகள், மிருதங்கம், பறை, வீணை, யாழ், நாதஸ்வரம், தமிழர்களின் சமூக பொருளாதார வாழ்வில் கோவில்களின் பங்கு.

**நாட்டுப்புறக் கலைகள் மற்றும் வீர விளையாட்டுகள்**: தெருக்கூத்து, கரகாட்டம், வில்லுப்பாட்டு, கணியான் கூத்து, ஒயிலாட்டம், தோல்பாவைக் கூத்து, சிலம்பாட்டம், வளரி, புலியாட்டம், தமிழர்களின் விளையாட்டுகள்.

**தமிழர்களின் திணைக் கோட்பாடுகள்**: தமிழகத்தின் தாவரங்களும், விலங்குகளும், தொல்காப்பியம் மற்றும் சங்க இலக்கியத்தில் அகம் மற்றும் புறக் கோட்பாடுகள், தமிழர்கள் போற்றிய அறக்கோட்பாடு, சங்ககாலத்தில் தமிழகத்தில் எழுத்தறிவும், கல்வியும், சங்ககால நகரங்களும் துறை முகங்களும், சங்ககாலத்தில் ஏற்றுமதி மற்றும் இறக்குமதி, கடல்கடந்த நாடுகளில் சோழர்களின் வெற்றி.

**இந்திய தேசிய இயக்கம் மற்றும் இந்திய பண்பாட்டிற்குத் தமிழர்களின் பங்களிப்பு:** இந்திய விடுதலைப்போரில் தமிழர்களின் பங்கு, இந்தியாவின் பிறப்பகுதிகளில் தமிழ்ப் பண்பாட்டின் தாக்கம் , சுயமரியாதை இயக்கம் இந்திய மருத்துவத்தில், சித்த மருத்துவத்தின் பங்கு, கல்வெட்டுகள், கையெழுத்துப்படிகள், தமிழ்ப் புத்தகங்களின் அச்சு வரலாறு.

**References:**


1. தமிழக வரலாறு, மக்களும் பண்பாடும், கே.கே. பிள்ளை (வெளியீடு: தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்).
2. கணினித் தமிழ், முனைவர் இல. சுந்தரம். (விகடன் பிரசுரம்).
3. கீழடி, வைகை நதிக்கரையில் சங்ககால நகர நாகரிகம் (தொல்லியல் துறை வெளியீடு)
4. பொருநை, ஆற்றங்கரை நாகரிகம். (தொல்லியல் துறை வெளியீடு)
5. Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL – (in print)
6. Social Life of the Tamils - The Classical Period (Dr.S.Singaravelu) (Published by: International Institute of Tamil Studies.
7. Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thirunavukkarasu) (Published by: International Institute of Tamil Studies).
8. The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: International Institute of Tamil Studies.)
9. Keeladi - 'Sangam City C ivilization on the banks of river Vaigai' (Jointly Published by: Department ofArchaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
10. Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay) (Publishedby: The Author)
11. Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Bookand Educational Services Corporation, Tamil Nadu)
12. Journey of Civilization Indus to Vaigai (R.Balakrishnan) (Published by: RMRL) – Reference Book.

| UC25H01 | Heritage of Tamils | L | T | P | C |
|---|---|---|---|---|---|
| | | 1 | 0 | 0 | 1 |

**Language and Literature:** Language Families in India, Dravidian Languages, Tamil as a Classical Language - Classical Literature in Tamil – Secular Nature of Sangam Literature, Distributive Justice in Sangam Literature, Management Principles in Thirukural, Tamil Epics and Impact of Buddhism & Jainism in Tamil Land, Bakthi Literature Azhwars and Nayanmars - Forms of minor Poetry - Development of Modern literature in Tamil, Contribution of Bharathiyar and Bharathidhasan.

**Heritage - Rock art Paintings to Modern Art – Sculpture:** Hero stone to modern sculpture, Bronze icons, Tribes and their handicrafts - Art of temple car making, Massive Terracotta sculptures, Village deities, Thiruvalluvar Statue at Kanyakumari, Making of musical instruments, Mridhangam, Parai, Veenai, Yazh and Nadhaswaram, Role of Temples in Social and Economic Life of Tamils.

**Folk and Martial Arts:** Therukoothu, Karagattam, Villu Pattu, Kaniyan Koothu, Oyillattam, Leather puppetry, Silambattam, Valari, Tiger dance - Sports and Games of Tamils

**Thinai Concept of Tamils:** Flora and Fauna of Tamils & Aham and Puram Concept from Tholkappiyam and Sangam Literature, Aram Concept of Tamils, Education and Literacy during Sangam Age - Ancient Cities and Ports of Sangam Age, Export and Import during Sangam Age - Overseas Conquest of Cholas.

**Contribution of Tamils to Indian National Movement and Indian Culture:** Contribution of Tamils to Indian Freedom Struggle, The Cultural Influence of Tamils over the other parts of India, Self-Respect Movement, Role of Siddha Medicine in Indigenous Systems of Medicine, Inscriptions & Manuscripts, Print History of Tamil Books.

**References**:


1. தமிழக வரலாறு – மக்களும் பண்பாடும் – கே.கே. பிள்ளை (வெளியீடு: தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்).
2. கணினித் தமிழ் – முனைவர் இல. சுந்தரம். (விகடன் பிரசுரம்).
3. கீழடி – வைகை நதிக்கரையில் சங்ககால நகர நாகரிகம் (தொல்லியல் துறை வெளியீடு)
4. பொருநை – ஆற்றங்கரை நாகரிகம். (தொல்லியல் துறை வெளியீடு)
5. Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL – (in print)
6. Social Life of the Tamils - The Classical Period (Dr.S.Singaravelu) (Published by: International Institute of Tamil Studies.
7. Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thirunavukkarasu) (Published by: International Institute of Tamil Studies).
8. The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: International Institute of Tamil Studies.)
9. Keeladi - 'Sangam City C ivilization on the banks of river Vaigai' (Jointly Published by: Department ofArchaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
10. Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay) (Publishedby: The Author)
11. Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Bookand Educational Services Corporation, Tamil Nadu)
12. Journey of Civilization Indus to Vaigai (R.Balakrishnan) (Published by: RMRL) – Reference Book.

| PH25C01 | Applied Physics – I | L | T | P | C |
|---|---|---|---|---|---|
| | | 2 | 0 | 2 | 3 |

**Course Objective(s):**

- To impart knowledge and expose the essentials of physics in various engineering applications.

**Properties of Matter:** Elasticity, Cantilever, Young's modulus (non-uniform bending), Girders: Bridges and buildings, Viscosity: Stokes method, Surface tension: drop weight method, Thermal expansion, Thermal stress, Bimetallic strips, Expansion joints

**Practical**: Non-Uniform bending, Young's modulus of the material, Torsional pendulum, Rigidity modulus of the wire and moment of inertia of the disc.

**Activities:** Virtual demonstration of thermal stress.

**Oscillations:** Simple Harmonic motion, Torsional pendulum, Couple per unit twist, Damped and Forced Oscillation

**Waves:** Waves on a stretched string, Energy and Power, standing waves, Ultrasonics, piezo, electric method, Acoustic grating, Electromagnetic waves: Maxwell equation, Production of EM waves by dipole antenna, Propagation of EM waves in free space, wave equation, Cell phone reception

**Practical**: Melde's string experiment – Frequency of an electrically vibrating metal tip.

**Activities:** Virtual demonstration of propagation of EM waves

**Quantum Mechanics:** Black body radiation, Photoelectric effect, de Broglie hypothesis, Schrodinger Wave equation, Particle in a box (infinite potential well - three-dimensional box), Barrier penetration and quantum tunnelling.

**Practical**: Photo-electric effect, Determination of Planck's constant.

**Activities**: Virtual demonstration of Scanning Transmission Electron Microscope

**Applied Optics:** Interference: Air wedge, Michelson's Interferometer, Fiber optics: Structure of a fiber, Fiber Optic Communication System, Fiber Sensors (Virtual demo), Displacement, pressure sensor and Temperature sensor, Einstein Co-efficient, Nd:YAG laser, $CO_2$ laser (construction, functioning and applications), dye laser

**Practical**: Ruling width of Compact disc using Laser, Thickness of a thin sheet/wire using Air wedge Method.

**Activities**: Demonstration of sensors and applications of Lasers

**Weightage:** Continuous Assessment: 50%, End Semester Examinations: 50%

**Assessment Methodology:** Quiz (5%), Assignments (20%), Flipped Class (5%), Practical (30%), Internal Examinations (40%)

**References:**


1. Young, H. D., & Freedman, R. A. (2020). University physics with modern physics. Pearson.
2. Gaur, R. K., & Gupta, S. L. (2022). Engineering physics. Dhanpat Rai Publications.
3. Mathur, D. S. (2010). Elements of properties of matter. S. Chand Publishing.
4. Griffiths, D. J. (2018). Introduction to quantum mechanics. Cambridge University Press.
5. Silfvast, W. T. (2008). Laser fundamentals. Cambridge University Press.


