NPR
COLLEGE OF ENGINEERING & TECHNOLOGY
(AUTONOMOUS)
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B.E -ELECTRONICS AND COMMUNICATION ENGINEERING

&

M.E – VLSI DESIGN

REGULATIONS 2023

CHOICE BASED CREDIT SYSTEM (CBCS)

CURRICULUM AND SYLLABUS

Chairperson-Board of Studies
Department of Electronics and Communication Engineering

Dr.B.MARUTHU PANDIAN, ME., Ph.D.,
Principal
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Natham, Dindigul(Dt)-624 401

B.E- ELECTRONICS AND COMMUNICATION ENGINEERING - SYLLABUS

SEMESTER I

I - Course Name: 23HS101 PROFESSIONAL ENGLISH - I

Program Name	B.E./B.TECH.–COMMON TO ALL BRANCHES	Sem	Category	L	T	P	C
Prerequisite	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	INTRODUCTIONTOEFFECTIVECOMMUNICATION	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: Why/ 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	NARRATIONAND 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-VerbAgreement;Prepositions.**Vocabulary**-Wordforms(prefixes&suffixes); Phrasal verbs.

Unit – III	DESCRIPTIONOFAPROCESS/PRODUCT	9 Hours

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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–Newspaperarticles; Journalreports–andNon-VerbalCommunication(tables,piechartsetc,) 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 /Semifixed expressions – Idioms and Phrases		
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,(2023edition)
	[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, RSSalaria, Khanna Publishing House
	[5] Learning to Communicate–Dr.V.Chellammal, Allied Publishing House, NewDelhi, 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)

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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
Prerequisite	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 quadratic forms.

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

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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 (Tangents problems 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 (excluding net change theorem), 5.5, 7.1 - 7.4 and 7.8].
Reference Books:	[1] Anton. H, Bivens. I and Davis. S, "Calculus", Wiley, 10th Edition, 2016. [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. [3] Jain. R.K. and Iyengar. S.R.K., "Advanced Engineering Mathematics", Narosa Publications, New Delhi, 5th Edition, 2016. [4] Narayanan. S. and ManicavachagomPillai. T. K.,"Calculus" Volume I and II, S. Viswanathan Publishers Pvt. Ltd., Chennai, 2009. [5] Ramana. B.V., "Higher Engineering Mathematics", McGraw Hill Education Pvt. Ltd, New Delhi, 2016. [6] Srimantha Pal and Bhunia. S.C, "Engineering Mathematics " Oxford University Press, 2015. [7] Thomas. G. B., Hass. J, and Weir. M.D, "Thomas Calculus", 14th Edition, Pearson India, 2018.
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

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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: 23PH102 PHYSICS FOR ELECTRONICS ENGINEERING

Program Name	B.E. ELECTRONICS AND COMMUNICATION ENGINEERING	Sem	Category	L	T	P	C
Prerequisite	NIL	I	BSC	3	0	0	3

II - Course Objectives

1.	To instill the essentials of properties of matter.
2.	To describe the principles of quantum mechanics and their various applications.
3.	To provide the fundamental understanding of crystals and their numerous crystal formations.
4.	To recognize the modelling of conducting materials' transport properties using both classical and quantum theories.
5.	To become knowledgeable about semiconductors and understands the applications of magnetic materials.

III - Course Content

Preamble:

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

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	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 – III	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.

Unit – IV	CONDUCTING MATERIALS	9 Hours

Classical free electron theory - electrical and thermal conductivity, expression - Wiedemann-Franz law - electrons in metals - particle in a three-dimensional box - degenerate states - Fermi-Dirac statistics - density

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of energy states - electron in periodic potential: Bloch theorem - metals and insulators - energy bands in solids - electron effective mass.		
Unit – V	**SEMICONDUCTING AND MAGNETIC MATERIALS**	**9 Hours**
Direct and indirect band gap semiconductors- carrier concentration in intrinsic semiconductors- carrier concentration in n-type & p-type semiconductors- Hall effect and applications - classification of magnetic materials: diamagnetic, paramagnetic and ferromagnetic materials - domain theory -hysteresis (based on domain theory) - soft and hard magnetic materials		

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, 10th edition,2022 [5] Marikani A, Engineering Physics, PHI, New Delhi, 2013.
MOOC/Web Platforms:	https://onlinecourses.nptel.ac.in/noc20_mm13/preview https://www.livescience.com/33816-quantum-mechanics-explanation.html https://archive.nptel.ac.in/courses/115/104/115104109/ https://onlinecourses.nptel.ac.in/noc20_ph10/preview semiconductors-insulators/semiconductor-materials-types-groups.php

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	Apply quantum theory's sophisticated physics notions to the matter's characterization.	Apply (BL 3)
CO3	Know the fundamentals of crystal formations and growth methods.	Understand (BL 2)
CO4	To understand about the creation of energy band structures, free electron theory, ar quantum theory.	Understand (BL 2)
CO5	To gain knowledge about semiconductor and magnetic materials, as well as the applications for them.	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)

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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	3	3	2	-	-	3	-	-	-	-	2	-	-	-
CO-3	3	2	3	3	-	-	-	-	-	-	-	1	-	-	-
CO-4	3	3	-	-	-	-	-	-	-	-	-	-	-	-	-
CO-5	3	3	-	3	-	-	-	-	-	-	-	-	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: 23CY101 ENGINEERING CHEMISTRY

Program Name	B.E./B.TECH.COMMON TO ALL BRANCHES	Sem	Category	L	T	P	C
Prerequisite	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.

