ANNA UNIVERSITY, CHENNAI
UNIVERSITY DEPARTMENTS
REGULATIONS – 2023
CHOICE BASED CREDIT SYSTEM
B.E. AERONAUTICAL ENGINEERING

THE VISION OF THE DEPARTMENT OF AEROSPACE ENGINEERING
The Department of Aerospace Engineering shall strive to be a globally known department, committed for its academic excellence, professionalism and societal expectations. The Department aims to impart state of the art technical knowledge, practical skills, leadership qualities, team spirit, ethical values and entrepreneurial skill to make all the students capable of taking up any task relevant to the area of Aerospace Engineering.

THE MISSION OF THE DEPARTMENT OF AEROSPACE ENGINEERING
The Mission of the Department of Aerospace Engineering is to
- Prepare the students to have a very good fundamental knowledge to meet the present and future needs of industries.
- Improve the technical knowledge of the students in tune with the current requirements through collaboration with industries and research organization.
- Make the students gain enough knowledge in various aspects of system integration.
- Motivate the students to take up jobs in national laboratories and aerospace industries of our country.
- Take up inter and multidisciplinary research, sponsored and consultancy projects with industries and research establishments.
- Encourage the faculty members and students to do research and to update with the latest developments in the area of Aerospace Engineering.

PROGRAMME EDUCATIONAL OBJECTIVES (PEOS)
PEO I: Adaptability to industry: Graduates of the programme will receive adequate academic input to adapt themselves in any aircraft and allied industries

PEO II: Successful Career Development: Graduates of the programme will have successful technical and professional careers in Aeronautical and allied industries and management.

PEO III: Motivation for Higher Studies: Graduates of the programme will have motivation to pursue higher studies and acquire masters and research degrees

PEO IV: Contribution to Aeronautical Field: Graduates of the programme will have innovative ideas and potential to contribute for the development and current needs of the aeronautical industries.

PEO V: Sustainable interest for Lifelong learning: Graduates of the programme will have sustained interest continuously to learn and adapt new technology and development to meet the changing industrial scenarios.
PROGRAMME SPECIFIC OUTCOMES

1. **Strong Foundation Knowledge**
   After completing the course, the graduate will have strong basics in aeronautical sciences which will help him/her to pursue either higher studies or seek employment in aeronautical or allied fields. The strong foundation knowledge will help the graduate to become a brilliant academician, a successful engineer/scientist or even an entrepreneur.

2. **Useful Deliverables to Society**
   The graduate will have the ability to help society by way of his participation in delivering useful products and services to society through his/her work in industry, research organisation, educational institution, business organization etc as he/she has strong basic knowledge in aeronautical engineering & ethics and is environmentally conscious.

3. **Desire to have Lifelong Learning**
   The curriculum and syllabus have been framed in such a way to impart desire to the graduate to acquire knowledge, on continuous basis even after completing the programme. This would help the graduate to excel in the line of profession he/she has chosen.

4. **Ability to work as Team Member**
   Graduate will be able to work as a team member which will be a main requirement in industry or research organisation or in any business enterprise. This will pave the way for successful career for the graduate and also play a role for the success of the organisation in which the graduate is employed.
**PROGRAMME OUTCOMES (POs)**
After going through the four years of study, Aeronautical Engineering Graduates will exhibit the following.