**E-Resources:**

1. Barrier penetration problem and Quantum tunnelling: https://archive.nptel.ac.in/courses/115/104/115104096/
2. EM waves and wireless channelling: https://onlinecourses.nptel.ac.in/noc24_ee31/preview
3. CO2 Laser: https://onlinecourses.nptel.ac.in/noc25_ph03/preview
4. Bimetallic Strips _ https://www.youtube.com/watch?v=WZQ8lvxdzDk
5. Cell phone Reception_ https://www.youtube.com/watch?v=1JZG9x_VOwA
6. Dipole Antenna_ https://www.youtube.com/watch?v=4xF1Fq2wB1I
7. Optical Sensors_ https://auece.digimat.in/nptel/courses/video/108106173/L02.html
8. Scanning Tunnelling Electron Microscope_ https://www.youtube.com/watch?v=XNYZYbXNWQA

| | Description of CO | PO | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|
| CO1 | Explain the physics concepts in various applications. | --- | | | |
| CO2 | Apply the principles of wave optics and laser physics in practical systems. | PO1(3) | | | |
| CO3 | Analyse the behaviour of materials under different conditions. | PO2(2) | | | |
| CO4 | Conduct experiments in groups and interpret the data. | PO4(3)<br>PO8(1) | | | |

| CY25C01 | Applied Chemistry – I | L | T | P | C |
|---|---|---|---|---|---|
| | | 2 | 0 | 2 | 3 |

**Course Objectives:**

- To provide students with a solid understanding of the chemical principles for engineering applications.
- To introduce the chemical properties of materials and how these properties influence the selection and use of materials in engineering systems.
- To impart practical applications of chemistry in commonly used engineering devices

**Water Technology:** Water quality parameters and standards. Industrial feed water, Remediation. Municipal water treatment. Desalination.

**Practical:** Analysis of alkalinity, hardness and dissolved oxygen.

Activity: Coagulation of water sample using Alum

**Nano-chemistry:** Classification, Size, dependent properties. Preparation of nanomaterials, Top-down and Botton-Up approaches, Applications (Flipped classroom).

**Practical:** Preparation of nanoparticles by Sol-Gel method.

**Electrochemistry:** Electrochemical cell, Electrode potential., Redox reaction. Conductivity of electrolytes, Factors.

**Practical:** Conductometric titrations

**Activity:** Electrochemical cell demonstration

**Corrosion & Control:** Chemical and electrochemical corrosions, galvanic series, factors influencing corrosion, Electrochemical protection. Organic and Inorganic coating.

**Practical:**

- Corrosion study by weight loss and salt spray method.
- Potentiometry/UV-visible spectrophotometer.

**Activities:** Case Study on Corrosion in Pipelines and Electronics, Control measures for a corroded metal

**Batteries:** Conventional, Contemporary and Emerging battery storage technologies, Primary & Secondary Batteries, Battery Pack, Battery Materials, Performance Parameters, Testing, Safety aspects.

**Practical:** Measurement of EMF, Internal Resistance, Charge and Discharge Characteristics.

**Activities:** Demonstration of battery pack in e-vehicles.

**Weightage:** Continuous Assessment: 50%, End Semester Examinations: 50%

**Assessment Methodology:** Quiz (5%), Assignments (20%), Flipped Class (5%), Practical (30%), Internal Examinations (40%)

**References:**

1. Jain, P. C., & Jain, M. (2015). Engineering Chemistry (17th ed.). Dhanpat Rai Publishing Company (P) Ltd.

2. Dara, S. S. (2004). A Textbook of Engineering Chemistry. Chand Publications.
3. Sachdeva, M. V. (2011). Basics of Nano Chemistry. Anmol Publications Pvt Ltd.
4. Friedrich, E. (2014). Engineering Chemistry. Medtech.

**E-Resources:**

1. Water and Wastewater Engineering (Prof. Ligy Philip, IIT Madras) – https://nptel.ac.in/courses/105106202.
2. Electrochemical Energy Systems (Prof. S. Mitra, IIT Madras) – https://nptel.ac.in/courses/113106028.
3. Corrosion (Prof. Kallol Mondal, IIT Kanpur) – https://nptel.ac.in/courses/112104088
4. Chemistry of Battery Systems (Prof. V. R. Marathe, IIT Madras) – https://nptel.ac.in/courses/115106130
5. Resource on all battery types, testing, and safety – https://batteryuniversity.com/articles

| | Description of CO | PO | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|
| CO1 | Understand the importance of chemistry applications with underlying mechanisms. | --- | | | |
| CO2 | Apply the chemistry concepts in widely used devices. | PO1(3) | | | |
| CO3 | Analyse the effect of various chemical parameters on performance of engineering systems. | PO2(2) | | | |
| CO4 | Perform experimentations as a group and interpret the results. | PO4(3)<br>PO8(1) | | | |
| CO5 | Communicate findings through case studies and reports | PO9(1) | | | |

| CS25C01 | Computer Programming: C | L | T | P | C |
|---|---|---|---|---|---|
| | | 2 | 0 | 2 | 3 |

**Course Objectives:**

- To equip engineering students with the foundational knowledge and practical skills in 'C' programming to analyse and solve computational problems effectively.
- To foster problem-solving, critical thinking, and modular programming skills essential for engineering domains.

**Introduction to C:** Problem Solving, Problem Analysis Chart, Developing an Algorithm, Flowchart and Pseudocode, program structure, Compilation & Execution process, Interactive and Script mode, Comments, Indentation, Error messages, Primitive data types, Constants, Variables, Reserved words, Arithmetic, Relational, Logical, Bitwise, Assignment, Conditional operators, Input/Output Functions, Built-in Functions.

**Practical:** Create Problem Analysis Charts, Flowcharts and Pseudocode for simple C programs (Minimum three).

**Control Structures:** if, if-else, nested if, switch-case, while, do-while, for, nested loops, Jump statements.

**Practical:** Usage of conditional logics in programs. (Minimum three)

**Functions:** Function Declaration, Definition and Calling, Function Parameters and Return Types, Call by Value and Call by Reference, Recursive Functions, Scope and Lifetime of Variables, Header files and Modular Programming.

**Practical:** Usage of functions in programs. (Minimum three)

**Strings & Pointers:** One-dimensional and Multi-dimensional Arrays, Array operations and traversals, String Handling: String declaration, input/output, string library functions, Pointer arithmetic, Pointers and Arrays, Pointers to function, Dynamic memory allocation.

**Practical:** Programs using pointers, dynamic memory, pointer arithmetic, string manipulations, array operations. (Minimum three)

**Structures & Unions:** Defining and using structures, Array of structures, Pointers to structures, Unions and their uses, Enumerations.

**Practical:** Program to use structures and unions

**File Operations:** Open, read, write, close file operations, Binary vs Text files, File pointers, Error handling in file operations.

**Practical:** Programs reading/writing data in text and binary files (Minimum three).

**Standard Libraries & Header Files:** Using standard libraries like stdio.h, stdlib.h, string.h, math.h, Creating and using user-defined header files and libraries.

**Practical:** Use of standard and user-defined libraries in solving problems. (Minimum three), Project (Minimum Two)

**Weightage:** Continuous Assessment: 50%, End Semester Examinations: 50%

**Assessment Methodology:** Quiz (5%), Project (15%), Assignment Programs (25%), Practical (25%), Internal Examinations (30%)

**References:**


1. Thareja, R. (2021). Programming in C . Oxford University Press.
2. Balagurusamy, E. (2019). Programming in ANSI C. McGraw Hill Education.
3. Kanetkar, Y. (2020). Let us C. BPB Publications.
4. Kalicharan, N. (2022). Learn to program with C: An introduction to programming using the C language. Apress.
5. Forouzan, B. A., & Afyouni, H. (2023). Computer science: A structured programming approach in C (4th ed.). Cengage.


**E-resources:**

1. Learn-C.org - https://www.learn-c.org/
2. GeeksforGeeks - C Programming - https://www.geeksforgeeks.org/c-programming-language/
3. GNU C Library Documentation - https://www.gnu.org/software/libc/manual/
4. “Introduction to C Programming”, Swayam MOOC Course, https://onlinecourses.swayam2.ac.in/imb25_mg71/

| | Description of CO | PO | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|
| CO1 | Explain the potential usage of ‘C’ in engineering applications | --- | | | |
| CO2 | To apply the concepts of ‘C’ in solving engineering problems and formulate new projects. | PO1 (2)<br>PO5 (2) | | | |
| CO3 | To interpret the data and effectively communicate in groups. | PO2 (3)<br>PO8 (1)<br>PO9 (1) | | | |
| CO4 | Adapt new programming concepts and technologies in the profession. | PO11 (1) | | | |

| CS25C03 | Essentials of Computing | L | T | P | C |
|---|---|---|---|---|---|
| | | 2 | 0 | 2 | 3 |

**Course Objectives:**

1. To introduce the basic components and operations of computers.
2. To develop problem-solving and computational thinking skills.
3. To enable learners to design simple solutions using algorithms and flowcharts.
4. To provide hands-on experience in visual programming and basic app development.

