



NPR

**COLLEGE OF ENGINEERING & TECHNOLOGY
(AUTONOMOUS)**

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NPR Nagar, Natham - 624 401, Dindigul Dist, Tamil Nadu. Ph: 04544 - 246500, 501, 502.



B.E. – CIVIL ENGINEERING

REGULATION - 2023

CHOICE BASED CREDIT SYSTEM (CBCS)

CURRICULUM AND SYLLABUS

Dr. B. MARUTHU KANNAN, M.E., Ph.D.,

Principal

**NPR College of Engineering and Technology
Natham, Dindigul Dt - 624 401**



**Chairperson-Board of Studies
Department of Civil Engineering**

I SEMESTER

I - Course Name: 23HS101 PROFESSIONAL ENGLISH - I

Program Name	B.E./B.TECH. – COMMON TOALL BRANCHES	Sem	Category	L	T	P	C
Prerequisites	NIL	I	HSMC	3	0	0	3

II - Course Objectives

1.	To improve the communicative competence of learners.	
2.	To learn to use basic grammatic structures in suitable contexts.	
3.	To acquire lexical competence and use them appropriately in a sentence and understand their meaning in a text.	
4.	To help learners use language effectively in professional contexts.	
5.	To develop learners' ability to read and write complex texts, summaries, articles, blogs, definitions, essays and user manuals.	

III - Course Content

Preamble:

This course is designed to impart required levels of Communication Skills in Reading and Writing and Proficiency in English language in writing necessary for different professional contexts.

Unit – I

INTRODUCTION TO EFFECTIVE COMMUNICATION

9 Hours

Fundamentals of Communication- effective communication- seven C's of effective communication **Reading** - Reading brochures (technical context), telephone messages / social media messages relevant to technical contexts and emails. **Writing** - Writing emails / letters. **Grammar** – Simple Tenses(Present / Past /Future); Question types: Wh/ Yes or No/- Question Tags. **Vocabulary** – Synonyms (word -meaning- sentence making); (One word substitution; Abbreviations & Acronyms (as used in technical contexts) –Silent letters

Unit – II

NARRATION AND SUMMATION

9 Hours

Reading - Reading biographies, travelogues, newspaper reports, Excerpts from literature, and travel & technical blogs. **Writing** - Guided writing-- Paragraph writing Short Report on an event (field trip etc.) **Grammar** – Progressive tenses (Present / Past /Future); Subject-Verb Agreement; Prepositions. **Vocabulary** - Wordforms (prefixes& suffixes); Phrasal verbs.

Unit – III

DESCRIPTION OF A PROCESS / PRODUCT

9 Hours

Reading – Reading advertisements, gadget reviews; user manuals. **Writing** - Writing definitions; instructions; and Product /Process description. **Grammar** - Imperatives; Adjectives; Degrees of comparison; Perfect Tenses (Present / Past /Future); **Vocabulary** - Compound Nouns, Homonyms; and Homophones.

Unit – IV

CLASSIFICATION AND RECOMMENDATIONS

9 Hours

Reading – Newspaper articles; Journal reports –and Non-Verbal Communication (tables, pie charts etc.) Note-making. **Writing** –Writing recommendations; Transferring information from non-verbal (chart, graph etc, to verbal mode), Transcoding, **Grammar** – Perfect continuous tenses (Present / Past /Future); Articles; Pronouns - Possessive & Relative pronouns. **Vocabulary** - Collocations; Fixed / Semi fixed expressions – Idioms and Phrases

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Unit – V	EXPRESSION	9 Hours
Reading – Reading editorials; and Opinion Blogs; Writing – Essay Writing (Descriptive or narrative). Grammar – Punctuation; Simple, Compound & Complex Sentences. Vocabulary - Cause & Effect Expressions – Content vs Function words – British & American vocabulary (spelling and word changes)		

Text Books:	[1] English for Engineers & Technologists Orient Blackswan Private Ltd. Department of English, Anna University, (2023 edition)
	[2] English for Science & Technology Cambridge University Press, 2021. Authored by Dr. Veena Selvam, Dr. Sujatha Priyadarshini, Dr. Deepa Mary Francis, Dr. KN.Shoba, and Dr. Lourdes Joevani, Department of English, Anna University.
Reference Books:	[1] Ashraf Rizvi, "Effective Technical Communication", 2nd Edition, McGraw-Hill India, 2017.
	[2] A Course Book On Technical English By Lakshminarayanan, Scitech Publications (India) Pvt. Ltd.
	[3] English For Technical Communication (With CD) By Aysha Viswamohan, McGraw Hill Education, ISBN : 0070264244.
	[4] Effective Communication Skill, Kulbhusan Kumar, RS Salaria, Khanna Publishing House
	[5] Learning to Communicate – Dr. V. Chellammal, Allied Publishing House, New Delhi, 2003.
MOOC/Web Platforms:	https://onlinecourses.nptel.ac.in/noc23_hs115/preview

IV - Course Outcome

On completion of the course, the students will be able to		Bloom's Level Mapped
CO1	To use appropriate words in a professional context and communicate in a professional context.	Apply (BL 3)
CO2	To gain understanding of basic grammatic structures and use them in right context.	Understand (BL 2)
CO3	To read and infer the denotative and connotative meanings of technical texts and use technical words in describing products with appropriate definitions.	Apply (BL 3)
CO4	To write definitions, descriptions, narrations and essays on various topics.	Create (BL 6)
CO5	To express their opinions effectively in both oral and written medium of communication.	Create (BL 6)

(Action verb of each CO to be matched with the next mapping table) (For example: if CO-1 uses the High Order Thinking Skills based action verb, then the corresponding PO must be mapped with High Correlation)

V - Mapping Table Mapping of COs with POs and PSOs

COs/ POs	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PSO-1	PSO-2	PSO-3
CO-1									3	3		2			
CO-2									3	3		2			
CO-3									3	3		2			
CO-4									3	3		2			
CO-5									3	3		2			

Mapping: 1-Low, 2-Medium, 3-High (Mapping value based on usage of Action verbs in each CO)



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I - Course Name: 23MA101 MATRICES AND CALCULUS

Program Name	B.E./B.TECH. COMMON TO ALL BRANCHES	Sem	Category	L	T	P	C
Prerequisites	NIL	I	BSC	3	1	0	4

II - Course Objectives

1.	To develop the use of matrix algebra techniques that is needed by engineers for practical applications.	
2.	To familiarize the student with functions of several variables. This is needed in many branches of engineering.	
3.	To familiarize the students with integral calculus and various techniques of integration.	
4.	To make the students understand the concepts of vector calculus and applications.	
5.	To acquaint the student with mathematical tools needed in evaluating ordinary differential equations and their applications.	

