# 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)

## Program Outcomes

1. **Engineering Knowledge**: Apply math, science, and engineering fundamentals to complex problems.
2. **Problem Analysis**: Identify and analyze complex problems using research and sustainability principles.
3. **Design Solutions**: Design systems and processes considering health, safety, cost, culture, and environment.
4. **Investigations**: Use experiments, modelling, and data analysis to reach valid conclusions.
5. **Engineering Tools**: Apply modern tools for modelling and problem-solving, recognizing their limits.
6. **Society & Environment**: Assess societal, legal, and environmental impacts of engineering solutions.
7. **Ethics**: Commit to ethics, human values, diversity, and legal compliance.
8. **Teamwork**: Work effectively as an individual and in multidisciplinary teams.
9. **Communication**: Communicate clearly in reports, presentations, and documentation across diverse groups.

10. **Management & Finance**: Apply management and economic principles in projects and teamwork.
11. **Lifelong Learning**: Engage in continuous learning, adapt to new technologies, and think critically.

## Programme Specific Outcomes

**PSO1** Analyze, design, and develop electrical circuits and systems for various industrial and societal requirements.

**PSO2** Utilize modern tools and techniques for solving complex problems in electrical and electronic systems and provide sustainable solutions.

**PSO3** Upskill with rapid advancements in the field of Electrical Engineering and exhibit research aptitude, work effectively as team and uphold ethical practices.

| 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 | 1 | HUM |
| 10. | UC25A02 | Physical Education – I* | --- | 0-0-4 | 4 | 1 | HUM |
| 11. | | NCC / NSS / NSO | --- | --- | --- | --- | --- |
| | | | | **Total Credits** | **33** | **23** | |

*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 | 1 | HUM |
| 10. | UC25A04 | Physical Education – II* | --- | 0-0-4 | 4 | 1 | HUM |
| 11. | | Foreign Language^ | LIT | 1-0-2 | 3 | 1 | 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. | | 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 |
| **OR** | | | | | | | |

| Semester – V | | | | | | | |
|---|---|---|---|---|---|---|---|
| S. No. | Course Code | Course Name | Course Type | Periods / Week | | Credits | Category |
| | | | | L-T- P | TCP | | |
| 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 – VI | | | | | | | |
|---|---|---|---|---|---|---|---|
| S. No. | Course Code | Course Name | Course Type | Periods / Week | | Credits | Category |
| | | | | L-T-P | TCP | | |
| 1. | | Electrical Machine Design | T | 3-1-0 | 4 | 4 | ES (PC) |
| 2. | | Microprocessors & Microcontrollers | LIT | 3-0-2 | 5 | 4 | ES (PC) |
| 3. | | Power System Protection and Switch Gear | T | 3-0-0 | 3 | 3 | ES (PC) |
| 4. | | Programme Elective – III (from Emerging Technology) | T | 3-0-0 | 3 | 3 | ES (PE) |
| 5. | | Open Elective | T | 3-0-0 | 3 | 3 | -- |
| 6. | | Introduction to Standards in Electrical Engineering | T | 1-0-0 | 1 | 1 | ES (PC) |
| 7. | | Power Electronics | LIT | 3-0-2 | 5 | 4 | ES (PC) |
| 8. | | Industry Oriented Course – II | LIT | 1-0-2 | 3 | 1 | SD |
| 9. | | Self-Learning Course | T | 1-0-0 | 0 | 1 | -- |
| | | | **Total Credits** | | **27** | **24** | |
| **For Honours Degree** | | | | | | | |
| 1. | | Capstone Design Project – Level II | CDP | 0-0-12 | 12 | 6 | SD |
| **OR** | | | | | | | |
| 1. | | Honours Elective – III | T | 3-0-0 | 3 | 3 | |
| 2. | | Honours Elective – IV | T | 3-0-0 | 3 | 3 | |
| **For Minor Degree** | | | | | | | |
| 1. | | Minor Elective – III | T | 3-0-0 | 3 | 3 | |
| 2. | | Minor Elective – IV | T | 3-0-0 | 3 | 3 | |

