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

THE VISION OF THE DEPARTMENT OF MANUFACTURING ENGINEERING:

To be outstanding institute where students can gain acumen and to brew them so that they unswervingly meet the needs of the society.

THE MISSION OF THE DEPARTMENT OF MANUFACTURING ENGINEERING:

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

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs):

To qualify as Manufacturing Engineering Graduates, the candidates are expected to meet the following Program Educational Objectives (PEOs) within 5 years after graduation:

1. To be employed in jobs related to manufacturing sectors at National and Global levels.
2. To be engaged in life-long learning, certification from professional organizations and active participation in professional societies/activities.
3. To be successful in their carrier and take up leadership roles in their professional life.
4. To become an expert and provide solutions to the industrial problems in the manufacturing sectors.
5. To become an entrepreneur by establishing an industry/startup and to provide jobs to others.

PROGRAMME OUTCOMES (POs):

The Programme Outcomes (POs) of the Manufacturing Engineering graduates are given below:

PO	Graduate Attribute	Programme Outcome
1	Engineering knowledge	Engineering/Fundamental knowledge in mathematics, engineering, sciences, computer science, humanities, and social science
2	Problem analysis	Identify, formulate and solve industrial problems with the knowledge gained.
3	Design/development of solutions	Design a component or system and provide solutions by understanding its current status to improve its performance and satisfying its constraints.
4	Conduct investigations of complexproblems	Conduct experimentation and collect, analyze aswell as interpret the data in a systematic way.

5	Modern tool usage	Ability to apply various modern tools and techniques to improve the efficiency of thesystem.
6	The Engineer and society	Conduct themselves to uphold the professional and social obligations.
7	Environment and sustainability	Design and develop the systems with environment consciousness and sustainable manufacturing.
8	Ethics	Behave and practice ethically in the professional carrier.
9	Individual and team work	Demonstrate leadership skills and also be able to function as a team player.
10	Communication	Communicate professionally in both oral and written forms.
11	Project management and finance	Ability to manage through effective economic planning and control.
12	Life-long learning	Creating interest in the lifelong learning attitude.

PROGRAM SPECIFIC OUTCOMES (PSOs):

On successful completion of Manufacturing Engineering degree program, the graduate shall have the following Program Specific Outcomes (PSOs).

1. Ability to demonstrate the knowledge gained in the fundamentals of manufacturing engineering in a systematic manner with ethics and sustainability.
2. Ability to understand, devise methodologies to solve problems and come out with best possible solutions in manufacturing engineering as an individual and as a team.
3. Ability to apply fundamental aspects of manufacturing engineering to innovate and to create new products and processes with sustainable manufacturing.

PEO / PO MAPPING:

PROGRAMME EDUCATIONAL OBJECTIVES	PROGRAMME OUTCOMES											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
I	3	3	3	3	3	2	1	-	-	-	-	3
II	3	2	2	1	3	3	3	3	3	3	3	3
III	-	-	3	3	-	3	1	-	3	-	3	1
IV	2	3	3	3	3	1	1	-	3	3	3	1
V	-	-	-	-	3	3	3	3	3	3	3	3

ANNA UNIVERSITY, CHENNAI
UNIVERSITY DEPARTMENTS
REGULATIONS – 2023
CHOICE BASED CREDIT SYSTEM
B.E. MANUFACTURING ENGINEERING
CURRICULUM AND SYLLABI FOR SEMESTERS I AND II
SEMESTER I

S. NO.	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
THEORY								
1.	HS3151	English for Communication- I	HSMC	3	0	0	3	3
2.	MA3151	Matrices and Calculus	BSC	3	1	0	4	4
3.	PH3151	Engineering Physics	BSC	3	0	0	3	3
4.	CY3151	Engineering Chemistry	BSC	3	0	0	3	3
5.	GE3155	Engineering Drawing	ESC	2	0	4	6	4
6.	GE3154	தமிழர் மரபு /Heritage of Tamils	HSMC	1	0	0	1	1
PRACTICALS								
7.	GE3161	Engineering Practices Laboratory	ESC	0	0	4	4	2
8.	CY3161	Chemistry Laboratory	BSC	0	0	2	2	1
9.	GE3162	English Laboratory - I$	EEC	0	0	2	2	1
			TOTAL	**15**	**1**	**12**	**28**	**22**

$ Skill Based Course

SEMESTER II

S. NO.	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
THEORY								
1.	HS3251	English for Communication - II	HSMC	3	0	0	3	3
2.	MA3251	Ordinary Differential Equations and Transform Techniques	BSC	3	1	0	4	4
3.	EE3151	Basics of Electrical and Electronics Engineering	ESC	3	0	2	5	4
4.	GE3152	Problem Solving and Python Programming	ESC	2	0	4	6	4
5.	GE3151	Engineering Mechanics	ESC	3	1	0	4	4
6.	MF3201	Basics of Manufacturing Engineering	PCC	1	0	0	1	1
7.	GE3251	தமிழரும் தொழில்நுட்பமும் / Tamils and Technology	HSMC	1	0	0	1	1
8.		NCC Credit Course Level 1*	-	2	0	0	2	2#
PRACTICALS								
9.	PH3161	Physics Laboratory	BSC	0	0	2	2	1
10.	GE3261	English Laboratory - II$	EEC	0	0	2	2	1
			Total	**16**	**2**	**10**	**28**	**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**   **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
2. "English for Science & Technology - I" by Cambridge University Press, 2023

REFERENCES
1. "Interchange" by Jack C.Richards, Fifth Edition, Cambridge University Press, 2017.
2. "English for Academic Correspondence and Socializing" by Adrian Wallwork, Springer, 2011.
3. "The Study Skills Handbook" by Stella Cortrell, Red Globe Press, 2019
4. www.uefap.com

CO-PO & PSO MAPPING

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	1	1	1	1	1	1	1	1	2	3	1	2	-	-	-
2	2	3	2	3	2	3	3	3	3	3	2	3	-	-	-
3	2	2	2	2	2	2	2	2	2	3	2	3	-	-	-
4	3	3	3	3	2	3	3	3	3	3	2	3	-	-	-
5	3	3	3	3	2	3	3	3	3	3	2	3	-	-	-
AVg.	2	2	2	2	2	2	2	2	3	3	2	2	-	-	-

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

MA3151 **MATRICES AND CALCULUS** **L T P C**
3 1 0 4

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)
Limit, continuity, partial derivatives – Homogeneous functions and Euler's theorem - Total derivative – Differentiation of implicit functions - Taylor's formula for two variables - Errors and approximations – Maxima and Minima of functions of two variables – Lagrange's method of undermined multipliers.