III - Course Content**Preamble:**

This course introduces basic concepts and techniques of multivariable calculus, matrices, and ordinary differential equations and highlights their applications in various field of engineering such as Design Engineering, Electric Circuit Theory, Cryptography, Resistor conversion, Robotics etc

Unit – I	MATRICES	12 Hours
Eigenvalues and Eigenvectors of a real matrix – Characteristic equation – Properties of Eigenvalues and Eigenvectors – Cayley – Hamilton theorem – Diagonalization of matrices by orthogonal transformation – Reduction of a quadratic form to canonical form by orthogonal transformation – Nature of quadraticforms		
Unit – II	FUNCTIONS OF SEVERAL VARIABLES	12 Hours
Partial differentiation – Homogeneous functions and Euler's theorem – Total derivative – Change of variables – Jacobians – Partial differentiation of implicit functions – Taylor's series for functions of two variables – Applications: Maxima and minima of functions of two variables and Lagrange's method of undetermined multipliers.		
Unit – III	INTEGRAL CALCULUS AND MULTIPLE INTEGRALS	12 Hours
Definite integrals – Properties – Problems- Double and Triple integrals – Cartesian, polar coordinates – change of order of integration – Applications: Area between curves, Volume of integrals.		
Unit – IV	VECTOR CALCULUS	12 Hours
Gradients - Divergence - Curl – Directional derivative - Irrotational and Solenoidal vector fields– Vector Integration (Line integral, Surface integral, Volume integral, Simple Problems only) – Green's theorem in plane, Gauss divergence theorem and Stoke's Theorem (excluding proof) – Simple applications involving cubes and rectangular parallelopipeds.		
Unit – V	ORDINARY DIFFERENTIAL EQUATIONS	12 Hours
Higher order linear differential equations with constant coefficients – Method of variation of parameters. Homogenous equation of Euler's and Legendre's type – System of simultaneous linear differential equations with constant coefficients.		

Text Books:

- [1] Kreyszig.E, "Advanced Engineering Mathematics", John Wiley and Sons, 10th Edition, New Delhi, 2016.
- [2] Grewal.B.S., -Higher Engineering Mathematics||, Khanna Publishers, New Delhi, 44th Edition, 2018.
- [3] James Stewart, "Calculus: Early Transcendentals", Cengage Learning, 8th Edition, New Delhi, 2015. [For Units II & IV - Sections 1.1, 2.2, 2.3, 2.5, 2.7 (Tangentsproblems only), 2.8, 3.1 to 3.6, 3.11, 4.1, 4.3, 5.1 (Area problems only), 5.2, 5.3, 5.4



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	(excluding net change theorem), 5.5, 7.1 - 7.4 and 7.8].
Reference Books:	<p>[1] Anton. H, Bivens. I and Davis. S, " Calculus ", Wiley, 10th Edition, 2016.</p> <p>[2] Bali. N., Goyal. M. and Watkins. C., -Advanced Engineering Mathematics , Firewall Media (An imprint of Lakshmi Publications Pvt., Ltd.), New Delhi, 7th Edition, 2009.</p> <p>[3] Jain. R.K. and Iyengar. S.R.K., -Advanced Engineering Mathematics , Narosa Publications, New Delhi, 5th Edition, 2016.</p> <p>[4] Narayanan. S. and Manicavachagom Pillai. T. K., -Calculus" Volume I and II, S. Viswanathan Publishers Pvt. Ltd., Chennai, 2009.</p> <p>[5] Ramana. B.V., "Higher Engineering Mathematics", McGraw Hill Education Pvt. Ltd, New Delhi, 2016.</p> <p>[6] Srimantha Pal and Bhunia. S.C, "Engineering Mathematics " Oxford University Press, 2015.</p> <p>[7] Thomas. G. B., Hass. J, and Weir. M.D, "Thomas Calculus", 14th Edition, Pearson India, 2018.</p>
MOOC/Web Platforms:	https://nptel.ac.in/courses/122104018 https://archive.nptel.ac.in/courses/111/106/111106146/ https://onlinecourses.nptel.ac.in/noc21_ma16/preview https://digimat.in/nptel/courses/video/111105122/L01.html

IV - Course Outcome

On completion of the course, the students will be able to		Bloom's Level Mapped
CO1	Use the matrix algebra methods for solving practical problems.	Apply (BL 3)
CO2	Able to use differential calculus ideas on several variable functions.	Apply (BL 3)
CO3	Apply integral calculus and multiple integral tools in solving various application problems.	Apply (BL 3)
CO4	Understand the concepts of Gradient, divergence and curl of a vector point function and related applications.	Understand (BL 2)
CO5	Apply various techniques in solving ordinary differential equations.	Apply (BL 3)

(Action verb of each CO to be matched with the next mapping table) (For example: if CO-1 uses the High Order Thinking Skills based action verb, then the corresponding PO must be mapped with High Correlation)

V - Mapping Table Mapping of COs with POs and PSOs

COs/ POs	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PSO-1	PSO-2	PSO-3
CO-1	3	3	1	1	-	-	-	-	2	-	2	3	-	-	-
CO-2	3	3	1	1	-	-	-	-	2	-	2	3	-	-	-
CO-3	3	3	1	1	-	-	-	-	2	-	2	3	-	-	-
CO-4	3	3	1	1	-	-	-	-	2	-	2	3	-	-	-
CO-5	3	3	-	-	-	-	-	-	2	-	-	2	-	-	-

Mapping: 1-Low, 2-Medium, 3-High (Mapping value based on usage of Action verbs in each CO)



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I - Course Name: 23PH101 ENGINEERING PHYSICS

Program Name	B.E./B.TECH. COMMON FOR CIVIL, CSE, EEE, MECH, IT AND AI&DS	Sem	Category	L	T	P	C
Prerequisites	NIL	I	BSC	3	0	0	3

II - Course Objectives

1.	To instill the essentials of properties of matter.	
2.	To gain knowledge of electromagnetic waves and its applications.	
3.	To amplify the information on optical fiber for communication purposes.	
4.	To describe the principles of quantum mechanics and their various applications.	
5.	To provide the fundamental understanding of crystals and their numerous crystal formations.	

III - Course Content**Preamble:**

The aim of the Engineering Physics Program is to offer students a solid background in the fundamentals of Physics and to impart that knowledge in engineering disciplines. The program is designed to develop scientific attitudes and enable the students to correlate the concepts of Physics with the core programmes.

Unit – I	PROPERTIES OF MATTER	9 Hours
Elasticity – stress - strain - Hooke's law- S-S diagram - factors affecting elastic modulus and tensile strength – Torsion pendulum - moment of inertia of a body - young's modulus – cantilever method, uniform and non-uniform bending – I-shaped girders - Poisson's ratio.		
Unit – II	ELECTROMAGNETIC FIELD AND WAVES	9 Hours
The Maxwell's equations - wave equation; plane electromagnetic waves in vacuum, conditions on the wave field - properties of electromagnetic waves - energy and momentum in EM waves: intensity, waves from localized sources, momentum and radiation pressure – smart phone reception.		
Unit – III	LASER AND FIBER OPTICS	9 Hours
LASER- interaction of light radiation with materials - Einstein's coefficients - Nd:YAG, CO ₂ , quantum dot laser – LIDAR. Fiber optics: modes of propagation of light – numerical aperture and acceptance angle – fiberoptical communication system - fiber optic displacement sensors.		
Unit – IV	QUANTUM PHYSICS	9 Hours
Comparison between classical and quantum theory – Compton scattering: experimental description- uncertainty principle – physical significance of wave function - Schrödinger's wave equation – time dependent and time independent equations – particle in a box - quantum confinement.		
Unit – V	CRYSTAL PHYSICS	9 Hours
Crystallography – unit cell, primitive cell - crystal systems, Bravais lattices, Miller indices – inter- planar distances - coordination number and packing factor for SC, BCC, FCC, HCP structures- diamond & NaCl Crystal structure - crystal defect and dislocation. crystal growth techniques: Bridgman method.		



