B.Tech – ARTIFICIAL INTELLIGENCE AND DATA SCIENCE

REGULATION - 2023

CHOICE BASED CREDIT SYSTEM (CBCS)

CURRICULUM AND SYLLABUS

Chairperson-Board of Studies
Department of Computer Science
and Engineering

Dr.B.MARUTHU KANNAN, ME.,Ph.D.,
Principal
NPR College of Engineering and Technology
Natham, Dindigul(Dt)-624 401

Course Name: 23HS101 PROFESSIONAL ENGLISH - I

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

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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

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 HillEducation, 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

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IV - Course Outcome

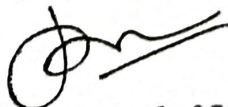|	On completion of the course, the students will be able to	Bloom's Level Mapped
CO1	To use appropriate words in a professional context and communicate in a professional context.	Apply (BL 3)
CO2	To gain understanding of basic grammatic structures and use them in right context.	Understand (BL 2)
CO3	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)

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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Course Name:23MA101 MATRICES AND CALCULUS

Program Name	B.E./B.TECH. COMMON TO ALL BRANCHES	Sem	Category	L	T	P	C
Prerequiste	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 cubes and rectangular parallelopipeds.

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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)

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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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
Prerequiste	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 - fiber optical 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 – interplanar 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, 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.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)

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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Course Name: 23CY101 ENGINEERING CHEMISTRY

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

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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.
MOOC/Web Platforms:	https://nptel.ac.in/courses

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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 fuel	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)

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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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.	

Text Cum Books:	[1] தமிழகவரலாறுமக்களும்பண்பாடும்கே.கே. பிள்ளை (வெளியீடு– தமிழ்நாடுபாடநூல்மற்றும்கல்வியியல்பணிகள்கழகம்). [2] கணினித்தமிழ்முனைவர்இலசுந்தரம் (விகடன்பிரசுரம்). [3] கீழடி–வைகைநதிக்கரையில்சங்ககாலநகரநாகரிகம் (தொல்லியல்துறைவெளியீடு) [4] பொருநை–ஆற்றங்கரைநாகரிகம். (தொல்லியல்துறைவெளியீடு) [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:

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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)

[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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Course Name: 23GE102 PROBLEM SOLVING AND PYTHON PROGRAMMING

Program Name	B.E/B.Tech. – Common to AI & DS,CIVIL,MECH	Sem	Category	L	T	P	C
Prerequiste	Computer Basics	I	ESC	3	0	0	3

II - Course Objectives

1	To understand the basics of algorithmic problem solving
2	To learn to solve problems using Python conditionals and loops.
3	To define Python functions and use function calls to solve problems
4	To use Python data structures - lists, tuples, dictionaries to represent complex data.
5	To do input/output with files in Python

III - Course Content

Preamble: Python is an open-sourced programming language that combines the features of C and *Java*. It has exceptional procedural as well as object-oriented capabilities. Having said this, always remember that everything in Python is an **object**.

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.

Unit – V	FILES, MODULES, PACKAGES	9 Hours

Files and exceptions: 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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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, 2021 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:	Introduction to C (w3schools.com) https://www.python.org/

IV - Course Outcome

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

(Action verb of each CO to be matched with the next mapping table)

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	2	2	-	-	-	-	-	-	-	-	2	-	-	2	3
CO-2	3	3	3	2	2	-	-	-	-	-	-	2	3	3	-	3
CO-3	3	3	3	2	2	-	-	-	-	-	-	2	3	3	2	3
CO-4	3	2	2	-	-	-	-	-	-	-	-	2	-	-	2	3
CO-5	3	3	3	2	3	-	-	-	-	-	-	2	3	3	2	3

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

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Course Name: 23HS201 PROFESSIONAL ENGLISH - II

Program Name	B.E./B.TECH. COMMON TO ALL BRANCHES	Sem	Category	L	T	P	C
Prerequiste	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 & 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, TataMcGraw 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 thewritten 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)

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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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
Prerequiste	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 derivates using interpolation polynomials – Numerical single and double integrations using Trapezoidal and Simpson's 1/3 rules.

