Vision Statement

Department of Mechanical Engineering strives to be recognized globally for its academic, industrial and research excellence in the field of Mechanical and allied Engineering disciplines.

Mission Statement

- To provide world class education through the conduct of pioneering and cutting-edge research for students and faculty to make impactful contribution to the society.
- To expand the frontiers of engineering and science in technological innovation while fostering academic excellence and scholarly learning in a collegial environment.
- To attract highly motivated students with enthusiasm, aptitude and interest in the field of Mechanical and allied Engineering.
- To excel in industrial collaboration and research leading to innovative technology development and transfer.
- To serve the society with Innovative and entrepreneurially competent graduates for the national and international community towards achieving the sustainable development goals.
1. PROGRAMME EDUCATIONAL OBJECTIVES (PEOs):

Bachelor of Materials Science and Engineering curriculum is designed

1. To prepare students to excel in research and to succeed in the areas of Materials Science and Metallurgical engineering.
2. To provide students with a solid foundation in mathematical, scientific and engineering fundamentals required to solve materials science and metallurgical engineering problems.
3. To train students with scientific and engineering knowledge so as to comprehend, select materials, process, characterize, analyze, design, and develop newer materials and solutions for the real time problems.
4. To inculcate students with professional and ethical attitude, effective communication skills, teamwork skills and multidisciplinary approach.
5. To develop student with an academic excellence, leadership qualities leading to life-long learning for a successful professional career.

2. PROGRAMME OUTCOMES (POs):

On successful completion of the Materials Science and Engineering Degree programme, the Graduates shall exhibit the following:

<table>
<thead>
<tr>
<th>PO</th>
<th>Graduate Attribute</th>
<th>Programme Outcome</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>Engineering knowledge</td>
<td>Apply knowledge of mathematics, basic science and engineering science.</td>
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<td>2</td>
<td>Problem analysis</td>
<td>Identify, formulate and solve engineering problems.</td>
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<td>3</td>
<td>Design/development of solutions</td>
<td>Design a system or process to improve its performance, satisfying its constraints.</td>
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<tr>
<td>4</td>
<td>Conduct investigations of complex problems</td>
<td>Conduct experiments &amp; collect, analyze and interpret the data.</td>
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<td>5</td>
<td>Modern tool usage</td>
<td>Apply various tools and techniques to improve the efficiency of the system.</td>
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<td>6</td>
<td>The Engineer and society</td>
<td>Conduct themselves to uphold the professional and social obligations.</td>
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<tr>
<td>7</td>
<td>Environment and sustainability</td>
<td>Design the system with environment consciousness and sustainable development.</td>
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<td>8</td>
<td>Ethics</td>
<td>Interacting industry, business and society in a professional and ethical manner.</td>
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<tr>
<td>9</td>
<td>Individual and team work</td>
<td>Function in a multidisciplinary team.</td>
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<td>Communication</td>
<td>Proficiency in oral and written Communication.</td>
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<td>Project management and finance</td>
<td>Implement cost effective and improved system.</td>
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<td>Life-long learning</td>
<td>Continue professional development and learning as a life-long activity.</td>
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3. PROGRAM SPECIFIC OUTCOMES (PSOs):

On successful completion of the Materials Science and Engineering Degree programme, the Graduates shall exhibit the following:

1. Ability to identify, analyze and provide solution to the problems related to Materials Science and Metallurgical engineering
2. Ability to implement/use appropriate characterization techniques, analytical skills, and latest/recent developments in materials technology to solve engineering problems related to materials selection and design.
3. Ability to select materials and processes to meet the industry needs within the realistic constraints such as economic, environmental, social, ethical, health and safety, manufacturability and sustainability.

4. PEO / PO Mapping:

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# Choice Based Credit System

## Curriculum and Syllabi for Semesters I and II

### Semester – I

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**PRACTICALS**

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**TOTAL** 15 | 1 | 12 | 28 | 22

$ Skill Based Course

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**TOTAL** 15 | 2 | 8 | 25 | 21

$ NCC Credit Course level 1 is offered for NCC students only. Other students may enroll for NSS/NSO/YRC activity. The grades earned by the students will be recorded in the Mark Sheet, however the same shall not be considered for the computation of CGPA.

$ Skill Based Course.
UNIT I  BASICS OF COMMUNICATION  9
Listening – Telephone conversation & Writing message, gap filling; Reading – Telephone message, bio-note; Writing – Personal profile; Grammar – Simple present tense, Present continuous tense, Asking questions (wh-questions); Vocabulary – One word substitution, Synonyms

UNIT II  NARRATION  9
Listening – Travel podcast / Watching a travel documentary; Reading – An excerpt from a travelogue, Newspaper Report; Writing – Narrative (Event, personal experience etc.); Grammar – Subject – verb agreement, Simple past, Past continuous Tenses; Vocabulary – Antonyms, Word formation (Prefix and Suffix).

UNIT III  DESCRIPTION  9
Listening – Conversation, Radio/TV advertisement; Reading – A tourist brochure and planning an itinerary, descriptive article / excerpt from literature; Writing – Definitions, Descriptive writing, Checklists; Grammar – Future tense, Perfect tenses, Preposition; Vocabulary – Adjectives and Adverbs

UNIT IV  CLASSIFICATION  9
Listening – Announcements and filling a table; Reading – An article, social media posts and classifying (channel conversion – text to table); Writing – Note making, Note taking and Summarising, a classification paragraph; Grammar – Connectives, Transition words; Vocabulary – Contextual vocabulary, Words used both as noun and verb, Classification related words.