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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.		
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:	[1] P. C. Jain and Monica Jain, "Engineering Chemistry", Dhanpat Rai Publishing Company (P) Ltd, New Delhi, 17th Edition, 2018. [2] Sivasankar B., "Engineering Chemistry", Tata McGraw-Hill Publishing Company Ltd, New Delhi, 6th Edition 2012. [3] S.S. Dara, "A text book of Engineering Chemistry", S. Chand Publishing, 12th Edition, 2018.
Reference Books:	[1] 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. [2] O.G. Palanna, "Engineering Chemistry" McGraw Hill Education (India) Private Limited, 2nd Edition, 2017. [3] Friedrich Emich, "Engineering Chemistry", Scientific International PVT, LTD, New Delhi, 2nd Edition, 2017. [4] Shikha Agarwal, "Engineering Chemistry-Fundamentals and Applications", Cambridge University Press, Delhi, 2nd Edition, 2019. [5] O.V. Roussak and H.D. Gesser, Applied Chemistry-A Text Book for Engineers and Technologists, Springer Science Business Media, New York, 2nd Edition, 2013. [6] Gowariker V.R., Viswanathan N.V. and Jayadev Sreedhar, "Polymer Science", New Age International P (Ltd.,) Chennai, 4thEdition, 2021.

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MOOC/Web 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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I - Course Name:

Course Name	23GE101 PROBLEM SOLVING AND C PROGRAMMING	Sem	Category	L	T	P	C
Prerequisite	NIL	I	ESC	3	0	2	4

II - Course Objectives

1.	To make the students understand the fundamentals of problem solving using Algorithm and Flowchart
2.	To teach the basic programming constructs for solving simple problems
3.	To introduce the basic concepts of arrays and strings
4.	To acquaint the students about functions, pointers, structures and their relationship
5.	To impart knowledge on the concepts of file handling

III - Course Content

Preamble: -		
Unit – I	**INTRODUCTION TO ALGORITHM AND C**	**10 Hours**
Algorithms, building blocks of algorithms, notation, algorithmic problem solving, simple strategies for developing algorithms. Structure of C program - C programming: Data Types - Constants – Enumeration Constants - Keywords – Operators: Precedence and Associativity - Expressions - Input/Output statements, Assignment statements – Decision making statements - Switch statement - Looping statements – Preprocessor directives - Compilation process		
Unit – II	**ARRAYS AND STRINGS**	**8 Hours**
Introduction to Arrays: Declaration, Initialization – One dimensional array – Two dimensional arrays – String operations: length, compare, concatenate, copy – Selection sort, linear and binary search		
Unit – III	**FUNCTIONS AND POINTERS**	**9 Hours**
Modular programming – Function prototype, function definition, function call, Built-in functions (string functions, math functions) – Recursion, Binary Search using recursive functions –Pointers – Pointer operators – Pointer arithmetic – Arrays and pointers – Array of pointers – Parameter passing: Pass by value, Pass by reference		
Unit – IV	**STRUCTURES AND UNION**	**9 Hours**
Structure – Nested structures – Pointer and Structures – Array of structures – Self referential structures – Dynamic memory allocation – Singly linked list – typedef – Union – Storage classes and Visibility		
Unit – V	**FILE PROCESSING**	**9 Hours**
Files – Types of file processing: Sequential access, Random access – Sequential access file – Random access file – Command line arguments		
		TOTAL:45 PERIODS

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List of Experiments:	30 Periods
Note: The lab instructor is expected to design problems based on the topics listed. The Examination shall not be restricted to the sample experiments designed. 1. I/O statements, operators, expressions 2. Decision-making constructs: if-else, goto, switch-case, break-continue 3. Loops: for, while, do-while 4. Arrays: 1D and 2D, Multi-dimensional arrays, traversal 5. Strings: operations 6. Functions: call, return, passing parameters by (value, reference), passing arrays to function. 7. Recursion 8. Pointers: Pointers to functions, Arrays,Strings, Pointers to Pointers, Array of Pointers 9. Structures: Nested Structures, Pointers to Structures, Arrays of Structures and Unions. 10. Files: reading and writing, File pointers, file operations, random access, processor directives.	
	TOTAL:**75Periods**