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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.

Text Books:	[1] Grewal, B.S., and Grewal, J.S., "Numerical Methods in Engineering and Science", Khanna Publishers, 10th Edition, New Delhi, 2015. [2] Johnson, R.A., Miller, I and Freund J., "Miller and Freund's Probability and Statistics for Engineers", Pearson Education, Asia, 8th Edition, 2015.
Reference Books:	[1] Burden, R.L and Faires, J.D, "Numerical Analysis", 9th Edition, Cengage Learning, 2016 [2] Devore. J.L., "Probability and Statistics for Engineering and the Sciences", Cengage Learning, New Delhi, 8th Edition, 2014. [3] Gerald. C.F. and Wheatley. P.O. "Applied Numerical Analysis" Pearson Education, Asia, New Delhi, 7th Edition, 2007. [4] Gupta S.C. and Kapoor V. K., "Fundamentals of Mathematical Statistics", Sultan Chand & Sons, New Delhi, 12th Edition, 2020. [5] Spiegel. M.R., Schiller. J. and Srinivasan. R.A., "Schaum's Outlines on Probability and Statistics ", Tata McGraw Hill Edition, 4th Edition, 2012. [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.
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	Understand 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)

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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	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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Course Name: 23PH203 PHYSICS FOR INFORMATION SCIENCE

Program Name	B.E. /B.TECH. COMMON FOR CSE, IT AND AI&DS	Sem	Category	L	T	P	C
Prerequiste	Engineering Physics	II	BSC	3	0	0	3

II - Course Objectives

1.	To understanding the fundamental physics of conducting materials, superconductors, and material characteristics.
2.	To impart fundamental knowledge of semiconductor device and electron transport characteristics.
3.	To get expertise in magnetic materials.
4.	To know how superconducting materials with null resistance and optical materials for optoelectronics work.
5.	To learn how nanoelectronic devices operate on a fundamental level.

III - Course Content

Preamble:

Students who complete this course will have a broader understanding of conducting, semiconducting, magnetic, superconducting, optical, and nanomaterials as well as an understanding of how different fields of knowledge are interconnected.

Unit – I	CONDUCTING MATERIALS	9 Hours

Classical free electron theory - electrical and thermal conductivity expression - Wiedemann-Franz law - electrons in metals - motion of a particle in a three-dimensional box - Fermi- Dirac statistics - density of energy states - electron in periodic potential - Kronig-Penney Model (Qualitative) - energy bands in solids - electron effective mass.

Unit – II	SEMICONDUCTING MATERIALS	9 Hours

Intrinsic semiconductors - direct and indirect band gap semiconductors - carrier concentration in intrinsic semiconductors - extrinsic semiconductors - carrier concentration in N-type & P-type semiconductors - variation of carrier concentration with temperature - variation of fermi level with temperature and impurity concentration - carrier transport in Semiconductor: random motion, drift, mobility and diffusion - Hall effect and experiment - Ohmic contacts - Schottky diode.

Unit – III	MAGNETIC MATERIALS	9 Hours

Magnetic dipole moment - atomic magnetic moments - magnetic permeability and susceptibility - magnetic material classification: diamagnetism - paramagnetism - ferromagnetism - antiferromagnetism - ferrimagnetism - ferromagnetism: origin and exchange interaction - domain theory - M versus H behavior - hard and soft magnetic materials - applications - magnetic principle in computer data storage - magnetic hard disc - GMR sensor.

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Unit – IV	SUPERCONDUCTING AND OPTICAL MATERIALS	9 Hours
	Super conductivity - type-I and type-II superconductors - properties and applications - classification of optical materials - carrier generation and recombination processes - photo current in a P-N diode - solar cell - LED - Organic LED - optical data storage techniques and devices.	
Unit – V	NANO DEVICES	9 Hours
	Introduction - size dependence of fermi energy - quantum confinement - quantum structures - density of states in quantum well, quantum wire and quantum dot structure - band gap of nanomaterials - tunneling: single electron phenomena and single electron transistor - quantum dot laser - carbon nanotubes: properties and applications.	