**Computers:** Computer, Characteristics of Computers, History of Computers, Classification of Computers, Applications of Computers, Basic Organization of a Computer. Data Representation, Using spread sheets for basic operations on data and visualize the data.

**Practical:**

1. Office Software for documentation and presentation
2. Spread sheets for calculations and data. Visualization

**Computational Thinking:** What is Computational Thinking, Decomposition, Abstraction, Real World Information to Computable Data, Number Systems, Conversions among Number systems, what is Logic, Boolean Logic, Applications of Propositional Logic.

**Activities:**

1. Solving problems based on number systems and logics.
2. Virtual Demonstration of Computational thinking

**Problem Solving Basics:** Problem Definition, Logical Reasoning, Decomposition, Software Design Concept of an Algorithm, Algorithm Representation – Algorithm Discovery – Iterative Structures – Recursive Structures – Efficiency and Correctness - Implementation of Algorithms - Fundamental Algorithms: Exchanging the values of two variables, Counting, Summation of a set of numbers, Factorial computation, Generation of Fibonacci Sequence, Reversing the digits of an Integer, Base Conversion.

**Activities:** Algorithm Development for simple mathematical problems

**Programming Languages:** Program Development Life Cycle, Program Design Tools, Algorithms, Flowcharts, Pseudocodes, Role of Algorithms, Programming Languages, Programming Paradigms Traditional Programming Concepts, Procedural Units, Language Implementation, Declarative Programming.

**Activities:** Flowchart design for simple mathematical problems

**Scratch Programming:** What is Scratch, Scratch Programming Environment, Paint Editor, Scratch Blocks, Arithmetic Operators and Functions, Use Motion Commands, Pen Commands and Easy Draw, Looks Palette, Sound Palette, Power of Repeat, Data Types, Variables, Getting Input from Users.

Making Decisions, Comparison Operators, Decision Structures, Logical Operators, Repetition, Loop Blocks, Stop Commands, Counters, Nested Loops, Recursion, String Processing, String Manipulation, Lists, Dynamic Lists, Numerical Lists, Searching and Sorting Lists.

**Activities:**

1. Creation of Functional Block for simple mathematical problems
2. Drawing and Painting operations
3. Scratch Animation for understanding Conditional and Loop statements.
4. Draw artistic, geometric patterns and create games.
5. Scratch Programs for applied scientific computing and data manipulations

**App Development:** Building Apps using problem, solving techniques on any app development platform, Modeling, incremental and iterative, reuse, modularization, algorithmic thinking, abstracting and modularizing, decomposition, testing and debugging.

**Activities:** Sample App Developments for societal problems.

**Weightage:** Continuous Assessment: 40%, End Semester Examinations: 60%

**Assessment Methodology:** Assignments (10%), Quiz (5%), Project based learning (20%), Flipped Classroom (5%), Review of GATE questions (10%) & Internal Assessment: 50%

**References:**


1. Thareja, R. (2020). Fundamentals of computers. Oxford University Press.
2. Rajaraman, V., & Adabala, N. (2014). Fundamentals of computers. PHI Learning.
3. Brookshear, J. G., & Brylow, D. (2015). Computer science: An overview. Pearson.
4. Dromey, R. G. (1982). How to solve it by computer. Prentice Hall International.
5. Marji, M. (2014). Learn to program with Scratch: A visual introduction to programming with games, art, science and math. No Starch Press.
6. Riley, D. D., & Hunt, K. A. (2014). Computational thinking for the modern problem solver. CRC Press.
7. Venkatesh, G., & Mukund, M. (2021). Computational thinking. Notion Press.

**E-Resources:**

1. Brennan and Resnick's CT Framework 2012: https://scratched.gse.harvard.edu/ct/files/AERA2012.pdf
2. CS50X 2025 Scratch YouTube lectures by Prof. David J Malan, Harvard University: https://www.youtube.com/watch?v=2WtPyqwTLKM
3. https://teachinglondoncomputing.org/resources/developing-computational-thinking/
4. Scratch software: https://scratch.mit.edu/
5. MIT APP INVENTOR software: https://appinventor.mit.edu/
6. app.diagrams.net

| | Description of CO | PO | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|
| CO1 | Describe the basic components and functioning of computers, number systems, and data representation. | | | | |
| CO2 | Apply computational thinking and problem-solving techniques to design simple algorithms for real-world problems | PO1(3) | | | |
| CO3 | Design and represent solutions using flowcharts, pseudocode, and basic visual programming tools. | PO2 (2) | | | |
| CO4 | Demonstrate the ability to independently learn new computing tools and practices essential for life-long learning | PO11(1) | | | |

| ME25C04 | Makerspace | L | T | P | C |
|---|---|---|---|---|---|
| | | 0 | 0 | 4 | 2 |

**Course Objectives:**

1. To impart practical skills in the assembly, disassembly, and welding of components using appropriate tools and techniques.
2. To provide hands-on training in electrical wiring practices, and the use of electronic components, sensors, and actuators.

**List of Activities**

**(A). Dis-assembly & Assembly Practices**

i. Tools and its handling techniques.
ii. Dis-assembly and assembly of home appliances – Grinder Mixer Grinder, Ceiling Fan, Table Fan & Washing Machine.
iii. Dis-assembly and assembly of Air-Conditioners & Refrigerators.
iv. Dis-assembly and assembly of a Bicycle.

**(B). Welding Practices**

i. Welding Procedure, Selection & Safety Measures.
ii. Power source of Arc Welding – Gas Metal Arc Welding & Gas Tungsten Arc Welding processes.
iii. Hands-on session of preparing base material & Joint groove for welding.
iv. Hands-on session of MAW, GMAW, GTAW, on Carbon Steel & Stainless Stell plates / pipes, for fabrication of a simple part.

**(C). Electrical Wiring Practices**

i. Electrical Installation tools, equipment & safety measures.
ii. Hands-on session of basic electrical connections for Fuses, Miniature Circuit Breakers and Distribution Box.
iii. Hands-on session of electrical connections for Lightings, Fans, Calling Bells.
iv. Hands-on session of electrical connections for Motors & Uninterruptible Power Supply.

**(D). Electronics Components / Equipment Practices**

i. Electronic components, equipment & safety measures.
ii. Dis-assembly and assembly of Computers.
iii. Hands-on session of Soldering Practices in a Printed Circuit Board.
iv. Hands-on session of Bridge Rectifier, Op-Amp and Transimpedance amplifier.
v. Hands-on session of integration of sensors and actuators with a Microcontroller.
vi. Demonstration of Programmable Logic Control Circuit.

**(E). Contemporary Systems**

i. Demonstration of Solid Modelling of components.
ii. Demonstration of Assembly Modelling of components.
iii. Fabrication of simple components / parts using 3D Printers.
iv. Demonstration of cutting of wood / metal in different complex shapes using Laser Cutting Machine.

**References:**


1. Stephen Christena, Learn to Weld: Beginning MIG Welding and Metal Fabrication Basics, Crestline Books, 2014.
2. H. Lipson, Fabricated - The New World of 3D Printing, Wiley, 1st edition, 2013.
3. Code of Practice for Electrical Wiring Installations (IS 732:2019)


| | Description of CO | PO | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|
| CO1 | Demonstrate proper use and handling of basic hand and power tools. | --- | | | |
| CO2 | Carry out electrical wiring installations and repairs, applying safety measures in domestic applications. | PO1(3) | | | |
| CO3 | Develop solid innovative models through software. | PO5(2) | | | |
| CO4 | Adapt and follow safety protocols in the work environment. | PO11(2) | | | |

| UC25A01 | Life Skills for Engineers – I | L | T | P | C |
|---|---|---|---|---|---|
| | | 1 | 0 | 2 | - |

**Course Objectives:**

- To equip engineering students with essential life skills encompassing personal and emotional development, effective management of time and stress, financial literacy, digital safety, and civic responsibility.
- To enhance self-awareness, interpersonal skills, and resilience to prepare students for the professional and personal challenges of engineering careers and life beyond academics**.**

**Personal and Emotional Development:** Self-Awareness & Personality, Emotional Intelligence & Empathy, Positive thinking, Right attitude, Stress & Anger Management, Goal-Setting & Time Management, Growth Mindset & Resilience.

**Activities:** Personality tests (MBTI, DISC), reflection journals, Empathy circle, role-playing difficult conversations, Guided mindfulness sessions, stress relief toolkit creation, Vision board creation, weekly time audit and planner, Group challenge scenarios, resilience journal

**Management Skills:** Financial Literacy: Budgeting & Saving, Nutrition, Health, and Hygiene, Digital Literacy & Online Safety, Civic Responsibility & Ethics

Activities: Create a monthly budget, financial simulation game, Meal planning workshop, physical wellness challenge, Social media audit, privacy and safety scenarios, Community service, values debate.