UNIT V  EXPRESSION OF VIEWS  9
Listening – Debate / Discussion; Reading – Formal letters, Letters to Editor, Opinion articles / Blogs; Writing – Letter writing/ Email writing (Enquiry / Permission, Letter to Editor); Grammar – Question tags, Indirect questions, Yes / No questions; Vocabulary – Compound words, Phrasal verbs.

Assessment
Two Written Assessments: 35% weightage each
Assignment: 30% weightage
Designing a tourist brochure / Writing an opinion article / Making a travel podcast

End Semester Exam: 3-hour written exam

TOTAL : 45 PERIODS

COURSE OUTCOMES
At the end of the course, students will be able to
CO1: Use grammar and vocabulary suitable for general context.
CO2: Comprehend the nuances of spoken and written communication.
CO3: Use descriptive and analytical words, phrases, and sentence structures in written communication.
CO4: Read different types of texts and comprehend their denotative and connotative meanings.
CO5: Write different types of texts using appropriate formats.

TEXT BOOKS:
1. “English for Engineers and Technologists” Volume I by Orient Blackswan, 2022
REFERENCES
4. www.uefap.com

<table>
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- 1-low, 2-medium, 3-high
UNIT I  MATRICES  
Eigen values and Eigen vectors of a real matrix – Properties of Eigen values - Cayley-Hamilton theorem (excluding proof) – Diagonalization of matrices - Reduction of Quadratic form to canonical form by using orthogonal transformation - Nature of a Quadratic form.

UNIT II  FUNCTIONS OF SEVERAL VARIABLES  

UNIT III  INTEGRAL CALCULUS  
Improper integrals of the first and second kind and their convergence – Differentiation under integrals - Evaluation of integrals involving a parameter by Leibnitz rule – Beta and Gamma functions- Properties – Evaluation of integrals by using Beta and Gamma functions – Error functions.

UNIT IV  MULTIPLE INTEGRALS  

UNIT V  VECTOR CALCULUS  
Gradient of a scalar field, directional derivative – Divergence and Curl – Solenoidal and Irrotational vector fields - Line integrals over a plane curve - Surface integrals – Area of a curved surface – Volume Integral - Green’s theorem, Stoke’s and Gauss divergence theorems – Verification and applications in evaluating line, surface and volume integrals.

TOTAL: 60 PERIODS

COURSE OUTCOMES:
At the end of the course, the students will be able to:
CO1: Use the matrix algebra methods for solving practical problems.
CO2: Use differential calculus ideas on several variable functions.
CO3: Apply different methods of integration in solving practical problems by using Beta and Gamma functions.
CO4: Apply multiple integral ideas in solving areas and volumes problems.
CO5: Apply the concept of vectors in solving practical problems.

TEXT BOOKS:

REFERENCES:

**CO-PO Mapping**

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- 1’ = Low; ‘2’ = Medium; ‘3’ = High
UNIT I  MECHANICS OF MATERIALS  

UNIT II  OSCILLATIONS, SOUND AND THERMAL PHYSICS  

UNIT III  OPTICS AND LASERS  

UNIT IV  QUANTUM MECHANICS  

UNIT V  CRYSTAL PHYSICS  

TOTAL: 45 PERIODS

COURSE OUTCOMES:
After completion of this course, the students shall be
CO1: Understand the important mechanical properties of materials
CO2: Express the knowledge of oscillations, sound and applications of Thermal Physics
CO3: Know the basics of optics and lasers and its applications
CO4: Understand the basics and importance of quantum physics.
CO5: Understand the significance of crystal physics.
TEXT BOOKS:

REFERENCES:

CO-PO & PSO MAPPING

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- 1’ = Low; ‘2’ = Medium; ‘3’ = High
UNIT I POLYMER CHEMISTRY

UNIT II NANOCHEMISTRY

UNIT III CORROSION SCIENCE

UNIT IV ENERGY SOURCES
Batteries - Characteristics - types of batteries – primary battery (dry cell), secondary battery (lead acid, lithium-ion-battery)- emerging batteries – nickel-metal hydride battery, aluminum air battery, batteries for automobiles and satellites - Fuel cells (Types) – H₂-O₂ fuel cell - Supercapacitors-Types and Applications, Renewable Energy: Solar- solar cells, DSSC

UNIT V WATER TECHNOLOGY

TOTAL: 45 PERIODS

COURSE OUTCOMES:
CO1: To recognize and apply basic knowledge on different types of polymeric materials, their general preparation methods and applications to futuristic material fabrication needs.
CO2: To identify and apply basic concepts of nanoscience and nanotechnology in designing the synthesis of nanomaterials for engineering and technology applications.
CO3: To recognize and apply basic knowledge on suitable corrosion protection technique for practical problems.

CO4: To recognize different storage devices and apply them for suitable applications in energy sectors.

CO5: To demonstrate the knowledge of water and their quality in using at different industries.

TEXT BOOKS:

REFERENCES:

CO - PO Mapping

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GE3155   ENGINEERING DRAWING   L   T   P   C
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COURSE OBJECTIVE:
The learning objectives of this course is to develop in students, the engineering graphic skills for communication of concepts, ideas and design of engineering products and expose them to existing national standards related to technical drawings.

CONCEPTS AND CONVENTIONS (NOT FOR EXAMINATION)  2
Importance of graphics in engineering applications – Use of drafting instruments – BIS conventions and specifications – Size, layout and folding of drawing sheets – Lettering and dimensioning.

UNIT I   PLANE CURVES  4 + 12
Basic Geometrical constructions, Curves used in engineering practices: Conics — Construction of ellipse, parabola and hyperbola by eccentricity method — Construction of cycloid — construction of involutes of square and circle — Drawing of tangents and normal to the above curves.