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Books for study & Reference:	[1] Tipler Mosca, Physics For Scientists and Engineers 6th Edition, 2015 [2] Gaur R.K. and Gupta S.L, Engineering Physics, Dhanpat Rai Publications, 2013. [3] Bhattacharya D.K. & Poonam T., Engineering Physics, Oxford University Press, 2015. [4] S. O. Pillai, Solid State Physics, New Age International Private Limited, 10 th edition, 2022 Marikani A, Engineering Physics, PHI, New Delhi, 2013.
MOOC/Web Platforms:	https://onlinecourses.nptel.ac.in/noc20_mm13/preview https://www.noaa.gov/jetstream/satellites/electromagnetic-waves https://fractory.com/fibre-lasers-explained/ https://www.livescience.com/33816-quantum-mechanics-explanation.html https://archive.nptel.ac.in/courses/115/104/115104109/

IV - Course Outcome

On completion of the course, the students will be able to		Bloom's Level Mapped
CO1	Choose the correct materials based on their qualities for any intended applications and learn the basics of elasticity and its engineering-related applications.	Apply (BL 3)
CO2	Express their knowledge in electromagnetic waves.	Understand (BL 2)
CO3	Infer the characteristics of laser for various Engineering applications and expand the understanding of optical fibers use in communications.	Understand (BL 2)
CO4	Apply quantum theory's sophisticated physics notions to the matter characterization.	Apply (BL 3)
CO5	Know the fundamentals of crystal formations and growth methods.	Understand (BL 2)

(Action verb of each CO to be matched with the next mapping table) (For example: if CO-1 uses the High Order Thinking Skills based action verb, then the corresponding PO must be mapped with High Correlation)

V - Mapping Table Mapping of COs with POs and PSOs

COs/Pos	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PSO-1	PSO-2	PSO-3
CO-1	3	2	3	3	-	-	2	-	-	-	-	3	-	-	-
CO-2	3	2	3	2	-	-	2	-	-	-	-	3	-	-	-
CO-3	3	3	3	3	-	-	-	-	-	-	-	3	-	-	-
CO-4	3	3	3	2	-	-	3	-	-	-	-	2	-	-	-
CO-5	3	2	3	3	-	-	-	-	-	-	-	1	-	-	-

Mapping: 1-Low, 2-Medium, 3-High (Mapping value based on usage of Action verbs in each CO)



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I - Course Name: 23CY101 ENGINEERING CHEMISTRY

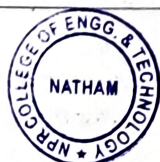
Program Name	B.E./B.TECH. COMMON TO ALL BRANCHES	Sem	Category	L	T	P	C
Prerequisites	NIL	I	BSC	3	0	0	3

II - Course Objectives

1.	To inculcate sound understanding of water quality parameters and water treatment techniques.	
2.	To impart knowledge on the basic principles and preparatory methods of nanomaterials.	
3.	To introduce the basic concepts and applications of polymers and composites.	
4.	To facilitate the understanding of different types of fuels, their preparation, properties and combustion characteristics.	
5.	To familiarize the students with the operating principles, working processes and applications of energy conversion and storage devices.	

III - Course Content

Preamble: The objective of this course is to bestow the better understanding of basic concepts of chemistry and its applications in Engineering and Technology. This course provides exposure on properties of water and its treatment methods. It also imparts knowledge on properties and application of nano-materials in data storage devices. This course also highlights preparation, properties and applications of polymers and composite materials. It also imparts knowledge on fuel types and applications of energy conversion and storage devices.		
Unit – I	WATER AND ITS TREATMENT	9 Hours
Water: sources and impurities, water quality parameters: colour, odour, turbidity, pH, hardness, alkalinity, TDS, COD and BOD, flouride and arsenic. Municipal water treatment: primary treatment and disinfection (UV, Ozonation, break-point chlorination). Desalination of brackish water: reverse osmosis. Boiler troubles: scale and sludge, boiler corrosion, caustic embrittlement, priming & foaming. Treatment of boiler feed water: internal treatment (phosphate, colloidal, sodium aluminate and calgon conditioning) and external treatment: ion exchange demineralisation and zeolite process.		
Unit – II	NANO CHEMISTRY	9 Hours
Basics: distinction between molecules, nanomaterials and bulk materials; size-dependent properties (optical, electrical, mechanical and magnetic); types of nanomaterials: definition, properties and uses of – nanoparticle, nanocluster, nanorod, nanowire and nanotube. Preparation of nanomaterials: sol- gel, solvothermal, laser ablation, chemical vapour deposition, electrochemical deposition and electro spinning. Applications of nanomaterials in medicine, agriculture, energy, electronics and catalysis.		
Unit – III	POLYMERS AND COMPOSITES	9 Hours
Introduction: classification of polymers – natural and synthetic; thermoplastic and thermosetting. Functionality – preparation properties and uses of PVC, teflon, nylon 6,6 and epoxy resins. Composites: introduction: definition & need for composites; constitution: matrix materials (Polymer matrix, metal matrix and ceramic matrix) and reinforcement (fiber, particulates, flakes and whiskers). Properties and applications of: metal matrix composites (MMC), ceramic matrix composites and polymer matrix composites. Hybrid composites - definition and examples.		
Unit – IV	FUELS AND COMBUSTION	9 Hours
Fuels: introduction, classification of fuels; coal and coke: analysis of coal (proximate and ultimate), carbonization, manufacture of metallurgical coke (Otto Hoffmann method). Petroleum and diesel: manufacture of synthetic petrol (Bergius process), knocking - octane number, diesel oil - cetane number; power alcohol and biodiesel. Combustion of fuels: introduction: calorific value - higher and lower calorific values, theoretical calculation of calorific value; ignition temperature: spontaneous ignition temperature, explosive range; flue gas analysis - ORSAT Method. CO ₂ emission and carbon foot print.		



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Unit – V	ENERGY STORAGE DEVICES	9 Hours
Nuclear energy: light water nuclear power plant, breeder reactor. Solar energy conversion: principle, working and applications of solar cells; recent developments in solar cell materials. Wind energy; geothermal energy; batteries: types of batteries, primary battery – dry cell, secondary battery -lead acid storage battery and lithium-ion-battery; electric vehicles-working principles; fuel cells: H ₂ -O ₂ fuel cell, super capacitors		
Text Books:	P. C. Jain and Monica Jain, -Engineering Chemistry , Dhanpat Rai Publishing Company (P) Ltd, New Delhi, 17 th Edition, 2018. Sivasankar B., -Engineering Chemistry , Tata McGraw-Hill Publishing Company Ltd, New Delhi, 6 th Edition 2012. S.S. Dara, -A text book of Engineering Chemistry , S. Chand Publishing, 12 th Edition, 2018.	
Reference Books:	B. S. Murty, P. Shankar, Baldev Raj, B. B. Rath and James Murday, -Text book of nanoscience and nanotechnology , Universities Press-IIM Series in Metallurgy and Materials Science, 2018. O.G. Palanna, -Engineering Chemistry McGraw Hill Education (India) Private Limited, 2 nd Edition, 2017. Friedrich Emich, -Engineering Chemistry , Scientific International PVT, LTD, New Delhi, 2 nd Edition, 2017. Shikha Agarwal, -Engineering Chemistry-Fundamentals and Applications , Cambridge University Press, Delhi, 2 nd Edition, 2019. O.V. Roussak and H.D. Gesser, Applied Chemistry-A Text Book for Engineers and Technologists, Springer Science Business Media, New York, 2 nd Edition, 2013. Gowariker V.R., Viswanathan N.V. and Jayadev Sreedhar, -Polymer Science , New Age International P (Ltd.,) Chennai, 4 th Edition, 2021.	
MOOC/eb Platforms:	https://nptel.ac.in/courses	

