VISION STATEMENT

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

MISSION STATEMENT

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

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

PEO 1: To achieve success in careers that deal with the design, simulation and analysis of engineering systems, experimentation and testing, manufacturing, technical services, and research.

PEO 2: To communicate effectively with peers, and updating and adapting their core knowledge and abilities to ethically compete in the ever-changing multicultural global enterprise.

PEO 3: To conduct multi-disciplinary research and development (via graduate study or industry) resulting in tangible applications that advance technology and foster innovation in order to compete successfully in the global economy.

PEO 4: To exchange and apply knowledge to create new opportunities that advance our society and proactively address through team efforts to solve a variety of technical, environmental and societal problems.

PEO 5: To actively embrace impactful leadership roles in the practice of Mechanical Engineering in industry and government organizations (including both traditional and emerging technical areas) as well as in public service organizations.
PROGRAMME OUTCOMES (POs)

On successful completion of the Materials Science and Engineering Degree programme, the Graduates shall 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>Apply knowledge of mathematics, basic science and engineering science.</td>
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<td>2.</td>
<td>Problem analysis</td>
<td>Identify, formulate and solve engineering problems.</td>
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<td>3.</td>
<td>Design/development of solutions</td>
<td>Design a system or process to improve its performance, satisfying its constraints.</td>
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<tr>
<td>4.</td>
<td>Conduct investigations of complex problems</td>
<td>Conduct experiments &amp; collect, analyze and interpret the data.</td>
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<td>5.</td>
<td>Modern tool usage</td>
<td>Apply various tools and techniques to improve the efficiency of the system.</td>
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<td>6.</td>
<td>The Engineer and society</td>
<td>Conduct themselves to uphold the professional and social obligations.</td>
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<td>7.</td>
<td>Environment and sustainability</td>
<td>Design the system with environment consciousness and sustainable development.</td>
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<td>8.</td>
<td>Ethics</td>
<td>Interacting industry, business and society in a professional and ethical manner.</td>
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<td>9.</td>
<td>Individual and team work</td>
<td>Function in a multidisciplinary team.</td>
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<td>11.</td>
<td>Project management and finance</td>
<td>Implement cost effective and improved system.</td>
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<td>12.</td>
<td>Life-long learning</td>
<td>Continue professional development and learning as a life-long activity.</td>
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PROGRAM SPECIFIC OUTCOMES (PSOs)

On successful completion of B.E Mechanical Engineering programme, that Graduates shall exhibit the following

PSO 1: Understand, analyse, apply, design and develop engineering systems adopting thermal, design and manufacturing concepts

PSO 2: Utilize computational and design tools for efficient product development

PSO 3: Apply the acquired knowledge for innovative solutions to cater societal needs and industrial problems

PEO / PO & PSO MAPPING
### Semester I

<table>
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<tr>
<th>S. No.</th>
<th>Course Code</th>
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| **PRACTICALS** |            |                                       |          |      |      |   |               |
| 7.             | GE3161      | Engineering Practices Laboratory      | ESC      | 0    | 0    | 4 | 4 | 2 |
| 8.             | GE3162      | English Laboratory - I                | EEC      | 0    | 0    | 2 | 2 | 1 |

**Total** 15 1 10 26 21

### Semester II

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| **PRACTICALS** |            |                                       |          |      |      |   |               |
| 9.             | PH3161      | Physics Laboratory                    | BSC      | 0    | 0    | 2 | 2 | 1 |
| 10.            | GE3261      | English Laboratory - II#              | EEC      | 0    | 0    | 2 | 2 | 1 |

**Total** 18 2 10 30 25

$ Skill Based Course

# NCC Credit Course level 1 is offered for NCC students only. The grades earned by the students will be recorded in the Mark Sheet, however the same shall not be considered for the computation of CGPA
UNIT I  BASICS OF COMMUNICATION  9
Listening – Telephone conversation & Writing message, gap filling; Reading – Telephone message, bio-note; Writing – Personal profile; Grammar – Simple present tense, Present continuous tense, Asking questions (wh-questions); Vocabulary – One word substitution, Synonyms

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

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

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

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

Assessment
Two Written Assessments; 35% weightage each
Assignment: 30% weightage
Designing a tourist brochure / Writing an opinion article / Making a travel podcast
End Semester Exam: 3-hour written exam