UNIT II   PROJECTION OF POINTS, LINES AND PLANE SURFACE  6 + 12
Orthographic projection - Principal planes - First angle projection - projection of points. Projection of straight lines (only First angle projections) inclined to both the principal planes - Determination of true lengths and true inclinations by rotating line method and traces. Projection of planes (polygonal and circular surfaces) inclined to both the principal planes by rotating object method.

UNIT III   PROJECTION OF SOLIDS AND FREEHAND SKETCHING  6 + 12
Projection of simple solids like prisms, pyramids, cylinder, and cone when the axis is inclined to both the principal planes by rotating object method. Visualization concepts and Free Hand sketching: Visualization principles — Representation of Three-Dimensional objects — Layout of views - Freehand sketching of multiple views from pictorial views of objects. Practicing three dimensional modeling of simple objects by CAD Software (Not for examination).

UNIT IV   PROJECTION OF SECTIONED SOLIDS AND DEVELOPMENT OF SURFACES  6 + 12
Sectioning of simple solids like prisms, pyramids, cylinder, and cone in simple vertical position when the cutting plane is inclined to the one of the principal planes and perpendicular to the other — obtaining true shape of section. Development of lateral surfaces of simple and sectioned solids — Prisms, pyramids cylinders and cones. Development of lateral surfaces of solids with cut-outs and holes. Practicing three dimensional modeling of simple truncated objects by CAD Software (Not for examination).

UNIT V   ISOMETRIC AND PERSPECTIVE PROJECTIONS  6 + 12
Principles of isometric projection — isometric scale - Isometric projections of simple solids and truncated solids - Prisms, pyramids, cylinders, cones- combination of two solid objects in simple vertical positions - Perspective projection of simple solids-Prisms, pyramids, cone and cylinders by visual ray method. Creating isometric model of simple objects from orthographic projections using CAD software (Not for examination).

TOTAL: 90 PERIODS
COURSE OUTCOMES:
On successful completion of this course, the student will be able to

CO1. Draw conic curves, cycloids and involutes
CO2. Draw orthographic projections of points, lines and planes
CO3. Draw orthographic projections and free hand sketches of solids
CO4. Draw sectional views of the objects and development of surfaces.
CO5. Draw isometric and perspective views of simple solids

TEXTBOOKS:

REFERENCES:

Publication of Bureau of Indian Standards:

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அலகு I  வாழ்நிலை மரபு தொகுப்பு:

இந்திய விடுதியில் தமிழகத்தின் - கிராமில் வேளையில் - சிறிய வளாகத் தமிழகத்தில் - தமிழன் விலங்களுக்கு தொடர்புடைய - வாழ்நிலை மரபு தொகுப்புகள் - சிற்றுலகியம் தாராவில் - சிறு மரபு தொகுப்புகளின் பரிசையை அறிய - சிற்றுலகியில் வாழ்நிலை மரபு தொகுப்புகள் - தமிழகத்தின் காப்பாட்டுகள், முகியத்துவம் அடர்த்தி வேளாளர்களின் சான்று - பக்தி துணையையும், அருந்தாரக் குடமுடிய தமிழகத்தில் - சிற்றுலகியம் தமிழகத்தில் தமிழின் தொடர்பு மற்றும் - தமிழகம் தொடர்பு பார்வையர் பண்டையில்.

அலகு II  மரபு - பானை தமிழப்பட்டி மூடி தமிழத்தின் முறை - சிற்றுலக் கணவன்:


TOTAL : 15 PERIODS
TEXT-CUM-REFERENCE BOOKS
1. தமிழக வரலை – மக்களும் பணமும் (கி.மு. 20000 – 2000 காலத்தில் மக்களும் பணமும் காரணியாக காணப்பட்டது).
2. கல்வி மற்றும் முழுமை (கி.மு. 10000 –). (மேலும் பற்றிய தலைப்பு).
3. விழாக்காக தமிழக கிராமங்கள் காட்சி (கிராம நிபுணர்களின் காண்பிட்டன தலைப்பு).
4. Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNB & ESC and RMRL – (in print)
5. Social Life of the Tamils - The Classical Period (Dr.S.Singaravelu) (Published by: International Institute of Tamil Studies).
6. Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thirunavukkarasu) (Published by: International Institute of Tamil Studies).
7. The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: International Institute of Tamil Studies.)
8. Keeladi - 'Sangam City Civilization on the banks of river Vaigai' (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
9. Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay) (Published by: The Author)
10. Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)

GE3154 HERITAGE OF TAMILS L T P C 1 0 0 1

UNIT I LANGUAGE AND LITERATURE 3

UNIT II HERITAGE - ROCK ART PAINTINGS TO MODERN ART – SCULPTURE 3

UNIT III FOLK AND MARTIAL ARTS 3
Therukoothu, Karagattam, Villu Pattu, Kaniyan Koothu, Oyillattam, Leatherpuppetry, Silambattam, Valari, Tiger dance - Sports and Games of Tamils.

UNIT IV THINAI CONCEPT OF TAMILS 3
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.
UNIT V CONTRIBUTION OF TAMILS TO INDIAN NATIONAL MOVEMENT AND INDIAN CULTURE

3 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.

