DEPARTMENT OF BIOTECHNOLOGY

ANNA UNIVERSITY, CHENNAI
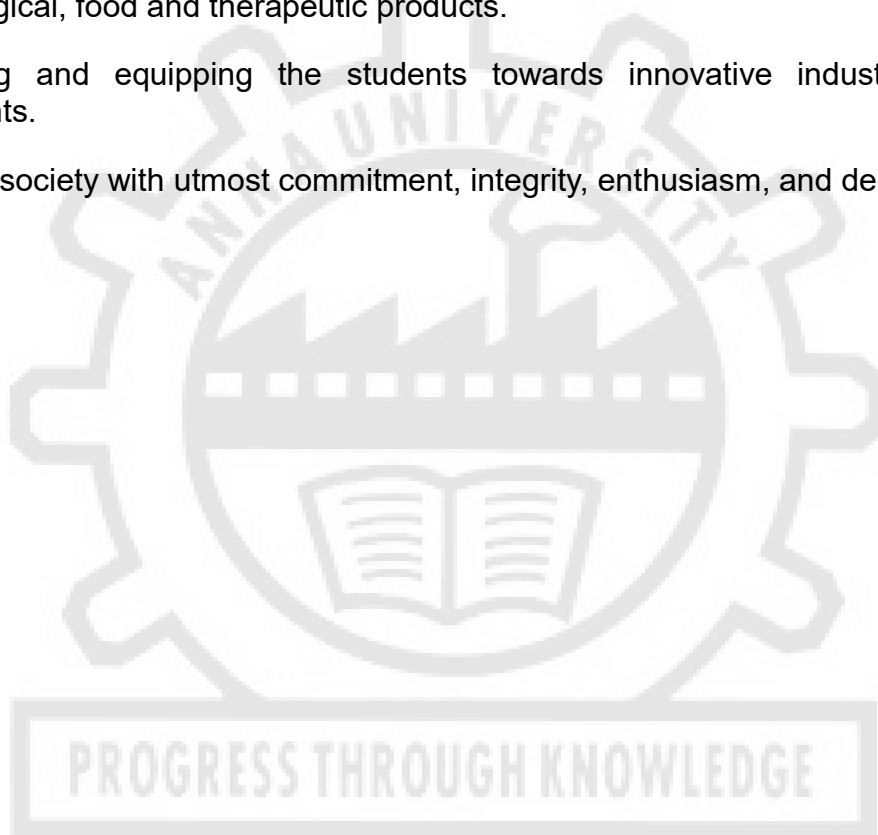
Vision:

The Department of Biotechnology is committed to evolve as a world class science and technology centre by integrating quality and ethics in teaching and research

Mission:

The mission of the department is

- ➢ Empowering students with an unique multidisciplinary learning experience and fostering the young minds to develop as a researcher, entrepreneur, etc.

- ➢ Enhancing academic and industrial collaborative research initiatives for the development of biotechnological, food and therapeutic products.

- ➢ Emphasizing and equipping the students towards innovative industrial and research developments.

- ➢ Serving the society with utmost commitment, integrity, enthusiasm, and dedication.

ANNA UNIVERSITY, CHENNAI: 600 025
UNIVERSITY DEPARTMENTS

REGULATIONS - 2023

CHOICE BASED CREDIT SYSTEM (CBCS)
B. TECH. FOOD TECHNOLOGY

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

The Food Technology curriculum is designed to prepare graduates having knowledge with high ethical values and industrial preparedness to

1. Understand the concepts of basic sciences, Engineering, and technology for their application in the area of Food Technology.
2. Identify and analyze to solve problems for the development of products, processes, techniques to meet the demands of the society.
3. Apply the learnt theory and practical skills in Food Technology for industry, R&D and entrepreneurship.

PROGRAMME OUTCOMES (POs)

After completion of four years of study, the Food technology Graduates will be able to

|	Graduate Attribute	Programme Outcomes
PO1	Engineering Knowledge	Apply knowledge of mathematics, basic science and engineering.
PO2	Problem Analysis	Identify, formulate and solve problems in the area of Food Technology.
PO3	Design/ development of solutions	Design new processes/ modifying the existing system to improve the performance and to satisfy the constraints.
PO4	Conduct investigations of complex problems	Perform experiments, analyze and interpret the data.
PO5	Modern tool usage	Apply various food analytical tools and techniques to improve the efficiency of the process and product.
PO6	The Engineer and society	Conduct themselves to uphold the professional and social obligations.
PO7	Environment and sustainability	Design the system with environment consciousness and sustainable development.
PO8	Ethics	Interact with industry, business and society in a professional and ethical manner.
PO9	Individual and team work	Ability to work in a multidisciplinary team.
PO10	Communication	Proficiency in oral and written communication.
PO11	Project management and finance	Implementation of cost effective projects and improve system.
PO12	Life-long learning	Continue professional development and learning as a life-long activity.

