1. VISION OF THE DEPARTMENT OF AUTOMOBILE ENGINEERING

“To be a premier department in Automobile engineering and reach the highest academic level in the field of Automobile Engineering by imparting knowledge, continuously enhancing Research & Development activities, supporting industries through consultancy vertic and providing the nation with high quality engineers”

2. MISSION OF THE DEPARTMENT OF AUTOMOBILE ENGINEERING

- To prepare students excel in their chosen professions by offering high quality education in automobile engineering with fundamental knowledge, interdisciplinary problem solving skills and confidence required.
- To provide supportive and diverse environment that encourage students to achieve the best of their abilities to be innovators or job providers.
- To maintain constant and active partnership with industries for technology development and transfer through consultancy projects.

3. PROGRAMME EDUCATIONAL OBJECTIVES (PEOS)

PEO1: Students will Excel in their professional career in automobile industry.
PEO2: Students will Exhibit research with highest professional and ethical standards
PEO3: Students will Acquire knowledge in basics of automobile engineering to apply in growth of the industry.
PEO4: Students will Showcase professionalism, team work in their chosen profession
PEO5: Students will Update themselves to recent trends, technologies and industrial scenarios by pursuing lifelong learning.

4. PROGRAMME OUTCOMES (POs)

After going through the four years of study, Automobile Engineering Graduates will exhibit the following.

1. Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2. Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3. Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
4. **Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

5. **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

6. **The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

7. **Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

8. **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

9. **Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

10. **Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

11. **Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one’s own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

12. **Life-long learning**: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

5. **PROGRAM SPECIFIC OUTCOMES (PSOs)**:

   **PSO 1**: The graduate will be able to apply mathematical, scientific, engineering concepts to deliver environmentally friendly and workable products in the automobile engineering domain as a part of a multidisciplinary team using modern tools.

   **PSO 2**: The graduate will be able to undertake a successful engineering career, higher studies, research, entrepreneur through lifelong learning and maintain professional ethics in the field of automobile engineering.

6. **PEO / PO Mapping**:

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UNIVERSITY DEPARTMENTS  
REGULATIONS 2023  
CHOICE BASED CREDIT SYSTEM  
B. E. AUTOMOBILE ENGINEERING  
CURRICULUM AND SYLLABI FOR SEMESTERS I AND II  

SEMESTER I

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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
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
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
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
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
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
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:
1. Raymond A. Serway, John W. Jewett, Physics for Scientists and Engineers, Thomson
4. Alan Giambattista, Betty McCarthy Richardson and Robert C. Richardson, College

REFERENCES:
   2017.

CO-PO & PSO MAPPING

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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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</table>
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  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

TEXT BOOKS:

REFERENCES:

Publication of Bureau of Indian Standards:

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UNIT – I  ELECTRICAL CIRCUITS  9

UNIT – II  ELECTRICAL MACHINES  9

UNIT – III  ANALOG AND DIGITAL ELECTRONICS  9
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  9
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  9

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.
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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1 – Slight, 2 – Moderate, 3 – Substantial

TEXT BOOKS:

REFERENCES:
அங்கியாய் மத்தியம் தோற்றிவரும்: 3
tamil பல்வேறு ததொல்லியல் - தமிழ்நாட்டில் - தமிழ் முதல் வட்டமைப்பு -
tamil தமிழகத்தில் தமிழ் - தமிழ் ததொல்லியல் தமிழ் ததொல்லியல் -
tamil தற்போது வட்ட பல்வேறு தமிழ் தங்குதல் -
tamil தற்போது வட்டத் வட்ட வட்டமைப்பு. - தமிழ் தங்குதல் வட்டமைப்பு -
tamil தற்போது வட்டத் வட்டமைப்பு. - தமிழ் தங்குதல் வட்டமைப்பு -
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tamil தற்போது வட்டத் வட்டமைப்பு - தமிழ் தங்குதல் வட்டமைப்பு.

அங்கியாய் மத்தியம் - பார்வை குறியீடுகள் பதிவு செய்ய குறியீட்டு வகை -
இலக்கியம்: 3
தமிழ் பதிவு செய்ய குறியீடுகள் மத்திய - தமிழ்நாட்டில் - பம்புசையில் பதிவு செய்ய குறியீடுகள் மத்திய -
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tamil ததொல்லியல் தமிழ்.

அங்கியாய் மத்தியம் குறியீடு விளக்கத்தின்: 3
தமிழ்நாட்டில் குறியீடு விளக்கத்தின் - பப்புசையில் பதிவு செய்ய குறியீடுகள் மத்திய -
tamil ததொல்லியல் தமிழ் - தமிழ் தங்குதல் தமிழ் -
tamil ததொல்லியல் தமிழ் -
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tamil ததொல்லியல் தமிழ்.

அங்கியாய் மத்தியம் சிற்பக்கல் பார்வை குறியீடுகள்: 3
தமிழ்நாட்டில் சிற்பக்கல் பார்வை குறியீடுகள் - பப்புசையில் பதிவு செய்ய குறியீடுகள் -
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tamil ததொল்லியல் தமிழ்.