**Weightage: Continuous Assessment: 100%**

**Assessment Methodology:** Assignments (20%), Flipped Class & Worksheets (10%), Practical (30%), Internal Examinations (40%)

**References:**


1. Khera, S. (2003). You can win. Macmillan.
2. Levesque, H. (n.d.). Life skills 101: A practical guide to leaving home and living on your own. (Publication year not specified)
3. Mitra, B. K. (2017). Personality development & soft skills (3rd impression). Oxford University Press.
4. ICT Academy of Kerala. (2016). Life skills for engineers. McGraw Hill Education (India) Private Ltd.

| | Description of CO | PO | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|
| CO1 | Understand personality traits and emotional intelligence, in interpersonal interactions. | --- | | | |
| CO2 | To work and execute as a team through successful implementation of set goals. | PO7 (1)<br>PO8 (2)<br>PO9 (2) | | | |
| CO3 | Develop and implement best practices in day-to-day life, in terms of planning and execution. | PO11 (3) | | | |

| UC25A02 | Physical Education - I | L | T | P | C |
|---|---|---|---|---|---|
| | | 0 | 0 | 4 | 1 |

**Course Objectives:**

- To impart the fundamentals of physical education for development of students' physical, mental, and social well-being.
- To instill a lifelong appreciation for physical activity towards the development of positive attitude and fostering values of team work and sportsmanship.

**Introduction to physical education:** Exercise for Good Posture – Conditioning and Calisthenics for Before start, Jogging, Bending, Twisting, Standing, Sitting and Relaxation, Training on First Aid Practices.

**Participation of athletic events:** Rules and regulations of important athletic events, Sprint, Jumps, Throws and Hurdles.

**Skill development in any one of the following outdoor games:** Basket Ball, Volley Ball, Ball Badminton, Football, Hockey, Kho-Kho, Kabaddi, Cricket, Hand ball and Tennis.

**Skill development in any one of the following indoor games:** Shuttle Badminton, Chess and Table Tennis.

**Weightage:** Continuous Assessment: 100%

**Assessment Methodology:** Attendance (60%), Quiz (10%), Participation in Sports and Games (20%) and Viva Voce (10%)

**References:**


1. Singh, A. (2008). Essentials of physical education. Kalyani Publishers.
2. Kamlesh, M. L. (2006). Psychology in physical education and sport (3rd ed.). Metropolitan Book Co.
3. Mangal, S. K. (2009). *Psychology of sports performance*. Sports Publication.


**E-resources:**

**https://www.who.int/health-topics/physical-activity**

| | CO Description | PO | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|
| CO1 | Understand and explain the importance of physical activity for mental and physical health. | --- | | | |
| CO2 | Apply basic principles of exercise science in the routine life. | PO1(3) | | | |
| CO3 | Develop teamwork, discipline, and leadership through sports and group activities and collaborate effectively. | PO8(3) | | | |
| CO4 | Demonstrate independent learning in health, nutrition, and fitness-related topics. | PO11(2) | | | |

# Semester II

| MA25C02 | Linear Algebra | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 1 | 0 | 4 |

**Course Objectives:**

- To impart foundational knowledge in linear algebra essential for analysing and solving problems in engineering applications.
- To provide the knowledge on computation using software and interpret key linear algebra concepts using software.

**Vector Spaces** Introduction to Vector Spaces, Examples, Subspaces, Linear Combinations, Span, Generating Sets, Linear Dependence and Independence, Basis and Dimension, Dimension of Subspaces.

**Activities:** Open-Source software, exercises to test linear dependence and independence using rank, compute span and basis of a set of vectors, determine the dimension of subspaces, and illustrate the concept of subspace and basis in $\boldsymbol{R^2}/\boldsymbol{R^3}$ with visualization.

**Linear Transformations and Diagonalization:** Null space, Range, Dimension Theorem (statement only), Matrix representation of a linear transformation, Eigenvalues & Eigenvectors, Diagonalizability.

**Activities:** Open-Source software, exercises to compute the matrix representation of a linear transformation, find the null space and range of a matrix, and compute eigenvalues and eigenvectors of a matrix.

**Inner Product Spaces:** Inner product, Norms, Cauchy, Schwarz inequality, Gram, Schmidt orthogonalization, Simple problems (up to $\boldsymbol{R^3}$).

**Activities:** Open-Source software, exercises to compute inner products and vector norms.

**Matrix Decomposition:** Orthogonal transformation of a symmetric matrix to diagonal form - Positive definite matrices, QR decomposition, Singular Value Decomposition (SVD), Least squares solutions- simple problems (up to $3 \times 3\ matrices$).

**Activities:** Open-Source software, exercises to check if a matrix is positive definite, perform QR decomposition and SVD using built-in functions.

**Weightage:** Continuous Assessment: 40%, End Semester Examinations: 60%.

**Assessment Methodology:** Assignment (20%), Software activity (20%), Quiz (20%), Internal Examinations (50%).

**References:**


1. Friedberg, S. H., Insel, A. J., & Spence, L. E. (2022). Linear algebra. Pearson.
2. Lay, D. C., Lay, S. R., & McDonald, J. J. (2020). Linear algebra and its applications with MATLAB. Pearson.
3. Bronson, R. (2011). Schaum's outline of matrix operations. McGraw-Hill Education.
4. Strang, G., & Thomson, R. (2005). Linear algebra and its applications. Brooks/Cole.
5. Lipschutz, S., & Lipson, M. (2009). Schaum's outline of linear algebra. McGraw-Hill.
6. Kreyszig, E. (2018). Advanced engineering mathematics. Wiley India.

| | Description of CO | PO | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|
| CO1 | Explain the fundamental concepts of Linear Algebra. | --- | | | |
| CO2 | Compute and interpret eigenvalues and eigenvectors. | PO1(3) | | | |
| CO3 | Apply inner product concepts and perform orthogonalization. | PO1 (3) | | | |
| CO4 | Compute least squares solutions of linear system of equations. | PO1 (2)<br>PO2 (2) | | | |
| CO5 | Use MATLAB to implement and validate key linear algebra concepts | PO5 (1)<br>PO11 (1) | | | |

| EE25C01 | Basic Electrical and Electronics Engineering | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 0 | 0 | 3 |

**Course Objectives:**

- To impart foundational knowledge in principles and applications of electrical and electronics engineering.

**DC Fundamentals:** Current and Voltage sources, Resistance, Inductance and Capacitance; Ohm's law, Kirchhoff's law, Series parallel combination of R, L and C components, Voltage Divider and Current Divider Rules.

**Activities:** Virtual Demonstration of electrical laws & circuits, Hands-on Breadboarding, Solving GATE questions.

**AC Fundamentals:** Faraday's Laws of Electro-magnetic Induction, Definition of Self and Mutual Inductances, Generation of sinusoidal voltage, Instantaneous & RMS values of sinusoidal signals, Introduction to 3-phase systems, Electrical Safety, Fuses and Earthing.

**Activities:** Virtual Demonstration of electromagnetic induction, Measurement of instantaneous and RMS values of AC signals, Solving GATE questions.

**Electric Machines:** DC Machines, Transformers, Star and delta Connections, Three phase Induction motors, Synchronous Generators, Single Phase Induction Motors, Stepper Motor, Universal Motor and BLDC motor.

**Activities:** Virtual demonstration of step-up and step-down transformers, Virtual working models of Universal and BLDC motors, Solving GATE questions.

**Semiconductor Devices:** PN junction diodes, Zener Diode, Voltage regulator, BJT & FET Transistors, Timers, Operational Amplifiers.

**Activities:** Virtual demonstration of V-I characteristics of PN junction and Zener diodes using simulation, inverting/non-inverting amplifiers, Solving GATE questions.

**Digital Electronics:** Boolean algebra, Basic and Universal Gates, adders, multiplexers, demultiplexers and flip-flops.