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<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>a. Graduate will demonstrate strong basics in mathematics, science and engineering.</td>
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<td>Problem Analysis</td>
<td>b. Graduate will demonstrate the ability to design, analyse and conduct experiments, as well as to interpret data.</td>
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<td>3</td>
<td>Design/Development of solutions</td>
<td>c. Graduate will demonstrate the ability to design a system or a component to meet the design requirements and other professional fields.</td>
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<td>Conduct of Investigations of Complex problems</td>
<td>d. Graduate will acquire the capability to identify, formulate and solve complex engineering problems of Aeronautical Engineering and aerospace subsystems.</td>
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<td>Modern tool usage</td>
<td>e. Graduate will become familiar with modern engineering tools and analyze the problems within the domains of Aeronautical Engineering as a member of multidisciplinary teams.</td>
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<td>The Engineer and Society</td>
<td>f. Graduates will be able to contribute to society by way of becoming good academicians or scientists/engineers in aircraft and aerospace industry for the development of aircraft and aerospace systems that are less noisy, produce less pollution and cheaper transport.</td>
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<td>Environment and sustainability</td>
<td>g. Graduate will exhibit the awareness of contemporary issues focusing on the necessity to develop new material, design, testing and solution for environmental problems pertaining to aircraft and aerospace industry.</td>
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<td>Ethics</td>
<td>h. Graduate will demonstrate an understanding of professional and ethical responsibility with reference to their career in the field of Aeronautical Engineering and other professional fields.</td>
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<td>Individual and Team work</td>
<td>i. Graduate will be trained towards developing and understanding the importance of design and development of Airplanes from system integration point of view.</td>
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<td>Communication</td>
<td>j. Graduate will be able to communicate effectively both in verbal and non-verbal forms. Graduates will have a firm scientific, technological and communication base that helps them to find a placement in the Aircraft industry and R &amp; D organisations related to Aero Engineering and other professional fields.</td>
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<td>Project Management and Finance</td>
<td>k. Graduates will be capable of developing cost effective solutions for development of aircraft and aerospace subsystems.</td>
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Graduate will be capable of understanding the value for life-long learning. Graduate will be capable of doing higher studies and research in inter and multi disciplinary areas.

### Mapping PEO with POs:

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### CURRICULUM AND SYLLABI FOR SEMESTERS I AND II

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Total 18 1 10 27 24

*Skill Based Course

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Total 15 2 12 29 23

$ 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
HS3151 ENGLISH FOR COMMUNICATION – I  
L T P C  3 0 0 3

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
CO-PO & PSO MAPPING

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- 1-low, 2-medium, 3-high

MA3151 MATRICES AND CALCULUS
(Common to all branches of B.E./B.Tech. Programmes in I semester)

UNIT I MATRICES (9+3)
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 (9+3)

UNIT III INTEGRAL CALCULUS (9+3)
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 (9+3)

UNIT V VECTOR CALCULUS (9+3)
Gradient of a scalar field, directional derivative – Divergence and Curl – Solenoidal and Irrotational vector fields - Line integrals over a plane curve - Surface integrals – Area of a curved surface – Volume Integral - Green’s theorem, Stoke’s and Gauss divergence theorems – Verification and applications in evaluating line, surface and volume integrals.

TOTAL: 60 PERIODS

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

REFERENCES:

CO-PO Mapping

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PH3151 ENGINEERING PHYSICS L T P C 3 0 0 3

UNIT I MECHANICS OF MATERIALS

UNIT II OSCILLATIONS, SOUND AND THERMAL PHYSICS

UNIT III OPTICS AND LASERS
Interference - Thin film interference - Air wedge- Applications -Interferometers–Michelson Interferometer — Diffraction - CD as diffraction grating – Diffraction by crystals -Polarization -

UNIT IV QUANTUM MECHANICS

UNIT V CRYSTAL PHYSICS

TOTAL: 45 PERIODS

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

TEXT BOOKS:

REFERENCES:

CO-PO & PSO MAPPING

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* 1’ = Low; ‘2’ = Medium; ‘3’ = High
UNIT I  POLYMER CHEMISTRY
Engineering Plastics: Polyamides, Polycarbonates and Polyurethanes. Compounding and Fabrication Techniques: Injection, Extrusion, Blow and Calendaring

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

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.

TOTAL: 45 PERIODS
TEXT BOOKS:

REFERENCES:

CO - PO Mapping

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AE3101 ENGINEERING DRAWING AND COMPUTER GRAPHICS

L T P C
2 0 4 4

COURSE OBJECTIVES:
Of this course are
1. Drawing freehand sketches of basic geometrical shapes and multiple view of objects
2. Drawing orthographic projections of lines and planes
3. Drawing orthographic projections of solids
4. Drawing section of solids and development of the surfaces of objects
5. Drawing Isometric and 2D drafting command for simple shapes

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 AND FREE HAND SKETCHING
Basic Geometrical constructions, Curves used in engineering practices-Conics – Construction of ellipse, parabola and hyperbola by different methods – Construction of cycloid – construction of involutes of square and circle – Drawing of tangents and normal to the above curves. Visualization concepts and Free Hand sketching: Visualization principles – Representation of Three-Dimensional objects – Layout of views- Free hand sketching of multiple views from pictorial views of objects

UNIT II PROJECTION OF POINTS, LINES AND PLANE SURFACES
Orthographic projection- principles-Principle 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 trapezoidal 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  12
Projection of simple solids like prisms, pyramids, cylinder, cone and truncated solids when the axis is inclined to both the principal planes by rotating object method and auxiliary plane method.