PROGRAMME SPECIFIC OUTCOMES (PSOs)

By the completion of B. Tech Food Technology programme the student will be able to

1. Apply the knowledge of hurdle technology for the shelf life enhancement of food preservation and Engineering, knowledge for the scale-up of industrial nutritional foodproducts.

2. Employ technology for product development by innovative food processing and preservation techniques for solving practical and real world problems.

3. Demonstrate professional and ethical competency with effective communication and managerial skills to emerge as a responsible leader or entrepreneur in the food sector.

MAPPING OF PROGRAMME EDUCATIONAL OBJECTIVE WITH PROGRAMME OUTCOMES

PEO	PROGRAMME OUTCOMES												PSO		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	1	2	3
1	3	3	2	3	-	-	-	-	2	-	-	2	2	2	2
2	2	3	3	2	3	2	-	1	2	2	3	2	3	3	1
3	1	2	3	3	3	3	1	1	2	2	1	2	3	3	3
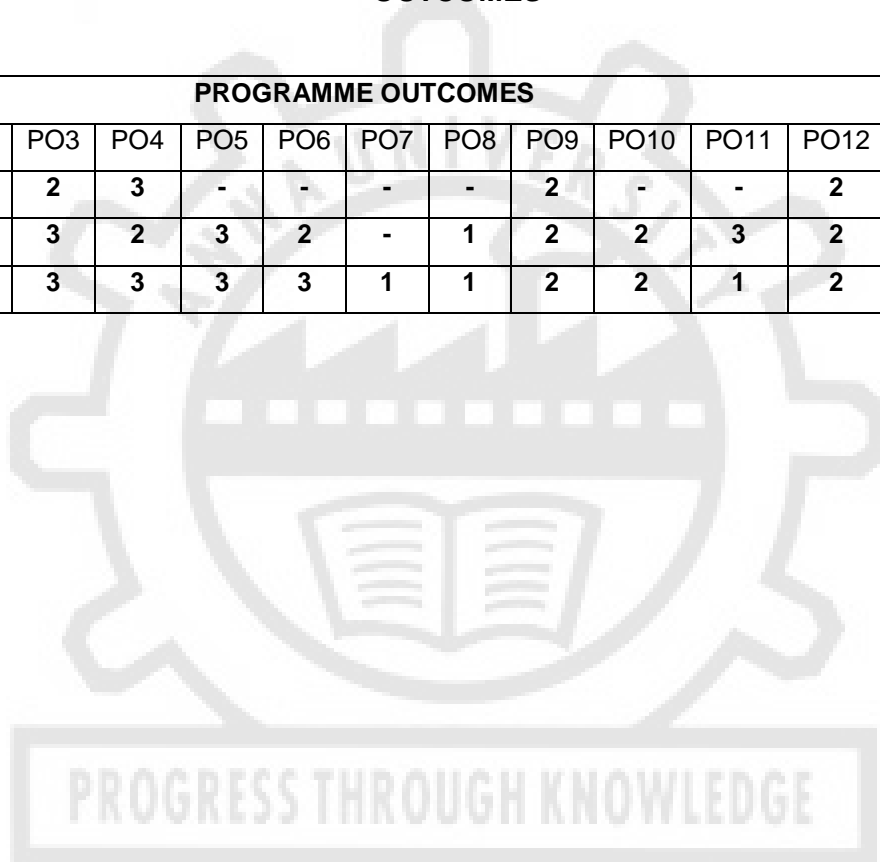
ANNA UNIVERSITY, CHENNAI: 600 025
UNIVERSITY DEPARTMENTS
B. TECH. FOOD TECHNOLOGY
REGULATIONS – 2023
CHOICE BASED CREDIT SYSTEM (CBCS)
CURRICULA AND SYLLABI FOR I AND II SEMESTERS

