THE VISION OF THE DEPARTMENT OF MANUFACTURING ENGINEERING:
To be outstanding institute where students can gain acumen and to brew them so that they unswervingly meet the needs of the society.

THE MISSION OF THE DEPARTMENT OF MANUFACTURING ENGINEERING:
1. To foster the growth of its members and develop them in new vistas promoting them to their fullest cognition.
2. To be nationally recognized as the leader of Manufacturing Engineering in education and research.
3. Bring augmentation to the Department, College and University.
4. Discern the potential of its members.
5. Have its members vivaciously conscripted nationally by employers and graduate programs.
6. To evoke new ideas in the minds of its members and infuse nascent technology into the modern era of manufacturing.

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs):
To qualify as Manufacturing Engineering Graduates, the candidates are expected to meet the following Program Educational Objectives (PEOs) within 5 years after graduation:
1. To be employed in jobs related to manufacturing sectors at National and Global levels.
2. To be engaged in life-long learning, certification from professional organizations and active participation in professional societies/activities.
3. To be successful in their carrier and take up leadership roles in their professional life.
4. To become an expert and provide solutions to the industrial problems in the manufacturing sectors.
5. To become an entrepreneur by establishing an industry/startup and to provide jobs to others.
PROGRAMME OUTCOMES (POs):
The Programme Outcomes (POs) of the Manufacturing Engineering graduates are given below:

<table>
<thead>
<tr>
<th>PO</th>
<th>Graduate Attribute</th>
<th>Programme Outcome</th>
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<tbody>
<tr>
<td>1</td>
<td>Engineering knowledge</td>
<td>Engineering/Fundamental knowledge in mathematics, engineering, sciences, computer</td>
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<td></td>
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<td>science, humanities, and social science</td>
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<tr>
<td>2</td>
<td>Problem analysis</td>
<td>Identify, formulate and solve industrial problems with the knowledge gained.</td>
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<td>3</td>
<td>Design/development of solutions</td>
<td>Design a component or system and provide solutions by understanding its current</td>
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<td>status to improve its performance and satisfying its constraints.</td>
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<td>4</td>
<td>Conduct investigations of complex problems</td>
<td>Conduct experimentation and collect, analyze as well as interpret the data in a</td>
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<td></td>
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<td>systematic way.</td>
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<td>5</td>
<td>Modern tool usage</td>
<td>Ability to apply various modern tools and techniques to improve the efficiency of</td>
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<td>the system.</td>
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<tr>
<td>6</td>
<td>The Engineer and society</td>
<td>Conduct themselves to uphold the professional and social obligations.</td>
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<td>7</td>
<td>Environment and sustainability</td>
<td>Design and develop the systems with environment consciousness and sustainable</td>
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<td>manufacturing.</td>
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<tr>
<td>8</td>
<td>Ethics</td>
<td>Behave and practice ethically in the professional carrier.</td>
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<tr>
<td>9</td>
<td>Individual and team work</td>
<td>Demonstrate leadership skills and also be able to function as a team player.</td>
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<td>Communication</td>
<td>Communicate professionally in both oral and written forms.</td>
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<td>Project management and finance</td>
<td>Ability to manage through effective economic planning and control.</td>
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<td>12</td>
<td>Life-long learning</td>
<td>Creating interest in the lifelong learning attitude.</td>
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PROGRAM SPECIFIC OUTCOMES (PSOs):
On successful completion of Manufacturing Engineering degree program, the graduate shall have the following Program Specific Outcomes (PSOs):
1. Ability to demonstrate the knowledge gained in the fundamentals of manufacturing engineering in a systematic manner with ethics and sustainability.
2. Ability to understand, devise methodologies to solve problems and come out with best possible solutions in manufacturing engineering as an individual and as a team.
3. Ability to apply fundamental aspects of manufacturing engineering to innovate and to create new products and processes with sustainable manufacturing.
PEO / PO MAPPING:

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<th>PROGRAMME OUTCOMES</th>
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## ANNA UNIVERSITY, CHENNAI
### UNIVERSITY DEPARTMENTS
#### REGULATIONS – 2023
##### CHOICE BASED CREDIT SYSTEM
### B.E. MANUFACTURING ENGINEERING
#### CURRICULUM AND SYLLABI FOR SEMESTERS I AND II
### SEMESTER I

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<th>COURSE CODE</th>
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<th>TOTAL CONTACT PERIODS</th>
<th>CREDITS</th>
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$ Skill Based Course

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$ Skill Based Course
# NCC Credit Course level 1 is offered for NCC students only. 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
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

CO-PO & PSO MAPPING

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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.