IV - Course Outcome

On completion of the course, the students will be able to		Bloom's Level Mapped
CO1	Summarize the water related problems in boilers and their treatment techniques.	Remember(BL 1)
CO2	Discuss the applications of nanomaterials in medicine, agriculture, energy, electronics and catalysis.	Understand(BL 2)
CO3	Discuss the types, properties and applications of polymers and composites.	Apply(BL 3)
CO4	Summarize the fuels used for engineering processes and applications of fuels.	Understand(BL 2)
CO5	Summarize the principles and generation of energy in batteries, nuclear reactors, solar cells, wind mills and fuel cells.	Apply(BL 3)

(Action verb of each CO to be matched with the next mapping table) (For example: if CO-1 uses the High Order Thinking Skills based action verb, then the corresponding PO must be mapped with High Correlation)

V - Mapping Table Mapping of COs with POs and PSOs

COs / POs	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PSO-1	PSO-2	PSO-3
CO-1	2	1	1				3					2			
CO-2	2	1	1				3					2			
CO-3	2	1	1				3					2			
CO-4	2	1	1				1					2			
CO-5	3	2	2				3					3			

Mapping: 1-Low, 2-Medium, 3-High (Mapping value based on usage of Action verbs in each CO)



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23GE102	PROBLEM SOLVING AND PYTHON PROGRAMMING	L	T	P	C
		3	0	0	3
Prerequisite:	Basic Computer Knowledge				
Course Objectives:					
Objective 1	To understand the basics of algorithmic problem solving.				
Objective 2	To learn to solve problems using Python conditionals and loops.				
Objective 3	To define Python functions and use function calls to solve problems.				
Objective 4	To use Python data structures - lists, tuples, dictionaries to represent complex data.				
Objective 5	To do input/output with files in Python.				
Course Outcome:					
Upon completion of the course, students will be able to					
CO1	Develop algorithmic solutions to simple computational problems.				
CO2	Create simple Python programs.				
CO3	Solve real time problems in Python using conditionals and looping statements and functions				
CO4	Design compound data using Python lists, tuples and dictionaries.				
CO5	Read and write data from/to files in Python programs				
UNIT 1	COMPUTATIONAL THINKING AND PROBLEM SOLVING				9
Fundamentals of Computing – Identification of Computational Problems -Algorithms, building blocks of algorithms (statements, state, control flow, functions), notation (pseudo code, flow chart, programming language), algorithmic problem solving, simple strategies for developing algorithms (iteration, recursion). Illustrative problems: find minimum in a list, insert a card in a list of sorted cards, guess an integer number in a range, Towers of Hanoi					
UNIT 2	DATA TYPES, EXPRESSIONS, STATEMENTS				9
Python interpreter and interactive mode, debugging; values and types: int, float, Boolean, string, and list; variables, expressions, statements, tuple assignment, precedence of operators, comments; Illustrative programs: exchange the values of two variables, circulate the values of n variables, distance between two points.					
UNIT 3	CONTROL FLOW, FUNCTIONS, STRINGS				9
Conditionals: Boolean values and operators, conditional (if), alternative (if-else), chained conditional (if-elif- else); Iteration: state, while, for, break, continue, pass; Fruitful functions: return values, parameters, local and global scope, function composition, recursion; Strings: string slices, immutability, string functions and methods, string module; Lists as arrays. Illustrative programs: square root, gcd, exponentiation, sum an array of numbers, linear search, binary search					
UNIT 4	LISTS, TUPLES, DICTIONARIES				9
Lists: list operations, list slices, list methods, list loop, mutability, aliasing, cloning lists, list parameters;Tuples: tuple assignment, tuple as return value; Dictionaries: operations and methods; advanced list processing – list comprehension; Illustrative programs: simple sorting, histogram, Students marks statement, Retail bill preparation.					
UNIT 5	FILES, MODULES, PACKAGES				9
Files and exception: text files, reading and writing files, format operator; command line arguments, errors and exceptions, handling exceptions, modules, packages; Illustrative programs: word count, copy file, Voter's age validation, Marks range validation (0-100).					



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Total Hours:		45
Text Books:		
[1] Allen B. Downey, -Think Python: How to Think like a Computer Scientist , 2nd Edition, O'Reilly Publishers, 2016.		
[2] Karl Beecher, -Computational Thinking: A Beginner's Guide to Problem Solving and programming , 1st Edition, BCS Learning & Development Limited, 2017.		
Reference Books:		
[1] Paul Deitel and Harvey Deitel, -Python for Programmers , Pearson Education, 1st Edition, 2021.		
[2] G Venkatesh and Madhavan Mukund, -Computational Thinking: A Primer for Programmers and Data Scientists , 1st Edition, Notion Press, 2021		
[3] John V Guttag, " Introduction to Computation and Programming Using Python: With Applications to Computational Modeling and Understanding Data__, Third Edition, MIT Press		
[4] Eric Matthes, -Python Crash Course, A Hands – on Project Based Introduction to Programming , 2nd Edition, No tarch Press, 2019.		
[5] https://www.python.org/		
[6] Martin C. Brown, -Python: The Complete Reference , 4th Edition, Mc-Graw Hill, 2018.		

Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	2	-	-	-	-	-	2	2	-	-	-
CO2	3	3	3	3	2	-	-	-	-	-	2	2	-	-	-
CO3	3	3	3	3	2	-	-	-	-	-	2	-	-	-	-
CO4	1	2	-	-	1	-	-	-	-	-	1	-	-	-	-
CO5	2	2	-	-	2	-	-	-	-	-	1	-	-	-	-
LOW (1); MEDIUM (2); HIGH (3) , NO CORRELATION (-)															




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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, ஓயிலாட்டம், 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 பண்பாட்டிற்குத் தமிழர்களின் பங்களிப்பு: 3
இந்திய விடுதலைப்போரில் தமிழர்களின் பங்கு - இந்தியாவின் பிறப்பகுதிகளில் தமிழ்ப் பண்பாட்டின் தாக்கம் - **சுயமரியாதை இயக்கம்** - இந்திய மருத்துவத்தில், சித்த மருத்துவத்தின் பங்கு - கல்வெட்டுகள், கையெழுத்துப்படிக்கள் - தமிழ்ப் புத்தகங்களின் அச்ச வரலாறு.

TOTAL : 15 PERIODS

TEXT-CUM-REFERENCE BOOKS

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



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- 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.


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Department of Civil Engineering

I - Course Name: 23HS201 PROFESSIONAL ENGLISH - II

Program Name	B.E./B.TECH. COMMON TO ALL BRANCHES	Sem	Category	L	T	P	C
Prerequisites	Professional English - I	II	HSMC	2	0	0	2

II - Course Objectives

1.	To engage learners in meaningful language activities to improve their reading and writing skills.	
2.	To learn various reading strategies and apply in comprehending documents in professional context.	
3.	To help learners understand the purpose, audience, contexts of different types of writing.	
4.	To develop analytical thinking skills for problem solving in communicative contexts.	
5.	To demonstrate an understanding of job applications and interviews for internship and placements.	

III - Course Content

Preamble:

This course is designed to impart required levels of Communication Skills in Reading and Writing and Proficiency in English language in writing necessary for different professional contexts.