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)
Double integrals – Change of order of integration – Double integrals in polar coordinates – Area enclosed by plane curves – Triple integrals – Volume of Solids – Change of variables in double and triple integrals.

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:

1. Joel Hass, Christopher Heil, Maurice D.Weir "'Thomas' Calculus", Pearson Education., New Delhi, 2018.
2. Grewal B.S., "Higher Engineering Mathematics", Khanna Publishers, 44th Edition, New Delhi, 2017.
3. James Stewart, "Calculus with Early Transcendental Functions", Cengage Learning, 6th Edition, New Delhi, 2013.

REFERENCES:
1. Erwin Kreyszig "Advanced Engineering Mathematics", Wiley India Pvt Ltd., New Delhi, 2015.
2. Greenberg M.D., "Advanced Engineering Mathematics", Pearson Education2nd Edition, 5th Reprint, Delhi, 2009.
3. Jain R.K. and Iyengar S.R.K., "Advanced Engineering Mathematics",Narosa Publications, 5 th Edition, New Delhi, 2017.
4. Narayanan S. and Manicavachagom Pillai T. K., "Calculus" Volume I and II, S. Viswanathan Publishers Pvt. Ltd., Chennai, 2009.
5. Peter V.O'Neil, "Advanced Engineering Mathematics", Cengage Learning India Pvt., Ltd, 7 th Edition, New Delhi , 2012.
6. Ramana B.V., "Higher Engineering Mathematics", Tata McGraw Hill Co. Ltd., 11th Reprint, New Delhi, 2010.

CO-PO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	-	1	1	2	-	-	-	-	-	3
CO2	3	2	-	1	1	2	-	-	-	-	-	3
CO3	3	2	-	1	1	2	-	-	-	-	-	3
CO4	3	2	-	1	1	2	-	-	-	-	-	3
CO5	3	2	-	1	1	2	-	-	-	-	-	3
AVg.	3	2		1	1	2						3

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

PH3151   **ENGINEERING PHYSICS**   L T P C
                                                                  3 0 0 3

UNIT I   MECHANICS OF MATERIALS   9
Rigid Body – Centre of mass – Rotational Energy - Moment of inertia (M.I)- Moment of Inertia for uniform objects with various geometrical shapes. Elasticity –Hooke's law - Poisson's ratio - stress-strain diagram for ductile and brittle materials – uses- Bending of beams – Cantilever - Simply supported beams - uniform and non-uniform bending - Young's modulus determination - I shaped girders –Twisting couple – Shafts. Viscosity – Viscous drag – Surface Tension.

UNIT II   OSCILLATIONS, SOUND AND THERMAL PHYSICS   9
Simple harmonic motion - Torsional pendulum –- Damped oscillations –Shock Absorber -Forced oscillations and Resonance –Applications of resonance.- Waves and Energy Transport –Sound waves – Intensity level – Standing Waves - Doppler effect and its applications - Speed of blood flow. Ultrasound – applications - Echolocation and Medical Imaging. Thermal Expansion – Expansion joints – Bimetallic strip – Seebeck effect – thermocouple -Heat Transfer Rate – Conduction – Convection and Radiation.

UNIT III   OPTICS AND LASERS   9
Interference - Thin film interference - Air wedge- Applications -Interferometers–Michelson Interferometer -– Diffraction - CD as diffraction grating – Diffraction by crystals -Polarization - polarizers -– Laser – characteristics – Spontaneous and Stimulated emission- population –

inversion - Metastable states - optical feedback - Nd-YAG laser, CO_2 laser, Semiconductor laser - Industrial and medical applications - Optical Fibers – Total internal reflection – Numerical aperture and acceptance angle – Fiber optic communication – Fiber sensors – Fiber lasers.

UNIT IV   QUANTUM MECHANICS   9
Black body radiation (Qualitative) – Planck's hypothesis – Einstein's theory of Radiation - Matter waves–de Broglie hypothesis - Electron microscope – Uncertainty Principle – The Schrodinger Wave equation (time-independent and time-dependent) – Meaning and Physical significance of wave function - Normalization - Particle in an infinite potential well-particle in a three-dimensional box - Degenerate energy states - Barrier penetration and quantum tunneling - Tunneling microscope.

UNIT V   CRYSTAL PHYSICS   9
Crystal Bonding – Ionic – covalent – metallic and van der Walls's/ molecular bonding. Crystal systems - unit cell, Bravais lattices, Miller indices - Crystal structures - atomic packing density of BCC, FCC and HCP structures. NaCl, Diamond, Graphite, Graphene, Zincblende and Wurtzite structures - crystal imperfections- point defects - edge and screw dislocations – grain boundaries. Crystal Growth – Czocharalski method – vapor phase epitaxy – Molecular beam epitaxy- Introduction to X-Ray Diffractometer.

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 Brooks/Cole, 2013.
2. D. Halliday, R. Resnick and J. Walker, Principles of Physics. John Wiley & Sons, 10th Edition, 2015
3. N. Garcia, A. Damask and S. Schwarz, Physics for Computer Science Students, Springer-Verlag, 2012.
4. Alan Giambattista, Betty McCarthy Richardson and Robert C. Richardson, College Physics, McGraw-Hill Higher Education, 2012.

REFERENCES:
1. R. Wolfson, Essential University Physics. Volume 1 & 2. Pearson, 2016.
2. D. Kleppner and R. Kolenkow. An Introduction to Mechanics, McGraw Hill Education, 2017.
3. K. Thyagarajan and A. Ghatak. Lasers: Fundamentals and Applications. Springer, 2012.