TOTAL : 15 PERIODS

TEXT-CUM-REFERENCE BOOKS

1. தமிழக வரலொறு – மாகாண பாடல்பாடங்கள் – சி.சி. பிளியான (தமிழில்: தமிழக பாடல்பாடுகள் மற்றும் பல்வேறு பண்பிள்ளைகள் குறிப்பிட்டு).
2. கலாவணிக் தமிழ் – வரலாறு நூல். குதுரியம். (திருக்கால் பிளியான).
3. சிதை – கல்விக் கற்கால பதிவுகள் காலகால தரவுகளின் (தங்களுள் தெளிவு தமிழில்)
4. புதுக்கோடு – சூட்டுவர் தரவுகள். (தமிழில் சூடு தமிழில்)
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).
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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)
COURSE OBJECTIVE:
To provide exposure to the students with hands on experience on various basic engineering practices in civil, mechanical, electrical and electronics engineering.

GROUP – A (CIVIL & ELECTRICAL)

PART I CIVIL ENGINEERING PRACTICES 15

PLUMBING WORK:
a) Connecting various basic pipe fittings like valves, taps, coupling, unions, reducers, elbows and other components which are commonly used in household.
b) Preparing plumbing line sketches.
c) Laying pipe connection to the suction side of a pump
d) Laying pipe connection to the delivery side of a pump.
e) Connecting pipes of different materials: Metal, plastic and flexible pipes used in household appliances.

WOOD WORK:
a) Sawing,
b) Planing and
c) Making joints like T-Joint, Mortise joint and Tenon joint and Dovetail joint.

Wood Work Study:
a) Studying joints in door panels and wooden furniture
b) Studying common industrial trusses using models.

PART II ELECTRICAL ENGINEERING PRACTICES 15

WIRING WORK:
a) Wiring Switches, Fuse, Indicator and Lamp etc. such as in basic household,
b) Wiring Stair case light.
c) Wiring tube – light.
d) Preparing wiring diagrams for a given situation.

Wiring Study:
a) Studying an Iron-Box wiring.
b) Studying a Fan Regulator wiring.
c) Studying an Emergency Lamp wiring.

GROUP – B (MECHANICAL AND ELECTRONICS)

PART III MECHANICAL ENGINEERING PRACTICES 15

WELDING WORK:
a) Welding of Butt Joints, Lap Joints, and Tee Joints using arc welding.
b) Demonstration of gas welding.

BASIC MACHINING WORK:
a) (simple)Turning.
b) (simple)Drilling.
c) (simple)Tapping.
ASSEMBLY WORK:
a) Assembling a centrifugal pump.
b) Assembling a household mixer.
c) Assembling an air conditioner.

SHEET METAL WORK:
a) Making of a square tray

FOUNDRY WORK:
a) Demonstrating basic foundry operations.

PART IV ELECTRONIC ENGINEERING PRACTICES

SOLDERING WORK:
a) Soldering simple electronic circuits and checking continuity.

ELECTRONIC ASSEMBLY AND TESTING WORK:
a) Assembling and testing electronic components on a small PCB.

ELECTRONIC EQUIPMENT STUDY:
a) Studying a FM radio.
b) Studying an electronic telephone.

TOTAL = 60 PERIODS

COURSE OUTCOMES: Upon completion of this course, the students will be able to:
CO1: Ability to make common joints in carpentry and pipe connections with fittings used in plumbing works.
2. Ability to weld steel the structures
3. Ability to do electrical wiring and to build electronics circuits.

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LIST OF EXPERIMENTS:
1. Estimation of HCl using Na₂CO₃ as primary standard
2. Determination of alkalinity in water sample.
3. Determination of hardness of water by EDTA method.
4. Determination of DO content of water sample by Winkler’s method.
5. Determination of chloride content of water sample by Argentometric method.
6. Estimation of copper content of the given solution by iodometry.
7. Determination of strength of given hydrochloric acid using pH meter.
8. Determination of strength of acids in a mixture of acids using conductivity meter.
9. Estimation of iron content of the given solution using potentiometer.
10. Estimation of iron content of the water sample using spectrophotometer (1, 10-
Phenanthroline/thiocyanate method).
11. Estimation of sodium and potassium present in water using flame photometer.
13. Determination of Glass transition temperature of a polymer
14. Phase change in a solid.
15. Corrosion experiment-weight loss method.

TOTAL: 30 PERIODS

COURSE OUTCOMES:
After completion of the laboratory course, the student will be able to –
CO1: analyse the water quality parameters for domestic and industrial purposes.
CO2: determine the amount of metal ions by spectroscopic techniques
CO3: select a suitable polymer for industrial applications.
CO4: quantitatively analyse the impurities in solution by electroanalytical techniques.
CO5: predict the choice of metals for industrial purposes using corrosion studies.

TEXTBOOKS:

CO - PO Mapping

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UNIT I  SELF-INTRODUCTION  6
Introducing oneself; Telephone conversation, Relaying telephone message – Role play

UNIT II  NARRATION  6
Narrating one’s personal experience in front of a group (formal and informal context)
Ex.: First day in college / vacation / first achievement etc.

UNIT III  CONVERSATION  6
Making conversation – formal and informal – Turn taking and Turn giving – Small talk

UNIT IV  SHORT SPEECH  6
Giving short speeches on topics like College Clubs and their activities in the college / Campus
Facilities / native place and its major attractions.

UNIT V  DISCUSSION  6
Taking part in a group discussion on general topics – Debating on topics of interest and relevance.