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
PH3151  ENGINEERING PHYSICS  L T P C  3 0 0 3

UNIT I  MECHANICS OF MATERIALS  9

UNIT II  OSCILLATIONS, SOUND AND THERMAL PHYSICS  9

UNIT III  OPTICS AND LASERS  9

UNIT IV  QUANTUM MECHANICS  9
Black body radiation (Qualitative) – Planck’s hypothesis – Einstein’s theory of Radiation - Matter

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:

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UNIT I POLYMER CHEMISTRY

UNIT II NANO CHEMISTRY
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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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)
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
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
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
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
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
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

TEXT BOOKS:

REFERENCES:

Publication of Bureau of Indian Standards:

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அலகு I

d தமிழர் மரபு – இலக்கியம்

3

அலகு II

பாண்டா – இலக்கியம்

3

அலகு III

தமிழகத்தின் விளக்கும் நிருவிழா

3

அலகு IV

தமிழர்கள் திறனுடைய தம்பக்கிள

3
TEXT-CUM-REFERENCE BOOKS

1. Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL – (in print)
2. Social Life of the Tamils - The Classical Period (Dr.S.Singaravelu) (Published by: International Institute of Tamil Studies.
3. Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thirunavukkarasu) (Published by: International Institute of Tamil Studies).
4. The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: International Institute of Tamil Studies.)
5. 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)
6. Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay) (Published by: The Author)
7. Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
UNIT I  LANGUAGE AND LITERATURE  

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

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

UNIT IV  THINAI CONCEPT OF TAMILS  
Flora and Fauna of Tamils & Aham and Puram Concept from Tholkappiyam and Sangam Literature - Aram Concept of Tamil - 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  
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. தமிழகவரலொறு – மக்களும் பண்ணபோடும் – மக.மக.பிள்மள (தவளியீடு: தமிழ்நொடுபொடநூல்மற்றும் கல்வியியல் பணிகள் கழகம்).
2. கணினி தமிழ் – முமனவர் இல.சுந்தரம் பிரசுரம்.
3. கீழடி – மவமகநதிக்கமரயில் எங்ககொலநகரிகம் (ததொல்லியல் தவளியீடு).
4. பொருமந – ஆற்றங்கமர நொகரிகம். (ததொல்லியல் 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).
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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)
12. Journey of Civilization Indus to Vaigai (R. Balakrishnan) (Published by: RMRL) – Reference Book
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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1’ = Low; ‘2’ = Medium; ‘3’ = High

GE3162 ENGLISH LABORATORY – I L T P C

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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- 1' = Low; '2' = Medium; '3' = High

HS3251 ENGLISH FOR COMMUNICATION – II

UNIT I CAUSE AND EFFECT
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
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
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
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

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

CO-PO & PSO MAPPING

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- 1’ = Low; ‘2’ = Medium; ‘3’ = High
- Note: The average value of this course to be used for program articulation matrix.
UNIT I ORDINARY DIFFERENTIAL EQUATIONS (9+3)
Homogeneous linear ordinary differential equations of second order, linearity principle, general solution-
Particular integral - Operator method - Solution by variation of parameters - Method of undetermined
coefficients - Homogenous equations of Euler–Cauchy and Legendre’s type – System of simultaneous
linear differential equations with constant coefficients.

UNIT II LAPLACE TRANSFORMS (9+3)
Existence theorem - Transform of standard functions – Transform of Unit step function and Dirac delta
function – Basic properties - Shifting theorems - Transforms of derivatives and integrals – Transform of
periodic functions - Initial and Final value theorem - Inverse Laplace - Convolution theorem (without
proof) – Solving Initial value problems by using Laplace Transform techniques.