Books for study & Reference:	[1] S.O.Pillai, "Solid State Physics, New Academic Science", 2017. [2] V.Raghavan. Materials Science and Engineering: A First Course, Prentice Hall India Learning Private Limited, 2015. [3] A. Marikani, Materials Science, PHI Learning Pvt Ltd, 2017 [4] D.K.Bhattacharya&PoonamTandon., "Physics for Information Science and Electronics Engineering", Oxford Higher Education",2017. [5] Rogers, B., Adams, J. &Pennathur, S., "Nanotechnology: Understanding Small Systems", CRC Press, 2014.
MOOC/Web Platforms:	https://onlinecourses.nptel.ac.in/noc20_ph10/preview https://www.electronics-notes.com/articles/basic_concepts/conductors-semiconductors-insulators/semiconductor-materials-types-groups.php https://advancedmagnetsource.com/types-magnetic-materials/ https://nptel.ac.in/courses/115103108 https://onlinecourses.nptel.ac.in/noc22_ee47/preview

IV - Course Outcome

On completion of the course, the students will be able to		Bloom's Level Mapped
CO1	To recognize the fundamental ideas behind different free-electron theories and establish the solids' electrical characteristics.	Understand (BL 2)
CO2	To evaluate the functions of semiconductors and their uses.	Apply (BL 3)
CO3	To employing quantum principles to examine the mechanisms at work in magnetic materials.	Apply (BL 3)
CO4	To understand about the uses of superconducting and Optical properties materials.	Understand (BL 2)
CO5	To show the fundamentals of how micro- and nano-electronic equipment functions.	Understand (BL 2)

(Action verb of each CO to be matched with the next mapping table)

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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	-	-	-	-	-	-	-	-	-	-	-	-	-
CO-2	3	3	-	3	-	-	-	-	-	-	-	-	-	-	-
CO-3	3	3	-	3	-	-	-	-	-	-	-	-	-	-	-
CO-4	3	3	3	-	2	-	-	-	-	-	-	2	-	-	-
CO-5	3	3	3	-	3	1	1	-	-	-	-	3	-	-	-

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

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Course Name: 23BE201-BASIC ELECTRICAL AND ELECTRONICS ENGINEERING

Program Name	BASIC ELECTRICAL AND ELECTRONICS ENGINEERING	Sem	Category	L	T	P	C
Prerequiste	Engineering Physics I	II	ESC	3	0	0	3

II - Course Objectives

6.	To introduce the basics of electric circuits and analysis
7.	To import knowledge in the basics of working principles and application of electrical Machines
8.	To introduce analog devices and their characteristics
9.	To educate on the fundamental concepts of digital electronics
10.	To introduce the functional elements and working of measuring instruments

III - Course Content

Preamble:

It is an introductory course which emphasizes the fundamental concepts and overview of Electrical Engineering. The concepts discussed herein are intended to provide clarification on basic electrical engineering for beginners of all engineering graduates.

Unit – I	ELECTRICAL CIRCUITS	9 Hours

DC Circuits: Circuit Components: Conductor, Resistor, Inductor, Capacitor – Ohm's Law - Kirchhoff's Laws –Independent and Dependent Sources – 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 – II	ELECTRICAL MACHINES (Qualitative Analysis)	9 Hours

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 – III	ANALOG ELECTRONICS (Qualitative Analysis)	9 Hours

Semiconductor Materials: Silicon &Germanium – PN Junction Diodes, Zener Diode –Characteristics Applications – Bipolar Junction Transistor-Biasing (CB Characteristics only) JFET, SCR, MOSFET – Types, I-V Characteristics and Applications

Unit – IV	DIGITAL ELECTRONICS	9 Hours

Review of number systems, binary codes, , Combinational logic –Half Adder & Full Adder - representation of logic functions-SOP and POS forms, K-map representations - minimization using K maps (Simple Problems only).