CO-PO & PSO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	1	1	2	1							
CO2	2	2	1	2	1							
CO3	2	2	2	2	1							
CO4	2	1	1	1	1							
CO5	2	2	2	2	1							
Avg	2	2	1	2	1	-	-	-	-	-	-	-

CY3151   **ENGINEERING CHEMISTRY**   **L T P C**
                                                                          3 0 0 3

UNIT I POLYMER CHEMISTRY

Introduction: Functionality-degree of polymerization. Classification of polymers (Source, Structure, Synthesis and Intermolecular forces). Mechanism of free radical addition polymerization. Properties of polymers: Tg, tacticity, molecular weight-number average, weight average, viscosity average and polydispersity index (Problems). Techniques of polymerization: Bulk, emulsion, solution and suspension.
Engineering Plastics: Polyamides, Polycarbonates and Polyurethanes. Compounding and Fabrication Techniques: Injection, Extrusion, Blow and Calendaring

UNIT II NANOCHEMISTRY

Basics-distinction between molecules, nanomaterials and bulk materials; size-dependent properties (optical, electrical, mechanical, magnetic and catalytic). Types –nanoparticle, nanocluster, nanorod, nanowire and nanotube. Preparation of nanomaterials: sol-gel, solvothermal, laser ablation, chemical vapour deposition, electrochemical deposition and electro spinning. Characterization - Scanning Electron Microscope and Transmission Electron Microscope - Principle and instrumentation (block diagram). Applications of nanomaterials - medicine, agriculture, electronics and catalysis.

UNIT III CORROSION SCIENCE

Electrochemical cell, redox reaction, electrode potential - oxidation and reduction potential. Measurement and its application Introduction to corrosion - chemical and electrochemical corrosions-mechanism of electrochemical and galvanic corrosions-concentration cell corrosion-passivity-soil, pitting, inter-granular, water line, stress and microbiological corrosions-galvanic series-factors influencing corrosion- measurement of corrosion rate. Corrosion control-material selection and design-electrochemical protection- sacrificial anodic protection and impressed current cathodic protection. Protective coatings-metallic coatings (galvanizing, tinning), organic coatings (paints). Paints: Constituents and functions.

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) – H_2-O_2 fuel cell - Supercapacitors-Types and Applications, Renewable Energy: Solar- solar cells, DSSC

UNIT V WATER TECHNOLOGY

Water – sources and impurities – water quality parameters: colour, odour, pH, hardness, alkalinity, TDS, COD, BOD and heavy metals. Boiler feed water – requirement – troubles (scale & sludge, caustic embrittlement, boiler corrosion and priming & foaming. Internal conditioning – phosphate, calgon and carbonate treatment. External conditioning - demineralization. Municipal water treatment (screening, sedimentation, coagulation, filtration and disinfection-ozonolysis, UV treatment, chlorination), Reverse Osmosis.

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:
1. Jain P. C. & Monica Jain., "Engineering Chemistry", 17th Edition, Dhanpat Rai Publishing Company (P) Ltd, New Delhi, 2015.
2. Sivasankar B., "Engineering Chemistry", Tata McGraw-Hill Publishing Company Ltd, New Delhi, 2012.
3. Dara S.S., "A Text book of Engineering Chemistry", Chand Publications, 2004.

REFERENCES:
1. Schdeva M.V., "Basics of Nano Chemistry", Anmol Publications Pvt Ltd, 2011.
2. Friedrich Emich, "Engineering Chemistry", Medtech, 2014.
3. Gowariker V.R., Viswanathan N.V. and Jayadev Sreedhar, "Polymer Science" New AGE International Publishers, 2009.

CO - PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	1	2									
CO2	2	1		2	2							
CO3	2	2	1	1	2							
CO4	2		2		2							
CO5	3	2	2	1	1							
Avg	2	1	1	1	2	-	-	-	-	-	-	-

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

GE3155   **ENGINEERING DRAWING**   **L T P C**

2 0 4 4

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:

1. Bhatt N.D. and Panchal V.M., "Engineering Drawing", Charotar Publishing House, 53rd Edition, 2019.
2. Natrajan K.V., "A Text Book of Engineering Graphics", Dhanalakshmi Publishers, Chennai, 2018. 3. Parthasarathy, N. S. and Vela Murali, "Engineering Drawing", Oxford University Press, 2015.

REFERENCES:

1. BasantAgarwal and Agarwal C.M.,"Engineering Drawing", McGraw Hill, 2 nd Edition, 2019.
2. Gopalakrishna K.R., "Engineering Drawing" (Vol. I&II combined), Subhas Publications, Bangalore, 27thEdition, 2017.
3. Luzzader, Warren.J. and Duff, John M., "Fundamentals of Engineering Drawing with an introduction to Interactive Computer Graphics for Design and Production, Eastern Economy Edition, Prentice Hall of India Pvt. Ltd, New Delhi, 2005.
4. Parthasarathy N. S. and Vela Murali, "Engineering Graphics", Oxford University, Press, New Delhi, 2015.

5. Shah M.B., and Rana B.C., "Engineering Drawing", Pearson Education India, 2nd Edition, 2009.
6. Venugopal K. and Prabhu Raja V., "Engineering Graphics", New Age International (P) Limited, 2008.

Publication of Bureau of Indian Standards:

1. IS10711 — 2001: Technical products Documentation — Size and layout of drawing sheets.

2. IS 9609 (Parts 0 & 1) — 2001: Technical products Documentation —Lettering.

3. IS 10714 (Part 20) — 2001 & SP 46 — 2003: Lines for technical drawings.

4. IS 11669 — 1986 & SP 46 —2003: Dimensioning of Technical Drawings.

5. IS 15021 (Parts 1 to 4) — 2001: Technical drawings — Projection Methods.

Special points applicable to University Examinations on Engineering Drawing:

1.There will be five questions, each of either or type covering all units of the syllabus.
2.All questions will carry equal marks of 20 each making a total of 100.
3.The answer paper shall consist of drawing sheets only in the size of A3.
4.The students will be permitted to use appropriate scale to fit the solution within A3 size.
5.The examination will be conducted in appropriate sessions on the same day.

CO-PO & PSO MAPPING

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	3	1	1	-	-	-	-	1	1	3	-	1	2	-	2
2	3	2	2	-	-	-	-	1	1	3	-	1	2	-	2
3	3	2	2	-	3	-	-	1	1	3	-	1	2	3	2
4	3	2	2	-	3	-	-	1	1	3	-	1	2	3	2
5	3	2	2	-	3	-	-	1	1	3	-	1	2	3	2
AVG	3	2	2	-	3	-	-	1	1	3	-	1	2	3	2