SEMESTER I

S. NO.	COURSE CODE	COURSE TITLE	CATE GORY	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.	EE3151	Basics of Electrical and Electronics Engineering	ESC	3	0	2	5	4
6.	GE3154	தமிழர் மரபு /Heritage of Tamils	HSMC	1	0	0	1	1
PRACTICALS								
7.	CY3161	Chemistry Laboratory	BSC	0	0	2	2	1
10.	GE3161	Engineering Practices Laboratory	ESC	0	0	4	4	2
11.	GE3162	English Laboratory- I$	EEC	0	0	2	2	1
			TOTAL	**16**	**1**	**10**	**27**	**22**

$ Skill Based Course

SEMESTER II

S. NO.	COURSE CODE	COURSE TITLE	CATE GORY	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.	IB3251	Bioorganic chemistry	BSC	3	0	0	3	3
4.	GE3152	Problem Solving and Python Programming	ESC	2	0	4	6	4
5.	GE3155	Engineering Drawing	ESC	2	0	4	6	4
6.	GE3251	தமிழரும் தொழில்நுட்பமும் / Tamils and Technology	HSMC	1	0	0	1	1
		NCC Credit Course Level I[#]	-	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	**14**	**1**	**12**	**27**	**21**

NCC Credit Course level 1 is offered for NCC students only. Other students may enroll for NSS/NSO/YRC activity. 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.

$ Skill Based Course.

HS3151   **ENGLISH FOR COMMUNICATION - I**   **L T   P C**
                                                                              3 0   0 3

OBJECTIVE
- To build lexical competency and accuracy that will help learners to use language effectively.
- To comprehend the nuances of spoken and written communication in different contexts.
- To learn and use various language functions required for effective communication.
- To read and write different types of texts and comprehend their connotative and denotative meanings.
- To enhance students' listening skills by using different types of audio materials and help them extract necessary information from those materials.

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

OUTCOME
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	2.4	2.2	2.4	1.8	2.4	2.4	2.4	2.6	3	1.8	2.8	-	-	-

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

MA3151   **MATRICES AND CALCULUS**   **L T P C**
                                                                      3 1 0 4
OBJECTIVE
- To develop the use of matrix algebra techniques in solving practical problems.
- To familiarize the student with functions of several variables.
- To solving integrals by using Beta and Gamma functions.
- To acquaint the student with mathematical tools needed in evaluating multiple integrals.
- To acquaint the students with the concepts of vector calculus which naturally arises in many engineering problems.

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
OBJECTIVE
- To impart knowledge on Mechanics of Materials.
- To impart knowledge of oscillations, sound and Thermal Physics
- To facilitate understanding of optics and its applications, different types of Laseand fiber

optics.
- To introduce the basics of Quantum Mechanics and its importance.
- To familiarize with crystal structure, bonding and crystal growth.

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, 201.
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

	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							

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

OBJECTIVE
- To introduce the basic concepts of polymers, their properties and some of the important applications.
- To impart knowledge on the basic principles and preparatory methods of nanomaterials.
- To facilitate the understanding of corrosion science and protecting coatings.
- To familiarize the operating principles and applications of energy conversion, its processes and storage devices.
- To inculcate sound understanding of water quality parameters and water treatment techniques.

UNIT I   POLYMER CHEMISTRY   9
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   9
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   9
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 9

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 9

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

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.

Mapping of COs with POs and PSOs															
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

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

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 வரை – சிற்பக் கலை: 3

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

12

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 பண்பாட்டிற்குத் தமிழர்களின் பங்களிப்பு: 3

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-REFERENCEBOOKS

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) (Publishedby: The Author)
11. Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Bookand 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 |
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UNIT I LANGUAGE AND LITERATURE 3

Language Families in India - Dravidian Languages – Tamil as a Classical Language - Classical Literature in Tamil – Secular Nature of Sangam Literature – Distributive Justice in Sangam Literature - Management Principles in Thirukural - Tamil Epics and Impact of Buddhism & Jainism in Tamil Land - Bakthi Literature Azhwars and Nayanmars - Forms of minor Poetry - Development of Modern literature in Tamil - Contribution of Bharathiyar and Bharathidhasan.