Unit – I	MAKING COMPARISONS	6 Hours
Reading - Reading advertisements, user manuals, brochures; - Discourse markers (connectives & sequence words), Writing — Compare and Contrast Essay; Grammar – Active & Passive Voice- Impersonal Passive Voice.		
Unit – II	EXPRESSING CAUSAL RELATIONS	6 Hours
Reading - Reading longer technical texts– Cause and Effect Essays, and Formal Letters / emails of complaint, Writing - Writing responses to complaints – Jumbled sentences. Grammar - Infinitive and Gerunds.		
Unit – III	CRITICAL THINKING AND PROBLEM SOLVING	6 Hours
Reading - Case Studies, excerpts from literary texts, news reports etc. Writing – Letter to the Editor, Checklists, Drafting of Circulars, Agenda & Minutes of the meeting, Problem solution essay / Argumentative Essay. Grammar – Error correction; If conditional sentences.		
Unit – IV	REPORTING OF EVENTS	6 Hours
Reading –Newspaper articles; Writing – Accident Report with Recommendations, Survey Report; Grammar – Reported Speech, Modals – Conjunctions- Sentence pattern		
Unit – V	COHESIVE WRITING	6 Hours
Reading – Company profiles, Statement of Purpose, (SOP), an excerpt of interview with professionals; Writing – Job / Internship application – Cover letter & Resume; Grammar – Numerical adjectives, Relative Clauses.		



[Signature]

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Text Books:	[1] English for Engineers & Technologists (2020 edition) Orient Blackswan Private Ltd. Department of English, Anna University.
	[2] English for Science & Technology Cambridge University Press 2021.
	[3] Authored by Dr. Veena Selvam, Dr. Sujatha Priyadarshini, Dr. Deepa Mary Francis, Dr. KN.Shoba, and Dr. Lourdes Joevani, Department of English, Anna University.
Reference Books:	[1] Ashraf Rizvi, "Effective Technical Communication", 2nd Edition, McGraw-Hill India, 2017.
	[2] Raman. Meenakshi, Sharma. Sangeeta (2019). Professional English. Oxford university press. New Delhi.
	[3] Improve Your Writing ed. V.N. Arora and Laxmi Chandra, Oxford Univ. Press, 2001, New Delhi.
	[4] Learning to Communicate – Dr. V. Chellammal. Allied Publishers, New Delhi, 2003.
	[5] Business Correspondence and Report Writing by Prof. R.C. Sharma & Krishna Mohan, Tata McGraw Hill & Co. Ltd., 2001, New Delhi.
MOOC/Web Platforms:	https://onlinecourses.nptel.ac.in/noc23_hs115/preview

IV - Course Outcome

On completion of the course, the students will be able to		Bloom's Level Mapped
CO1	To compare and contrast products and ideas in technical texts and write analytical essays.	Apply (BL 2)
CO2	To identify and report cause and effects in events, industrial processes through technical texts and draft a report with suggestions.	Create (BL 6)
CO3	To analyze problems in order to arrive at feasible solutions and communicate them in the written format.	Analyze (BL 4)
CO4	To present their ideas and opinions in a planned and logical manner in industrial nature.	Create (BL 6)
CO5	To draft effective resumes in the context of job application.	Create (BL 6)

(Action verb of each CO to be matched with the next mapping table) (For example: if CO-1 uses the High Order Thinking Skills based action verb, then the corresponding PO must be mapped with High Correlation)

V - Mapping Table Mapping of COs with POs and PSOs

COs/POs	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PSO-1	PSO-2	PSO-3
CO-1									3	3		2			
CO-2									3	3		2			
CO-3									3	3		2			
CO-4									3	3		2			
CO-5									3	3		2			

Mapping: 1-Low, 2-Medium, 3-High (Mapping value based on usage of Action verbs in each CO)



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I - Course Name: 23MA201 STATISTICS AND NUMERICAL METHODS

Program Name	B. E / B. TECH. COMMON FOR CIVIL, MECH AND AI & DS	Sem	Category	L	T	P	C
Prerequisites	NIL	II	BSC	3	1	0	4

II - Course Objectives

1.	This course aims at providing the necessary basic concepts of a few statistical and numerical methods and give procedures for solving numerically different kinds of problems occurring in engineering and technology.	
2.	To acquaint the knowledge of testing of hypothesis for small and large samples which plays an important role in real life problems.	
3.	To introduce the basic concepts of solving algebraic and transcendental equations.	
4.	To introduce the numerical techniques of interpolation in various intervals and numerical techniques of differentiation and integration which plays an important role in engineering and technology disciplines.	
5.	To acquaint the knowledge of various techniques and methods of solving ordinary differential equations.	

III - Course Content

Preamble: This course is applied to analyse the ground water, pollutants in civil engineering, automatic control systems, fluid mechanics, gas dynamics, heat and mass transfer, thermodynamics, vibrations, data communication, data computing, etc		
Unit – I	TESTING OF HYPOTHESIS	12 Hours
Statistical hypothesis – Small sample Tests based on t for single mean and difference of means - F-distributions for single variance and equality of variances – Chi square test for goodness of fit – Independence of attributes - Large sample tests based on Normal distribution for single mean and difference of means - proportion.		
Unit – II	DESIGN OF EXPERIMENTS	12 Hours
One way and two way classifications - Completely randomized design – Randomized block design – Latin square design.		
Unit – III	SOLUTION OF EQUATIONS	12 Hours
Solution of algebraic and transcendental equations - Fixed point iteration method – Newton Raphson method - Solution of linear system of equations – direct method (Gauss elimination method, Gauss Jordan method) – Iterative methods (Gauss Jacobi and Gauss Seidel methods).		
Unit – IV	INTERPOLATION, NUMERICAL DIFFERENTIATION AND NUMERICAL INTEGRATION	12 Hours
Lagrange's and Newton's divided difference interpolations – Newton's forward and backward difference interpolation – Approximation of derivatives using interpolation polynomials – Numerical single and double integrations using Trapezoidal and Simpson's 1/3 rules.		
Unit – V	NUMERICAL SOLUTION OF ORDINARY DIFFERENTIAL EQUATIONS	12 Hours
Single step methods: Taylor's series method - Euler's method - Modified Euler's method - Fourth order Runge-Kutta method for solving first order differential equations - Multi step methods: Milne's and Adams - Bash forth predictor corrector methods for solving first order differential equations.		