UNIT IV SECTIONES OF SOLIDS AND DEVELOPMENT OF SURFACES 12
Sectioning of solids 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.

UNIT V ISOMETRIC PROJECTION AND COMPUTER AIDED DRAFTING 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 and miscellaneous problems. Introduction to computer aided drafting hardware-overview of application software-2D drafting commands for simple shapes-dimensioning.

COURSE OUTCOMES:
Upon completion of the course, the students will be able to
CO1 Draw freehand sketching of basic geometrical shapes and multiple views of objects
CO2 Draw orthographic projections of lines and planes
CO3 Draw orthographic projections of solids
CO4 Draw section of solids and development of the surfaces of objects
CO5 Drawing isometric projection of solids and 2D drafting commands for simple shapes

TOTAL :60 PERIODS

TEXTBOOKS:

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UNIT I INTRODUCTION
Units and standards – Classification of errors, Limiting error and probable error – Error analysis
Static characteristics: Accuracy, precision, resolution, sensitivity, linearity, span and range
variable Resistance transducers- Principle of operation, construction details, characteristics
and applications of potentiometer, strain gauge.

UNIT II MEASUREMENT OF ELECTRICAL PARAMETERS
Types of ammeters and voltmeters: PMMC Instruments, Moving Iron Instruments,
Dynamometer type Instruments – Resistance measurement: Wheatstone bridge, Kelvin double
bridge and Direct deflection methods, Megger. Measurement of Inductance: Maxwell-Wein
Bridge, Hay’s bridge and Anderson Bridge - Measurement of Capacitance: Schering Bridge.

UNIT III ANALOG AND DIGITAL INSTRUMENTS
Wave analyzers, Logic analyser, spectrum analyser – Signal and function generators –
Distortion factor meter – Q meter – Digital voltmeter and multi-meter – Microprocessor based
DMM with auto ranging and self-diagnostic features – Frequency & time period measurement,
digital LCR meter.

UNIT IV DISPLAY AND RECORDING DEVICES
Cathode ray oscilloscope: Classification, Sampling and storage scopes –MSO, seven
segment, Organic Light Emitting Diode display, LCD– X-Y recorders —Digital Data Recording
– Digital memory waveform recorder – Data loggers, IOT enabled recorder.

UNIT V INTERFACING OF TRANSDUCERS
Digital Data Acquisition System: Interfacing transducers to Electronics Control and Measuring
System. Instrumentation Amplifier, Isolation Amplifier. An Introduction to Computer-Controlled

TOTAL : 45 PERIODS

COURSE OUTCOMES (COs)
After completion of course student will be able to
CO 1 Apply the Mathematical knowledge, basics of Science and Engineering fundamentals
to solve the problems pertaining to measurement applications and to perform error
analysis and uncertainty analysis. (L3)
CO 2 Acquire knowledge on the static and dynamic characteristics of various transducers to
know the behavior and hence to model the transducer. (L1)
CO 3 Develop sound understanding on different transduction principles like resistive,
capacitive and inductive. (L2)
CO 4 Select and use the most appropriate transducer for a given application.(L4)
CO 5 Explain the working principle of various display and recording devices. (L3)
CO 6 Demonstrate the various methods of interfacing transducers. (L4)

TEXT BOOKS:
1. Albert D Helfrick, William D cooper, “Modern Electronic Instrumentation & Measurement
REFERENCES:

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GE3154 ஊர்பணியாத்தை பொருட்கள் மூலை

அட்சம் I பொருட்கள் மூலை திட்டமிட்டு:

3

அட்சம் II பொருட்கள் மூலை திட்டமிட்டு மூலை

3
நொட்டுப்புறக் கறலகள் மற்றும் வீரவிறளொட்டுகள்:

3. மதருக்கூத்து, கரகொட்ட, வில்லுப்பொட்டு, கணியொன் கூத்து, ஒயிலொட்டு, மதொல்பொமவக் கூத்து, மாற்றுகள், மகொட்பொடுகள், வளரி, புலியொட்டு, தமிழர்களின் விமளயொட்டுகள்.