TOTAL : 45 PERIODS

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

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

REFERENCES
4. www.uefap.com
### CO-PO & PSO MAPPING

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### Notes:
- 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  9

UNIT II  OSCILLATIONS, SOUND AND THERMAL PHYSICS  9

UNIT III  OPTICS AND LASERS  9

UNIT IV  QUANTUM MECHANICS  9

UNIT V  CRYSTAL PHYSICS  9

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:
3. N. Garcia, A. Damask and S. Schwarz, Physics for Computer Science Students, Springer-Verlag,
REFERENCES:

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

UNIT II NANOCHEMISTRY

UNIT III CORROSION SCIENCE

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

UNIT V WATER TECHNOLOGY

TOTAL: 45 PERIODS

COURSE OUTCOMES:
CO1: To recognize and apply basic knowledge on different types of polymeric materials, their general preparation methods and applications to futuristic material fabrication needs.
CO2: To identify and apply basic concepts of nanoscience and nanotechnology in designing the synthesis of nanomaterials for engineering and technology applications.
CO3: To recognize and apply basic knowledge on suitable corrosion protection technique for practical problems.
CO4: To recognize different storage devices and apply them for suitable applications in energy sectors.
CO5: To demonstrate the knowledge of water and their quality in using at different industries.
TEXT BOOKS:

REFERENCES:

CO - PO Mapping

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- 1' = Low; '2' = Medium; '3' = High
COURSE OBJECTIVE:

The learning objectives of this course is to develop in students, the engineering graphic skills for communication of concepts, ideas and design of engineering products and expose them to existing national standards related to technical drawings.

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

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

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

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

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

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

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

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

TEXTBOOKS:

REFERENCES:

Publication of Bureau of Indian Standards:

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அத்தி வருடத்துச் சீர்காண்பதாக

இத்தியாந்திகள் - நிகழ்ச்சிகள் - மகளுத்து வருடங்கள் - மகளுத்து வருடவிளக்கம் மற்றும் காலத்தின் குறுக்கு - தலை துறைக்கும் பரிகார் அளக சிற்றிலகத் தமிழக விமல யொருட்கள் - மாருக்கும் வெசியல், வெசியல்கள் கொண்டு நெடுக்கும் யொருட்கள் - சிற்றிலகத் தொன்றுப பார்களும் பார்கள் வழித்துச் சீர்காண்பதாக.

அத்தி வருடத்து - பார்ககும் விளக்கங்கள் பதிவு தொண்டிகள் மற்றும் - திருப்புச் சீர்காண்பதாக

இத்தியாந்திகள் - மாருக்கும் வெசியல், மாருக்கும் வெசியலின் ஒன்று மாருக்கும் வெசியல், வெசியல் கொண்டு நெடுக்கும் யொருட்கள் - சிற்றிலகத் தொன்றுப பார்களும் பார்கள் வழித்துச் சீர்காண்பதாக.

अத்தி வருடத்துச் சீர்காண்பதாக

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TEXT-CUM-REFERENCE BOOKS

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

GE3154 HERITAGE OF TAMILS

UNIT I LANGUAGE AND LITERATURE


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


UNIT III FOLK AND MARTIAL ARTS

Therukoothu, Karagattam, Villu Pattu, Kaniyan Koothu, Oyillattam, Leather puppetry, Silambattam, Valari, Tiger dance - Sports and Games of Tamils.

UNIT IV THINAI CONCEPT OF TAMILS

Flora and Fauna of Tamils & Aham and Puram Concept from Tholkappiyam and Sangam Literature - Aram Concept of 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

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

2. தமிழிலை குறிப்பு – உயர்ந்த இல்லா கருத்துப் பணி. (தில்லியில் பிரசுரம்).
3. மூதை – கதைக்கோரகம் சார்க்காய கரு தார்க்கியம் (தமிழில் சார்க்காய கரு தார்க்கியம்)
4. பண்டைக்கடல் – உயர்ந்த இல்லா கருத்துப் பணி (தமிழில் சார்க்காய கரு தார்க்கியம்)
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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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)
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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TOTAL = 60 PERIODS
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

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

CO-PO & PSO MAPPING

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- 1’ = Low; ‘2’ = Medium; ‘3’ = High