IV - Course Outcome

On completion of the course, the students will be able to		Bloom's Level Mapped
CO1	Understand the basic concepts of C programming tokens, control statements Input/Output statements, and Preprocessor directives	Apply (BL 3)
CO2	Develop C Programs using basic programming constructs for solving simple problems	Apply (BL 3)
CO3	Develop C programs for solving computational problems by using arrays and strings	Apply (BL 3)
CO4	Develop simple real-time applications in C using functions, arrays, and strings	Apply (BL 3)
CO5	Develop applications for real time problems in C using pointers and structures	Apply (BL 3)

Text Books:	1. Reema Thareja, "Programming in C", Oxford University Press, Second Edition, 2016. 2. Kernighan, B.W and Ritchie, D.M, "The C Programming language", Second Edition, Pearson Education, 2015.
Reference Books:	1. B. Gottfried, Programming with C, Schaum Outline Series, Fourth Edition, 2018 2. Yashwant Kanetkar, Let us C, 17th Edition, BPB Publications, 2020. 3. Byron S. Gottfried, "Schaum's Outline of Theory and Problems of Programming with C", McGraw-Hill Education, 1996. 4. Pradip Dey, Manas Ghosh, "Computer Fundamentals and Programming in C", Second Edition, Oxford University Press, 2013. 5. Anita Goel and Ajay Mittal, "Computer Fundamentals and Programming in C", 1st Edition, Pearson Education, 2013.
MOOC/Web Platforms:	

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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	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
CO1	3	2	2	-	3	-	-	-	-	-	2	-	2	-	-
CO2	3	3	3	-	3	-	-	-	-	-	2	-	2	-	-
CO3	3	3	2	-	3	-	-	-	-	-	2	-	2	-	-
CO4	3	2	2	-	3	-	-	-	-	-	2	-	2	-	-
CO5	3	3	3	-	3	-	-	-	-	-	2	-	2	-	-

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I - Course Name: 23GE103 தமிழர் மரபு /HERITAGE OF TAMILS

Program Name	B.E./B.TECH.COMMON TO ALL BRANCHES	Sem	Category	L	T	P	C
Prerequisite	NIL	I	HSMC	1	0	0	1

II - Course Content

Unit – I	LANGUAGE AND LITERATURE	3 Hours
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 Hours**
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 Hours**
Therukoothu, Karagattam, Villu Pattu, Kaniyan Koothu, Oyillattam, Leather puppetry, Silambattam, Valari, Tiger dance - Sports and Games of Tamils.		
Unit – IV	**THINAI CONCEPT OF TAMILS**	**3 Hours**
Flora and Fauna of Tamils & Aham and Puram Concept from Tholkappiyam and Sangam Literature - Aram Concept of Tamils - Education and Literacy during Sangam Age - Ancient Cities and Ports of Sangam Age - Export and Import during Sangam Age - Overseas Conquest of Cholas.		
Unit – V	**CONTRIBUTION OF TAMILS TO INDIAN NATIONAL MOVEMENT AND INDIAN CULTURE**	**3 Hours**
Contribution of Tamils to Indian Freedom Struggle - The Cultural Influence of Tamils over the other parts of India – Self-Respect Movement - Role of Siddha Medicine in Indigenous Systems of Medicine – Inscriptions & Manuscripts – Print History of Tamil Books,		

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Text Cum Books:	[1] தமிழக வரலாறு மக்களும் பண்பாடும் கே.கே. பிள்ளை (வெளியீடு–தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள்கழகம்). [2] கணினித்தமிழ்முனைவர்இலசுந்தரம் (விகடன்பிரசுரம்). [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.
Reference Books:	[1] Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D.Thirunavukkarasu) (Published by: International Institute of Tamil Studies). [2] The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: International Institute of Tamil Studies) [3] Keeladi - 'Sangam City Civilization on the banks of river Vaigai' (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services

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	Corporation, Tamil Nadu) [4] Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay) (Published by: The Author) [5] Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu) [6] Journey of Civilization Indus to Vaigai (R.Balakrishnan) (Published by: RMRL) – Reference Book.
MOOC/Web Platforms:	

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SEMESTER II

I - Course Name: 23HS201 PROFESSIONAL ENGLISH - II

Program Name	B.E./B.TECH.COMMON TO ALL BRANCHES	Sem	Category	L	T	P	C
Prerequisite	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.		

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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&TechnologyCambridgeUniversityPress2021.
	[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 Mc Graw Hill & Co.Ltd.,2001,NewDelhi.
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)

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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: 23MA203 PARTIAL DIFFERENTIAL EQUATIONS AND TRANSFORMS

Program Name	B.E. ELECTRONICS AND COMMUNICATION ENGINEERING	Sem	Category	L	T	P	C
Prerequisite	NIL	II	BSC	3	1	0	4

II - Course Objectives

1.	To study the formation and solve the Partial Differential Equations.
2.	To understand the concepts of Dirichlet's conditions and Fourier series.
3.	To Study the application of transform techniques using Fourier Transforms.
4.	To understand the concept of Laplace transforms can be used for efficiently solving the problems that occur in various branches of engineering disciplines.
5.	To provide the basic concepts of Z-Transform and solve the difference equations.