1-low, 2-medium, 3-high

GE3154	தமிழர் மரபு	L T P C
		1 0 0 1

அலகு I   மொழி மற்றும் இலக்கியம்   **3**

இந்திய மொழிக் குடும்பங்கள் – திராவிட மொழிகள் – தமிழ் ஒரு செம்மொழி – தமிழ் செவ்விலக்கியங்கள் - சங்க இலக்கியத்தின் சமயச் சார்பற்ற தன்மை – சங்க இலக்கியத்தில் பகிர்தல் அறம் – திருக்குறளில் மேலாண்மைக் கருத்துக்கள் – தமிழ்க் காப்பியங்கள், தமிழகத்தில் சமண பௌத்த சமயங்களின் தாக்கம் - பக்தி இலக்கியம், ஆழ்வார்கள் மற்றும் நாயன்மார்கள் – சிற்றிலக்கியங்கள் – தமிழில் நவீன இலக்கியத்தின் வளர்ச்சி – தமிழ் இலக்கிய வளர்ச்சியில் பாரதியார் மற்றும் பாரதிதாசன் ஆகியோரின் பங்களிப்பு

அலகு II   மரபு – பாறை ஓவியங்கள் முதல் நவீன ஓவியங்கள்   3
வரை – சிற்பக் கலை

நடுகல் முதல் நவீன சிற்பங்கள் வரை – ஐம்பொன் சிலைகள்– பழங்குடியினர் மற்றும் அவர்கள் தயாரிக்கும் கைவினைப் பொருட்கள், பொம்மைகள் – தேர் செய்யும் கலை – சுடுமண் சிற்பங்கள் – நாட்டுப்புறத் தெய்வங்கள் – குமரிமுனையில் திருவள்ளுவர் சிலை – இசைக் கருவிகள் – மிருதங்கம், பறை, வீணை, யாழ், நாதஸ்வரம் – தமிழர்களின் சமூக பொருளாதார வாழ்வில் கோவில்களின் பங்கு

அலகு III   நாட்டுப்புறக் கலைகள் மற்றும் வீர விளையாட்டுகள்   3

தெருக்கூத்து, கரகாட்டம், வில்லுப்பாட்டு, கணியான் கூத்து, ஒயிலாட்டம், தோல்பாவைக் கூத்து, சிலம்பாட்டம், வளரி, புலியாட்டம், தமிழர்களின் விளையாட்டுகள்

அலகு IV   தமிழர்களின் திணைக் கோட்பாடுகள்   3

தமிழகத்தின் தாவரங்களும், விலங்குகளும் – தொல்காப்பியம் மற்றும் சங்க இலக்கியத்தில் அகம் மற்றும் புறக் கோட்பாடுகள் – தமிழர்கள் போற்றிய அறக்கோட்பாடு – சங்ககாலத்தில் தமிழகத்தில் எழுத்தறிவும், கல்வியும் – சங்ககால நகரங்களும் துறை முகங்களும் – சங்ககாலத்தில் ஏற்றுமதி மற்றும் இறக்குமதி – கடல்கடந்த நாடுகளில் சோழர்களின் வெற்றி

அலகு V   இந்திய தேசிய இயக்கம் மற்றும் இந்திய   3
பண்பாட்டிற்குத் தமிழர்களின் பங்களிப்பு

இந்திய விடுதலைப்போரில் தமிழர்களின் பங்கு – இந்தியாவின் பிறப்பகுதிகளில் தமிழ்ப் பண்பாட்டின் தாக்கம் – சுயமரியாதை இயக்கம் – இந்திய மருத்துவத்தில், சித்த மருத்துவத்தின் பங்கு – கல்வெட்டுகள், கையெழுத்துப்படிகள் - தமிழ்ப் புத்தகங்களின் அச்சு வரலாறு

TOTAL: 15 PERIODS

TEXT-CUM-REFERENCE BOOKS
1. தமிழக வரலாறு – மக்களும் பண்பாடும் – கே.கே. பிள்ளை (வெளியீடு: தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்).
2. கணினித் தமிழ் – முனைவர் இல. சுந்தரம். (விகடன் பிரசுரம்).
3. கீழடி – வைகை நதிக்கரையில் சங்ககால நகர நாகரிகம் (தொல்லியல் துறை வெளியீடு)
4. பொருநை – ஆற்றங்கரை நாகரிகம். (தொல்லியல் துறை வெளியீடு)
5. Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL – (in print)
6. 6.Social Life of the Tamils - The Classical Period (Dr.S.Singaravelu) (Published by: International   Institute of Tamil Studies.
7. 7.Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thirunavukkarasu) (Published   by: International Institute of Tamil Studies).
8. The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: International Institute of Tamil Studies.)
9. Keeladi - 'Sangam City Civilization on the banks of river Vaigai' (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
10. Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay) (Published by: The Author)
11. Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text

Book and Educational Services Corporation, Tamil Nadu)
12. Journey of Civilization Indus to Vaigai (R.Balakrishnan) (Published by: RMRL) – Reference Book.

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

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 –   3
**   SCULPTURE**

Hero stone to modern sculpture - Bronze icons - Tribes and their handicrafts - Art of temple car 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 Koothu, 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   3
**   MOVEMENT AND INDIAN CULTURE**

Contribution of Tamils to Indian Freedom Struggle - The Cultural Influence of Tamils over the other parts of India – Self-Respect Movement - Role of Siddha Medicine in Indigenous Systems of Medicine – Inscriptions & Manuscripts – Print History of Tamil Books.

TOTAL: 15 PERIODS

TEXT-CUM-REFERENCE BOOKS

1. தமிழக வரலாறு – மக்களும் பண்பாடும் – கே.கே. பிள்ளை (வெளியீடு: தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்).
2. கணினித் தமிழ் – முனைவர் இல. சுந்தரம். (விகடன் பிரசுரம்).
3. கீழடி – வைகை நதிக்கரையில் சங்ககால நகர நாகரிகம் (தொல்லியல் துறை வெளியீடு)
4. பொருநை – ஆற்றங்கரை நாகரிகம். (தொல்லியல் துறை வெளியீடு)
5. Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL – (in print)
6. Social Life of the Tamils - The Classical Period (Dr.S.Singaravelu) (Published by: International   Institute of Tamil Studies.
7. Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thirunavukkarasu) (Published   by: International Institute of Tamil Studies).
8. The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: International Institute of Tamil Studies.)

9. Keeladi - 'Sangam City Civilization on the banks of river Vaigai' (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
10. Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay) (Published by: The Author)
11. Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
12. Journey of Civilization Indus to Vaigai (R.Balakrishnan) (Published by: RMRL) – Reference Book

GE3161   ENGINEERING PRACTICES LABORATORY   L T P C
**   (Common to all Branches of B.E. / B.Tech. Programmes)   0 0 4 2**

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 IVELECTRONIC ENGINEERING PRACTICES15

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.