TOTAL : 30 PERIODS
UNIT I  CAUSE AND EFFECT  9
Listening – Radio / TV / Podcast Interview (survivors tale) and framing a set of instructions/ Do’s and Don’ts; Reading – Excerpts of Literature (short stories), Journal articles on issues like Global warming; Writing - Instructions; Official letter / email (Request for internship / Industrial visit); Grammar – If conditionals, Imperatives; Vocabulary – Cause and effect expressions, Idiom

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

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

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

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

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

TOTAL : 45 PERIODS

COURSE OUTCOMES
On completion of the course, the students will be able to:
CO1. Listen effectively to various oral forms of conversation, lectures, discussion and understand the main gist of the content.
CO2. Communicate effectively in formal and informal context.
CO3. Read and comprehend technical texts effortlessly.
CO4. Write reports and job application for internship or placement.
CO5. Learn to use language effectively in a professional context.

TEXT BOOKS
1. “English for Engineers and Technologists” Volume 2 by Orient Blackswan, 2022
REFERENCES
4. www.uefap.com

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- 1’ = Low; ’2’ = Medium; ’3’ = High

- Note: The average value of this course to be used for program articulation matrix.
MA3251 ORDINARY DIFFERENTIAL EQUATIONS AND TRANSFORM TECHNIQUES

UNIT I ORDINARY DIFFERENTIAL EQUATIONS (9+3)

UNIT II LAPLACE TRANSFORMS (9+3)

UNIT III FOURIER SERIES (9+3)

UNIT IV FOURIER TRANSFORMS (9+3)

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

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

TEXT BOOKS:

REFERENCES:
## CO-PO Mapping

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

UNIT I DESIGN THINKING FOR NEED IDENTIFICATION

UNIT II PRODUCT DEVELOPMENT PROCESS

UNIT III PRODUCT ARCHITECTURE AND INDUSTRIAL DESIGN FOR ENVIRONMENT

UNIT IV ROBUST DESIGN FOR MANUFACTURING AND SUPPLY CHAIN
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

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:

REFERENCES:

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OBJECTIVES

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

Unit 1  PROGRAMMING BASICS  6+12

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  6+12

PRACTICALS:

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

Unit 3  STRING, LIST, TUPLES  6+12

PRACTICALS:

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

Unit 4  SETS & DICTIONARIES, FUNCTIONAL PROGRAMMING  6+12
PRACTICALS:
- Write Python programs creating sets and performing set operations
- Develop Python programs using Dictionary, Nested Dictionary and comprehensions
- Write Python programs by applying functional programming concepts
- Create, import, and use user-defined modules
- Organize python code using Packages

Unit 5 EXCEPTIONS AND FILE HANDLING
PRACTICALS:
- Design Python programs to handle errors and exceptions
- Write Python programs with multiple handlers for exceptions
- Write Python programs to perform various operations on files
- Write Python programs to read and update text and data files

Total Hours: 90 (30+60)

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

TEXT BOOKS

REFERENCE BOOKS
4. Python official documentation and tutorial, https://docs.python.org/3/
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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UNIT – I  ELECTRICAL CIRCUITS

UNIT – II  ELECTRICAL MACHINES

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

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

UNIT – V  MEASUREMENTS AND INSTRUMENTATION

TOTAL: 45 PERIODS

Laboratory Experiments:
LIST OF EXPERIMENTS:

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

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

TOTAL: 30 PERIODS
 COURSE OUTCOMES

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

CO 1: Compute and demonstrate the electric circuit parameters for simple problems.

CO 2: Explain the working principles and characteristics of electrical machines, electronic devices and measuring instruments.

CO 3: Identify general applications of electrical machines, electronic devices and measuring instruments.

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.