III - Course Content

Preamble:

Fourier analysis allows modelling periodic phenomena which appears frequently in engineering, alternating electric currents or the motion of planets. The idea of Fourier analysis is to represent complicated functions in terms of simple periodic functions, namely cosines and sines.

Unit – I	**PARTIAL DIFFERENTIAL EQUATIONS**	**12 Hours**

Formation of partial differential equations - Elimination of arbitrary constants and functions –Solutions of five standard types of first order partial differential equations - Lagrange's linear equation - Homogenous type of Second order Linear differential equations with constant coefficients.

Unit – II	**FOURIER SERIES**	**12 Hours**

Dirichlet's conditions – General Fourier series – Half range sine and cosine series – Parseval's identity – Harmonic analysis.

Unit – III	**FOURIER TRANSFORMS**	**12 Hours**

Fourier transform pair – Fourier sine and cosine transforms – Properties – Transforms of simple functions – Convolution theorem (excluding Proof) – Parseval's identity.

Unit – IV	**LAPLACE TRANSFORMS**	**12 Hours**

Existence conditions – Transforms of elementary functions – Transform of unit step function and unit impulse function – Basic properties – Shifting theorems - Transforms of derivatives and integrals – Initial and final value theorems – Inverse transforms – Convolution theorem (excluding Proof) – Transform of periodic functions – Application to solution of linear second order ordinary differential equations with constant coefficients.

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Unit – V	Z - TRANSFORMS AND DIFFERENCE EQUATIONS	12 Hours
Z-transforms - Elementary properties – Inverse Z-transform (using partial fraction and residues) - Convolution theorem - Formation of difference equations – Solution of difference equations using Z - transform.		

Text Books:	[1] Veerarajan T., "Transforms and Partial Differential Equations", Tata McGraw Hill Education Pvt.Ltd., New Delhi, Second reprint,2012. [2] Grewal B.S., "Higher Engineering Mathematics", 42nd Edition, Khanna Publishers, Delhi, 2012.
Reference Books:	[1] Bali. N.P and Manish Goyal, "A Textbook of Engineering Mathematics", 7th Edition, Laxmi Publications Pvt Ltd,2007. [2] Glyn James, "Advanced Modern Engineering Mathematics", 3rd Edition, Pearson Education, 2007. [3] Erwin Kreyszig, "Advanced Engineering Mathematics", 8th Edition, Wiley India,2007. [4] Ray Wylie C and Barrett.L.C, "Advanced Engineering Mathematics" Tata McGraw Hill Education Pvt Ltd, Sixth Edition, New Delhi,2012. [5] Datta K.B., "Mathematical Methods of Science and Engineering", Cengage Learning India Pvt Ltd, Delhi,2013.
MOOC/Web Platforms:	https://archive.nptel.ac.in/courses/111/103/111103021/ https://archive.nptel.ac.in/courses/111/106/111106139/

IV - Course Outcome

On completion of the course, the students will be able to		Bloom's Level Mapped
CO1	To apply Partial Differential Equation in real time Engineering problems.	Apply(BL 3)
CO2	To understand general periodic functions and apply in problems of Fourier series, which are sums of sines and cosines.	Understand(BL 2)
CO3	To use the Fourier transform as the tool to connect the time domain and frequency domain in signal processing.	Apply(BL 3)
CO4	To apply Laplace transform and inverse transform of simple functions, properties, various related theorems and application to differential equations with constant coefficients.	Apply(BL 3)
CO5	To introduce the effective mathematical tools for the solutions of partial differential equations that model several physical processes and to develop Z - Transform techniques for discrete time systems.	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)

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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	-	-	3	-	-	-
CO-2	3	3	1	1		-	-	-	2	-	-	3	-	-	-
CO-3	3	3	1	1		-	-	-	2	-	-	3	-	-	-
CO-4	3	3	1	1		-	-	-	2	-	-	3	-	-	-
CO-5	3	3	1	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 Name:

Course Name	23BE204 ELECTRONIC DEVICES	Sem	Category	L	T	P	C
Prerequisite	-	II	ESC	3	0	0	3

II - Course Objectives

1.	To understand the basic concepts of semiconductor devices.
2.	To learn the characteristics of bipolar junctions.
3.	To inculcate the construction, characteristics of FET and MOSFET.
4.	To understand the special purpose semiconductor devices.
5.	To introduce the concepts of power devices and display devices.