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Text Books:	<p>[1] Grewal, B.S., and Grewal, J.S., "Numerical Methods in Engineering and Science", Khanna Publishers, 10th Edition, New Delhi, 2015.</p> <p>[2] Johnson, R.A., Miller, I and Freund J., -Miller and Freund's Probability and Statistics for Engineers", Pearson Education, Asia, 8th Edition, 2015.</p>
Reference Books:	<p>[1] Burden, R.L and Faires, J.D, "Numerical Analysis", 9th Edition, Cengage Learning, 2016</p> <p>[2] Devore. J.L., "Probability and Statistics for Engineering and the Sciences", Cengage Learning, New Delhi, 8th Edition, 2014.</p> <p>[3] Gerald. C.F. and Wheatley. P.O. "Applied Numerical Analysis", Pearson Education, Asia, New Delhi, 7th Edition, 2007.</p> <p>[4] Gupta S.C. and Kapoor V. K., -Fundamentals of Mathematical Statistics", Sultan Chand & Sons, New Delhi, 12th Edition, 2020.</p> <p>[5] Spiegel. M.R., Schiller. J. and Srinivasan. R.A., "Schaum's Outlines on Probability and Statistics", Tata McGraw Hill Edition, 4th Edition, 2012.</p> <p>[6] Walpole. R.E., Myers. R.H., Myers. S.L. and Ye. K., -Probability and Statistics for Engineers and Scientists", 9th Edition, Pearson Education, Asia, 2010.</p>
MOOC/Web Platforms:	https://onlinecourses.nptel.ac.in/noc21_ma74/preview

IV - Course Outcome

On completion of the course, the students will be able to		Bloom's Level Mapped
CO1	Apply the concept of testing of hypothesis for small and large samples in real life problems.	Apply (BL 3)
CO2	Apply the basic concepts of classifications of design of experiments in the field of agriculture.	Apply (BL 3)
CO3	Apply the basic concepts and Techniques of solving algebraic and transcendental equations.	Apply (BL 3)
CO4	Understand the numerical techniques of interpolation in various intervals and apply the numerical techniques of differentiation and integration for engineering problems.	Understand (BL 2)
CO5	Solve the ordinary differential equations with initial conditions by using certain techniques with engineering applications.	Analyse (BL 4)

(Action verb of each CO to be matched with the next mapping table) (For example: if CO-1 uses the High Order Thinking Skills based action verb, then the corresponding PO must be mapped with High Correlation)

V - Mapping Table Mapping of COs with POs and PSOs

COs/ POs	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PSO-1	PSO-2	PSO-3
CO-1	3	3	1	1	1	-	-	-	2	-	2	3	-	-	-
CO-2	3	3	1	1	1	-	-	-	2	-	2	3	-	-	-
CO-3	3	3	1	1	1	-	-	-	2	-	2	3	-	-	-
CO-4	2	3	1	1	1	-	-	-	2	-	2	3	-	-	-
CO-5	3	3	1	1	1	-	-	-	2	-	2	3	-	-	-

Mapping: 1-Low, 2-Medium, 3-High (Mapping value based on usage of Action verbs in each CO)



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I - Course Name: 23PH201 PHYSICS FOR CIVIL ENGINEERING

Program Name	B.E. CIVIL ENGINEERING	Sem	Category	L	T	P	C
Prerequisites	Engineering Physics	II	BSC	3	0	0	3

II - Course Objectives

1.	To provide an introduction to the fundamentals of heat transmission through various materials, building thermal performance, and diverse thermal applications.	
2.	To dissemination of information on building ventilation and air conditioning.	
3.	To introduce the ideas of soundproofing and lighting layouts.	
4.	To provide an overview of the uses and processing of innovative engineered materials	
5.	To create knowledge of safety precautions and natural disasters	

III - Course Content

Preamble: The purpose of this course is to provide information to students about thermal applications, ventilation, sound absorption materials, ceramics, and natural disasters. In the civil engineering programme, it also comprehends the ideas described above.		
Unit – I	THERMAL APPLICATIONS	9 Hours
Principles of heat transfer, steady state of heat flow, conduction through compound media - series and parallel - conductivity of rubber tube and powder materials - heat transfer through fenestrations, thermal insulation and its benefits - heat gain and heat loss estimation - factors affecting the thermal performance of buildings, thermal comfort, shading devices - central heating.		
Unit – II	VENTILATION AND REFRIGERATION	9 Hours
Requirements, principles of natural ventilation - ventilation measurements, design for natural ventilation - window types and packaged air conditioners - chilled water plant - fan coil systems - water piping - cooling load - air conditioning systems for different types of buildings - protection against fire to be caused by A.C. Systems.		
Unit – III	ACOUSTICS AND LIGHTING DESIGNS	9 Hours
Methods of sound absorptions - absorbing materials - noise and its measurements, sound insulation and its measurements. visual field glare, colour - day light calculations - daylight design of windows, measurement of day-light and use of models and artificial skies, principles of artificial lighting, supplementary artificial lighting.		
Unit – IV	NEW ENGINEERING MATERIALS	9 Hours
Composites - fibre reinforced plastics (FRP) and fiber reinforced metals (FRM) - metallic glasses - shape memory alloys - ceramics - bonded ceramics - slip casting - isostatic pressing - gas pressure bonding - properties of ceramic fibres - ferroelectric and ferromagnetic ceramics - high aluminium ceramics.		
Unit – V	NATURAL DISASTERS	9 Hours
Seismology and seismic waves - earth quake ground motion - basic concepts and estimation techniques - site effects - probabilistic and deterministic seismic hazard analysis - cyclone and flood hazards - fire hazards and fire protection, fire-proofing of materials, fire safety regulations and firefighting equipment - prevention and safety measures.		



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Books for study & Reference:	[1] Marko Pinteric, Building Physics, Springer 2017. [2] Peter A. Claisse, Civil Engineering Materials, Elsevier, 2016. [3] Hugo Hens, Building Physics: Heat, Air and Moisture, Wiley, 2017 [4] W.R.Stevens. Building Physics: Lighting. Pergamon Press, 2013. [5] K.G.Budinski and M.K.Budinski. Engineering Materials: Properties and Selection. Pearson Education, 2016.
MOOC/Web Platforms:	https://onlinecourses.nptel.ac.in/noc23_me31/preview https://beeindia.gov.in/sites/default/files/3Ch4.pdf https://www.slideshare.net/nikitaloknathan/light-acoustics https://www.slideshare.net/tparikh25/new-engineering-materials https://archive.nptel.ac.in/courses/105/104/105104183/

IV - Course Outcome

On completion of the course, the students will be able to		Bloom's Level Mapped
CO1	To learn about thermal performance of buildings, insulation, and heat transfer through various materials.	Understand (BL 2)
CO2	To know about building air conditioning and ventilation systems.	Understand (BL 2)
CO3	To comprehend the ideas behind lighting schemes, noise insulation, and sound absorption.	Understand (BL 2)
CO4	To appreciate how composites, metallic glasses, shape memory alloys, and ceramics are processed and used.	Apply (BL 3)
CO5	To Explore about safety precautions and natural disasters including earthquakes, cyclones, and fires.	Understand (BL 2)

(Action verb of each CO to be matched with the next mapping table) (For example: if CO-1 uses the High Order Thinking Skills based action verb, then the corresponding PO must be mapped with High Correlation)

V - Mapping Table Mapping of COs with POs and PSOs

COs/POs	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PSO-1	PSO-2	PSO-3
CO-1	3	3	-	-	-	-	-	-	-	-	-	-	-	-	-
CO-2	3	2	1	1	-	-	2	-	-	-	-	-	-	-	-
CO-3	3	3	-	3	-	-	-	-	-	-	-	-	-	-	-
CO-4	3	3	-	3	-	-	-	-	-	-	-	-	-	-	-
CO-5	3	2	3	3	-	-	-	-	-	-	-	1	-	-	-

Mapping: 1-Low, 2-Medium, 3-High (Mapping value based on usage of Action verbs in each CO)