UNIT II HERITAGE - ROCK ART PAINTINGS TO MODERN ART – SCULPTURE 3

Hero stone to modern sculpture - Bronze icons - Tribes and their handicrafts - Art of temple 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, VilluPattu, KaniyanKoothu, Oyillattam, Leatherpuppetry, Silambattam, Valari, Tiger dance - Sports and Games of Tamils.

UNIT IV THINAICONCEPTOFTAMILS 3

Flora and Fauna of Tamils&AhamandPuramConceptfromTholkappiyam and Sangam Literature - Aram Concept of Tamils - Education and Literacy during Sangam Age - Ancient Cities and Ports of Sangam Age - Export and Import duringSangamAge -Overseas Conquestof Cholas.

UNIT V CONTRIBUTION OF TAMILS TO INDIAN NATIONAL MOVEMENT AND INDIAN CULTURE 3

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

TOTAL : 15 PERIODS

TEXT-CUM-REFERENCEBOOKS

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 ofArchaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
10. Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay) (Publishedby: The Author)
11. Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Bookand Educational Services Corporation, Tamil Nadu)
12. Journey of Civilization Indus to Vaigai (R.Balakrishnan) (Published by: RMRL) – Reference Book.

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

OBJECTIVE

- To inculcate experimental skills to test basic understanding of water quality parameters, such as, alkalinity, hardness, DO, chloride and copper.
- To induce the students to familiarize with electroanalytical techniques such as, pH metry, potentiometry and conductometry in the determination of impurities in aqueous solutions.
- To estimate the corrosion resistance of metals by weight loss method and molecularweight of polymer by viscometry.

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

GE3161   **ENGINEERING PRACTICES LABORATORY**   **L T P C**
                                                      0 0 4 2

GROUP – A (CIVIL & ELECTRICAL)

1. CIVIL ENGINEERING PRACTICES   **15**

PLUMBING:
Basic pipe connections involving the fittings like valves, taps, coupling, unions, reducers, elbows and other components used in household fittings. Preparation of plumbing line sketches.
     a) Laying pipe connection to the suction side of a pump
     b) Laying pipe connection to the delivery side of a pump.
     c) Practice in connecting pipes of different materials: Metal, plastic and flexible pipes used in household appliances.

WOOD WORK:

Sawing, planing and making joints like T-Joint, Mortise and Tenon joint and Dovetail joint.

STUDY EXCERSISES
a) Study of joints in door panels and wooden furniture
b) Study of common industrial trusses using models.

2. ELECTRICAL ENGINEERING PRACTICES 15
a) Basic household wiring using Switches, Fuse, Indicator and Lamp etc.,
b) Stair case light wiring
c) Tube – light wiring
d) Preparation of wiring diagrams for a given situation.
e) Study of Iron-Box, Fan Regulator and Emergency Lamp

GROUP – B (MECHANICAL AND ELECTRONICS)

3. MECHANICAL ENGINEERING PRACTICES 15

WELDING
a) Arc welding of Butt Joints, Lap Joints, and Tee Joints
b) Gas welding demonstration.
c) Basic Machining - Simple turning, drilling and tapping operations.
d) Study and assembling of the following: Centrifugal pump, Mixer, Air-conditioner

SHEET METAL PRACTICE: Making of a square tray

DEMONSTRATION ON FOUNDRY OPERATIONS.

4. ELECTRONIC ENGINEERING PRACTICES 15

a) Soldering simple electronic circuits and checking continuity.
b) Assembling electronic components on a small PCB and Testing.
c) Study of Telephone, FM radio and Low Voltage Power supplies.

TOTAL: 60 PERIODS

COURSE OUTCOMES:
CO1. Ability to make common joints in carpentry and pipe connections with fittings used in plumbing works.
CO2. Ability to do electrical wiring for household applications.
CO3. Ability to weld the steel the structures and soldering of electronical connections and testing of PCBs

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	-	3	-	3	2	3	-	-
2	3	3	-	2	-	-	2	-	3	-	3	2	3	-	-
3	3	2	-	-	-	-	2	-	3	-	3	2	3	2	-
Avg	3	2	-	2	-	-	2	-	3	-	3	2	3	2	-

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, '-"- no correlation
- **Note:** The average value of this course to be used for program articulation matrix.