III - Course Content

Preamble:

Electronics industry plays a vital role in all aspects of our day life with the evolution in automation industry, IoT, Robotics and Artificial Intelligence. Every industry, in order to work with this growing technology, one should know the working principle, operation and characteristics, diodes, transistors, FET, MOSFET, Special purpose semiconductor diodes, display devices and power devices.

Unit – I	**SEMICONDUCTOR DIODE**	**9 Hours**

PN junction diode, Current equations, Diffusion and drift current densities, forward and reverse bias characteristics, Transition and Diffusion Capacitances, rectifier circuits, Zener Diode and its characteristics, regulators

Unit – II	**BIPOLAR JUNCTION TRANSISTORS**	**9 Hours**

NPN -PNP -Junctions-Early Effect-Current equations – Input and Output characteristics of CE, CB CC-Hybrid π model, h-parameter model, Ebers Moll Model, Multi Emitter Transistor.

Unit – III	**FIELD EFFECT TRANSISTORS**	**9 Hours**

JFETs – Drain and Transfer characteristics, -Current Equations-Pinch off voltage and its significance, MOSFET- Characteristics- Channel length modulation, D-MOSFET, E-MOSFET

Unit – IV	**SPECIAL PURPOSE SEMICONDUCTOR DEVICES**	**9 Hours**

Metal-Semiconductor Junction- MESFET, Schottky barrier diode--Varactor diode –Tunnel diode- Gallium Arsenide device, LASER diode, LDR, Photo diode, Photo transistor, Opto Coupler, Solar cell

Unit – V	**POWER DEVICES AND DISPLAY DEVICES**	**9 Hours**

Uni Junction Transistor, Silicon Controlled Rectifier, Diac, Triac, Power BJT, Light Emitting Diode, Liquid Crystal Display, Charge Coupled Devices

TOTAL:45 Periods

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Text Books:	1. Robert Boylestad and Louis Nashelsky, "Electron Devices and Circuit Theory": Printice Hall Publications, 11th Edition , 2015 2. Donald A Neaman, "Semiconductor Physics and Devices", Fourth Edition, Tata Mc GrawH ill Inc. 2012 3. David A. Bell, Electronic Devices & Circuits, 5th Edition, Oxford University Press, 2008.
Reference Books:	1. Millman and Halkias, "Electronic devices and circuits", 2nd Edition, McGraw Hill Publication, 2007 2. Salivahanan. S, Suresh Kumar. N, Vallavaraj.A, —Electronic Devices and circuit, Third Edition, Tata McGraw- Hill, 2008. 3. Yang, "Fundamentals of Semiconductor devices", McGraw Hill International Edition, 1978.
MOOC/Web Platforms:	

IV - Course Outcome

	On completion of the course, the students will be able to	Bloom's Level Mapped
CO1	Design simple rectifiers and voltage regulators using diodes	Apply (BL3)
CO2	Apply suitable biasing conditions to study the input and output characteristics of BJT	Apply (BL3)
CO3	Elaborate the operation of BJT using various transistor models	Understand (BL2)
CO4	Explore the characteristics and operation of JFET and MOSFET	Understand (BL2)
CO5	Compare the characteristics of special Semiconductor diodes	Understand (BL2)
CO6	Articulate the applications of Power and Display devices	Understand (BL2)

(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	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3	2	1	-	-	-	-	-	-	-	-	-	1	-
CO2	3	2	1	-	-	-	-	-	-	-	-	-	1	-
CO3	3	2	1	-	-	-	-	-	-	-	-	-	1	-
CO4	3	2	1	-	-	-	-	-	-	-	-	-	1	-
CO5	3	2	1	-	-	-	-	-	-	-	-	-	1	-
CO6	3	2	1	-	-	-	-	-	-	-	-	-	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:

Course Name	23CS201 PYTHON PROGRAMMING	Sem	Category	L	T	P	C
Prerequisite	C Programming	II	ESC	3	0	0	3

II - Course Objectives

1.	To learn to solve problems using Python conditionals and loops.
2.	To define Python functions and use function calls to solve problems
3.	To use Python data structures - lists, tuples, dictionaries to represent complex data.
4.	To do input/output with files in Python
5.	To use python Exceptions and Libraries

III - Course Content

Preamble: -

Unit – I	**COMPUTATIONAL THINKING AND PROBLEM SOLVING**	**9 Hours**

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 – II	**DATA TYPES, EXPRESSIONS, STATEMENTS**	**9 Hours**

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 – III	**CONTROL FLOW, FUNCTIONS, STRINGS**	**9 Hours**

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 – IV	**LISTS, TUPLES, DICTIONARIES**	**9 Hours**

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.

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Unit – V	FILES, MODULES, PACKAGES	9 Hours
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).		