Assessment
Internals – 100%

Short Speeches
Group discussion

TOTAL : 30 PERIODS

COURSE OUTCOMES
At the end of the course, students will be able to
CO1. Communicate effectively in formal and informal contexts
CO2. Converse appropriately and confidently with different people
CO3. Express their opinions assertively in group discussions

CO-PO & PSO MAPPING

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UNIT I  CAUSE AND EFFECT  9
Listening – Radio / TV / Podcast Interview (survivors tale) and framing a set of instructions/ Do's and Don'ts; Reading – Excerpts of Literature (short stories), Journal articles on issues like Global warming; Writing - Instructions; Official letter / email (Request for internship / Industrial visit); Grammar – If conditionals, Imperatives; Vocabulary – Cause and effect expressions, Idiom

UNIT II  COMPARE AND CONTRAST  9
Listening – Product reviews and gap fill exercises, Short Talks (like TED Talks) for specific information; Reading – Graphical content (table / chart / graph) and making inferences; Writing – Compare and Contrast Essay; Grammar – Degrees of Comparison; Mixed Tenses; Vocabulary – Order of Adjectives, Transition words.

UNIT III  PROBLEM AND SOLUTION  9
Listening – Group discussion (case study); Reading – Visual content (Pictures on social issues / natural disasters) for comprehension; Editorial; Writing Picture description; Problem and Solution Essay; Grammar – Modal verbs; Relative pronoun; Vocabulary – Negative prefixes, Signal words for problem and solution.

UNIT IV  REPORTING  9
Listening – Oral news report; Reading – Newspaper report on survey findings – Writing – Survey report, Making recommendations; Grammar – Active and passive voice, Direct and Indirect speech; Vocabulary – Reporting verbs, Numerical adjectives.

UNIT V  PRESENTATION  9
Listening – Job interview, Telephone interview; Reading - Job advertisement and company profile and making inferences; Writing – Job application (cover letter and CV) Grammar – Prepositional phrases; Vocabulary – Fixed expressions, Collocations.

Assessment
Two Written Assessments : 35% weightage each
Assignment: 30% weightage
Conducting a survey on specific topic and write a final survey report.
End Semester Exam: 3-hour written exam

TOTAL : 45 PERIODS

COURSE OUTCOMES
On completion of the course, the students will be able to:

CO1. Listen effectively to various oral forms of conversation, lectures, discussion and understand the main gist of the content.
CO2. Communicate effectively in formal and informal context.
CO3. Read and comprehend technical texts effortlessly.
CO4. Write reports and job application for internship or placement.
CO5. Learn to use language effectively in a professional context.
TEXT BOOKS
1. “English for Engineers and Technologists” Volume 2 by Orient Blackswan, 2022

REFERENCES
4. www.uefap.com

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- 1 = Low; 2 = Medium; 3 = High
- **Note:** The average value of this course to be used for program articulation matrix.
MA3251   ORDINARY DIFFERENTIAL EQUATIONS AND TRANSFORM TECHNIQUES

UNIT I   ORDINARY DIFFERENTIAL EQUATIONS

UNIT II  LAPLACE TRANSFORMS

UNIT III  FOURIER SERIES
Dirichlet’s conditions – General Fourier series – Odd and even functions – Half-range Sine and Cosine series – Complex form of Fourier series – Parseval’s identity – Harmonic Analysis.

UNIT IV   FOURIER TRANSFORMS
Fourier integral theorem – Fourier transform pair - Fourier sine and cosine transforms – Properties – Transform of elementary functions - Convolution theorem (without proof) – Parseval’s identity.

UNIT V    Z – TRANSFORM AND DIFFERENCE EQUATIONS

TOTAL: 60 PERIODS

COURSE OUTCOMES:
At the end of the course, the students will be able to:
CO1: Solve higher order ordinary differential equations which arise in engineering applications.
CO2: Apply Laplace transform techniques in solving linear differential equations.
CO3: Apply Fourier series techniques in engineering applications.
CO4: Understand the Fourier transforms techniques in solving engineering problems.
CO5: Understand the Z-transforms techniques in solving difference equations.

TEXT BOOKS:

REFERENCES:

**CO-PO MAPPING**

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- 1’ = Low; ‘2’ = Medium; ‘3’ = High

**ML3201 **

**REACTION KINETICS AND DYNAMICS**

**COURSE OBJECTIVES:**
The main objective of the course is
1. To discuss and explain the basics of solid state chemistry.
2. To understand and apply the basic principles of chemical reaction kinetics and dynamics.
3. To explain the theoretical models of molecular collisions, reaction dynamics and microscopic kinetics.
4. To theoretically derive rate law equations and solve simple numerical problems.
5. To describe the experimental methods of preparation of materials in various forms.

**UNIT – I **

**SOLID STATE CHEMISTRY**

**UNIT – II **

**REACTION KINETICS IN SOLUTIONS**
Chemical kinetics – rate equation, order of reaction and rate law determination: Integral, Isolation, half-life and differential methods; comparison of different techniques. Kinetic equations for complex reactions-chain, parallel, opposing and consecutive reactions; Theory of reaction rates; Temperature effect on reaction rates; Rate constant for simple bimolecular reactions; Collision theory; Activated complex theory. Reactions in solutions: Diffusion controlled and activation controlled reactions; Thermodynamic formulation of rate constant: effect of pressure and ionic strength.
UNIT – III  REACTION KINETICS ON SURFACES

UNIT – IV  KINETICS OF SOLID STATE REACTIONS
Sintering, Nucleation; Factors influencing the reactivity of solids; Precursors to solid state reactions; Tammann and Hedvall mechanism; Wagner’s diffusion theory, Material transport in solid state reaction-counter diffusion, Kirkendall effect; Huttig’s mechanism; Kinetic model- Reaction in powder compact, Atomic theory of diffusion- self diffusion mechanism.