### Mapping of COs with POs and PSOs

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1 – Slight, 2 – Moderate, 3 – Substantial

### TEXT BOOKS:


### REFERENCES:

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

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

**NX3253 (AIR FORCE WING) NCC Credit Course Level - I**

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**TOTAL : 30 PERIODS**
அலகு I  விளகல் பகுதியில் குறிப்பிட்டுள்ளது: 3

அலகு II  யார் என்றுக் குறிப்பிட்டுள்ளது: 3

அலகு III  பார்வைகளின் பகுதியில் குறிப்பிட்டுள்ளது: 3

அலகு IV  குழுவிடுதல் பகுதியில் குறிப்பிட்டுள்ளது: 3

அலகு V  அறிவியல் விளகல்களில் குறிப்பிட்டுள்ளது: 3

TEXT-CUM-REFERENCE BOOKS

1. தமிழ் வரலைப்பு - முக்கியமான பகுதிகள் - லட்சம். பிரசுரம் (மதொல்லியல்: தமிழ் வரலைப்பு - முக்கியமான பகுதிகள்).
2. காலப்பிரசுரம் - பொதுகாலாட்சிகள். (மதொல்லியல்: பொதுகாலாட்சிகள்).
3. இராம வேத விளகல் குறிப்பிட்டுள்ளது: (சிஙக்காயின் குறி வேத விளகல்)
4. சிவப்பு - இளஞங்காலக் குறிப்பிட்டுள்ளது: (சிஙக்காயின் குறி வேத விளகல்)
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)

GE3251 TAMILOS AND TECHNOLOGY

UNIT I WEAVING AND CERAMIC TECHNOLOGY
Weaving Industry during Sangam Age – Ceramic technology – Black and Red Ware Potteries (BRW) – Graffiti on Potteries.

UNIT II DESIGN AND CONSTRUCTION TECHNOLOGY
Designing and Structural construction House & Designs in household materials during Sangam Age - Building materials and Hero stones of Sangam age – Details of Stage Constructions in Silappathikaram - Sculptures and Temples of Mamallapuram - Great Temples of Cholas and other worship places - Temples of Nayaka Period - Type study (Madurai Meenakshi Temple)- Thirumalai Nayakar Mahal - Chetti Nadu Houses, Indo - Saracenic architecture at Madras during British Period.

UNIT III MANUFACTURING TECHNOLOGY

UNIT IV AGRICULTURE AND IRRIGATION TECHNOLOGY
Dam, Tank, ponds, Sluice, Significance of Kumizhi Thoompu of Chola Period, Animal Husbandry - Wells designed for cattle use - Agriculture and Agro Processing - Knowledge of Sea - Fisheries – Pearl - Conche diving - Ancient Knowledge of Ocean - Knowledge Specific Society.

UNIT V SCIENTIFIC TAMIL & TAMIL COMPUTING

TOTAL: 15 PERIODS

TEXT-CUM-REFERENCE BOOKS
1. பாரசுர வேதா முழுங்கை – மேசசு பரிநிலாவிய – சுந்தர பொய்த்த குட்டிகளின் கருத்துக்கோட்டை (வேதாங்கள்: பாரசுர வேதா முழுங்கை – மேசசு பரிநிலாவிய – சுந்தர பொய்த்த குட்டிகளின் கருத்துக்கோட்டை).
2. கருத்துக்கோட்டை பாரசுர வேதா முழுங்கை – மேசசு பரிநிலாவிய – சுந்தர பொய்த்த குட்டிகளின் கருத்துக்கோட்டை (வேதாங்கள்: பாரசுர வேதா முழுங்கை – மேசசு பரிநிலாவிய – சுந்தர பொய்த்த குட்டிகளின் கருத்துக்கோட்டை).
3. பாரூடூர் - மேசசு பரிநிலாவிய – சுந்தர பொய்த்த குட்டிகளின் கருத்துக்கோட்டை (வேதாங்கள்: பாரூடூர் - மேசசு பரிநிலாவிய – சுந்தர பொய்த்த குட்டிகளின் கருத்துக்கோட்டை).
4. பாரூடூர் - மேசசு பரிநிலாவிய – சுந்தர பொய்த்த குட்டிகளின் கருத்துக்கோட்டை (வேதாங்கள்: பாரூடூர் - மேசசு பரிநிலாவிய – சுந்தர பொய்த்த குட்டிகளின் கருத்துக்கோட்டை).
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.Singaraveedu) (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
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)

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.
10. a) Optical fibre - Determination of Numerical Aperture and acceptance angle
    b) - Determination of bending loss of fibre.
12. Michelson Interferometer - Determination of wavelength of the monochromatic source of light.
13. Photoelectric effect – Determination of Planck’s constant.
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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