| Semester – VII | | | | | | | |
|---|---|---|---|---|---|---|---|
| **S. No.** | **Course Code** | **Course Name** | **Course Type** | **Periods / Week** | | **Credits** | **Category** |
| | | | | **L-T-P** | **TCP** | | |
| 1. | | Engineering Entrepreneurship Development | T | 2-0-2 | 4 | 3 | HUM |
| 2. | | Climate Change and Sustainability | T | 2-0-0 | 2 | 2 | HUM |
| 3. | | High Voltage Engineering | T | 3-0-0 | 3 | 3 | ES (PC) |
| 4. | | Programme Elective – IV | T | 3-0-0 | 3 | 3 | ES (PE) |
| 5. | | Programme Elective – V | T | 3-0-0 | 3 | 3 | ES (PE) |
| 6. | | Project Management | T | 2-0-0 | 2 | 2 | HUM |
| 7. | | Power System Laboratory | L | 0-0-4 | 4 | 2 | ES (PC) |
| 8. | | Summer Internship | --- | --- | --- | 1 | SD |
| | | | | **Total Credits** | **21** | **19** | |
| **For Honours Degree** | | | | | | | |
| 1. | | Capstone Design Project – Level III | CDP | 0-0-12 | 12 | 6 | SD |
| **OR** | | | | | | | |
| 1. | | Honours Elective – V | T | 3-0-0 | 3 | 3 | |
| 2. | | Honours Elective – VI | T | 3-0-0 | 3 | 3 | |
| **For Minor Degree** | | | | | | | |
| 1. | | Minor Elective – V | T | 3-0-0 | 3 | 3 | |
| 2. | | Minor Elective – VI | T | 3-0-0 | 3 | 3 | |

| Semester – VIII | | | | | | | |
|---|---|---|---|---|---|---|---|
| **S. No.** | **Course Code** | **Course Name** | **Course Type** | **Periods/Week** | | **Credits** | **Category** |
| | | | | **L-T-P** | **TCP** | | |
| 1 | | Project Work / Internship cum Project Work | PW / IPW | 0-0-16 | 16 | 8 | SD |
| | | | | **Total Credits** | **16** | **8** | |

**Total Credits of the Programme: 163**

| PROGRAMME ELECTIVE COURSES – STREAMS | | | | | |
|---|---|---|---|---|---|
| **Power Engineering** | **Power Electronic Converters and Drives** | **Embedded Systems** | **Electric Vehicle Technology** | **Advanced Control** | **Diversified Courses** |
| Utilization and Conservation of Electrical Energy | Special Electrical Machines | Digital Signal Processing | e-Mobility | Process modelling and Simulation | Hybrid Energy Technology |
| Substation Engineering and Automation | Modern Power Converters | Smart System Automation | Electric Vehicle Architecture | Computer Control of Processes | Design and Modelling of Renewable Energy Systems |
| Restructured Power Market | Analysis of Electrical Machines | MEMS and NEMS | Design of Motor and Power Converters for Electric Vehicles | Model based Control | Energy Management and Auditing |
| Smart Grid | SMPS and UPS | Embedded Communication Protocols | Battery Management Systems | Non Linear Control | VLSI Design |
| HVDC and FACTS | Power Electronics for Renewable Energy Systems | Embedded System Design | EV Charging infrastructure | Optimal Control | Substation Erection |
| Power system Transients | Control of Power Electronic systems | Embedded Processors | Safety and Testing of Electric Vehicles | Adaptive Control | Power Plant Engineering |
| Renewable Energy Systems | | Internet of things | Connected Vehicles | Process Control | EMI and EMC |
| Power System Operation and Control | Electrical Drives | Signals and Systems | Drone Technologies | System Identification Techniques | Machine Learning |
| Grid Integration Techniques | Power Quality | - | - | Factory Automation | Energy Storage System |
| Condition Monitoring and Testing of Electrical Equipment | - | - | - | - | - |

# 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 | PSO |
|---|---|---|---|
| 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) | PSO1(2)<br>PSO2(2) |
| CO3 | Analyze the behavior of single and multivariable functions using derivatives and partial derivatives. | PO2(3) | PSO1(2)<br>PSO3(1) |
| CO4 | Utilize modern computational software and online platforms to deepen understanding, perform complex calculations, and visualize mathematical concepts. | PO5(2)<br>PO11(1) | PSO2(3)<br>PSO3(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 | PSO |
|---|---|---|---|
| CO1 | Explain core electrical engineering concepts. | --- | PSO1 (1)<br>PSO3 (1) |
| CO2 | Apply basic engineering calculations in electrical systems. | PO1(3) | PSO1 (2)<br>PSO3 (1) |
| CO3 | Identify common various components and its applications in various electrical circuits | PO2 (3) | PSO1 (1)<br>PSO3 (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) (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:**