TOTAL : 15 PERIODS

TEXT-CUM-REFERENCE BOOKS
1. தமிழ் மான்றங்கள் - மத்தியம் மான்றங்கள் - 5 வ.த. பிரிவு (பலகைவு: தமிழ்நாட்டில் மாண்டங்கள் மாண்டங்கள் குழு குழு).
2. தமிழ் தொடர்பு - தமிழ் தொடர்பு (தமிழ் பிரிவு).
3. தமிழ் - தமிழ் ததொல்லியல் தமிழ் ததொல்லியல் (தமிழ்நாட்டில் தமிழ் ததொல்லியல்)
4. பொருநூர் – குறிக்கத்தல் தொகுகுறிகள். (கலாச்சார குறிப்பிட்டு தொடர்பு)
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 Bookand Educational Services Corporation, Tamil Nadu)
UNIT I  LANGUAGE AND LITERATURE 3
Language Families in India - Dravidian Languages – Tamil as a Classical Language -
Classical Literature in Tamil – Secular Nature of Sangam Literature – Distributive Justice in
Sangam Literature - Management Principles in Thirukural - Tamil Epics and Impact of
Buddhism & Jainism in Tamil Land - Bakthi Literature Azhwars and Nayanmars - Forms of
minor Poetry - Development of Modern literature in Tamil - Contribution of Bharathiyar
and Bharathidhasan.

UNIT II  HERITAGE - ROCK ART PAINTINGS TO MODERN ART – SCULPTURE 3
Hero stone to modern sculpture - Bronze icons - Tribes and their handicrafts - Art of temple
making - - Massive Terracotta sculptures, Village deities, Thiruvalluvar Statue at
Kanyakumari, Making of musical instruments - Mridhangam, Parai, Veenai, Yazh and
Nadhaswaram - Role of Temples in Social and Economic Life of Tamils.

UNIT III  FOLK AND MARTIAL ARTS 3
Therukoothu, Karagattam, Villu Pattu, Kaniyan Koottu, Oyillattam, Leather puppetry,
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 – மக்களும் பண் பொடும் – மக். மக்குடகு பிள்ம. (தவளியீடு:
    தமிழ்நொடு பொடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்).
2.  தமிழ் முமனவர் விகடன் பிரசுரம் - (சுந்தரம்).
3.  ஸ்ரீதலை - ஸ்ரீதலை சின்னங்களில் கல்லறைக்கு காரணம் (ததொல்லியல்
    தவளியீடு).
4.  பால்வோள் - வேழ்வோள் ததொல்லியல் தவளியீடு (ததொல்லியல்
    தவளியீடு).
5.  Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL – (in
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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 Bookand 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  15

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:
1. 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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21
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.

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GE3162 ENGLISH LABORATORY – I

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

UNIT II NARRATION
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
Making conversation – formal and informal – Turn taking and Turn giving – Small talk

UNIT IV SHORT SPEECH
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
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
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  

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: 

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PH3206  MATERIALS SCIENCE FOR AUTOMOBILE ENGINEERING  L  T  P  C  
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COURSE OBJECTIVES:

- To make the students to understand the basics of phase diagrams and their applications.
- To introduce various strengthening methods of materials, and also various mechanical properties and their measurement.
- To learn about iron-carbon system, effect of alloying elements and various transformations in the Fe-C system.
- To instill the phase transformations and various heat treatment processes.
- To introduce the advanced materials preparation, properties and applications of ceramics and composites.

UNIT I  PHASE DIAGRAMS  9
Solid solutions - Hume Rothery's rules - The phase rule - single component system (iron) - binary phase diagrams - isomorphous systems (Cu-Ni) - determination of phase composition and phase amounts - the tie-line rule - the lever rule - eutectic phase diagram - peritectic phase diagram - other invariant reactions - binary eutectic diagram with no solid solution and limited solid solution (Pb-Sn) – microstructural change during cooling.

UNIT II  MECHANICAL PROPERTIES  9

UNIT III  FERROUS ALLOYS AND STEELS  9
The iron-carbon equilibrium diagram - phases, invariant reactions - microstructure of slowly cooled steels - eutectoid steel, hypo and hypereutectoid steels - effect of alloying elements on the Fe-C system - steels - stainless steels - cast irons - copper alloys – aluminum alloys - titanium alloys - NiTi alloy and its applications

UNIT IV  HEAT TREATMENT OF MATERIALS  9

UNIT V  ADVANCED MATERIALS  9

TOTAL 45 PERIODS
COURSE OUTCOMES:
Upon completion of this course, the students will
- gain knowledge of the basics of binary phase diagrams and the use of lever rule
- understand the significance of dislocations, strengthening mechanisms, and tensile, creep, hardness and fracture behavior of materials
- learn about the Fe-C phase diagram, the effect of alloying elements, TTT in the Fe-C system, and also the heat treatment of steels.
- acquire knowledge on heat treatment of materials and phase transformations
- get an adequate understanding of the preparation, properties, and applications of ceramics, composites, metallic glasses, and shape-memory alloys.