UNIT III FOURIER SERIES (9+3)

UNIT IV  FOURIER TRANSFORMS (9+3)

UNIT V  Z – TRANSFORM AND DIFFERENCE EQUATIONS (9+3)

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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</table>
UNIT – I  ELECTRICAL CIRCUITS  9
DC Circuits: Ohm’s Law - Kirchhoff’s Laws – Independent and Dependent Sources – Nodal Analysis, Mesh analysis with Independent sources only (Steady state) – AC Fundamentals: Waveforms, Average value, RMS Value, Impedance, Instantaneous Power, Real Power, Reactive
Power and Apparent Power, Power Factor – Steady State Analysis of RL and RC Circuits - Introduction to Balanced 3-Phase Circuits and power measurement.

UNIT – II ELECTRICAL MACHINES

UNIT – III ANALOG AND DIGITAL ELECTRONICS
Operation and Characteristics of electronic devices: PN Junction Diodes, Zener Diode, BJT, JFET and MOSFET– Operational Amplifiers (OPAMPs) : Characteristics and basic application circuits-555 timer IC based astable and monostable multivibrator. Basic switching circuits – Gates and Flip-Flops-Sample and hold circuit- R-2R ladder type DAC-Successive approximation based ADC.

UNIT – IV SENSORS AND TRANSDUCERS
Solenoids, electro-pneumatic systems, proximity sensors, limit switches, piezoelectric, hall effect, photo sensors, Strain gauge, LVDT, differential pressure transducer, optical and digital transducers, Smart sensors, Thermal Imagers.

UNIT – V MEASUREMENTS AND INSTRUMENTATION

TOTAL: 45 PERIODS

Laboratory Experiments:

LIST OF EXPERIMENTS:

ELECTRICAL
1. Verification of ohms and Kirchhoff's Laws.
2. Load test on DC Shunt Motor.
3. Load test on Single Phase Transformer.
4. Load test on 3 Phase Induction Motor.

ELECTRONICS
1. Half wave and full wave Rectifiers.
2. Application of Zener diode as shunt regulator.
3. Inverting and non-inverting amplifier using operational amplifier.

TOTAL: 30 PERIODS

COURSE OUTCOMES
Upon successful completion of the course, students should be able to:
CO 1: Compute and demonstrate the electric circuit parameters for simple problems.
CO 2: Explain the working principles and characteristics of electrical machines, electronic devices and measuring instruments.
CO 3: Identify general applications of electrical machines, electronic devices and measuring instruments.

29
CO 4: Analyze and demonstrate the basic electrical and electronic circuits and characteristics of electrical machines.

CO 5: Explain the types and operating principles of sensors and transducers.

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CO/PO & PSO Average: 2.2, 1.8, 2.2

1 – Slight, 2 – Moderate, 3 – Substantial

TEXT BOOKS:


REFERENCES:

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

6+12

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/](https://docs.python.org/3/)

### CO’s-PO’s & PSO’s MAPPING

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1 : low, 2 : medium, 3 : high, '-' : no correlation
GE3151  ENGINEERING MECHANICS  L  T  P  C  3  1  0  4

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  FRICTION 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. evaluate the kinetic and kinematic parameters of a particle.

CO5 Determine kinetic and kinematic parameters of the rigid bodies subjected to concurrent coplanar forces.

TEXT BOOKS:

REFERENCES:
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**MF3201**  
**BASICS OF MANUFACTURING ENGINEERING**  
**L T P C**  
**1 0 0 1**

**COURSE OBJECTIVES:**
- To introduce manufacturing engineering and evolution to the students
- To explain Evolution of manufacturing engineering and systems

**INTRODUCTION**
Manufacturing - Overview, History, Economic Impact-Failure and Success in Manufacturing—The General Motors–Toyota NUMMI Joint Venture: The Age of the Artisan

**UNIT I THE FACTORY SYSTEM**

**UNIT II MASS PRODUCTION**

**UNIT III THE CUTTING EDGE**
COURSE OUTCOMES

Upon successful completion of the course, students should be able to:

**CO1:** To gain knowledge in emerging of manufacturing from stone age to factory system

**CO2:** To know about advances in manufacturing towards to serve mass requirements

**CO3:** To acquaintance in current trends in manufacturing.

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### CO’s- PO’s & PSO’s MAPPING

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### REFERENCES


அகஸ்த் I

அலகு அறிவுமேன்மை - பாடல் அதுமாலிலும் - கட்டிட வலையும் பாடல்முனை - பாடலமைந்துக்கில் நிசை துறவுதல்.