- Enhance learners' listening and speaking skills to understand and deliver speeches effectively
- Equip students with the skills to write clear, coherent, and grammatically correct texts for various purposes.
- Strengthen the ability to comprehend, interpret, and analyse written English across diverse contexts.

**Speaking Skills:** Self-Introduction (Tenses, Adjectives) Expressing opinions (Subject-Verb Agreement), Participating in Conversations (Speech Acts - agreeing & disagreeing – synonyms and antonyms**)**

**Suggested Activities:** Self-Introduction, Just a Minute (JAM) Video recording, Situational role plays, Spell Bee, Word Substitution, Usage of Apps.

**Listening Skills:** Listening to Simple Conversations (Understanding tone and intent), Short Speeches / Stories, Extracting information, Pronunciation, Listening to Various Accents.

**Suggested Activities:** Listening and Repeating, Gap fill exercises, Note-taking

**Reading Skills:** Reading Strategies – (Skimming, scanning, predicting) intensive reading - short passages and long passages on suggested themes (Sentence Patterns, Prefixes and suffixes, idioms and phrases).

**Activities:** Reading - newspaper and digital articles, Cloze, Reading comprehension, note making and summarising,

**Writing Skills:** Word Substitution, Sentence Formation, Hints Development (Guided Writing), Writing Different Types of Paragraphs - (Sentence Structure) – Letter Writing / Emails (Informal)

**Activities:** Error Detection, Picture and poster description, Descriptive, Narrative and Comparative paragraphs, Brainstorming and Mind Mapping - Informal letters/ Emails

**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** |
|---|---|---|---|
| CO1 | Listen and comprehend spoken English, take and draft notes. | --- | --- |
| CO2 | Apply vocabulary and grammar appropriately to communicate in written and spoken forms. | PO1(3) | PSO1(2)<br>PSO3(3) |
| CO3 | Analyze texts in different contexts using appropriate reading strategies. | PO2(2) | PSO2(1) |
| CO4 | Communicate thoughts and ideas in real life situations. | PO9(2) | PSO3(2) |
| CO5 | Develop communication skills relevant to engineering and technology. | PO11(1) | PSO3(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 | PSO |
|---|---|---|---|
| CO1 | Explain the physics concepts in various applications. | --- | --- |
| CO2 | Apply the principles of wave optics and laser physics in practical systems. | PO1(3) | PSO1(2)<br>PSO2(2) |
| CO3 | Analyse the behaviour of materials under different conditions. | PO2(2) | PSO1(2)<br>PSO3(1) |
| CO4 | Conduct experiments in groups and interpret the data. | PO4(3)<br>PO8(1) | PSO1(2)<br>PSO2(2) |

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

| 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/

| CO | Description of CO | PO | PSO |
|---|---|---|---|
| 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) | PSO1(3)<br>PSO3(1) |
| CO3 | To interpret the data and effectively communicate in groups. | PO2 (3)<br>PO8 (1)<br>PO9 (1) | PSO2(3)<br>PSO3(1) |
| CO4 | Adapt new programming concepts and technologies in the profession. | PO11 (1) | PSO2(1),<br>PSO3(3) |

| 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 | PSO |
|---|---|---|---|
| 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) | PSO2(1) |
| CO3 | Develop solid innovative models through software. | PO5(2) | PSO2(2) |
| CO4 | Adapt and follow safety protocols in the work environment. | PO11(2) | PSO3(2) |