Unit – V	MEASUREMENTS AND INSTRUMENTATION	9 Hours

Functional elements of an instrument, Standards and calibration, Operating Principle, types -Moving Coil and Moving Iron meters, Measurement of three phase power, Energy Meter, DSO- Block diagram- Data acquisition- Block Diagram.

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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, 2017.
Reference Books:	[1] Kothari DP and I.J Nagrath, "Basic Electrical Engineering", Fourth Edition, McGraw Hill Education, 2019. [2] Albert Malvino, David Bates, 'Electronic Principles, McGraw Hill Education; 7th edition, 2017 [3]H.S. Kalsi, 'Electronic Instrumentation and Measurements', Tata McGraw-Hill, New Delhi, 2019
MOOC/Web Platforms:	https://www.classcentral.com/course/swayam-fundamentals-of-electrical-engineering-14074

IV - Course Outcome

	On completion of the course, the students will be able to	Bloom's Level Mapped
CO1	Compute the electric circuit parameters for simple problems	Applying (BL 3)
CO2	Examine the working principle and applications of electrical machines	Understanding (BL 2)
CO3	Illustrate the characteristics of analog electronic devices	Understanding (BL 2)
CO4	Examine the basic concepts of digital electronics	Analyzing (BL 4)
CO5	Apply the concepts of principles of measuring instruments for real time applications	Applying (BL 2)

(Action verb of each CO to be matched with the next mapping table)

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	2	1				1				2	2			
CO-2	2	2	1				1				2	2			
CO-3	2	1	1				1				2	2			
CO-4	2	2	1				1				2	2			
CO-5	2	2	1				1				2	2			

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

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Course Name: 23CS901-DIGITAL PRINCIPLES AND COMPUTER ORGANIZATION

Course Name	DIGITAL PRINCIPLES AND COMPUTER ORGANIZATION	Sem	Category	L	T	P	C
Prerequiste	-	II	ESC	3	0	2	4

II - Course Objectives

1.	To analyze and design combinational circuits.
2.	To analyze and design sequential circuits.
3.	To understand the basic structure and operation of a digital computer.
4.	To study the design of data path unit, control unit for processor and to familiarize with the hazards.
5.	To understand the concept of various memories and I/O interfacing.

III - Course Content

Unit – I	COMBINATIONAL LOGIC	9 Hours
Combinational Circuits – Karnaugh Map - Analysis and Design Procedures – Binary Adder – Subtractor – Decimal Adder - Magnitude Comparator – Decoder – Encoder – Multiplexers - Demultiplexers		
Unit – II	SYNCHRONOUS SEQUENTIAL LOGIC	9 Hours
Introduction to Sequential Circuits – Flip-Flops – operation and excitation tables, Triggering of FF, Analysis and design of clocked sequential circuits – Design – Moore/Mealy models, state minimization, state assignment, circuit implementation - Registers – Counters		
Unit – III	COMPUTER FUNDAMENTALS	9 Hours
Functional Units of a Digital Computer: Von Neumann Architecture – Operation and Operands of Computer Hardware Instruction – Instruction Set Architecture (ISA): Memory Location, Address and Operation – Instruction and Instruction Sequencing – Addressing Modes, Encoding of Machine Instruction – Interaction between Assembly and High Level Language		
Unit – IV	PROCESSOR	9 Hours
Instruction Execution – Building a Data Path – Designing a Control Unit – Hardwired Control/ Microprogrammed Control – Pipelining – Data Hazard – Control Hazards		
Unit – V	MEMORY AND I/O	9 Hours
Memory Concepts and Hierarchy – Memory Management – Cache Memories: Mapping and Replacement Techniques – Virtual Memory – DMA – I/O – Accessing I/O: Parallel and Serial Interface – Interrupt I/O – Interconnection Standards: USB, SATA		
		TOTAL:45 Periods