UNIT – V  SYNTHETIC METHODS

TOTAL: 45 PERIODS

COURSE OUTCOMES:
At the end of this course, the students will be able to:
CO1: Remember and explain the basic concepts of solid state chemistry.
CO2: Understand and apply the basic principles of chemical reaction kinetics and dynamics.
CO3: To analyse the theoretical models of molecular collisions, reaction dynamics and microscopic kinetics.
CO4: To derive and evaluate rate law equations and solve simple numerical problems.
CO5: To develop suitable experimental methods for material preparations.

TEXT BOOKS:

REFERENCES:

CO’s- PO’s & PSO’s MAPPING

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Objectives

- To understand basics of problem solving and design solutions for computational problems.
- To apply different control structures in Python programming and solve using functions.
- To apply different data structures in Python.
- To use built-in and user defined modules in Python.
- To develop applications for file manipulation with error and exception handling in Python.

Unit 1 PROGRAMMING BASICS


PRACTICALS:

- Design algorithms for simple computational problems
- Develop Pseudocode and Flow charts for simple computational problems
- Develop Python programs using Input / Output operations
- Develop Python programs using operators and expressions
- Executing simple programs using Python interactive mode

Unit 2 CONTROL STATEMENTS AND FUNCTIONS


PRACTICALS:

- Write Python programs using simple and nested selective control statements
- Develop Python programs using simple and nested repetitive control statements
- Write Python programs to generate series and patterns using repetitive control statements
- Develop Python programs using simple functions and recursion
- Write Python programs using lambda functions

Unit 3 STRING, LIST, TUPLES

PRACTICALS:

- Write Python programs for operating on Strings
- Design Python programs using Lists, Nested Lists and Lists comprehensions
- Develop Python programs using Tuples, Nested Tuples, Tuple comprehensions, and Sets

Unit 4 SETS & DICTIONARIES, FUNCTIONAL PROGRAMMING 6+12


PRACTICALS:

- Write Python programs creating sets and performing set operations
- Develop Python programs using Dictionary, Nested Dictionary and comprehensions
- Write Python programs by applying functional programming concepts
- Create, import, and use user-defined modules
- Organize python code using Packages

Unit 5 EXCEPTIONS AND FILE HANDLING 6+12


PRACTICALS:

- Design Python programs to handle errors and exceptions
- Write Python programs with multiple handlers for exceptions
- Write Python programs to perform various operations on files
- Write Python programs to read and update text and data files

Total Hours: 90 (30+60)

COURSE OUTCOMES

1. Understand algorithmic solutions to simple computational problems.
2. Develop Python programs using conditional statements to solve computational problems.
3. Ability to apply suitable Python data structure(s) for a given problem
4. Design modular Python programs
5. Develop Python programs over files and handle exceptions

TEXT BOOKS

REFERENCE BOOKS

4. Python official documentation and tutorial, https://docs.python.org/3/

**CO's-PO's & PSO's MAPPING**

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1 : low, 2 : medium, 3 : high, '-' : no correlation
COURSE OBJECTIVES: The main learning objective of this course is to prepare the students for:

1. determining the resultant forces acting on a particle in 2D and 3D and for applying methods of equilibrium on a particle in 2D and 3D.
2. evaluating the reaction forces for bodies under equilibrium, for determining the moment of a force, moment of a couple, for resolving force into a force-couple system and for analyzing trusses.
3. assessing the centroids of 2D sections / center of gravity of volumes and for calculating area moments of inertia for the sections and mass moment of inertia of solids.
4. evaluating the frictional forces acting at the contact surfaces of various engineering systems and for applying the work-energy principles on a particle.
5. determining kinetic and kinematic parameters of the rigid bodies subjected to concurrent coplanar forces.

UNIT I STATICS OF PARTICLES 9+3


UNIT II EQUILIBRIUM OF RIGID BODIES AND TRUSSES 9+3


UNIT III DISTRIBUTED FORCES 9+3

Centroids of lines and areas – symmetrical and unsymmetrical shapes, Determination of Centroids by Integration, Theorems of Pappus-Guldinus, Distributed Loads on Beams, Centre of Gravity of a Three-Dimensional Body, Centroid of a Volume, Composite Bodies, Determination of Centroids of Volumes by Integration. Moments of Inertia of Areas and Mass - Determination of the Moment of Inertia of an Area by Integration , Polar Moment of Inertia , Radius of Gyration of an Area , Parallel-Axis Theorem , Moments of Inertia of Composite Areas, Moments of Inertia of a Mass - Moments of Inertia of Thin Plates , Determination of the Moment of Inertia of a Three-Dimensional Body by Integration.
UNIT IV  
**FRICITION AND WORK PRINCIPLES**  
9+3


UNIT V  
**DYNAMICS OF PARTICLES AND RIGID BODIES**  
9+3


**TOTAL :60 PERIODS**

**COURSE OUTCOMES:**
Upon completion of this course, the students will be able to:

- **CO1** To determine the resultant forces acting on a particle in 2D and 3D and to apply methods of equilibrium on a particle in 2D and 3D.
- **CO2** Evaluate the reaction forces for bodies under equilibrium, to determine moment of a force, moment of a couple, to resolve force into a force-couple system and to analyze trusses.
- **CO3** Assess the centroids of 2D sections / center of gravity of volumes and to calculate area moments of inertia for the sections and mass moment of inertia of solids.
- **CO4** Evaluate the frictional forces acting at the contact surfaces of various engineering systems and apply the work-energy principles on a particle.
- **CO5** Determine kinetic and kinematic parameters of the rigid bodies subjected to concurrent coplanar forces.

**TEXT BOOKS:**

**REFERENCES:**
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ஏற்ற I  நூற்றாண்டு பார்வை தமிழியலுக்கு:
3
ஏற்றக் கலைகள் தேர்வு பரிசா - பார்வை தமிழியலுக்கு குழுப் சிவப்பு
பார்வைக்குறிகள் - பார்வைக்குறிகளின் இடை கருப்பினை.