தமிழர்களின் திறைக் ககொட்பொடுகள்:


இந்தியகதசிய இயக்கம் மற்றும் இந்தியபைபொட்டிற்குத் தமிழர்களின் பங்களிப்பு:

### TEXT-CUM-REFERENCE BOOKS

1. மனம் மறுகை - மரப்பகுதி புலனைகள் – ஞ.க. போஸ்கோ (மாறம்: மரப்பகுதி நடுவுக் புலனைகள் புலனைகள் மறுகை குழுரூக்கு).
2. மனம் மறுகை - மரப்பகுதி வருகை. (மாறம்: பாத்திரம்).
3. முருகன் - மதோல்லியல் புராணத்தில் சிங்ககர் காவளிகுரு (மாறம்: புராணத்தில் சிங்ககர் காவளிகுரு).
4. மாறம் - மதோல்லியல் புராணத்தில் சிங்ககர் காவளிகுரு. (இருமுனைப்பு: காவளிகுரு).
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.Valarmathy) (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) (Publishedby: 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:
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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GE3162 ENGLISH LABORATORY – I

OBJECTIVES:
• To improve the communicative competence of learners
• To help learners use language effectively in formal and informal conversations.
• To use language efficiently in expressing their opinions in discussions and talks.

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

Learning Outcomes
At the end of the course, students will be able to
- Communicate effectively in formal and informal contexts
- Converse appropriately and confidently with different people
- Express their opinions assertively in group discussions

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1-low, 2-medium, 3-high, '-'- no correlation
Note: The average value of this course to be used for program articulation matrix.

HS3251  ENGLISH FOR COMMUNICATION – II  L T P C
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UNIT I  CAUSE AND EFFECT  9
Listening – Radio / TV / Podcast Interview (survivors tale) and framing a set of instructions/ Do’s and Don’ts; Reading – Excerpts of Literature (short stories), Journal articles on issues like Global warming; Writing - Instructions; Official letter / email (Request for internship / Industrial visit); Grammar – If conditionals, Imperatives; Vocabulary – Cause and effect expressions, Idiom

UNIT II  COMPARE AND CONTRAST  9
Listening – Product reviews and gap fill exercises, Short Talks (like TED Talks) for specific information; Reading – Graphical content (table / chart / graph) and making inferences; Writing – Compare and Contrast Essay; Grammar – Degrees of Comparison; Mixed Tenses; Vocabulary – Order of Adjectives, Transition words.
UNIT III  PROBLEM AND SOLUTION  9
Listening – Group discussion (case study); Reading – Visual content (Pictures on social issues / natural disasters) for comprehension; Editorial; Writing Picture description; Problem and Solution Essay; Grammar – Modal verbs; Relative pronoun; Vocabulary – Negative prefixes, Signal words for problem and solution.

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

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

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

Learning Outcomes
On completion of the course, the students will be able to:
- Listen effectively to various oral forms of conversation, lectures, discussion and understand the main gist of the content.
- Communicate effectively in formal and informal context.
- Read and comprehend technical texts effortlessly.
- Write reports and job application for internship or placement.
- Learn to use language effectively in a professional context.

TEXT BOOKS
1. “English for Engineers and Technologists” Volume 2 by Orient Blackswan, 2022

REFERENCE BOOKS
4. www.uefap.com

CO-PO & PSO MAPPING

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- 1-low, 2-medium, 3-high, "-" no correlation
- **Note:** The average value of this course to be used for program articulation matrix.

20
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) – Parsevals’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:
COURSE OBJECTIVE:
To impart the importance of design in today’s context of global competition.