**Activity:** Online logic gate simulators, Solving GATE questions.

**Microcontrollers:** Introduction, Architecture, Potential Applications.

**Activities:** Physical demonstration of a microcontroller and online simulation of microcontroller.

**Weightage:** Continuous Assessment: 40%, End Semester Examinations: 60%

**Assessment Methodology:** Quiz (5%), Assignments (25%), GATE Questions (20%), Internal Examinations (50%)

**E-resources:**

1. https://archive.nptel.ac.in/courses/108/106/108106172/
2. Circuit Simulator – https://www.falstad.com/circuit/

| | Description of CO | PO | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|
| CO1 | Understand and explain basic electrical and electronic concepts. | --- | | | |
| CO2 | Apply and analyse electrical circuits in real-time applications. | PO1 (3)<br>PO2 (1) | | | |
| CO3 | Identify and utilise key electronic devices used in engineering applications | PO2 (2) | | | |

| CW25201 | Computer Organization and Architecture | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 1 | 0 | 4 |

**Course Objectives**

- To introduce the fundamental components of digital computer systems.
- To explain various Instruction Set Architecture (ISA) types and instruction execution processes.
- To impart knowledge on system performance metrics and evaluation techniques**.**

**Introduction:** Functional Units of a Digital Computer, Classes of Computer Systems, Hardware-Software Interface, Operation and Operands of Computer Hardware, Instruction Set Architecture, RISC and CISC Architectures, Addressing Modes, Assembly Language Programming, Translation from High-Level Language to Machine Language, Performance Metrics, Benchmarks, Transition from Uniprocessors to Multiprocessors

**Activities:**

- C code to machine code mapping.
- Assembly of computer system components

**Arithmetic for Computers:** Integer Arithmetic, Binary Parallel Adder, Carry Lookahead Adder, Carry Save Adder, Fast Adders, Binary Multiplication, Booth's Algorithm, Bit Pair Recoding, Binary Division, Restoring and Non-Restoring Division, Floating Point Numbers (Single and Double Precision), Floating Point Representation, Arithmetic Operations on Floating Point Numbers, ALU Design, Parallelism and Computer Arithmetic.

**Activities:**

- Arithmetic Operations
- Restoring / Non-restoring division

**Processor Design:** Design Conventions of a Processor, Datapath Design, Building the Datapath, Implementation of Basic MIPS ISA, Designing the Control Unit, Simple Implementation Scheme and Drawbacks, Execution of a Complete Instruction, Hardwired and Microprogrammed Control, Instruction Level Parallelism, Basic Concepts of Pipelining, Pipelined Datapath and Control, Performance, Pipeline Hazards – Structural, Data, and Control Hazards, Handling Exceptions.

**Activities:**

- CPU datapath analysis.
- Pipeline hazard analysis.

**Memory and I/O:** Types of Memories, Need for a Hierarchical Memory System, Cache Memories, Memory Mapping, Measuring and Improving Cache Performance, Virtual Memory, Paging and Segmentation, TLB, Implementing Protection with Virtual Memory, Memory Management Techniques, Associative Memories, Introduction to Virtual Machines, Memory and I/O Devices, Interfacing I/O Devices to the Processor, Memory and Operating System, Programmed Input/Output, Interrupts, Direct Memory Access (DMA), RAID.

**Activities:**

- CPU Cortex memory hierarchy.
- Cache memory mapping

**Advanced ILP and Parallel Processing:** Advanced Instruction Level Parallelism (ILP), Exploitation of ILP, Out-of-Order Execution, Dynamic Scheduling, Speculation, Dynamic Branch Prediction, Multiple Issue Processors – Static and Dynamic, Limitations of ILP, Multithreading**.**

**Activities:**

- Out-of-Order Execution and Dynamic Scheduling
- Virtual Demonstration of processor performance in real workloads

**Next Generation Computer Architecture:** Multicore Architectures, Superscalar Processors, VLIW, Introduction to Multicore and Multiprocessor Systems, Graphics Processing Units (GPU), CUDA Programming Paradigm, Neural Processing Units (NPU), AI Processing Chips (AI PC), Overview of Next Generation Processors.

**Activities**

- ILP Pipeline Simulation
- Dynamic branch prediction strategies

**Weightage:** Continuous Assessment: 40%, End Semester Examinations: 60%

**Assessment Methodology:** Assignments (10%), Quiz (5%), Project based learning (20%), Flipped Classroom (5%), Review of GATE questions (10%) & Internal Assessment (50%)

**References:**


1. Stallings, W. (2016). Computer organization and architecture: Designing for performance. Pearson Education.
2. Hennessy, J. L., & Patterson, D. A. (2019). Computer architecture: A quantitative approach. Morgan Kaufmann / Elsevier Publishers.
3. Hayes, J. P. (2017). Computer organization and architecture. Tata McGraw Hill.
4. Sarangi, S. R. (2023). Next-gen computer architecture. White Falcon Publishing.
5. Patterson, D. A., & Hennessy, J. L. (2020). Computer organization and design: The hardware/software interface. Morgan Kaufmann / Elsevier.
6. Heuring, V. P., & Jordan, H. F. (2004). Computer systems design and architecture. Pearson Education.


**E Resources / E materials:**

1. https://onlinecourses.nptel.ac.in/noc22_cs88/preview?utm_source=chatgpt.com
2. https://www.coursera.org/learn/comparch
3. https://epgp.inflibnet.ac.in/Home/ViewSubject?catid=fBYckQKJvP3a/8Vd3L08tQ
4. https://www.coursera.org/learn/build-a-computer

| | Description of CO | PO | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|
| CO1 | Describe the functional units and instruction set architectures of a computer system. | | | | |
| CO2 | Apply knowledge of processor functionality to implement and analyze the internal operations of a computer system. | PO1 (3) | | | |
| CO3 | Design and analyze basic digital systems and control units for efficient instruction execution | PO2 (2) | | | |
| CO4 | Recognize the importance of learning advancements to keep up with evolving computer architecture | PO11 (1) | | | |

| UC25H02 | தமிழர்களும் தொழில்நுட்பமும் | L | T | P | C |
|---|---|---|---|---|---|
| | | 1 | 0 | 0 | 1 |

**நெசவு மற்றும் பானைத் தொழில்நுட்பம்**: சங்க காலத்தில் நெசவுத் தொழில், பானைத் தொழில்நுட்பம், கருப்பு சிவப்பு பாண்டங்கள், பாண்டங்களில் கீறல் குறியீடுகள்.

**வடிவமைப்பு மற்றும் கட்டிடத் தொழில்நுட்பம்**: சங்க காலத்தில் வடிவமைப்பு மற்றும் கட்டுமானங்கள் & சங்க காலத்தில் வீட்டுப் பொருட்களில் வடிவமைப்பு- சங்க காலத்தில் கட்டுமான பொருட்களும் நடுகல்லும், சிலப்பதிகாரத்தில் மேடை அமைப்பு பற்றிய விவரங்கள், மாமல்லபுரச் சிற்பங்களும், கோவில்களும், சோழர் காலத்துப் பெருங்கோயில்கள் மற்றும் பிற வழிபாட்டுத் தலங்கள், நாயக்கர் காலக் கோயில்கள், மாதிரி கட்டமைப்புகள் பற்றி அறிதல், மதுரை மீனாட்சி அம்மன் ஆலயம் மற்றும் திருமலை நாயக்கர் மஹால், செட்டிநாட்டு வீடுகள், பிரிட்டிஷ் காலத்தில் சென்னையில் இந்தோ-சாரோசெனிக் கட்டிடக் கலை.

**உற்பத்தித் தொழில் நுட்பம்**: கப்பல் கட்டும் கலை, உலோகவியல், இரும்புத் தொழிற்சாலை, இரும்பை உருக்குதல், எஃகு, வரலாற்றுச் சான்றுகளாக செம்பு மற்றும் தங்க நாணயங்கள், நாணயங்கள் அச்சடித்தல், மணி உருவாக்கும் தொழிற்சாலைகள், கல்மணிகள், கண்ணாடி மணிகள், சுடுமண் மணிகள், சங்கு மணிகள், எலும்புத்துண்டுகள், தொல்லியல் சான்றுகள், சிலப்பதிகாரத்தில் மணிகளின் வகைகள்.

**வேளாண்மை மற்றும் நீர்ப்பாசனத் தொழில் நுட்பம்**: அணை, ஏரி, குளங்கள், மதகு, சோழர்காலக் குமுழித் தூம்பின் முக்கியத்துவம், கால்நடை பராமரிப்பு, கால்நடைகளுக்காக வடிவமைக்கப்பட்ட கிணறுகள், வேளாண்மை மற்றும் வேளாண்மைச் சார்ந்த செயல்பாடுகள், கடல்சார் அறிவு, மீன்வளம், முத்து மற்றும் முத்துக்குளித்தல், பெருங்கடல் குறித்த பண்டைய அறிவு, அறிவுசார் சமூகம்.

**அறிவியல் தமிழ் மற்றும் கணித்தமிழ்**: அறிவியல் தமிழின் வளர்ச்சி, கணித்தமிழ் வளர்ச்சி, தமிழ் நூல்களை மின்பதிப்பு செய்தல், தமிழ் மென்பொருட்கள் உருவாக்கம், தமிழ் இணையக் கல்விக்கழகம் – தமிழ் மின் நூலகம், இணையத்தில் தமிழ் அகராதிகள், சொற்குவைத் திட்டம்.