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23BE202	BASIC ELECTRICAL, ELECTRONICS AND INSTRUMENTATION ENGINEERING	L	T	P	C
		3	0	0	3
Prerequisite:	NIL				
Course Objectives:					
Objective 1	To introduce the basics of electric circuits analysis and various electrical equipment installations				
Objective 2	To introduce working, operating principle of various electrical machines, analog devices and their characteristics and the function of various sensors				
Course Outcome:					
CO1	Students will be able to compute the electric circuit parameters for simple problems				
CO2	Students will be able to acquire the knowledge of different types of electrical installation				
CO3	Students will be able to explain the working principle and applications of electrical machines				
CO4	Students will be able to illustrate the characteristics of analog electronic devices				
CO5	Students will be able to explain the sensors used in building management				
UNIT 1	ELECTRICAL CIRCUITS				9
DC Circuits: Circuit Components: Conductor, Resistor, Inductor, Capacitor – Ohm's Law - Kirchhoff's Laws – Simple problems- Nodal Analysis, Mesh analysis with Independent sources only (Steady state) Introduction to AC Circuits and Parameters: Waveforms, Average value, RMS Value, Instantaneous power, real power, reactive power and apparent power, power factor – (Simple problems only)					
UNIT 2	MAGNETIC CIRCUITS AND ELECTRICAL INSTALLATIONS				9
Magnetic circuits-definitions-MMF, flux, reluctance, magnetic field intensity, flux density (Qualitative Analysis) . Domestic wiring, types of wires and cables, earthing, protective devices- switch fuse unit- Miniature circuit breaker- moulded case circuit breaker- earth leakage circuit breaker, safety precautions and First Aid					
UNIT 3	ELECTRICAL MACHINES (Qualitative Analysis)				9
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. Construction, Working principle and Applications of Transformer, Single phase Induction Motor, Working- types and Applications					
UNIT 4	ANALOG ELECTRONICS (Qualitative Analysis)				9
Semiconductor Materials: Silicon & Germanium – PN Junction Diodes, Zener Diode – Characteristics Applications – Bipolar Junction Transistor Working -CB Characteristics, JFET, SCR, MOSFET – Types, I- V Characteristics and Applications, Rectifiers					
UNIT 5	SENSORS FOR BUILDING MANAGEMENT				9
Sensors, solenoids, pneumatic controls with electrical actuator, types of valves and its applications, electro-pneumatic systems, proximity sensors, piezoelectric, hall effect, Air quality sensor, Smoke sensor, Co2 sensor, Water leakage detection sensor, Smart sensors, Thermal Imagers.					
Total Hours:					45
Text Books:					
[1] Kothari DP and I.J Nagrath, -Basic Electrical and Electronics Engineering , Second Edition, McGraw Hill Education, 2020					
[2] S.K.Bhattacharya -Basic Electrical and Electronics Engineering , Pearson Education, Second Edition, 2018					
[3]. A.K. Sawhney, Puneet Sawhney _A Course in Electrical & Electronic Measurements & Instrumentation', Dhanpat Rai and Co, 2015.					
[4]. James A Svoboda, Richard C. Dorf, Dorf's Introduction to Electric Circuits, Wiley, 2018					
Reference Books:					
[1] John Bird, -Electrical Circuit theory and technology , Routledge; 2017.					
[2] Thomas L. Floyd, _Electronic Devices', 10th Edition, Pearson Education, 2018.					



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[3] Albert Malvino, David Bates, _Electronic Principles, McGraw Hill Education; 7th edition, 2017

[4] Muhammad H.Rashid, -Spice for Circuits and electronics||, 4th Edition., Cengage India,2019.


[5] H.S. Kalsi, _Electronic Instrumentation', Tata McGraw-Hill, New Delhi, 2010

Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	1	1					1				1		
CO2	2	1	1					1				1		
CO3	2	1	1					1				1		
CO4	2	1	1					1				1		
CO5	2	1	1					1				1		
LOW (1); MEDIUM (2); HIGH (3)														


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தமிழரும் தொழில்நுட்பமும்

L T P C
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அலகு I நெசவு மற்றும் பாணைத் தொழில்நுட்பம்:

சங்க காலத்தில் நெசவுத் தொழில் - பாணைத் தொழில்நுட்பம் - கருப்பு சிவப்பு பாண்டங்கள் - 3

அலகு II வடிவமைப்பு மற்றும் கட்டிடத் தொழில்நுட்பம்:

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, 3

அலகு III உற்பத்தித் தொழில் நுட்பம்:

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, 3

அலகு IV வேளாண்மை மற்றும் நீர்ப்பாசனத் தொழில் நுட்பம்:

அணை, ஏரி, குளங்கள், மதகு - சோழர்காலக் குழுவித் தூம்பின் முக்கியத்துவம் - கால்நடை பராமரிப்பு - கால்நடைகளுக்காக வடிவமைக்கப்பட்ட கிணறுகள் - வேளாண்மை மற்றும் வேளாண்மைச் சார்ந்த செயல்பாடுகள் - கடல்சார் அறிவு - மீன்வளம் - முத்து மற்றும் முத்துக்குளித்தல் - பெருங்கடல் குறித்த பண்டைய அறிவு - அறிவுசார் சமூகம், 3

அலகு V அறிவியல் தமிழ் மற்றும் கணித்தமிழ்:

அறிவியல் தமிழின் வளர்ச்சி - கணித்தமிழ் வளர்ச்சி - தமிழ் நூல்களை மின்பதிப்பு செய்தல் - தமிழ் மென்பொருட்கள் உருவாக்கம் - தமிழ் இணையக் கல்விக்கழகம் - தமிழ் மின் நூலகம் - இணையத்தில் தமிழ் அகராதிகள் - சொற்குவைத் திட்டம், 3

TEXT-CUM-REFERENCE BOOKS

TOTAL : 15 PERIODS

1. தமிழக வரலாறு - மக்களும் பண்பாடும் - கல்விவியல் பணிகள் கழகம்).
2. கணினித் தமிழ் - முனைவர் இல. சுந்தரம். (விகடன் பிரசுரம்).
3. கீழடி - வைகை நதிக்கரையில் சங்ககால நகர நாகரிகம் (தொல்லியல் துறை வெளியீடு)
4. பொருநதை - ஆற்றங்கரை நாகரிகம். (தொல்லியல் துறை வெளியீடு)

கே.கே. பிள்ளை (வெளியீடு: தமிழ்நாடு பாடநூல் மற்றும்



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5. Social Life of Tamils (Dr.K.K.Pillay) A joint publication of INTB & 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. Ponnai 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.



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I – Course Code & Name: 23ME201 ENGINEERING MECHANICS

Program Name	B.E. – COMMON TO MECHANICAL & CIVIL ENGINEERING	Sem	Category	L	T	P	C
Prerequisites	Nil	II	ESC	3	0	0	3

II - Course Objectives

6.	To expose various laws of forces for the equilibrium of rigid bodies.	
7.	To introduce the concept of properties of surfaces and solids.	
8.	To impart knowledge on the fundamental of dynamics of particles and rigid bodies.	

III - Course Content

Preamble:

The engineering Mechanics course is designed to provide a comprehensive understanding of the fundamental principles that govern the behavior of bodies under the influence of forces and moments. Through this course, students will gain insights into the mechanics of how structures and machines interact with their environments and how these principles form the basis of engineering analysis and design.

Unit – I	EQUILIBRIUM OF FORCES	9 Hours
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Types of force system- Coplanar concurrent force – Resultant - Moment of force and its applications – couples and resultant of a force system equation of equilibrium of coplanar concurrent and non-concurrent force system Lami's theorem- Resolution of a force into a force and a couple-polygon law of forces for resultant.