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	2	2	2	-	-	-	-	-	-	2	-	-	3	3	3
2	2	2	2	-	-	-	-	-	-	2	-	-	3	3	3
3	2	2	2	-	-	-	-	-	-	2	-	-	3	2	2
Avg.	2	2	2	-	-	-	-	-	-	2	-	-	3	2	2

CY3161   **CHEMISTRY LABORATORY**   **L T P C**
(Minimum of 8 experiments to be conducted)   **0 0 2 1**

LIST OF EXPERIMENTS:
1. Estimation of HCl using Na_2CO_3 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.
12. Determination of molecular weight of polyvinyl alcohol using Ostwald viscometer.
13. Determination of Glass transition temperature of a polymer
14. Phase change in a solid.
15. Corrosion experiment-weight loss method.

TOTAL: 30 PERIODS

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

TEXTBOOKS:
1. Laboratory Manual - Department of Chemistry, CEGC, Anna University (2023).
2. Vogel's Textbook of Quantitative Chemical Analysis (8th edition, 2014).

CO - PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2	1	2			2		1			
CO2	2	1	2	1		2			1			
CO3	2	2	2	1	2				1			
CO4	1	1	1	1	1				1			
CO5	2	2	2	2	1	2			1			
Avg	2	2	2	1	1	2	2		1			

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

GE3162   **ENGLISH LABORATORY – I**   **L T P C**
        0 0 2 1

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

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

UNIT III   CONVERSATION   6

Making conversation – formal and informal – Turn taking and Turn giving – Small talk

UNIT IV   SHORT SPEECH   6

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

UNIT V   DISCUSSION   6

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

Assessment

Internals – 100%

Short Speeches
Group discussion

TOTAL : 30 PERIODS

COURSE OUTCOMES

At the end of the course, students will be able to

CO1. Communicate effectively in formal and informal contexts
CO2. Converse appropriately and confidently with different people
CO3. Express their opinions assertively in group discussions

CO-PO & PSO MAPPING

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	1	2	2	2	1	3	3	3	3	3	2	3	-	-	-
2	1	2	2	2	1	3	3	3	3	3	1	3	-	-	-
3	1	2	2	2	1	3	3	3	3	3	1	3	-	-	-
4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
AVg.	1	2	2	2	1	3	3	3	3	3	1	3	-	-	-

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

HS3251   **ENGLISH FOR COMMUNICATION – II**   **L T P C**
                                                                          3 0 0 3

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; **Readin**g - 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

2. "English for Science & Technology - II" by Cambridge University Press, 2023.

REFERENCES

1. "Communicative English for Engineers and Professionals" by Bhatnagar Nitin, Pearson India, 2010.
2."Take Off – Technical English for Engineering" by David Morgan, Garnet Education, 2008.
3. "Advanced Communication Skills" by Mathew Richardson, Charlie Creative Lab, 2020.
4. www.uefap.com

CO-PO & PSO MAPPING

CO	PO												PSO		
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
1	1	3	3	3	1	3	3	3	3	3	2	3	-	-	-
2	2	3	2	3	2	3	3	3	3	3	2	3	-	-	-
3	2	2	2	2	2	2	2	2	2	3	2	3	-	-	-
4	1	1	1	1	1	1	1	1	1	3	1	3	-	-	-
5	3	3	3	3	2	3	3	3	3	3	2	3	-	-	-
AVg.	2	2	2	2	2	2	2	2	2	3	2	3	-	-	-

- 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

L T P C
3 1 0 4

UNIT I   ORDINARY DIFFERENTIAL EQUATIONS   (9+3)
Homogeneous linear ordinary differential equations of second order, linearity principle, general solution- Particular integral - Operator method - Solution by variation of parameters - Method of undetermined coefficients - Homogenous equations of Euler–Cauchy and Legendre's type – System of simultaneous linear differential equations with constant coefficients.

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

UNIT III   FOURIER SERIES   (9+3)
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   (9+3)
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   (9+3)
 Z-transform – Elementary properties – Inverse Z-transform – Convolution theorem – Initial and final value theorems – Formation of difference equation – Solution of difference equation using Z - transform.

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:
1. Grewal B.S., "Higher Engineering Mathematics", Khanna Publishers, 44th Edition, New Delhi, 2017.
2. Erwin Kreyszig, "Advanced Engineering Mathematics", Wiley India Pvt Ltd., New Delhi, 2015.

REFERENCES:
1. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2008.
2. Greenberg M.D., "Advanced Engineering Mathematics", Pearson Education 2nd Edition, 5th Reprint, Delhi, 2009.
3. Jain R.K. and Iyengar S.R.K., "Advanced Engineering Mathematics",Narosa Publications, 5th Edition, New Delhi, 2017.
4. Peter V.O'Neil, "Advanced Engineering Mathematics", Cengage Learning India Pvt., Ltd, 7th Edition, New Delhi , 2012.
5. Ramana B.V., "Higher Engineering Mathematics", Tata McGraw Hill Co. Ltd., 11th Reprint, New Delhi, 2010.

CO-PO MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	-	2	3	3	-	-	-	-	-	3
CO2	3	2	-	2	3	3	-	-	-	-	-	3
CO3	3	2	-	2	3	2	-	-	-	-	-	3
CO4	3	2	-	1	3	3	-	-	-	-	-	3
CO5	3	2	-	1	3	2	-	-	-	-	-	3
AVg.	3	2		1	3	2						3

EE3151   BASICS OF ELECTRICAL AND ELECTRONICS ENGINEERING   L T P C
3 0 2 4

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

UNIT – II   ELECTRICAL MACHINES   9
Basic Magnetic Circuit - Construction and Working Principle – DC Separately and Self excited Generators, EMF Equation, Types and Applications. Working Principle of DC motors, Torque Equation, Types and Applications. Transformer - Construction, Working and Applications - Three phase Alternator, Synchronous motor - Single and Three Phase Induction Motor – BLDC motor.

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
Functional Elements of an Instrument, Error analysis; Operating Principle - Moving Coil and Moving Iron Instruments, Wattmeter, Energy Meter, Instrument Transformers - CT and PT, Multimeter- DSO - Block Diagram Approach.

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.
4. Astable multivibrator using IC 555.

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.