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 Understand Data'', Third Edition, MIT Press [4] Eric Matthes, "Python Crash Course, A Hands – on Project Based Introduction to Programming", 2nd Edition, No Starch Press, 2019. [5] Martin C. Brown, "Python: The Complete Reference", 4th Edition, Mc-Graw Hill, 2018.
MOOC/Web Platforms:	https://www.python.org/

IV - Course Outcome

On completion of the course, the students will be able to		Bloom's Level Mapped
CO1	Develop simple python programs for applying the concepts of datatypes, expressions, and python statements	Apply (BL 3)
CO2	Develop Python programs for solving real-time computational problems by using conditionals, looping, functions, and strings.	Apply (BL 3)
CO3	Understand the concepts of compound data using Python lists, tuples, and dictionaries	Understand (BL 2)
CO4	Develop python programs for solving computational problems by using modules, files, and python packages	Apply (BL 3)
CO5	Develop python programs for solving computational problems by using Exceptions and Libraries	Apply (BL 3)

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	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
CO1	3	2	2	-	-	-	-	-	-	-	2	-	-	2	-
CO2	3	3	3	2	2	-	-	-	-	-	2	3	-	2	-
CO3	3	3	3	2	2	-	-	-	-	-	2	3	-	2	-
CO4	3	2	2	-	-	-	-	-	-	-	2	-	-	2	-
CO5	3	3	3	2	3	-	-	-	-	-	2	3	-	2	-

NPR COLLEGE OF ENGG. & TECHNOLOGY NATHAM

Chairperson-Board of Studies
Department of Electronics and Communication Engineering

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I - Course Name:

Course Name	23EC201 CIRCUITS ANALYSIS	Sem	Category	L	T	P	C
Prerequisite - Matrices and Calculus		II	PCC	3	0	2	4

II - Course Objectives

1.	To learn the basic concepts and behaviour of DC and AC circuits.
2.	To understand various methods of circuit/ network analysis using network theorems.
3.	To learn the concept of coupling in circuits.
4.	To understand the transient response of the circuits subjected to DC and AC excitations.
5.	To gain hands- on experience on verification of network theorems.
6.	To understand the working of RLC circuits and Two port networks.

III - Course Content

Preamble:

- This course introduces the fundamental concepts and principles that are essential for comprehending circuit behavior, design, and troubleshooting.
- They are the building blocks of countless electronic systems, from simple flashlight circuits to complex integrated circuits powering computers and smart phones.

Unit – I	**BASIC CIRCUITS ANALYSIS OF DC AND AC CIRCUITS**	**9 Hours**
Ohm's Law – Kirchhoff's laws – The single Node – Pair Circuit, series and Parallel Connected Independent Sources, Resistors in Series and Parallel, voltage and current division, source transformation - Mesh current and node voltage method of analysis for D.C and A.C. circuits - Duality and dual networks.		
Unit – II	**NETWORK THEOREMS FOR DC AND AC CIRCUITS**	**9 Hours**
Superposition theorem, Thevenin's theorem, Norton's theorem, Reciprocity theorem, Millman's theorem, and Maximum power transfer theorem, application of Network theorems— star delta conversion.		
Unit – III	**RESONANCE AND COUPLED CIRCUITS**	**9 Hours**
Resonance - Series resonance - Parallel resonance - Variation of impedance with frequency, Variation in current through and voltage across L and C with frequency, Bandwidth, Quality factor, Selectivity, Self-inductance- Mutual inductance - Dot rule -Coefficient of coupling - Series, Parallel connection of coupled inductors		
Unit – IV	**TRANSIENT ANALYSIS**	**9 Hours**
Natural response-Forced response - Transient response of RC, RL and RLC circuits to excitation by Step Signal, Impulse Signal and exponential sources - Complete response of RC, RL and RLC Circuits to sinusoidal excitation.		
Unit – V	**TWOPORT NETWORKS**	**9 Hours**
Two port networks, Z parameters, Y parameters, Transmission (ABCD) parameters, Hybrid (H) Parameters, Interconnection of two port networks, Symmetrical properties of T and π networks.		
		TOTAL:**45 Periods**

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List of Experiments:	**30 Periods**
1. Verifications of KVL & KCL. 2. Verifications of Thevenin & Norton theorem. 3. Verification of Superposition Theorem. 4. Verification of maximum power transfer Theorem 5. Implementation of Star-Delta Conversion 6. Determination of Resonance Frequency of Series and Parallel RLC Circuits 7. Transient analysis of RL and RC circuits to step signal excitation 8. Transient analysis of RL and RC circuits to sinusoidal excitation 9. Measurement of currents and voltages of a two-port network to calculate Z and Y parameters	
	TOTAL:**75Periods**