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PRACTICAL EXERCISES:	30 Periods

1. Verification of Boolean theorems using logic gates.
2. Design and implementation of combinational circuits using gates for arbitrary functions.
3. Implementation of 4-bit binary adder/subtractor circuits.
4. Implementation of code converters.
5. Implementation of BCD adder, encoder and decoder circuits.
6. Implementation of functions using Multiplexers.
7. Implementation of the synchronous counters.
8. Implementation of a Universal Shift register.
9. Simulator based study of Computer Architecture

TOTAL: **75 Periods**

Text Books:	1.M. Morris Mano, Michael D. Ciletti, "Digital Design : With an Introduction to the Verilog HDL, VHDL, and System Verilog", Sixth Edition, Pearson Education, 2018. 2. David A. Patterson, John L. Hennessy, "Computer Organization and Design, The Hardware/Software Interface", Sixth Edition, Morgan Kaufmann/Elsevier, 2020
Reference Books:	1.Carl Hamacher, Zvonko Vranesic, Safwat Zaky, Naraig Manjikian, "Computer Organization and Embedded Systems", Sixth Edition, Tata McGraw-Hill, 2012. 2. William Stallings, "Computer Organization and Architecture – Designing for Performance", Tenth Edition, Pearson Education, 2016. 3. M. Morris Mano, "Digital Logic and Computer Design", Pearson Education, 2016.
MOOC/Web Platforms:	-

IV - Course Outcome

	On completion of the course, the students will be able to	Bloom's Level Mapped
CO1	Design various combinational digital circuits using logic gates	Apply (BL3)
CO2	Describe the operation and construction of various flip flops.	Understand (BL2)
CO3	Design sequential circuits and analyze the design procedures.	Apply (BL3)
CO4	State the fundamentals of computer systems and analyze the execution of an instruction.	Understand (BL2)
CO5	Analyze different types of control design and identify hazards.	Analyze (BL4)
CO6	Identify the characteristics of various memory systems and I/O communication.	Understand (BL2)
CO7	Design and implementation of combinational circuits.	Apply (BL3)
CO8	Design and implementation of sequential circuits.	Apply (BL3)

(Action verb of each CO to be matched with the next mapping table)

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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
CO-1	3	3	3	3	3	-	-	-	-	-	-	2	-	-
CO-2	3	3	3	3	1	-	-	-	-	-	-	1	-	-
CO-3	3	3	3	3	3	-	-	-	-	-	-	2	-	-
CO-4	3	3	3	3	1	-	-	-	-	-	-	1	-	-
CO-5	3	3	3	3	3	-	-	-	-	-	-	2	-	-
CO-6	3	3	3	3	1	-	-	-	-	-	-	1	-	-
CO-7	3	3	3	3	3	-	-	-	-	-	-	2	-	-
CO-8	3	3	3	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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Course Name: 23AD201 DATA STRCUTURES DESIGN

Course Name	DATA STRUCTURES DESIGN	Sem	Category	L	T	P	C
Prerequisite:	Problem Solving and Python Programming	II	PCC	3	0	0	3

II - Course Objectives

1.	To understand the principles underlying Abstract Data Types (ADTs)
2.	To create linear data structures encompassing lists, stacks, and queues.
3.	To comprehend algorithms for sorting, searching, and hashing.
4.	To utilize tree and graph structures.

III - Course Content

Preamble:

- The course of data structures design typically involves the fundamental building blocks of data organization, manipulation, and retrieval that form the backbone of intelligent systems. It outlining the fundamental concepts, goals, and principles that guide the creation and implementation of data structures.
- It sets the stage for understanding why data structures are important, what problems they aim to solve, and the considerations that go into designing them effectively.