COs/POs & PSOs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	3	2	2	3	-	-	-	1	2	1	1	-	-	-
CO2	2	3	2	3	3	-	-	-	1	2	1	1	-	-	-
CO3	3	2	1	1	3	-	-	-	1	2	1	1	-	-	-
CO4	1	2	2	2	3	-	-	-	1	2	-	1	-	-	-
CO5	1	1	2	2	2	-	-	-	1	2	-	2	-	-	-
CO/PO & PSO Average	**2**	**2.2**	**1.8**	**2**	**-**	**-**	**-**	**-**	**1**	**2**	**1**	**1.2**	**-**	**-**	**-**
1 – Slight, 2 – Moderate, 3 – Substantial															

Mapping of COs with POs and PSOs

TEXT BOOKS:

1. Del Toro 'Electrical Engineering Fundamentals' Pearson Education, New Delhi, 2022.
2. Alan S. Moris, Principles of Measurements and Instruments, Prentice-Hall of India Pvt. Ltd., New Delhi, 1988.
3. Smarjit Ghosh 'Fundamentals of Electrical and Electronics Engineering, 2nd Edition 2010.

REFERENCES:

1. Rajendra Prasad 'Fundamentals of Electrical engineering', Third Edition, Prentice Hall of India, 2014.
2. Sanjeev Sharma 'Basics of Electrical Engineering' Wiley, 2019.
3. John Bird, Electrical Circuits theory and Technology, Taylor & Francis Ltd, Seventh Edition, 2022.
4. Doebelin, E.O., Measurements Systems – Application and Design', McGrawHill Publishing Co, 2019.
5. D.Roy Choudhury, Shail B. Jain, Linear Integrated Circuits, New age international Publishers, 2018.
6. H.S. Kalsi, 'Electronic Instrumentation', Tata McGraw-Hill, New Delhi, 2010

GE3152   PROBLEM SOLVING AND PYTHON PROGRAMMING   L T P C
                                                                2 0 4 4

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

Architecture of Computer – Program design: Algorithm - Pseudocode and flow chart– Interpreter – Introduction to Python Specification - Data Representation: Simple statements: Variables and Identifiers – Object Types - Operators - Expressions and its evaluation

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

Conditional statements: if- if else – if elif – Nested conditional statements. Repetitive statements: while – for – Nested repetitive statements. Branching statement: break – continue – pass. Functions - Defining functions – Argument types – Scope and namespaces - Recursive functions – Lambda functions – Functions as arguments

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

String literals – String methods – String formatting expressions. Lists – Lists iteration and operations - Lists as stacks and queues – List comprehensions – Nested List comprehensions – Matrix operations using Lists - Tuples and sequences – Tuple iteration and operations

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

Sets – Set iteration and operations - Dictionaries – Dictionary iteration and operations - Dictionary comprehensions - Nested Dictionary comprehensions. Functional programming tools (map, filter, reduce) – Modules – import and from statements- Executing modules as scripts – Standard modules & Packages, creation of module/package

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

Errors: Syntax and logical errors – Exceptions: Exception types - Handling exceptions - Multiple exceptions and handlers – Raising exceptions. Files: File Path - Type of files - opening modes - Reading and Writing files. Handling Data files.

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

1. Reema Thareja, Python Programming using Problem Solving Approach, Oxford University Press, First Edition, 2017.
2. Paul Deitel, Harvey Deitel, Python for Programmers, Pearson Education, 2020.

REFERENCE BOOKS

1. S. Sridhar, J. Indumathi, V. M. Hariharan, Python Programming, Pearson Education, First Edition, 2023
2. John V Guttag. Introduction to Computation and Programming Using Python, With Application to Computational Modeling and Understanding Data. Third Edition, The MIT Press, 2021
3. Mark Lutz, Learning Python, 5th Edition, O'Reilly Media, Inc.
4. Python official documentation and tutorial, https://docs.python.org/3/

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

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	3	2	2	-	-	-	-	-	-	-	1
CO2	1	3	3	2	-		-	-	-	-	-	1
CO3	1	2	3	2	-	-	-	-	-	-	-	1
CO4	1	2	3	2	-	-	-	-	-	-	1	1
CO5	1	2	3	2	1	1	-	-	-	2	1	1

1 : low, 2 : medium, 3 : high, '-': no correlation

GE3151   **ENGINEERING MECHANICS**   **L T P C**
                                                                  3 1 0 4

COURSE OBJECTIVES: The main learning objective of this course is to prepare the students for:

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

UNIT I   STATICS OF PARTICLES   9+3

Fundamental Concepts and Principles, Systems of Units, Method of Problem Solutions, Statics of Particles -Forces in a Plane, Resultant of Forces, Resolution of a Force into Components, Rectangular Components of a Force, Unit Vectors. Equilibrium of a Particle- Newton's First Law of Motion, Space and Free-Body Diagrams, Forces in Space, Equilibrium of a Particle in Space.

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 Force, Scalar Product of Two Vectors, Mixed Triple Product of Three Vectors, Moment of a Force about an Axis, Couple - Moment of a Couple, Equivalent Couples, Addition of Couples, Resolution of a Given Force into a Force -Couple system, Further Reduction of a System of Forces, Equilibrium in Two and Three Dimensions - Reactions at Supports and Connections – Analysis of Trusses – Method of Joints and Method of Sections.

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

The Laws of Dry Friction. Coefficients of Friction, Angles of Friction, Wedges, Wheel Friction. Rolling Resistance, Ladder friction. Work of a Force, Kinetic Energy of a Particle, Principle of Work and Energy, Principle of Impulse and Momentum, Impact, Method of Virtual Work - Work of a Force, Potential Energy, Potential Energy and Equilibrium.

UNIT V   DYNAMICS OF PARTICLES AND RIGID BODIES   9+3

Kinematics - Rectilinear Motion and Curvilinear Motion of Particles. Kinetics- Newton's Second Law of Motion -Equations of Motions, Dynamic Equilibrium, Energy and Momentum Methods – Kinematics of Rigid Bodies and Plane Kinetics.

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.

TEXTBOOKS:

1. Beer Ferdinand P, Russel Johnston Jr., David F Mazurek, Philip J Cornwell, Sanjeev Sanghi, Vector Mechanics for Engineers: Statics and Dynamics, McGraw Higher Education., 12th Edition, 2019.

2. Vela Murali, "Engineering Mechanics-Statics and Dynamics", Oxford University Press, 2018.

REFERENCES:

1. Boresi P and Schmidt J, Engineering Mechanics: Statics and Dynamics, 1/e, Cengage learning, 2008.

2. Hibbeller, R.C., Engineering Mechanics: Statics, and Engineering Mechanics: Dynamics, 13th edition, Prentice Hall, 2013.