Text Books:	1. Hayt Jack Kemmerly, Steven Durbin, "Engineering Circuit Analysis", Mc Graw Hill education, 9th Edition, 2018. 2. Joseph Edminister and Mahmood Nahvi, —Electric Circuits, Schaum's Outline Series, Tata McGraw Hill Publishing Company, New Delhi, Fifth Edition Reprint 2016. 3. Charles K. Alexander & Mathew N.O.Sadiku, "Fundamentals of Electric Circuits", Mc GrawHill, 2nd Edition, 2003.
Reference Books:	1. Robert.L. Boylestead, "Introductory Circuit Analysis", Pearson Education India, 12th Edition, 2014. 2.Allan H.Robbins, Wilhelm C.Miller, "Circuit Analysis Theory and Practice", Cengage Learning, Fifth Edition, 1st Indian Reprint 2013 3. John O Mallay, Schaum's Outlines "Basic Circuit Analysis", The Mc Graw Hill companies, 2nd Edition, 2011
MOOC/Web Platforms:	https://youtu.be/7Nh7ISeqn6E https://youtu.be/zF12z_R6xZA https://www.youtube.com/live/X2y1LI9Tq3w?feature=share

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IV - Course Outcome

On completion of the course, the students will be able to		Bloom's Level Mapped
CO1	Apply the basic concepts of Kirchoff's laws, mesh current and node voltage method for analysis of DC and AC circuits	Apply (BL 3)
CO2	Apply suitable network theorems to analyze DC circuits	Apply (BL 3)
CO3	Apply suitable network theorems to analyze AC circuits	Apply (BL 3)
CO4	Analyze series, parallel resonance and coupled circuits	Analyze (BL 4)
CO5	Analyze the transient response for any RC, RL and RLC circuits	Analyze (BL 4)
CO6	Analyze the two port network parameters and properties	Analyze (BL 4)
CO7	Verify various network theorems and star delta conversion	Apply (BL 3)
CO8	Analyze resonance circuits and transient response of RLC circuits and calculate Z and Y parameters	Analyze (BL4)

(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
CO-1	3	2	2	1	-	-	-	-	-	-	1	-	-	2	-
CO-2	3	3	2	1	-	-	-	-	-	-	1	-	-	2	-
CO-3	3	3	2	1	-	-	-	-	-	-	1	-	-	2	-
CO-4	3	3	3	2	-	-	-	-	-	-	1	-	-	2	-
CO-5	3	3	3	2	-	-	-	-	-	-	1	-	-	2	-
CO-6	3	3	3	2	-	-	-	-	-	-	1	-	-	2	-
CO-7	3	3	2	1	-	-	-	-	-	1	1	-	-	2	-
CO-8	3	3	3	2	-	-	-	-	-	1	1	-	-	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: 23GE901ENVIRONMENTAL SCIENCES AND SUSTAINABILITY

Program Name	B.E. /B.TECH. COMMON FOR CSE, ECE, AND IT	Sem	Category	L	T	P	C
Prerequisite	NIL	II	BSC	2	0	0	0

II - Course Objectives

1.	To introduce the basic concepts of environment, ecosystems and biodiversity and emphasize on t biodiversity of India and its conservation.
2.	To impart knowledge on the causes, effects and control or prevention measures of environmental pollution.
3.	To study the dynamic processes and understand the features of the earth's interior and surface.
4.	To facilitate the understanding of global and Indian scenario of renewable and nonrenewable resources, causes of their degradation and measures to preserve them.
5.	To inculcate and embrace sustainability practices and develop a broader understanding on green materials, energy cycles and analyze the role of sustainable urbanization.

III - Course Content

Preamble:

The objective of this course is intended to make the students to understand the basic concepts of environment, ecology and pollution of the current environmental issues and to participate in various activities on conserving and protecting the environment.

Unit – I	ENVIRONMENT AND BIODIVERSITY	6 Hours

Definition, scope and importance of environment – need for public awareness. Eco-system and energy flow – ecological succession. Types of biodiversity: genetic, species and ecosystem diversity– values of biodiversity, India as a mega-diversity nation – hot-spots of biodiversity – threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts – endangered and endemic species of India – conservation of biodiversity: in-situ and ex-situ.

Unit – II	ENVIRONMENTAL POLLUTION	6 Hours

Causes, effects and preventive measures of water, soil, air and noise pollutions. Solid, hazardous and e-waste management. case studies on occupational health and safety management system (OHASMS). Environmental protection - environmental protection acts.

Unit – III	SOCIAL ISSUES AND THE ENVIRONMENT	6 Hours

Water conservation, rain water harvesting, watershed management – Issues and possible solutions – climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust, case studies.

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Unit – IV	RENEWABLE SOURCES OF ENERGY	6 Hours
Energy management and conservation, new energy sources: need of new sources. Different types new energy sources. Applications of - hydrogen energy, ocean energy resources, tidal energy conversion. Concept, origin and power plants of geothermal energy.		
Unit – V	**SUSTAINABILITY PRACTICES**	**6 Hours**
Zero waste and R concept, circular economy, ISO 14000 series, material life cycle assessment, environmental impact assessment. Sustainable habitat: green buildings, green materials, energy efficiency, Sustainable transports. Sustainable energy: non-conventional sources, energy cycles carbon cycle, emission and sequestration, green engineering: sustainable urbanization - socio economical and technological change.		