Semester II

HS3251   **ENGLISH FOR COMMUNICATION – II**   L T P C
                                                                  3 0 0 3
OBJECTIVE
- To actively listen and collect relevant data from various forms of oral content like presentations, lectures and videos.
- To develop study skills and communication skills in formal and informal situations.
- To comprehend various reading materials relevant to formal context and understand the main and supporting ideas of the reading materials.
- To explore definitions, essay and report writing techniques and practice them in order to develop associated skills.
- To write effective job applications along with detailed CV for internship or placements.

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

OUTCOME
 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.
        .
TEXTBOOK
    1. "English for Science & Technology" by Cambridge University Press, 2023.
    2. "English for Engineers and Technologists" by Orient Blackswan, 2022

REFERENCE BOOKS
    1. "Communicative English for Engineers and Professionals" by Bhatnagar Nitin, PearsonIndia, 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

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.	1.8	2.4	2.4	2.4	1.6	2.4	2.4	2.4	2.4	3	1.8	3	-	-	-

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

MA3251 ORDINARY DIFFERENTIAL EQUATIONS ANDTRANSFORM TECHNIQUES L T P C
3 1 0 4

OBJECTIVE
- To acquaint the students with Differential Equations which are significantly used in engineering problems.
- To make the students to understand the Laplace transforms techniques.
- To develop the analytic solutions for partial differential equations used in engineeringby Fourier series.
- To acquaint the student with Fourier transform techniques used in wide variety of situations in which the functions used are not periodic.
- To develop Z- transform techniques in solving difference equations.

UNIT I   ORDINARY DIFFERENTIAL EQUATIONS   9
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
Existence theorem - Transform of standard functions – Transform of Unit step function andDirac 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
Dirichlet's conditions – General Fourier series – Odd and even functions – Half-range Sineand Cosine series – Complex form of Fourier series – Parseval's identity – Harmonic
Analysis.

UNIT IV   FOURIER TRANSFORMS   9
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
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: 45 PERIODS

OUTCOME
    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.

TEXTBOOK

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

REFERENCE BOOKS

1. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, LaxmiPublications, Reprint, 2008.
2. Greenberg M.D., "Advanced Engineering Mathematics", Pearson Education2ndEdition, 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. Peter V.O'Neil, "Advanced Engineering Mathematics", Cengage Learning India Pvt.,Ltd, 7 th 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

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

IB3251 **BIOORGANIC CHEMISTRY** **L T P C**
3 0 0 3

OBJECTIVE

The course aims to

enable the students to understand the basics concepts of chemical reactions make students understand the kinetics and its reaction mechanism.

UNIT I   BONDING AND STEREOCHEMISTRY   9

Atoms Electrons and orbitals - Covalent Bonds - Octet rule - Polar covalent Bonds - Electronegativity formal charge - Resonance Acids and Bases - Arrhenius and Bronsted Lowry Theories - Acid Base equilibria - SP3 hybridization - Conformations analysis ethane,butane and cyclohexane - Cis- trans isomerism. Stereochemical activity around the tetrahedral carbon – optical activity - Conformation of the peptide bond.

UNIT II   MECHANISMS OF SUBSTITUTION AND ADDITION REACTIONS   9

SN1 and SN2 reactions on tetrahedral carbon- nucleophiles- mechanism steric effects – nucleophilic addition on Acetals and ketals -Aldehyde and ketone groups – reactions ofcarbonyl group with amines- acid catalyzed ester hydrolysis – Saponification of an ester- hydrolysis ofamides. Ester enolates - claisen .condensation – Michael condensation.

UNIT III   KINETICS AND MECHANISM   9

Kinetic method – Rate law and mechanism – Transition states- Intermediates – Trapping of intermediates – Microscopic reversibility – Kinetic and thermodynamic reversibility – Isotopes for detecting intermediates. Primary and secondary isotopes – the Arrhenius
equation Eyring equation- ΔG, ΔS, ΔH, Thermodynamics of coupled reactions.