ஏற்ற II  அறிவியல் பொழிவு குழு தமிழியலைப் பற்றியுங்கள்:
3
அறிவியல் பொழிவு குழுப் படாணம் கலைகள் & கலை கலைகள் இன்று
பெருமானாகவி வாழ்க்காயில் கலைப் பார்வைக் குழு செயல்பாடு - கலை கலைகள் வாழ்க்காய் தமிழகத்திலும் - சிற்பப் பிரிவுக்குறிகள் வைத்து அடையப்பட்டது - சிற்பப் பிரிவுக்குறிகள் வைத்து அடையப்பட்டது - நாடு கலை வீட்டுப் பொருட்கள் மற்றும் நாடு கலை வீட்டுப் பொருட்களும் - சிற்பங்களும், மனப்பொருள்களுக்கு இடைய மக்கள் தமிழக நாட்டுக்குளிகள் - பொருள்களுக்கு இடைய மக்கள் தமிழக நாட்டுக்குளிகள் - பொருள்களுக்கு இடைய மக்கள் தமிழக நாட்டுக்குளிகள் - பொருள்களுக்கு இடைய மக்கள் தமிழக நாட்டுக்குளிகள்.

ஏற்ற III  வரலாற்றின் தொகுப்பு:
3
குற்றம் செய்ய கலை - தொன்மை நூற்றாண்டு - தொன்மை நூற்றாண்டுசெயல், கொன்று - நூற்றாண்டு மத்தியக் கலை செயல் குற்றம் தொன்மை நூற்றாண்டு - நூற்றாண்டு மத்தியக் கலை செயல் குற்றம் - கொல்லாரின் பண்பாடுகள் - கொல்லாரின் பண்பாடுகள் - கொல்லாரின் பண்பாடுகள் - கொல்லாரின் பண்பாடுகள் – கொல்லாரின் பண்பாடுகள் - கொல்லாரின் பண்பாடுகள் - கொல்லாரின் பண்பாடுகள்.

ஏற்ற IV  பார்வைச் செயல்கள் பிரிப்பு நூற்றாண்டு வரலாற்றின் தொகுப்பு:
3
அறிஞர், அரசு, மகாமகம், மகர் - வரலாற்றுக் கலை கலைநிலத்தில் சுவர்கள் பல்கலைகள் - கலைகள் பெருநிலத்தில் - கலைகள் பெருநிலத்தில் - கலைகள் பெருநிலத்தில் - கலைகள் பெருநிலத்தில் - கலைகள் பெருநிலத்தில் - கலைகள் பெருநிலத்தில் - கலைகள் பெருநிலத்தில் - கலைகள் பெருநிலத்தில் - கலைகள் பெருநிலத்தில் - கலைகள் பெருநிலத்தில் - கலைகள் பெருநிலத்தில் - கலைகள் பெருநிலத்தில் - கலைகள் பெருநிலத்தில் - கலைகள் பெருநிலத்தில் - கலைகள் பெருநிலத்தில் - கலைகள் பெருநிலத்தில் - கலைகள் பெருநிலத்தில் - கலைகள் பெருநிலத்தில் - கலைகள் பெருநிலத்தில் - கலைகள் பெருநிலத்தில்.

ஏற்ற V  அறிஞர்கள் தமிழ் மக்கள் கலைகளில்:
3
அறிஞர்கள் தமிழ் மக்கள் கலைகளில் - தமிழ் மக்கள் கலைகளில் - தமிழ் மக்கள் கலைகளில் - தமிழ் மக்கள் கலைகளில் - தமிழ் மக்கள் கலைகளில் - தமிழ் மக்கள் கலைகளில் - தமிழ் மக்கள் கலைகளில் - தமிழ் மக்கள் கலைகளில் - தமிழ் மக்கள் கலைகளில் - தமிழ் மக்கள் கலைகளில் - தமிழ் மக்கள் கலைகளில். TOTAL : 15 PERIODS

TEXT-CUM-REFERENCE BOOKS
1. தமிழ் பௌத்தம் - மதகு பௌத்தம் - தமிழ். பௌத்தம் (தமிழ்: தமிழ் பௌத்தம்)

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**UNIT I  WEAVING AND CERAMIC TECHNOLOGY**

Weaving Industry during Sangam Age – Ceramic technology – Black and Red Ware Potteries (BRW) – Graffiti on Potteries.

**UNIT II  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.

**UNIT III  MANUFACTURING TECHNOLOGY**

UNIT IV   AGRICULTURE AND IRRIGATION TECHNOLOGY

Dam, Tank, ponds, Sluice, Significance of Kumizhi Thoompu of 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.

UNIT V   SCIENTIFIC TAMIL & TAMIL COMPUTING


TOTAL : 15 PERIODS

TEXT-CUM-REFERENCE BOOKS
1. தமிழ் வரலை மற்றும் பண் பொடும் (தவளியீடு: தமிழ்நொடுபொடநூல் மற்றும் கல்வியியல் பணிகளைக் கழகம்).
2. கணினித் தமிழ் (பிரசுரங்கொண்ட விகடன்).
3. ஜெய்புரம் தத்தொல்லியல் துமற்தவளியீடு (தவளியீடு).
4. பொருமந் - ஆற்றங்கரை தேசிகம் (தவளியீடு).
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 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) (Published by: The Author)
11. Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
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### PERSONALITY DEVELOPMENT

| PD 1 | Self-Awareness, Empathy, Critical & Creative Thinking, Decision Making and Problem Solving | 2 |
| PD 2 | Communication Skills | 3 |
| PD 3 | Group Discussion: Stress & Emotions | 2 |