**References:**


1. தமிழக வரலாறு – மக்களும் பண்பாடும் – கே.கே. பிள்ளை (வெளியீடு: தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்).
2. கணினித் தமிழ் – முனைவர் இல. சுந்தரம். (விகடன் பிரசுரம்).
3. கீழடி – வைகை நதிக்கரையில் சங்ககால நகர நாகரிகம் (தொல்லியல் துறை வெளியீடு)
4. பொருநை – ஆற்றங்கரை நாகரிகம். (தொல்லியல் துறை வெளியீடு)
5. Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL – (in print)
6. Social Life of the Tamils – The Classical Period (Dr.S.Singaravelu) (Published by: InternationalInstitute of Tamil Studies.
7. Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thirunavukkarasu) (Published by: International Institute of Tamil Studies).
8. The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: International Institute of Tamil Studies.)
9. Keeladi – 'Sangam City C ivilization on the banks of river Vaigai' (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
10. Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay) (Publishedby: The Author)
11. Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Bookand Educational Services Corporation, Tamil Nadu)
12. Journey of Civilization Indus to Vaigai (R.Balakrishnan) (Published by: RMRL) – Reference Book.

| UC25H02 | Tamils and Technology | L | T | P | C |
|---|---|---|---|---|---|
| | | 1 | 0 | 0 | 1 |

**Weaving and Ceramic Technology:** Weaving Industry during Sangam Age, Ceramic technology, Black and Red Ware Potteries (BRW), Graffiti on Potteries.

**Design and Construction Technology:** Designing and Structural construction House & Designs in household materials during Sangam Age, Building materials and Hero stones of Sangam age, Details of Stage Constructions in Silappathikaram, Sculptures and Temples of Mamallapuram, Great Temples of Cholas and other worship places - Temples of Nayaka Period -Type study (Madurai Meenakshi Temple), Thirumalai Nayakar Mahal -Chetti Nadu Houses, Indo-Saracenic architecture at Madras during British Period.

**Manufacturing Technology:** Art of Ship Building - Metallurgical studies, Iron industry, Iron smelting, steel -Copper and gold- Coins as source of history - Minting of Coins, Beads making-industries Stonebeads, Glass beads, Terracotta beads -Shell beads/ bone beats, Archeological evidences - Gem stone types described in Silappathikaram.

**Agriculture and Irrigation Technology:** Dam, Tank, ponds, Sluice, Significance of Kumizhi Thoompuof Chola Period, Animal Husbandry - Wells designed for cattle use - Agriculture and Agro Processing - Knowledge of Sea, Fisheries, Pearl, Conche diving - Ancient Knowledge of Ocean -Knowledge Specific Society.

**Scientific Tamil & Tamil Computing:** Development of Scientific Tamil, Tamil computing, Digitalization of Tamil Books, Development of Tamil Software, Tamil Virtual Academy, Tamil Digital Library, Online Tamil Dictionaries, Sorkuvai Project.

**References:**


1. தமிழக வரலாறு – மக்களும் பண்பாடும் – கே.கே. பிள்ளை (வெளியீடு: தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்).
2. கணினித் தமிழ் – முனைவர் இல. சுந்தரம். (விகடன் பிரசுரம்).
3. கீழடி – வைகை நதிக்கரையில் சங்ககால நகர நாகரிகம் (தொல்லியல் துறை வெளியீடு)
4. பொருநை – ஆற்றங்கரை நாகரிகம். (தொல்லியல் துறை வெளியீடு)
5. Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL – (in print)
6. Social Life of the Tamils – The Classical Period (Dr.S.Singaravelu) (Published by: International Institute of Tamil Studies.
7. Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thirunavukkarasu) (Published by: International Institute of Tamil Studies).
8. The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: International Institute of Tamil Studies.)
9. Keeladi – 'Sangam City C ivilization on the banks of river Vaigai' (Jointly Published by: Department ofArchaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
10. Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay) (Publishedby: The Author)
11. Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Bookand Educational Services Corporation, Tamil Nadu)
12. Journey of Civilization Indus to Vaigai (R.Balakrishnan) (Published by: RMRL) – Reference Book.

| PH25C03 | Applied Physics (CSIE) – II | L | T | P | C |
|---|---|---|---|---|---|
| | | 2 | 1 | 0 | 3 |

**Course Objectives:**

- To provide a comprehensive understanding of physics concepts in computer science and engineering applications.

**Magnetic Materials:** Parameters, Ferromagnetic materials, Ferrites - Soft and Hard magnetic materials – GMR sensors - magnetic disk memories – Principle of magnetic recording – Magnetic data storage.

**Activities:** Determination of Hysteresis loop for ferromagnetic materials.

**Logic Gates:** Conversion of Binary to decimal - decimal to binary – binary coded decimal code-logic gates (OR, AND, NOT, NAND and NOR)–Exclusive OR gate-simplification based on basic Boolean theorems (sum of products, product of sums expression)- simplification by Karnaugh Map method (don't care conditions).

**Activities:** Virtual demonstration of Logic Gates.

**Nano-Devices:** Introduction – electron density in bulk material – size dependence of Fermi energy-quantum confinement – quantum structures: quantum wells, wires and dots – band gap of nanomaterials. Tunneling- Coulomb blockade - single electron transistor - resonant-tunneling diode- Carbon nanotubes: Properties and applications.

**Activities:** Virtual demonstration of single electron transistor

**Quantum Computing:** Quantum system for information processing - quantum states – classical bits – quantum bits or qubits – Bloch sphere -CNOT gate – Single and multiple qubits – quantum gates (Pauli – X, Y and Z Gates, Hadamard Gate, Phase gate - T gate .CNOT Gate) – advantage of quantum computing over classical computing.

**Activities:** Virtual demonstration of quantum computing

**Weightage:** Continuous Assessment: 40%, End Semester Examinations: 60%

**Assessment Methodology:** Quiz (10%), Assignments (30%), Flipped Class (10%), Internal Examinations (50%)

**References:**


1. Kasap, S. O. (2007). Principles of electronic materials and devices. McGraw-Hill Education.
2. Bernhardt, C. (2019). Quantum computing for everyone. MIT Press.
3. Hanson, G. W. (2009). Fundamentals of nanoelectronics. Pearson Education.


**E-Resources:**

1. Single electron Transistor: https://youtu.be/MTT729LtB-o?si=RGaEhGgmyWJWcZib
2. Basics of quantum computing- https://lab.quantumflytrap.com
3. Single electron transistor - http://vlabs.iitkgp.ac.in/tcad

4. Quantum Computing:
   http://www.digimat.in/nptel/courses/video/106106232/L01.html
5. Review article: Claude Chappert, Albert Fert and Frédéric Nguyen Van Dau, “The emergence of spin electronics in data storage” Nature Publishing 2007

| | Description of CO | PO | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|
| CO1 | Explain the concepts of physics in computer science stream. | --- | | | |
| CO2 | Apply appropriate techniques in physics to solve engineering problems. | PO1(3) | | | |
| CO3 | Analyse physical systems and interpret data from the virtual studies in the core branches in computer science and engineering. | PO2(2) | | | |

| CS25C07 | Object Oriented Programming | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 0 | 4 | 5 |

**Course Objectives:**

- To impart the principles of object-oriented programming and their advantages over procedural programming.
- To develop problem-solving skills by creating real-world applications using OOP features.

**Principles of Object-Oriented Programming:** Characteristics of object-oriented languages, C++ Program structure, Procedure Oriented Programming vs Object Oriented Programming, C++ constructs and syntax, tokens, variables, data-types, type conversion, operators, Expressions, Namespace, flow Control and decision, making statements.

**Practical:**

1. Simple programs to using Operators, and type conversion.
2. Programs using Conditional and Loop statements and loops.

**Classes and Objects:** Abstraction mechanism: Classes, Objects, member data, member functions - Constructors and types - destructors, inline function, friend function -- array of objects, objects as function arguments - memory allocation for objects, static members static data and static function.

**Practical:**

1. Programs using in-line and friend functions.
2. Programs using constructors and destructors

**Inheritance and Compile Time Polymorphism:** Inheritance: Derived Classes – Single inheritance – Multilevel Inheritance – Multiple Inheritance - Hierarchical inheritance – Hybrid inheritance. Operator Overloading: Compile time Polymorphism – Overloading Functions, Overloading Operators, Overloading Unary Operators – Overloading Binary Operators – Operator Overloading with Friend Functions.

**Practical:**

1. Programs for inheritance and its types.
2. Programs using friend function and operator overloading.

**Pointers and Runtime Polymorphism:** Pointers with arithmetic operations - this pointer – Pointers to Derived classes and Base classes - Compile time versus Runtime Polymorphism - Virtual functions - Late Binding - Abstract classes- Pure virtual functions and Virtual Destructors - Virtual base class.

**Practical:**

1. Programs for pointer manipulation.
2. Programs for virtual functions.

**Templates and Exception Handling:** Class Templates - Function Templates – Overloading of Template Functions - String, iterators, hashes, IO streams; Exception Handling.

**Practical:**

1. Programs using function and class templates.
2. Programs using exception handling.

**I/O Systems and File I/O:** C++ Streams - Formatted and Unformatted I/O –File stream classes – File modes - File operations, Sequential Read / Write operations – Binary and ASCII Files - Error handling in file I/O with member function.