TEXTBOOKS:

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

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

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

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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  


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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அலகு 1  அறிவியல் அலகு வடிவரைப்பு:
பெறுவம் அலகு வடிவரைப்பு - பெறுவம் அலகு வடிவரைப்பு - கட்டுமொனத்தில் பெறுவம் அலகு வடிவரைப்பு.

அலகு 2  அனுகரம் வடிவரைப்பு:
பெறுவம் அலகு வடிவரைப்பு - பெறுவம் அலகு வடிவரைப்பு - கட்டுமொனத்தில் பெறுவம் அலகு வடிவரைப்பு.

அலகு 3  மநகுவகன் வடிவரைப்பு:
பெறுவம் கணினித் தமிழகக் கொலையில் (III - IV):

அலகு 4  குறுக்குகள் மும்பை வடிவரைப்பு:

அலகு 5  அகரொதிகள் வடிவரைப்பு:

TEXT-CUM-REFERENCE BOOKS
1. தமிழ் மொழித் - மக்கள் பார்வாயின் - த.ச.வ. படைப்பு (போடுபோல்: ததொழில் கொலையில் மக்கள் பார்வாயின் குறுக்குகளும்).
2. கணிதத் துறைமுக - பார்வாயின் விள. கோரோக. (சிற்று புதியா).
3. மீன்வளம் தற்காலப்பின் கணினியார் துறை நூல் (கொலையில் குறு போடுபோல்)
4. பொருள் வளம் (அறிவியல் கொலையில்).
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  3
Weaving Industry during Sangam Age – Ceramic technology – Black and Red Ware Potteries (BRW) – Graffiti on Potteries.

UNIT II  DESIGN AND CONSTRUCTION TECHNOLOGY  3
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  3

UNIT IV  AGRICULTURE AND IRRIGATION TECHNOLOGY  3
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  3

TOTAL : 15 PERIODS

TEXT-CUM-REFERENCE BOOKS
1. கீழடி - மவமக நகரிகம் (ததொல்லியல் தவளியீடு)
2. கணினித் தமிழ் - முமனவர் இல. (விகடன் பிரசுரம்)
3. கீழடி - மவமக நகரிகம் (ததொல்லியல் துமறதவளியீடு)
4. பாலூடி - கண்டமேகர் நடுகிழமை (தக்காலியில் துமறதவளியீடு)
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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## NCC Credit Course Level 1*

NX3251  
(ARMY WING) NCC Credit Course Level - I  

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### NCC GENERAL

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### NATIONAL INTEGRATION AND AWARENESS

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### PERSONALITY DEVELOPMENT

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### LEADERSHIP

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### SOCIAL SERVICE AND COMMUNITY DEVELOPMENT

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**TOTAL : 30 PERIODS**
## NCC Credit Course Level 1*

**NX3252 (NAVAL WING) NCC Credit Course Level - I**  
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### NCC GENERAL
- **NCC 1**: Aims, Objectives & Organization of NCC  
- **NCC 2**: Incentives  
- **NCC 3**: Duties of NCC Cadet  
- **NCC 4**: NCC Camps: Types & Conduct

### NATIONAL INTEGRATION AND AWARENESS
- **NI 1**: National Integration: Importance & Necessity  
- **NI 2**: Factors Affecting National Integration  
- **NI 3**: Unity in Diversity & Role of NCC in Nation Building  
- **NI 4**: Threats to National Security

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

### LEADERSHIP
- **L 1**: Leadership Capsule: Traits, Indicators, Motivation, Moral Values, Honour Code  
- **L 2**: Case Studies: Shivaji, Jhasi Ki Rani

### SOCIAL SERVICE AND COMMUNITY DEVELOPMENT
- **SS 1**: Basics, Rural Development Programmes, NGOs, Contribution of Youth  
- **SS 2**: Protection of Children and Women Safety  
- **SS 3**: Road / Rail Travel Safety  
- **SS 4**: New Initiatives  
- **SS 5**: Cyber and Mobile Security Awareness

**TOTAL : 30 PERIODS**
NCC Credit Course Level 1*
NCC 1 Aims, Objectives & Organization of NCC
NCC 2 Incentives
NCC 3 Duties of NCC Cadet
NCC 4 NCC Camps: Types & Conduct

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

PERSONALITY DEVELOPMENT
PD 1 Self-Awareness, Empathy, Critical & Creative Thinking, Decision Making and Problem Solving
PD 2 Communication Skills
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L 2 Case Studies: Shivaji, Jhasi Ki Rani

SOCIAL SERVICE AND COMMUNITY DEVELOPMENT
SS 1 Basics, Rural Development Programmes, NGOs, Contribution of Youth
SS 4 Protection of Children and Women Safety
SS 5 Road / Rail Travel Safety
SS 6 New Initiatives
SS 7 Cyber and Mobile Security Awareness

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

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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<td>-</td>
<td>-</td>
<td></td>
</tr>
</tbody>
</table>

• 1’ = Low; ‘2’ = Medium; ‘3’ = High