UNIT I  DESIGN THINKING FOR NEED IDENTIFICATION  9

UNIT II  PRODUCT DEVELOPMENT PROCESS  9

UNIT III  PRODUCT ARCHITECTURE AND INDUSTRIAL DESIGN FOR ENVIRONMENT  9

UNIT IV  ROBUST DESIGN FOR MANUFACTURING AND SUPPLY CHAIN  9
Robust design through the design of experiments (DOE)–Design for X (DFX)–Iteration of DFM method–Failure Mode and Effect Analysis (FMEA)–Quality Function Deployment (QFD)–Partial disassembly, folding, or compression– Delayed final packaging.

UNIT V  DESIGN THINKING IN COST-CUTTING AND INTELLECTUAL PROPERTY  9

TOTAL: 45 PERIODS

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

CO1  Apply design concepts for manufacturing, assembly and environment.
CO2  Make economically sound decisions.
CO3 Design methodologies on industrial ecology.
CO4 Analyze the design for its manufacturability using modern quality control concepts and Approaches.
CO5 Learn the value of design and how it impacts society, industry, and the environment.

TEXT BOOKS:

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GE3153 PROGRAMMING IN C

UNIT I - BASICS OF C PROGRAMMING
Introduction to programming paradigms — Structure of C program - C programming: Data Types - Constants - Keywords - Operators: Precedence and Associativity - Expressions - Input/Output statements, Assignment statements - Decision making statements - Switch statement.
PRACTICALS:
- Designing programs with algorithms/flowchart
- Programs for i/o operations with different data types
- Programs using various operators
- Programs using decision making and branching statements

UNIT II – LOOP CONTROL STATEMENTS AND ARRAYS 6+12
Iteration statements: For, while, Do-while statements, nested loops, break & continue statements - Introduction to Arrays: Declaration, Initialization - One dimensional array - Two dimensional arrays – Searching and sorting in Arrays – Strings – string handling functions - array of strings

PRACTICALS:
- Programs using for, while, do-while loops and nested loops.
- Programs using arrays and operations on arrays.
- Programs implementing searching and sorting using arrays
- Programs implementing string operations on arrays

UNIT III - FUNCTIONS AND POINTERS 6+12
Modular programming - Function prototype, function definition, function call, Built-in functions – Recursion – Recursive functions - Pointers - Pointer increment, Pointer arithmetic - Parameter passing: Pass by value, Pass by reference, pointer and arrays, dynamic memory allocation with malloc calloc

PRACTICALS:
- Programs using functions
- Programs using recursion
- Programs using pointers & strings with pointers
- Programs using Dynamic Memory Allocation

UNIT IV - STRUCTURES AND UNION 6+12
Storage class, Structure and union, Features of structures, Declaration and initialization of structures, array of structures, Pointer to structure, structure and functions, typedef , bit fields , enumerated data types, Union.

PRACTICALS:
- Programs using Structures
- Programs using Unions
- Programs using pointers to structures and self-referential structures

UNIT V – MACROS AND FILE PROCESSING 6+12

PRACTICALS:
- Programs using pre-processor directives & macros
- Programs to handle file operations
- Programs to handle file with structure
COURSE OUTCOMES:
Upon completion of the course, the students will be able to

CO1: Write simple C programs using basic constructs.
CO2: Design searching and sorting algorithms using arrays and strings.
CO3: Implement modular applications using Functions and pointers.
CO4: Develop and execute applications using structures and Unions.
CO5: Solve real world problem using files.

Total Hours: 90 (30+60)

TEXT BOOKS:

REFERENCES:

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GE3151 ENGINEERING MECHANICS

UNIT I STATICS OF PARTICLES
9+3

UNIT II EQUILIBRIUM OF RIGID BODIES AND TRUSSES
9+3
Principle of Transmissibility, Equivalent Forces, Vector Product of Two Vectors, Moment of a Force about a Point, Varignon’s Theorem, Rectangular Components of the Moment of a
UNIT I  FUNDAMENTALS OF FORCES, MOMENTS, AND WORKS  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

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.