Unit – II	EQUILIBRIUM OF RIGID BODIES	9 Hours
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Free body diagram – Types of supports –Support reaction – Moments and Couples – Moment of a force about a point and about an axis – Scalar components of a moment – Varignon's theorem – Single equivalent force -Equilibrium of Rigid bodies in two dimensions.

Unit – III	PROPERTIES OF SURFACES AND SOLIDS	9 Hours
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Centroids and centre of mass – Centroids of lines and areas - Rectangular, circular, triangular areas by integration – T section, I section, - Angle section, Hollow section by using standard formula – Theorems of Pappus - Area moments of inertia of plane areas – Rectangular, circular, triangular areas by integration – T section, I section, by using standard formula – Parallel axis theorem and perpendicular axis theorem – Principal moments of inertia of plane areas – Principal axes of inertia-Mass moment of inertia – mass moment of inertia for prismatic and cylindrical solids.

Unit – IV	DYNAMICS OF PARTICLES	9 Hours
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Displacements, Velocity and acceleration, their relationship – Relative motion – Curvilinear motion - Newton's laws of motion – Work Energy Equation – Impulse and Momentum –Impact of elastic bodies.

Unit – V	FRICTION AND RIGID BODY DYNAMICS	9 Hours
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Friction force – Laws of sliding friction – equilibrium analysis of simple systems with sliding friction – wedge friction- Rolling resistance - Translation and Rotation of Rigid Bodies – Velocity and acceleration – General Plane motion of simple rigid bodies such as cylinder, disc/wheel and sphere.

Text Books:	1. Vela Murali, "Engineering Mechanics", Oxford University Press (2018) 2. Bhavikatti, S.S, "Engineering Mechanics", MULTI COLOUR EDITION, NewAge International (P) Limited Publishers, 2021.
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Reference Books:	1. Beer, F.P and Johnston Jr. E.R., "Vector Mechanics for Engineers (In SI Units): Statics and Dynamics", 9th Edition, Tata McGraw-Hill Publishing company, New Delhi (2009). 2. S. Timoshenko, D.H young, J.V. Rao, Sukumar pati, "Engineering Mechanics" 4th edition TMH Education 2016. 3. Sanjay Bansal R. K. Bansal A Text book of Engineering Mechanics 8th edition Lakshmi Publication 2011.
MOOC/Web Platforms:	

IV - Course Outcome

On completion of the course, the students will be able to		Bloom's Level Mapped
CO1	Identify various force system in a plane.	Understanding (BL 2)
CO2	Solve equilibrium of rigid bodies in two dimensions.	Applying (BL3)
CO3	Calculate the centroid, areas and mass moment of inertia for surface and solids.	Applying (BL3)
CO4	Apply the concept of dynamics for particle motions.	Applying (BL3)
CO5	Determine the friction of elements and dynamics of rigid bodies.	Applying (BL3)

(Action verb of each CO to be matched with the next mapping table) (For example: if CO-1 uses the High Order Thinking Skills based action verb, then the corresponding PO must be mapped with High Correlation)

V - Mapping Table Mapping of COs with POs and PSOs

COs/ POs	PO -1	PO -2	PO -3	PO -4	PO -5	PO -5	PO -6	PO -7	PO -8	PO -9	PO -10	PO -11	PO -12	PSO -1	PSO -2	PSO -3
CO-1	3	3	2	1									2	3		
CO-2	3	3	2	1									2	3		
CO-3	3	3	2	1									2	3		
CO-4	3	3	2	1									2	3		
CO-5	3	3	2	1									2	3		

Mapping: 1-Low, 2-Medium, 3-High (Mapping value based on usage of Action verbs in each CO)



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I – Course Code & Name: 23GE202 ENGINEERING GRAPHICS

Program Name	B.E./B.TECH. – COMMON TO ALL BRANCHES	Sem	Category	L	T	P	C
Prerequisites	Nil	II	ESC	2	0	4	4

II - Course Objectives

1.	Drawing engineering curves.	
2.	Drawing freehand sketch of simple objects.	
3.	Drawing orthographic projection of solids and section of solids.	
4.	Drawing development of solids.	
5.	Drawing isometric and perspective projections of simple solids.	

III - Course Content

Preamble:

Engineering graphics serves as a foundation for your journey into the world of engineering design and visualization. Through this course, you will acquire essential skills and knowledge that are crucial for effective communication and representation of engineering concepts. This course bridges the gap between ideas and reality by transforming abstract concepts into visual representations.

Unit – I	PLANE CURVES	18 Hours
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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	18 Hours
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Orthographic projection – principles - 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	18 Hours
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Projection of simple solids like prisms, pyramids, cylinder, cone and truncated solids when the axis is inclined to one of the principal planes and parallel to the other 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	SECTION OF SOLIDS AND DEVELOPMENT OF SURFACES	18 Hours
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Sectioning of above solids in simple vertical position when the cutting plane is inclined to the one of the principal planes and perpendicular to the other — obtaining true shape of section. Development of lateral surfaces of simple and sectioned solids — Prisms, pyramids cylinders and cones. Practicing three-dimensional modeling of simple objects by CAD Software (Not for examination).

Unit – V	ISOMETRIC AND PERSPECTIVE PROJECTIONS	18 Hours
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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 and cylinders by visual ray method.** Practicing three-dimensional modeling of isometric projection of simple objects by CAD Software (Not for examination).



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Text Books:	<ol style="list-style-type: none"> 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.
Reference Books:	<ol style="list-style-type: none"> 1. Venugopal K. and Prabhu Raja V., "Engineering Graphics", New Age International (P) Limited, 2008. 2. Parthasarathy N. S. and Vela Murali, "Engineering Graphics", Oxford University Press, New Delhi, 2015. 3. T.Jeyapoovan, "Engineering Graphics Using AutoCAD", 7th Edition, Vikas Publishing Houses Pvt Ltd, 2015. 4. Basant Agarwal and Agarwal C.M., "Engineering Drawing", McGraw Hill, 2nd Edition, 2019. 5. Shah M.B., and Rana B.C., "Engineering Drawing", Pearson Education India, 2nd Edition, 2009.
MOOC/Web Platforms:	<ol style="list-style-type: none"> 1. https://nptel.ac.in/courses/112103019 2. https://archive.nptel.ac.in/courses/112/102/112102304/

IV - Course Outcome

On completion of the course, the students will be able to		Bloom's Level Mapped
CO1	Construct the conic curves, involutes and cycloid.	Applying (BL 3)
CO2	Solve practical problems involving projection of lines, points and plane surfaces	Applying (BL 3)
CO3	Draw orthographic projection of solids and freehand sketch of simple objects.	Applying (BL 3)
CO4	Draw the sectioning and development of simple solids.	Applying (BL 3)
CO5	Draw isometric and perspective projections of simple solids	Applying (BL 3)

(Action verb of each CO to be matched with the next mapping table) (For example: if CO-1 uses the High Order Thinking Skills based action verb, then the corresponding PO must be mapped with High Correlation)

V - Mapping Table Mapping of COs with POs and PSOs

COs / POs	PO -1	PO -2	PO -3	PO -4	PO -5	PO -5	PO -6	PO -7	PO -8	PO -9	PO -10	PO -11	PO -12	PSO -1	PSO -2	PSO -3
CO-1	3	1	1								3		2			
CO-2	3	3	1								3		2			
CO-3	3	1	1								3		2			
CO-4	3	1	1								3		2			
CO-5	3	1	1								3		2			

Mapping: 1-Low, 2-Medium, 3-High (Mapping value based on usage of Action verbs in each CO)



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