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

**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 |
|---|---|---|---|
| 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) | PSO3(2) |
| CO3 | Develop and implement best practices in day-to-day life, in terms of planning and execution. | PO11 (3) | PSO3(2) |

| 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 | PSO |
|---|---|---|---|
| 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) | PSO1(1) |
| CO3 | Develop teamwork, discipline, and leadership through sports and group activities and collaborate effectively. | PO8(3) | PSO3(2) |
| CO4 | Demonstrate independent learning in health, nutrition, and fitness-related topics. | PO11(2) | PSO3(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** | **PSO** |
|---|---|---|---|
| CO1 | Explain the concepts of physics in electrical engineering stream. | --- | |
| CO2 | Apply appropriate techniques in physics to solve engineering problems. | PO1(3) | PSO1(3) |
| CO3 | Analyse physical systems and interpret data from the virtual studies in the core branches in electrical engineering. | PO2(2) | PSO1(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. Natarajan, K. V. (2025). A Text Book of Engineering Graphics. Dhanalakshmi Publisher.
2. Venugopal, K., & Prabhu Raja, V. (2022). Engineering Drawing + AutoCAD. New Age International Publishers.


**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 |
|---|---|---|---|
| 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) | PSO1(2) |
| CO3 | Analyse the various view and interpret the engineering drawings. | PO2(3) | PSO1(2) |
| CO4 | Use CAD tools for creation of various models. | PO3(1) | PSO2(2) |
| CO5 | Critically think and develop innovative models. | PO11(1) | PSO3(1) |

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

**Course Objectives:**

- Enable learners to improve fluency and accuracy in spoken and written communication.
- Develop learners' ability to articulate ideas clearly and effectively in formal and informal spoken interactions.
- Help learners construct well-organised written documents relevant to academic and workplace contexts.

**Oral Communication:** Types (Verbal and Nonverbal), Interpersonal and group communication, Telephonic conversation.

**Suggested Activities:** Short presentations, Debates, Formal Speeches (Welcome, Vote of Thanks and introducing guests), Listen and respond to short podcasts.

**Business Correspondence:** Email Communication, Formal Letters (Types), Business Meeting.

**Suggested Activities:** Email and letter writing (Complaint, request, permission), Agenda, minutes of the meeting.

**Academic Writing:** Paraphrasing, Summarizing, Essay Writing, Instructions and Recommendations.

**Suggested Activities:** Essay writing (Cause and effect, argumentative, persuasive), User guides/ manuals, policy document.

**Team Work:** Leadership Skills (Team building, Team Leader, Team player), Negotiation and Problem solving skills

**Suggested Activities:** SWOT Analysis, Brainstorming and Group discussions.

**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 | PSO |
|---|---|---|---|
| CO4 | Understand the importance of communication and drafting skills in engineering and technology. | --- | |
| CO5 | Apply listening strategies to comprehend spoken English in various contexts. | PO1(3) | PSO3(2) |
| CO6 | Participate actively in group discussions by analysing critically from different views. | PO2(2)<br>PO8(1) | PSO3(3) |
| CO7 | Create written reports coherently for various purposes. | PO9(2) | PSO3(2) |
| CO8 | Adapt communication styles to global, multicultural environments. | PO11(1) | PSO2(2) |

| 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 | PSO |
|---|---|---|---|
| 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) | PSO1(2) |
| CO3 | Collaborate in teams to fabricate prototypes using appropriate tools. | PO5 (2)<br>PO8 (1)<br>PO9 (1) | PSO3(3) |
| CO4 | Engage in independent learning and continuously adapt to emerging technologies in product design | PO11(2) | PSO2(2)<br>PSO3(2) |

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

**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 | PSO |
|---|---|---|---|
| CO1 | Explain the importance of leadership and management skills in life. | --- | |
| CO2 | Apply and demonstrate creative thinking techniques to generate innovative solutions. | PO7 (3) | PSO1(1)<br>PSO2(1) |
| CO3 | Exhibit effective collaboration and communication skills through teamwork, active listening, and conflict resolution strategies. | PO8 (2) | PSO3(3) |
| CO4 | Integrate scientific temperament and logical reasoning into c problem solving in engineering and real-world contexts. | PO11 (2) | PSO2(1)<br>PSO3(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 | PSO |
|---|---|---|---|
| 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) | PSO3(1) |
| CO3 | Develop teamwork, discipline, and leadership through sports and group activities and collaborate effectively. | PO8 (3) | PSO3(2) |
| CO4 | Demonstrate the advanced technical skills and strategic understanding in the game of their interest. | PO11(1) | PSO3(2) |

## Foreign Language^

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

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

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

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

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

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