3. Irving H. Shames, Krishna Mohana Rao G, Engineering Mechanics – Statics and Dynamics, 4thEdition, Pearson Education Asia Pvt. Ltd., 2005.

4. Meriam J L and Kraige L G, Engineering Mechanics: Statics and Engineering Mechanics: Dynamics, 7th edition, Wiley student edition, 2013.

5. Timoshenko S, Young D H, Rao J V and Sukumar Pati, Engineering Mechanics, 5thEdition, McGraw Hill Higher Education, 2017.

CO-PO & PSO MAPPING

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	3	2	2	1	2			1				2	3	1	2
2	3	2	2	1	2			1				2	3	1	2
3	3	2	2	1	2			1				2	3	1	2
4	3	2	2	1	2			1				2	3	1	2
5	3	2	2	1	2			1				2	3	1	2
Avg	3	2	2	1	2			1				2	3	1	2

1-low, 2-medium, 3-high

MF3201	BASICS OF MANUFACTURING ENGINEERING	L T P C
		1 0 0 1

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

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

UNIT I   THE FACTORY SYSTEM   5
The Emergence of Society: - Early Division of Labor- - The First Standardization -The Industrial Revolution— Manufacturing Gets Mechanized- Early Modern Europe.- Manufacturing Technology - Working Together—The Emergence of the Manufactory-The Science of Manufacturing Processes-Steam Power: **Steam Engine**- The First Engineering Workshops- Steel—A New Industry Based on Fire and Iron - **Interchangeable Parts**: The End of Filing in Assembly -Honoré Blanc and French Musket Production- The American System of Manufacturing- Eli Whitney- Working Conditions in the Factories.

UNIT II   MASS PRODUCTION   5
Technological Advances: Electricity- New Manufacturing Technologies Based on Electricity - Plastics and Rubber- Machine Technology- **Science Meets Shop Floor:** The Beginning of Manufacturing Management -FW Taylor—Progress in Scientific Management - Time Studies—REFA and MTM-**The Assembly Line and the Era of the Industrial Empires** -The First Assembly Lines—Consumer Products-—Mass Production - The Birth of the Automobile - The Father of Mass Production—Henry Ford and His Model T.

UNIT III   THE CUTTING EDGE   5
Computers in Manufacturing - Continuous Processing Industry-Computer-Controlled Machine Tools-Industrial Robots - Computerized Production Planning- **The Toyota Production System and Lean Manufacturing** : Lessons Learned from History - The Big Potential: Decision Making - Need for Speed - Need for Flexibility- Need for Labor Relations -**Things to Come** - Three-Dimensional Printing- Downfall of the Automotive Industry

TOTAL: 15 PERIODS

COURSE OUTCOMES

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

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

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

CO3: To acquaintance in current trends in manufacturing.

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

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	3					3		3	3		3	3	3	3	3
2	3					3		3	3		3	3	3	3	3
3	3					3		3	3		3	3	3	3	3
Avg	3					3		3	3		3	3	3	3	3

REFERENCES

1. Christoph Roser ,"Faster, Better, Cheaper in the History of Manufacturing From the Stone Age to Lean Manufacturing and Beyond" Productivity Press, 2016, ISBN 9781498756303.
2. Behzad Esmaeilian, Sara Behdad, Ben Wang (2016), "The evolution and future of manufacturing: A review", Journal of Manufacturing Systems, Vol.39 pp.79–100

GE3252   தமிழரும் தொழில்நுட்பமும்   L T P C

                                            1 0 0 1

அலகு I   நெசவு மற்றும் பானைத் தொழில்நுட்பம்   3

சங்க காலத்தில் நெசவுத் தொழில் – பானைத் தொழில்நுட்பம் - கருப்பு சிவப்பு பாண்டங்கள் – பாண்டங்களில் கீறல் குறியீடுகள்.

அலகு II   வடிவமைப்பு மற்றும் கட்டிடத் தொழில்நுட்பம்   3

சங்க காலத்தில் வடிவமைப்பு மற்றும் கட்டுமானங்கள் & சங்க காலத்தில் வீட்டுப் பொருட்களில் வடிவமைப்பு- சங்க காலத்தில் கட்டுமான பொருட்களும் நடுகல்லும் – சிலப்பதிகாரத்தில் மேடை அமைப்பு பற்றிய விவரங்கள் - மாமல்லபுரச் சிற்பங்களும், கோவில்களும் – சோழர் காலத்துப் பெருங்கோயில்கள் மற்றும் பிற வழிபாட்டுத் தலங்கள் – நாயக்கர் காலக் கோயில்கள் - மாதிரி கட்டமைப்புகள் பற்றி அறிதல், மதுரை மீனாட்சி அம்மன் ஆலயம் மற்றும் திருமலை நாயக்கர் மஹால் – செட்டிநாட்டு வீடுகள் – பிரிட்டிஷ் காலத்தில் சென்னையில் இந்தோ-சாரோசெனிக் கட்டிடக் கலை

அலகு III   உற்பத்தித் தொழில் நுட்பம்   3

கப்பல் கட்டும் கலை – உலோகவியல் – இரும்புத் தொழிற்சாலை – இரும்பை உருக்குதல், எஃகு – வரலாற்றுச் சான்றுகளாக செம்பு மற்றும் தங்க நாணயங்கள் – நாணயங்கள் அச்சடித்தல் – மணி உருவாக்கும் தொழிற்சாலைகள் – கல்மணிகள், கண்ணாடி மணிகள் – சுடுமண் மணிகள் – சங்கு மணிகள் – எலும்புத்துண்டுகள் – தொல்லியல் சான்றுகள் – சிலப்பதிகாரத்தில் மணிகளின் வகைகள்

அலகு IV   வேளாண்மை மற்றும் நீர்ப்பாசனத் தொழில் நுட்பம்   3

அணை, ஏரி, குளங்கள், மதகு – சோழர்காலக் குமுழித் தூம்பின் முக்கியத்துவம் – கால்நடை பராமரிப்பு – கால்நடைகளுக்காக வடிவமைக்கப்பட்ட கிணறுகள் – வேளாண்மை மற்றும் வேளாண்மைச் சார்ந்த செயல்பாடுகள் – கடல்சார் அறிவு –

மீன்வளம் – முத்து மற்றும் முத்துக்குளித்தல் – பெருங்கடல் குறித்த பண்டைய அறிவு – அறிவுசார் சமூகம்