UNIT IV   CATALYSIS   9

Reactivity – Coenzymes – Proton transfer – metal ions – Intra molecular reactions – Covalent catalysis – Catalysis by organized aggregates and phases. Inclusion complexation

UNIT V   BIOORGANIC REACTIONS   9

Timing of Bond formation and fission – Acyl group transfer – C-C bond formation and fission – Catalysis of proton transfer reactions – Transfer of hydride ion – Alkyl group. Transfer – Terpene biosynthesis – Merrifield state peptide synthesis – Sanger method for peptide andDNA sequencing

TOTAL:45 PERIODS

OUTCOME

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

CO1: define and appraise Bonding and stereochemistry
CO2: classify and solve Mechanisms of substitution and addition reactions
CO3: discuss and formulate the Thermodynamics, kinetics and mechanism
CO4: describe and demonstrate Catalysis
CO5: classify and analyze Bioorganic reactions & mechanisms

TEXTBOOKS

1. Carey, Francis A." Organic Chemistry". VIIth Edition, Tata MCGraw Hill, 2009.
2. Page, M.I. and Andrew Williams "Organic and Bio-organic Mechanisms". Pearson, 2010.

REFERENCES

1. Dugas, Hermann "Bioorganic Chemistry: A Chemical Approach to Enzyme Action" 3rd Edition, Springer, 2003.

CO's	PO's												PSO's		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	2	2	2	2	1	1	1	1	-	-	-	2	2	3	1
2	3	2	2	2	3	2	2	1	1	1	-	2	3	2	2
3	3	2	2	2	2	2	-	-	-	1	-	2	2	2	2
4	1	2	2	2	1	2	1	-	1	1	-	1	2	1	1
5	2	2	2	2	2	1	2	2	2	2	-	2	3	2	3
Overall CO	2.2	2	2	2	1.8	1.6	1.5	1.3	1.3	1.3	-	1.8	2.4	2	1.8

Course Articulation Matrix

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 I   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 II   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 III   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 IV   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 V   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 : 90 (30+60) PERIODS

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. S. Sridhar, J. Indumathi, V. M. Hariharan, Python Programming, Pearson Education, First Edition, 2023

REFERENCE BOOKS
1. Paul Deitel, Harvey Deitel, Python for Programmers, Pearson Education, 2020.
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
Avg	1	2.4	2.8	2	0.2	0.2	-	-	-	0.4	0.4	1

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

GE3155   **ENGINEERING DRAWING**   **L T P C**
                                                                        2 0 4 4
OBJECTIVES:
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 OFSURFACES 6+ 12
Sectioning of simple solids like prisms, pyramids, cylinder, and cone in simple verticalposition 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 lateralsurfaces 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 solidsand truncated solids - Prisms, pyramids, cylinders, cones- combination of two solid objects in simple vertical positions - Perspective projection of simple solids-Prisms, pyramids, coneand 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

GE3251   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) (Publishedby: The Author)
11. Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Bookand 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 andgold- Coins as source of history - Minting of Coins – Beads making-industries Stone beads -Glass beads - Terracotta beads -Shell beads/ bone beats - Archeological evidences - Gemstone 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 - KnowledgeSpecific 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.

TOTAL15 HOURS

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) (Publishedby: The Author)
11. Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Bookand Educational Services Corporation, Tamil Nadu)
12. Journey of Civilization Indus to Vaigai (R.Balakrishnan) (Published by: RMRL) – Reference Book.

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

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
		0	0	2	1

OBJECTIVES:

- To inculcate experimental skills to test basic materials' properties including materials mechanical, thermal and optical properties.
- To induce the students to familiarize themselves with the properties of sound waves and ultrasonic waves.
- To impart practical skills and to understand the characteristics of mechanical vibrations and logic operation.
- To elucidate to understand the electric and magnetic parameters of materials and semiconductors devices and sensors

Any SEVEN Experiments

1. Torsional Pendulum-Determination of rigidity modulus of wire and moment of inertia ofthe 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
      c) 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 HOURS

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		

   • 1-low, 2-medium, 3-high, '-"- no correlation

GE3261   **ENGLISH LABORATORY - II**   **L T P C**
                                                                    0 0 2 1
OBJECTIVES:
   • To comprehend visual material and transcode it into verbal content using appropriate register.
   • To identify varied group discussion skills and apply them to take part in effective discussions in professional context.
   • To use language effectively in a formal presentation.

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

UNIT II: PERSUASIVE SKILLS   6
Speaking about specifications of a product (Eg. Home appliances) – Persuasive Talk – Roleplay 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 / innovativeproduct presentation)

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

                                                                        TOTAL30 HOURS

OUTCOMES:
At the end of the course, students will be able to
- Comprehend and transcode visual content appropriately.
- Participate effectively in formal group discussions.
- 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.	1.3	2	2	2	1.3	3	3	3	3	3	1.6	3	-	-	-

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