TEXTBOOKS:
REFERENCES:

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GE3251 தொழில்நுட்ப முறையியல்

அலகு I மநசவும் பொறனத்து உற்பத்தியியல்:

அலகு II மநசவும் வடிவமைப்பு கட்டிடக்கலை:

அலகு III உற்பத்தியியல் உற்பத்தியியல்:
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 Nayakkar 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. தமிழகவரலொறு - மக்கள் பண்பொடு - மக்கள் பிள்மள (தமிழ்நொடுபொடநூல் கல்வியியல் பணிகள் கழக).
2. கணினித் தமிழ் - முமனவர் இல.சுந்தர பிரசுர.
3. மபொருமந - ஆற்றங்கமர - எங்கநகரிக (தமிழ்யல் துமறமவளியீடு).
4. பொருளாதார - அரிமாராதார கற்காலம. (தமிழ்யல் துமறமவளியீடு)
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)
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### PERSONALITY DEVELOPMENT

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

### LEADERSHIP

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

### SOCIAL SERVICE AND COMMUNITY DEVELOPMENT

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

TOTAL: 30 PERIODS

### NCC Credit Course Level 1*

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TOTAL: 30 PERIODS
COURSE OBJECTIVES:
Of this course are
1. To introduce students to the fundamentals of 3D geometric modeling using computer-aided design (CAD) software.
2. To develop students’ skills in creating and manipulating solid and surface models for various engineering applications.
3. To familiarize students with the concept of assembly and the use of constraints for creating functional mechanical designs.
4. To provide hands-on experience in drafting and creating engineering drawings, including layouts, sectional views, and detailing.
5. To enable students to apply their knowledge and skills to model and draft mechanical components and aircraft structural components.

LIST OF EXPERIMENTS
3D GEOMETRIC MODELING
i. CAD Introduction – Sketcher
iii. Surface modeling: Extrude, Sweep, Trim, Mesh of curves and Free form.
iv. Feature manipulation: Copy, Edit, Pattern, Suppress, History operations.
v. Assembly: Constraints, Exploded Views, Interference check
vii. Exercises in Modeling and drafting of Mechanical Components
viii. Assembly using Parametric and Feature based Packages

2D DRAFTING
1. Bearings – Bush Bearing
3. Couplings – Flange, Oldham’s, Muff, Gear couplings.
4. Joints – Types of Riveted Joints
5. Engine parts – Piston, Connecting Rod.
6. Aircraft structural components
   i. Wing
   ii. Fuselage
   iii. Landing gear
   iv. Spars
   v. Ribs
   vi. Stringers

TOTAL : 60 PERIODS

COURSE OUTCOMES:
Upon completion of the course, the students will be able to
CO1 To demonstrate proficiency in using CAD software for creating 3D models using various techniques such as extrusion, revolve, sweep, and loft.
CO2 To generate complex surface models using extrusion, sweep, trim, mesh of curves, and free-form techniques.
CO3 To apply feature manipulation operations such as copy, edit, pattern, suppress, and history operations to modify and refine their models.
CO4 To assemble individual components, apply constraints, and perform interference checks to ensure proper fit and functionality.
CO5  To create engineering drawings of aircraft structural components including layouts, standard and sectional views, and detailing, and effectively communicate design information through proper plotting and documentation.

PH3161  PHYSICS LABORATORY  L  T  P  C
0  0  2  1

COURSE OBJECTIVES:
1. To inculcate experimental skills to test basic understanding of the materials’ properties including materials mechanical, thermal and optical properties.
2. To induce the students to familiarize themselves with the properties of sound waves and ultrasonic waves.
3. To impart practical skills
   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. 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.
   5. Air wedge -Determination of the thickness of a thin sheet/wire
   6. a) Optical fibre -Determination of Numerical Aperture and acceptance angle
      b) Determination of bending loss of fibre.
   7. Acoustic grating-Determination of the velocity of ultrasonic waves in liquids.
   8. Ultrasonic interferometer – determination of sound velocity and liquids compressibility.
   9. Spectrometer-Determination of the wavelength of light using grating
   10. Photoelectric effect – Determination of Planck’s constant
   11. Michelson Interferometer -Determination off wavelength of the monochromatic source of light.
   12. Melde’s string experiment - Standing waves.
   13. Forced and Damped Oscillations
   15. Lee’s Disc Experiment - Determination of thermal conductivity of bad conductors.
   16. Black body radiation (Demonstration)
   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.
GE3261

ENGLISH LABORATORY – II

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

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

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

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

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

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

TOTAL : 30 PERIODS

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

CO-PO & PSO MAPPING

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1’ = Low; ‘2’ = Medium; ‘3’ = High