### LEADERSHIP

| L 1 | Leadership Capsule: Traits, Indicators, Motivation, Moral Values, Honour Code | 3 |
| L 2 | Case Studies: Shivaji, Jhasi Ki Rani | 2 |

### SOCIAL SERVICE AND COMMUNITY DEVELOPMENT

| SS 1 | Basics, Rural Development Programmes, NGOs, Contribution of Youth | 3 |
| SS 4 | Protection of Children and Women Safety | 1 |
| SS 5 | Road / Rail Travel Safety | 1 |
| SS 6 | New Initiatives | 2 |
| SS 7 | Cyber and Mobile Security Awareness | 1 |

**TOTAL : 30 PERIODS**

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### NCC GENERAL

| NCC 1 | Aims, Objectives & Organization of NCC | 1 |
| NCC 2 | Incentives | 2 |
| NCC 3 | Duties of NCC Cadet | 1 |
| NCC 4 | NCC Camps: Types & Conduct | 2 |

### NATIONAL INTEGRATION AND AWARENESS

| NI 1 | National Integration: Importance & Necessity | 1 |
| NI 2 | Factors Affecting National Integration | 1 |
| NI 3 | Unity in Diversity & Role of NCC in Nation Building | 1 |
| NI 4 | Threats to National Security | 1 |

### PERSONALITY DEVELOPMENT

| PD 1 | Self-Awareness, Empathy, Critical & Creative Thinking, Decision Making and Problem Solving | 2 |
| PD 2 | Communication Skills | 3 |
| PD 3 | Group Discussion: Stress & Emotions | 2 |

### LEADERSHIP

| L 1 | Leadership Capsule: Traits, Indicators, Motivation, Moral Values, Honour Code | 3 |
| L 2 | Case Studies: Shivaji, Jhasi Ki Rani | 2 |

### SOCIAL SERVICE AND COMMUNITY DEVELOPMENT

| SS 1 | Basics, Rural Development Programmes, NGOs, Contribution of Youth | 3 |
| SS 4 | Protection of Children and Women Safety | 1 |
| SS 5 | Road / Rail Travel Safety | 1 |
| SS 6 | New Initiatives | 2 |
| SS 7 | Cyber and Mobile Security Awareness | 1 |

**TOTAL : 30 PERIODS**
Any SEVEN Experiments

1. Torsional Pendulum-Determination of rigidity modulus of wire and moment of inertia of the disc
2. Non-uniform bending - Determination of Young’s modulus of the material of the beam.
3. Uniform bending – Determination of Young’s modulus of the material of the beam.
4. Lee’s Disc Experiment - Determination of thermal conductivity of bad conductors.
5. Viscosity of Liquids.
6. Acoustic grating-Determination of the velocity of ultrasonic waves in liquids.
7. Ultrasonic interferometer – determination of sound velocity and liquids compressibility
8. Laser-Determination of the wavelength of the laser using grating
   - Determination of the width of the groove of the compact disc using laser.
   - Estimation of laser parameters.
9. Air wedge - Determination of the thickness of a thin sheet/wire
10. a) Optical fibre - Determination of Numerical Aperture and acceptance angle
    b) - Determination of bending loss of fibre.
11. Spectrometer-Determination of the wavelength of light using grating
12. Michelson Interferometer - Determination of wavelength of the monochromatic source of light.
13. Photoelectric effect – Determination of Planck’s constant
14. Black body radiation (Demonstration)
15. Melde’s string experiment - Standing waves.
16. Forced and Damped Oscillations.
17. Thermistor sensor
18. Thermocouple sensor
20. Design LCR series and parallel circuit and estimation of the resonant frequency.
22. Four Probe Set up – determination of band gap/resistivity of a material.

TOTAL: 30 PERIODS

COURSE OUTCOMES:
Upon completion of the course, the students will be able

CO1: To determine various moduli of elasticity, thermal properties of materials and viscosity of liquids
CO2: To determine the velocity of ultrasonic waves in Liquids.
CO3: To calculate and analyze various optical properties.
CO4: To build and analyze the characteristics of mechanical vibrations and logic operation.
CO5: To determine the desired electric and magnetic parameters of materials, semiconductors devices and sensors.
CO-PO & PSO MAPPING

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• 1’ = Low; ‘2’ = Medium; ‘3’ = High

GE3261 ENGLISH LABORATORY – II

UNIT I INTERVIEW IN SOCIAL CONTEXT 6
Asking questions and answering - Conducting an interview (of an achiever / survivor) – Role play

UNIT II PERSUASIVE SKILLS 6
Speaking about specifications of a product (Eg. Home appliances) – Persuasive Talk – Role play activity.

UNIT III CASE STUDY 6
Discussions on Case Study to find solutions for problems in professional contexts – Analytical discussion on various aspects of a given problem.

UNIT IV VISUAL INTERPRETATION 6
Describing visual content (Pictures/Table/Chart) using appropriate descriptive language and making appropriate inferences and giving recommendations.

UNIT V PRESENTATION 6
Making presentation with visual component (PPT slides) (job interview / project / innovative product presentation)

Assessment
Internals – 100%
Picture / Graphical description and Interpretation
Formal Presentation with visual tool (like PPT)

TOTAL : 30 PERIODS

COURSE OUTCOMES
At the end of the course, students will be able to
CO1: Comprehend and transcode visual content appropriately.
CO2: Participate effectively in formal group discussions.
CO3: Make presentation on a given topic in a formal context.
### CO-PO & PSO MAPPING

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