அலகு V   அறிவியல் தமிழ் மற்றும் கணித்தமிழ்   3

அறிவியல் தமிழின் வளர்ச்சி –கணித்தமிழ் வளர்ச்சி - தமிழ் நூல்களை மின்பதிப்பு செய்தல் – தமிழ் மென்பொருட்கள் உருவாக்கம் – தமிழ் இணையக் கல்விக்கழகம் – தமிழ் மின் நூலகம் – இணையத்தில் தமிழ் அகராதிகள் – சொற்குவைத் திட்டம்

TOTAL: 15 PERIODS

TEXT-CUM-REFERENCE BOOKS

1. தமிழக வரலாறு – மக்களும் பண்பாடும் – கே.கே. பிள்ளை (வெளியீடு: தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்).
2. கணினித் தமிழ் – முனைவர் இல. சுந்தரம். (விகடன் பிரசுரம்).
3. கீழடி – வைகை நதிக்கரையில் சங்ககால நகர நாகரிகம் (தொல்லியல் துறை வெளியீடு)
4. பொருநை – ஆற்றங்கரை நாகரிகம். (தொல்லியல் துறை வெளியீடு)
5. Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL – (in print)
6. Social Life of the Tamils - The Classical Period (Dr.S.Singaravelu) (Published by: International Institute of Tamil Studies.
7. Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thirunavukkarasu) (Published by: International Institute of Tamil Studies).
8. The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: International Institute of Tamil Studies.)
9. Keeladi - 'Sangam City Civilization on the banks of river Vaigai' (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
10. Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay) (Published by: The Author)
11. Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
12. Journey of Civilization Indus to Vaigai (R.Balakrishnan) (Published by: RMRL) – Reference Book.

| GE3251 | TAMILS AND TECHNOLOGY | L T P C |
| | | 1 0 0 1 |

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
Art of Ship Building - Metallurgical studies - Iron industry - Iron smelting, steel -Copper and gold- Coins as source of history - Minting of Coins – Beads making-industries Stone beads -Glass beads - Terracotta beads -Shell beads/ bone beats - Archeological evidences - Gem stone types described in Silappathikaram.

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

Development of Scientific Tamil - Tamil computing – Digitalization of Tamil Books – Development of Tamil Software – Tamil Virtual Academy – Tamil Digital Library – Online Tamil Dictionaries – Sorkuvai Project.

TOTAL: 15 PERIODS

TEXT-CUM-REFERENCE BOOKS

1. தமிழக வரலாறு – மக்களும் பண்பாடும் – கே.கே. பிள்ளை (வெளியீடு: தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்).
2. கணினித் தமிழ் – முனைவர் இல. சுந்தரம். (விகடன் பிரசுரம்).
3. கீழடி – வைகை நதிக்கரையில் சங்ககால நகர நாகரிகம் (தொல்லியல் துறை வெளியீடு)
4. பொருநை – ஆற்றங்கரை நாகரிகம். (தொல்லியல் துறை வெளியீடு)
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NCC Credit Course Level 1*

NX3251	**(ARMY WING) NCC Credit Course Level - I**	**L**	**T**	**P**	**C**
		2	**0**	**0**	**2**

NCC GENERAL		**6**
NCC 1	Aims, Objectives & Organization of NCC	1
NCC 2	Incentives	2
NCC 3	Duties of NCC Cadet	1
NCC 4	NCC Camps: Types & Conduct	2

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

PERSONALITY DEVELOPMENT		**7**
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		**5**
L 1	Leadership Capsule: Traits, Indicators, Motivation, Moral Values, Honour 'Code	3

L 2	Case Studies: Shivaji, Jhasi Ki Rani	2

SOCIAL SERVICE AND COMMUNITY DEVELOPMENT		**8**
SS 1	Basics, Rural Development Programmes, NGOs, Contribution of Youth	3
SS 4	Protection of Children and Women Safety	1
SS 5	Road / Rail Travel Safety	1
SS 6	New Initiatives	2
SS 7	Cyber and Mobile Security Awareness	1

TOTAL : 30 PERIODS

NCC Credit Course Level 1*

NX3252	(NAVAL WING) NCC Credit Course Level - I	L	T	P	C
		2	0	0	2

NCC GENERAL		**6**
NCC 1	Aims, Objectives & Organization of NCC	1
NCC 2	Incentives	2
NCC 3	Duties of NCC Cadet	1
NCC 4	NCC Camps: Types & Conduct	2

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

PERSONALITY DEVELOPMENT		**7**
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		**5**
L 1	Leadership Capsule: Traits, Indicators, Motivation, Moral Values, Honour Code	3
L 2	Case Studies: Shivaji, Jhasi Ki Rani	2

SOCIAL SERVICE AND COMMUNITY DEVELOPMENT		**8**
SS 1	Basics, Rural Development Programmes, NGOs, Contribution of Youth	3
SS 4	Protection of Children and Women Safety	1
SS 5	Road / Rail Travel Safety	1
SS 6	New Initiatives	2
SS 7	Cyber and Mobile Security Awareness	1

TOTAL : 30 PERIODS

NCC Credit Course Level 1*

NX3253	(AIR FORCE WING) NCC Credit Course Level - I	L	T	P	C
		2	0	0	2

NCC GENERAL		**6**
NCC 1	Aims, Objectives & Organization of NCC	1
NCC 2	Incentives	2
NCC 3	Duties of NCC Cadet	1
NCC 4	NCC Camps: Types & Conduct	2

NATIONAL INTEGRATION AND AWARENESS   4

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

PERSONALITY DEVELOPMENT   7

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   5

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

SOCIAL SERVICE AND COMMUNITY DEVELOPMENT   8

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

TOTAL : 30 PERIODS

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

Any SEVEN Experiments

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

21. Magnetic Hysteresis Loop tracer – determination of magnetic parameters.
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

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	1	2	1					1		
CO2	2	2	1	2	1					1		
CO3	3	3	1	2	1					1		
CO4	2	1	1	2	1					1		
CO5	2	2	1	2	1					1		
Avg	2	2	1	2	1					1		

• 1' = Low; '2' = Medium; '3' = High

GE3261	ENGLISH LABORATORY – II	L T P C
		0 0 2 1

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

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	2	2	2	2	2	3	3	3	3	3	2	3	-	-	-
2	1	2	2	2	1	3	3	3	3	3	1	3	-	-	-
3	1	2	2	2	1	3	3	3	3	3	2	3	-	-	-
4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Avg.	1.	2	2	2	1	3	3	3	3	3	2	3	-	-	-

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