அகஸ்த் II

அலகு அறிவுமேன்மை - பாடல் அதுமாலிலும் - கட்டிட வலையும் பாடல்முனை - கட்டிட வலையும் பாடலமைந்துக்கில் நிசை துறவுதல்.

அகஸ்த் III

கட்டும் அறிவுெொர் - இமணயத்தில், பெண் - எடுத்துக்கொள்ளும் கல்வியியல் பண்பு மற்றும் கட்டும் தெயல்பொடுகள் - கொலக்கட்டிடம் நூல்கள் - பெண் எடுத்துக்கொள்ளும் கொலக்கட்டிடம் - கொலக்கட்டிடம் பொருளில் பற்றி தெயல்பொடுகள் - கொலக்கட்டிடம் பொருளில் தெயல்பொடுகள் - கொலக்கட்டிடம் பொருளில் தெயல்பொடுகள் - கொலக்கட்டிடம் பொருளில் தெயல்பொடுகள் - கொலக்கட்டிடம் பொருளில் தெயல்பொடுகள்.

அகஸ்த் IV


அகஸ்த் V

அதிவிலையான நூறு முனை கணினிக்கட்டிடம் - அதிவிலையான நூறு முனை கணினிக்கட்டிடம் - அதிவிலையான நூறு முனை கணினிக்கட்டிடம் - அதிவிலையான நூறு முனை கணினிக்கட்டிடம் - அதிவிலையான நூறு முனை கணினிக்கட்டிடம் - அதிவிலையான நூறு முனை கணினிக்கட்டிடம் - அதிவிலையான நூறு முனை கணினிக்கட்டிடம் - அதிவிலையான நூறு முனை கணினிக்கட்டிடம் - அதிவிலையான நூறு முனை கணினிக்கட்டிடம் - அதிவிலையான நூறு முனை கணினிக்கட்டிடம் - அதிவிலையான நூறு முனை கணினிக்கட்டிடம்.

TOTAL: 15 PERIODS

TEXT-CUM-REFERENCE BOOKS
1. குறிப்பிட்டு வருவாய் - குறிப்பிட்டு வருவாய் - நூறு வருவாய் (சூட்டுச் சுருக்கம்: குறிப்பிட்டு வருவாய் - குறிப்பிட்டு வருவாய் - குறிப்பிட்டு வருவாய்).)
2. குறிப்பிட்டு வருவாய் - குறிப்பிட்டு வருவாய். (சூட்டுச் சுருக்கம்).
3. சுருக்கம் - சுருக்கம் விளக்கப்பட்டு கணினிக் கட்டிடம் - சுருக்கம் விளக்கப்பட்டு கணினிக் கட்டிடம் (சூட்டுச் சுருக்கம்).
4. தபொருமு - அம்மன்கள் தாரகாயம். (துறுத்துப்பையும் குறுதையும்)
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)
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. தமிழக வரலொறு – மக்களும் பண பொடும் – மக..மக..பிள்மள (தவளியீடு: தமிழ்நொடு பொடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்).
2. கணினித் தமிழ் – முமனவர் இல..சுந்தரம் (விகடன் பிரசுரம்).
3. கீழடி – மவமக நதிக்கமரில் ஆங்ககொல நகரங்கம் (ததொல்லியல் துமற).
4. தபொருமந – ஆற்றங்கமர நொகரிகம். (ததொல்லியல் துமற).
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)
12. Journey of Civilization Indus to Vaiga (R.Balakrishnan) (Published by: RMRL) – Reference Book

NCC Credit Course Level 1*
NX3251 (ARMY WING) NCC Credit Course Level - I

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NCC Credit Course Level 1*
NX3252 (NAVAL WING) NCC Credit Course Level - I

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42
### 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**

**NCC Credit Course Level 1**

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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  8
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

PH3161  PHYSICS LABORATORY  L T P C
(Common to all branches of B.E. /B.Tech Programmes)  0 0 2 1

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

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

UNIT III  CASE STUDY
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
Describing visual content (Pictures/Table/Chart) using appropriate descriptive language and making appropriate inferences and giving recommendations.

UNIT V  PRESENTATION
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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