Text Books:	1. Anubha Kaushik and C. P. Kaushik's 'Perspectives in Environmental Studies', 6th Edition, New Age International Publishers, 2018. 2. Benny Joseph, 'Environmental Science and Engineering', Tata McGraw-Hill, New Delhi, 2017. 3. Gilbert M.Masters, 'Introduction to Environmental Engineering and Science', 2nd edition, Pearson Education, 2004. 4. Allen, D. T. and Shonnard, D. R., 'Sustainability Engineering: Concepts, Design and Case Studies', Prentice Hall. 5. Bradley. A.S; Adebayo, A.O., Maria, P. 'Engineering applications in sustainable design
Reference Books:	1. R.K. Trivedi, 'Handbook of Environmental Laws, Rules, Guidelines, Compliances and Standards', Vol. I and II, Enviro Media, 2010. 2. Rajagopalan, R, 'Environmental Studies-From Crisis to Cure', Oxford University Press, Third Edition, 2015. 3. Erach Bharucha 'Textbook of Environmental Studies for Under graduate Courses' Orient
MOOC/Web Platforms:	https://onlinecourses.nptel.ac.in/

IV - Course Outcome

On completion of the course, the students will be able to		Bloom's Level Mapped
CO1	To recognize and understand the functions of environment, ecosystems and biodiversity and their conservation	Remember (BL 1)
CO2	To identify the causes, effects of environmental pollution and natural disasters and contribute to the preventive measures in the society.	Understand (BL 2)
CO3	To identify the causes, effects of natural disasters and contribute to the preventive measures in the society.	Apply (BL 3)

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CO4	To identify and apply the understanding of renewable and non-renewable resources and contribute to the sustainable measures to preserve them for future generations.	Understand (BL 2)
CO5	To demonstrate the knowledge of sustainability practices and identify green materials, energy cycles and the role of sustainable urbanization.	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
CO1	2	1				2	3		1			2			
CO2	3	2				3	3		1			2			
CO3	3	1	1			2	2					2			
CO4	3	1	1	1		2	2		1			2			
CO5	3	2	1			2	2		1			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: 23GE201 தமிழரும் தொழில்நுட்பமும் / Tamils and Technology

Program Name	B.E./B.TECH.COMMON TO ALL BRANCHES	Sem	Category	L	T	P	C
Prerequisite	-	II	HSMC	1	0	0	1

II - Course Content

Unit – I	WEAVING AND CERAMIC TECHNOLOGY	3 Hours
Weaving Industry during Sangam Age – Ceramic technology – Black and Red Ware Potteries (BRW) – Graffiti on Potteries.		
Unit – II	**DESIGN AND CONSTRUCTION TECHNOLOGY**	**3 Hours**
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 (Madural Meenakshi Temple) - Thirumalai Nayakar Mahal - Chetti Nadu Houses, Indo - Saracenic architecture at Madras during British Period		
Unit – III	**MANUFACTURING TECHNOLOGY**	**3 Hours**
Art of Ship Building - Metallurgical studies - Iron industry - Iron smelting, steel -Copper and goldCoins as source of history - Minting of Coins – Beads making-industries Stone beads -Glass beads - Terracotta beads -Shell beads/ bone beats - Archeological evidences - Gem stone types described in Silappathikaram.		
Unit – IV	**AGRICULTURE AND IRRIGATION TECHNOLOGY**	**3 Hours**
Dam, Tank, ponds, Sluice, Significance of KumizhiThoompu of Chola Period, Animal Husbandry - Wells designed for cattle use - Agriculture and Agro Processing - Knowledge of Sea - Fisheries – Pearl - Conche diving - Ancient Knowledge of Ocean - Knowledge Specific Society.		
Unit – V	**SCIENTIFIC TAMIL & TAMIL COMPUTING**	**3 Hours**
Development of Scientific Tamil - Tamil computing – Digitalization of Tamil Books – Development of Tamil		

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	Software – Tamil Virtual Academy – Tamil Digital Library – Online Tamil Dictionaries – Sorkuvai Project.
	TOTAL:**15 Periods**

Text Cum Books:	[1] தமிழக வரலாறு மக்களும் பண்பாடும் கே.கே. பிள்ளை (வெளியீடு–தமிழ்நாடுபாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்). [2] கணினித்தமிழ் முனைவர் இலசுந்தரம் (விகடன்பிரசுரம்). [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.
Reference Books:	[1] Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D.Thirunavukkarasu) (Published by: International Institute of Tamil Studies). [2] The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: International Institute of Tamil Studies) [3] 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) [4] Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay) (Published by: The Author)

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	[5] Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu) [6] Journey of Civilization Indus to Vaigai (R.Balakrishnan) (Published by: RMRL) – Reference Book.

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