**Practical Activities**

1. Programs for error handling in file and I/O management
2. Develop applications using OOP features.

**Weightage:** Continuous Assessment: 40%, End Semester Examinations: 60%

**Assessment Methodology:** Quiz (5%), Assignments (10%), Flipped Classroom (5%), Project (20%), Review of GATE questions (10%) & Internal Assessment (50%).

**References:**


1. Deitel, P., & Deitel, H. (2024). C++ how to program: An objects-natural approach. Pearson Education.
2. Bronson, G. (2011). A first book of C++. Course Technology Inc.
3. Balagurusamy, E. (2020). Object oriented programming with C++. McGraw Hill Education.


**eResources / eMaterials**

1. https://en.cppreference.com/w/cpp
2. https://youtu.be/M-mKgBHaMb0?si=1I-pEiAFgwwBA8IC

| | Description of CO | PO | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|
| CO1 | Understand the core OOP concepts and applications | --- | | | |
| CO2 | Apply Object Oriented Paradigms to solve problems using C++ | PO1 (3) | | | |
| CO3 | Design and Analyze solutions involving code reusability and complexity management | PO2 (2) | | | |
| CO4 | Demonstrate life-long learning skills through application development | PO11 (1) | | | |

| EN25C02 | English Essentials – II | L | T | P | C |
|---|---|---|---|---|---|
| | | 1 | 0 | 2 | 2 |

**Course Objectives:**

- To integrate vocabulary and functional grammar into communication tasks to improve fluency and accuracy.
- To articulate ideas clearly and effectively in formal and informal spoken interactions.
- To construct well-organised written documents including summaries, reports, and emails relevant to academic and workplace contexts.

**Communication:** Types, Inter and Intra-personal, communication barriers, Summarising visuals, media terminology, rhetorical devices and TED Talks.

**Activities:** Short presentation, Media based responses and Speeches, Error detection, Welcome, Vote of Thanks and Formal Speeches, Listen and respond to short podcast, Worksheets.

**Correspondence:** Modal Verbs, Job Application Letters, Resume Writing, Statement of Purpose, Paraphrasing & Summarizing, Executive Summary.

**Activities:** Email writing, Submission of applications, Graphical summaries, Report on college events.

**Professional Writing:** Paraphrasing & Summarizing, Executive Summary, Proposal, Decision Making, Recommendations.

**Activities:** Report preparation and recommendation letters.

**Team Work:** Team Leader, Quality of Team leader, Leadership model, Negotiations.

**Activities:** SWOT Analysis, Mock meetings, Group discussions, Brainstorming sessions.

**Weightage:** Continuous Assessment: 50%, End Semester Examinations: 50%

**Assessment Methodology:** Worksheets (10%), Group Activity (20%), Report Writing (20%), Internal Examinations (50%)

**References:**


1. Koneru Aruna. (2020). English Language Skills for Engineers. McGraw Hill Education.
2. Taylor, Shirley & Chandra.V. (2010). Communication for Business A Practical Approach. India: Pearson Longman.
3. Ian Badger, et al., (2014). Listening: B2 (Collins English for Life: Skills), Collins.
4. Raymond Murphy (2019), Grammar in Use, Cambridge University Press.


**E-Resources:**

1. Communication for Business Success- https://open.umn.edu/opentextbooks/textbooks/8
2. TED Talks – https://www.ted.com/

| | Description of CO | PO | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|
| CO1 | Understand the importance of communication and drafting skills in engineering and technology. | --- | | | |
| CO2 | Apply listening strategies to comprehend spoken English in various contexts. | PO1(3) | | | |
| CO3 | Participate actively in group discussions by analysing critically from different views. | PO2(2)<br>PO8(1) | | | |
| CO4 | Create written reports coherently for various purposes. | PO9(2) | | | |
| CO5 | Adapt communication styles to global, multicultural environments. | PO11(1) | | | |

| ME25C05 | Re-Engineering for Innovation | L | T | P | C |
|---|---|---|---|---|---|
| | | 0 | 0 | 4 | 2 |

**Course Objectives:**

- To cultivate foundational skills in prototyping, and automation for development of prototypes with real-world applications.
- To provide a comprehensive, hands-on exposure to product development through reverse engineering concepts.

**Bootcamp 1:** Introduction to Product Development, Reverse Engineering, Overview of the product lifecycle, Hands-on disassembly of simple products, Practice of basic measurements and sketching, Introduction to CAD modeling of disassembled parts, Virtual assembly of parts.

**Bootcamp 2:** Embedded System Programming (Open-source platforms), Practice of interfacing sensors, reading data, automation in home, healthcare and agriculture.

**Reverse Engineering:** Sketch and prototype alternative designs, Group brainstorming sessions, Manufacture prototype parts using 3D printing and / or workshop tools, Assemble prototype product.

**Weightage:** Continuous Assessment: 60%, End Semester Examinations: 40%

**Assessment Methodology:** Project (30%), Assignment (10%), Practical (30%), Internal Examinations (30%)

**References:**


1. Wang, W. (2010). Reverse engineering: Mechanisms, structures, systems & materials. CRC Press.
2. Margolis, M. (2020). Arduino cookbook: Recipes to begin, expand, and enhance your projects (3rd ed.). O'Reilly Media.


**E-Resources:**

1. GrabCAD – https://grabcad.com/
2. GitHub – https://github.com/

| | Description of CO | PO | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|
| CO1 | Understand the product development lifecycle, including stages such as concept generation, design, prototyping, and testing. | --- | | | |
| CO2 | Apply reverse engineering techniques to analyze and document existing products. | PO1 (3)<br>PO2 (2) | | | |
| CO3 | Collaborate in teams to fabricate prototypes using appropriate tools. | PO5 (2)<br>PO8 (1)<br>PO9 (1) | | | |
| CO4 | Engage in independent learning and continuously adapt to emerging technologies in product design | PO11(2) | | | |

| UC25A03 | Life Skills for Engineers – II | L | T | P | C |
|---|---|---|---|---|---|
| | | 1 | 0 | 2 | - |

**Course Objectives:**

- To impart and cultivate analytical reasoning, innovative thinking, effective collaboration, and ethical leadership to prepare students for complex challenges in professional and personal environments**.**

**Critical Thinking:** Creativity, Critical Thinking, Collaboration, Problem Solving, Decision Making, Imagination, Intuition, Experience, Sources of Creativity, Lateral Thinking, Myths of creativity, Critical thinking Vs Creative thinking, Convergent & Divergent Thinking, Critical reading & Multiple Intelligence.

**Activities:** Two-Brainstorm Method, “30 Circles” Challenge, “Desert Survival” Simulation, Lateral thinking riddles and puzzles, "What If?" Scenario Writing, Fast vs. Slow Thinking Game, Creativity Myth Busters

**Problem Solving:** Techniques, Six Thinking Hats, Mind Mapping, Forced Connections. Analytical Thinking, Numeric, symbolic, and graphic reasoning. Scientific temperament and Logical thinking.

**Activities:** Case study analysis, Escape Room challenge.

**Leadership:** Leadership Styles & Self-Assessment, Communication & Active Listening, Decision-Making & Responsibility, Teamwork & Delegation, Empathy, Integrity & Conflict Management, Vision, Motivation & Goal-Setting.

**Activities:** Crisis Leadership Simulation, Tower Challenge, Leadership Dilemmas Role-Play, Team Vision Board

**Weightage:** Continuous Assessment: 100%

**Assessment Methodology:** Assignments (20%), Flipped Class & Worksheets (10%), Practical (30%), Internal Examinations (40%)

**References:**


1. De Bono, E. (2017). Six thinking hats, Little, Brown Book Group.
2. Facione, P. A. (2015). Critical thinking: What it is and why it counts. Insight Assessment.
3. Kahneman, D. (2011). Thinking, fast and slow. Farrar, Straus and Giroux.
4. Whetten, D. A., & Cameron, K. S. (2016). Developing management skills. Pearson


| | Description of CO | PO | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|
| CO1 | Explain the importance of leadership and management skills in life. | --- | | | |
| CO2 | Apply and demonstrate creative thinking techniques to generate innovative solutions. | PO7 (3) | | | |
| CO3 | Exhibit effective collaboration and communication skills through teamwork, active listening, and conflict resolution strategies. | PO8 (2) | | | |

| UC25A04 | Physical Education - II | L | T | P | C |
|---|---|---|---|---|---|
| | | 0 | 0 | 4 | 1 |

**Course Objectives:**

- To impart knowledge on gymnastic exercises and pressing needs for upskilling in a particular game.

**Basic gymnastics exercises:** Warming up, Suitable exercise, Lead up games, Safety education, Movement education, Balanced Walk, execution, floor exercise, tumbling/acrobatics, grip, release, swinging, parallel bar exercise, horizontal bar exercise, flic-flac-walk and pyramids.