Unit	I	ABSTRACT DATA TYPES	9 Hours

Abstract Data Types (ADTs) -ADTs and classes-introduction to OOP-classes in Python -inheritance-namespaces-shallow and deep copying - Introduction to analysis of algorithms -asymptotic notations-recursion-analyzing recursive algorithms

Unit	II	LINEAR STRUCTURES	9 Hours

List ADT array-based implementations- linked list implementations-singly linked lists circularly linked lists- doubly linked lists - applications of lists - Stack ADT- Queue ADT double ended queues

Unit	III	SORTING AND SEARCHING	9 Hours

Bubble sort-selection sort-insertion sort-merge sort-quick sort-linear search-binarysearch-hashing-hash functions-collision handling-load factors, rehashing, and efficiency

Unit	IV	TREE STRUCTURES	9 Hours

Tree ADT-Binary Tree ADT-tree traversals-binary search trees-AVL trees-heaps-multiway search trees

Unit	V	GRAPH STRUCTURES	9 Hours

Graph ADT-representations of graph-graph traversals-DAG-topological ordering-shortest paths-minimum spanning trees

	TOTAL:45 Periods

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Text Books:	1. Michael T. Goodrich, Roberto Tamassia, and Michael H. Goldwasser, "Data Structures and Algorithms in Python" (An Indian Adaptation), Wiley, 2021 2. Lee, Kent D., Hubbard, Steve,"Data Structures and Algorithms with Python",Springer Edition 2015. 3. Narasimha Karumanchi,"Data Structures and Algorithmic Thinking with Python",Careermonk, 2015.
Reference Books:	1. Rance D. Necaise,,"Data Structures and Algorithms Using Python", John Wiley &Sons, 2011. 2. Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, and Clifford Stein,"Introduction to Algorithms", Third Edition, PHI Learning, 2010. 3. Mark Allen Weiss,"Data Structures and Algorithm Analysis in C++", FourthEdition, Pearson Education, 2014. 4. Aho, Hopcroft, and Ullman, "Data Structures and Algorithms", Pearson EducationIndia,2002.
MOOC/ Web Platforms:	https://www.coursera.org/specializations/data-structures-algorithms https://www.edx.org/learn/data-structures/the-university-of-california-san-diego-data-structures-fundamentals https://www.youtube.com/watch?v=_t2GVaQasRY&list=PLeo1K3hjS3uu_n_a MIKktGTLYopZ12 https://www.youtube.com/watch?v=UljGkm2ikdY&list=PLrk5tgtnMN6TYBW0-U4YhIRyYEVpqVEnJ

IV- Course Outcome

	On completion of the course, the students will be able to	Bloom's Level Mapped
CO1	Understanding of Abstract Data Types (ADTs) and their practical implementations.	Understand (BL2)
CO2	Apply the Design and Implementation of Lists, Stacks, and Queues to Address Real-World Challenges	Apply (BL 3)
CO3	Apply In-Depth Understanding of Sorting, Searching, and Hashing Algorithms for Effective Problem Solving	Apply (BL 3)
CO4	Apply Profound Understanding of Trees to Effectively Manage Hierarchical and Interconnected Data	Apply (BL 3)
CO5	Analyze, Synthesize, and Innovate with Graph Structures for Complex Interconnected Data and Network Solutions	Analyze (BL 4)

(Action verb of each CO to be matched with the next mapping table)

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V - Mapping Table Mapping of COs with POs and PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	2	3	3	-	-	-	-	3	1	2	1	2	3	3
CO2	2	3	1	3	1	-	-	-	1	2	2	1	3	3	3
CO3	2	2	2	1	1	-	-	-	2	3	1	2	1	1	2
CO4	2	2	3	1	-	-	-	-	1	2	1	2	2	2	2
CO5	2	3	2	1	-	-	-	-	2	1	1	2	1	2	1

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

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Course Name: 23GE201   தமிழரும் தொழில்நுட்பமும் / Tamils and Technology

Program Name	B.E./B.TECH. – COMMON TO ALL BRANCHES	Sem	Category	L	T	P	C
Perquisite	Nil	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 (Madurai 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 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) [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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