**Upskilling in any one of the athletics:** Broad Jump, High Jump, Triple Jump, Relay Sprints, Javelin Throw, Discuss Throw, Shot Put, Short and Long-distance Running.

**Advance skills in any one of the indoor/outdoor games, which has been opted by the student in the I semester.**

**Weightage:** Continuous Assessment: 100%

**Assessment Methodology:** Attendance (60%), Quiz (10%), Participation in Sports and Games (20%) and Viva Voce (10%)

**References:**


1. Singh, A. (2008). Essentials of physical education. Kalyani Publishers.
2. Kamlesh, M. L. (2006). Psychology in physical education and sport (3rd ed.). Metropolitan Book Co.
3. Mangal, S. K. (2009). *Psychology of sports performance*. Sports Publication.
4. Kandappan, K. (2004). *Foundations of physical education*. Friends Publications.


**E-resources:**

**https://www.who.int/health-topics/physical-activity**

| | CO Description | PO | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|
| CO1 | Understand and explain the importance of physical activity for mental and physical health. | --- | | | |
| CO2 | Apply safety principles and methods during sports activities. | PO1(3) | | | |
| CO3 | Develop teamwork, discipline, and leadership through sports and group activities and collaborate effectively. | PO8 (3) | | | |
| CO4 | Demonstrate the advanced technical skills and strategic understanding in the game of their interest. | PO11(1) | | | |

## Foreign Language

| UC25F01 | Deutsch – I | L | T | P | C |
|---|---|---|---|---|---|
| | | 1 | 0 | 2 | - |

**Course Objectives:**

- To impart fundamentals of the Deutsch language, including reading, writing systems, pronunciation, and speaking.

**Basics & Introduction:** German alphabet and pronunciation, Basic greetings and farewells, Introducing yourself and others (Ich heiße…, Wer bist du?), Numbers 1–100 and days of the week, Personal pronouns (ich, du, er, sie…), Sentence structure (SVO word order).

**Activities:** Alphabet spelling game, short skits, Use color-coded cards for SVO sentences.

**Grammar Essentials & Everyday Vocabulary:** Present tense of regular verbs (spielen, arbeiten, machen…), Common irregular verbs: sein (to be), haben (to have), gehen, kommen, Articles and gender (der, die, das; ein, eine), Simple questions and negation (nicht, kein), Describing people and things: adjectives and colors, Family, school, food, and common objects vocabulary.

**Activities:** Conjugate regular and irregular verbs, “Question Chain” game, Create a simple family tree.

**Everyday Communication in German:** Asking for and giving directions, Telling the time and talking about schedules, Ordering food and drinks at a café or restaurant, Talking about hobbies, weather, and daily routines, Listening to short conversations and responding appropriately, Introduction to German culture and formal/informal language use (du vs Sie).

**Activities:** Ordering food and drinks, Give directions, Formal / Informal greetings, Do’s and Don’ts.

**Weightage:** Continuous Assessment: 100%

**Assessment Methodology:** Assignments (30%), Quiz (10%) and Internal Examinations 60%

**References:**

1. Funk, H., Kuhn, C., & Demme, S. (2015). Menschen A1: Deutsch als Fremdsprache Kursbuch. Hueber Verlag.

| | CO Description | PO | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|
| CO1 | Understand simple spoken Deutsch in everyday contexts. | --- | | | |
| CO2 | Communicate with widely used Deutsch words effectively. | PO9 (2) | | | |
| CO3 | Develop the skills necessary for self-directed learning and continuous improvement in Deutsch language. | PO11 (1) | | | |

| UC25F02 | Japanese – I | L | T | P | C |
|---|---|---|---|---|---|
| | | 1 | 0 | 2 | - |

**Course Objectives:**

- To impart fundamentals of the Japanese language, including reading, writing systems, pronunciation, and speaking.

**Writing Systems & Basic Communication:** Introduction to Hiragana: vowels, basic characters, reading & writing, Introduction to Katakana: basic characters and usage, Basic greetings and farewells (こんにちは, おはようございます, さようなら), Introducing yourself (名前、出身、年齢), Basic sentence structure: Subject–Object–Verb, Numbers 1–100, days of the week, classroom expressions.

**Activities:** Flashcard games and writing drills, Self-introduction, Numbers & date-matching, Greeting expressions, Listening to audio.

**Grammar & Everyday Vocabulary:** Particles: は (wa), を (wo), の (no), へ (e), に (ni), Present tense verbs: です, ます-form conjugation (たべます、のみます), Negative forms: ではありません, ません, Describing people and objects using adjectives (い and な), Question formation: なに、どこ、だれ、いつ, Vocabulary for family, food, colors, and basic actions.

**Activities:** Verb conjugation drills, Guessing game, Picture description, “Shopping” with food vocab and counters

**Conversation & Cultural Etiquette:** Talking about routines and schedules (daily verbs, time expressions), Asking and giving simple directions (〜はどこですか？), Ordering food and making polite requests (〜をください、〜をおねがいします), Expressing likes and dislikes (すき・きらい), Listening to short conversations and identifying key phrases, Introduction to formal/informal speech and Japanese etiquette.

**Activities:** Skits and role-plays, daily schedule, beginner-level dialogue, Group discussion on etiquette.

**Activities:** Practice worksheets and flashcards for hiragana, Writing drills and reading simple katakana words, Dialogue practice for greetings and self-introduction, Sentence construction exercises with basic SOV structure, Particle usage exercises and short dialogues, Role-play scheduling, shopping, and telling time, Verb conjugation drills for common verbs, Descriptive sentence exercises using adjectives, Practice Q&A dialogues forming questions and negations, Kanji writing practice and quizzes for basic characters, Vocabulary tests and conversational practice on daily topics, Oral presentations and listening comprehension quizzes.

**Weightage:** Continuous Assessment: 100%

**Assessment Methodology:** Assignments (30%), Quiz (10%) and Internal Examinations 60%

**References:**


1. Banno, E., Ikeda, Y., Ohno, Y., Shinagawa, C., & Tokashiki, K. (2011). Genki I: An integrated course in elementary Japanese. The Japan Times.
2. The Japan Foundation. (2017). Marugoto Japanese language and culture starter (A1) course book for communicative language activities. Goyal Publishers.


| | CO Description | PO | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|
| CO1 | Understand simple spoken Japanese in everyday contexts. | --- | | | |
| CO2 | Communicate with widely used Japanese words effectively. | PO9 (2) | | | |
| CO3 | Develop the skills necessary for self-directed learning and continuous improvement in Japanese language. | PO11 (1) | | | |

| UC25F03 | Korean – I | L | T | P | C |
|---|---|---|---|---|---|
| | | 1 | 0 | 2 | - |

**Course Objectives:**

- To impart fundamentals of the Korean language, including reading, writing systems, pronunciation, and speaking.

**Fundamentals of Korean:** Introduction to Hangul: consonants and vowels, Basic pronunciation and syllable formation, Common greetings and self-introductions, Numbers (Sino-Korean and Native Korean basics), Basic sentence structure (Subject-Object-Verb), Simple expressions (e.g., 감사합니다, 안녕하세요).

**Activities:** Writing and reading Hangul practice sheets, Pronunciation drills and audio repetition, Dialogue practice for greetings and self-introduction, Counting and number exercises.

**Essential Grammar and Vocabulary:** Particles (은/는, 이/가, 을/를) and usage, Basic verbs and present tense conjugation, Sentence patterns: affirmative, negative, interrogative, Common adjectives and descriptive sentences, Expressing possession and location, Asking simple questions (어디, 뭐, 누구).

**Activities:** Verb conjugation and sentence formation drills, Role-play conversations for shopping and daily routines, Descriptive writing and speaking exercises, Question and answer practice.

**Everyday Korean Communication:** Polite speech levels and honorifics introduction, Talking about time, dates, and schedules, Ordering food, shopping phrases, counting objects, Simple directions and transportation vocabulary, Listening practice with short dialogues, Cultural notes on etiquette and communication.

**Activities:** Role-play ordering at a restaurant or buying items, Listening comprehension exercises, Giving and asking for directions practice, Group conversations and presentations.

**Weightage:** Continuous Assessment: 100%

**Assessment Methodology:** Assignments (30%), Quiz (10%) and Internal Examinations 60%

**References:**


1. King, R., Yeon, J., & Brown, A. (2015). Elementary Korean (2nd ed.). Tuttle Publishing.
2. Cho, Y., Lee, H., Schulz, C., Sohn, H.-M., & Sohn, S.-O. (2001). Integrated Korean: Beginning 1. University of Hawai‘i Press.

| | CO Description | PO | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|
| CO1 | Understand simple spoken Korean in everyday contexts. | --- | | | |
| CO2 | Communicate with widely used Korean words effectively. | PO9 (2) | | | |
| CO3 | Develop the skills necessary for self-directed learning and continuous improvement in Korean language. | PO11 (1) | | | |