



ST. VINCENT PALLOTTI COLLEGE OF ENGINEERING & TECHNOLOGY, NAGPUR

B. Tech. Scheme of Examination & Syllabus 2024-25

(An autonomous institution affiliated to Rashtrasant Tukadoji Maharaj Nagpur University)

ARTIFICIAL INTELLIGENCE

GROUP 1: SEMESTER I

Sr No	Course Category	Course Code	Course Title	Hours per Week			Credits	Maximum Marks				No of Hours
				L	T	P		Mid-Sem Examination	Continual Assessment	End Sem Examination	Total	
1.	BSC	24AI101T	Engineering Chemistry and Environmental Science	2	-	-	2	10	10	30	50	1.5
2.	BSC	24AI101P	Engineering Chemistry and Environmental Science Lab	-	-	2	1	-	25	25	50	
3.	BSC	24AI102T	Linear Algebra and Calculus	3	1	-	4	20	20	60	100	3
4.	PCC	24AI103T	Logic Building and Problem Solving	3	1	-	4	20	20	60	100	3
5.	PCC	24AI103P	Logic Building and Problem Solving Lab	-	-	2	1	-	25	25	50	
6.	PCC	24AI104T	Introduction to AI	2	-	-	2	20	20	60	100	3
7.	PCC	24AI105P	AI Workshop – I (MATLAB for AI)	-	-	4	2	-	25	25	50	-
8.	AEC	24AI106P	Business Communication Skills I Lab	-	-	2	1	-	25	25	50	-
9.	IKS	24AI107T	Indian Knowledge Systems	2	-	-	2	10	10	30	50	1.5
10	SEC	24AI141P	Career Development I	-	-	2	1	-	50	-	50	-
11	CC	24AI108T	Co-curricular Courses - I	2	-	-	2	-	50	-	50	-
Total				14	2	12	22	80	280	340	700	10.5

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ARTIFICIAL INTELLIGENCE

GROUP 1: SEMESTER II

Sr No	Course Category	Course Code	Course Title	Hours per Week			Credits	Maximum Marks				Duration No. of Hrs for ESE
				L	T	P		Mid-Sem Examination	Continual Assessment	End Sem Examination	Total	
1.	BSC	24AI201T	Engineering Physics and Materials Science	2	-	-	2	10	10	30	50	1.5
2.	BSC	24AI201P	Engineering Physics and Materials Science Lab	-	-	2	1	-	25	25	50	-
3.	BSC	24AI202T	Statistics and Probability	3	1	-	4	20	20	60	100	3
4.	PCC	24AI203T	Digital Logic and Computer Architecture	3		-	3	20	20	60	100	3
5.	PCC	24AI204T	Foundation of Data Analysis	3	1	-	4	20	20	60	100	3
6.	PCC	24AI204P	Foundation of Data Analysis Lab	-	-	2	1	-	25	25	50	-
7.	PCC	24AI205P	AI Workshop – II	-	-	2	1	-	25	25	50	-
8.	AEC	24AI206P	Business Communication Skills – II Lab	-	-	2	1	-	25	25	50	-
9.	SEC	24AI207T	Design Thinking	2	-	-	2	10	10	30	50	1.5
10.	SEC	24AI241P	Career Development – II	-	-	2	1	-	50	-	50	
11.	CC	24AI208T	Co-curricular Courses – II	2	-	-	2	-	50	-	50	-
Total				15	2	10	22	80	280	340	700	12

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FIRST SEMESTER

courseCode	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24AI101T	Engineering Chemistry and Environmental Science	2	-	-	2	10	10	30	50

Course Objectives	Course Outcomes
<p>This course is intended</p> <ul style="list-style-type: none">To acquaint the students with the basic phenomenon, concepts, knowledge and understanding of the fundamental principles of chemistry.To develop necessary skills and abilities to succeed in engineering education, research, Industry, environment and social context.	<p>Students will be able to</p> <ul style="list-style-type: none">Develop innovative ideas for use of advanced materials in sustainable development.Apply the principles of green Chemistry for sustainable developmentUnderstand the environmental impacts of e-waste & apply concepts of e-waste management.

Unit I: Advanced Materials -	[9 Hrs]
Introduction-Need for Development Biodegradable polymers- PLA, PCL - Synthesis, Properties and Applications, Conducting Polymers- Polypyrrole, PANI Synthesis, Properties and Applications. Liquid Crystal Polymers- Types, Properties and Applications.	
Unit II: Green Chemistry	[9 Hrs]
Green Chemistry- Introduction, Principles of Green Chemistry with example, Green Reagents- Super Critical Fluid (CO ₂)- Properties and Applications, Green Building-Introduction, Components, Green Crackers- Introduction, Types, Advantages, Bio Catalysis- Definition and examples. Carbon Credit, Carbon Sequestration, Carbon Trade exchange platform.	
Unit III: E-waste Management	[8 Hrs]
Introduction. E- Waste; composition and generation. E-waste pollutants, E waste hazardous properties, Effects of pollutant (E-waste) on human health and surrounding environment, Basic principles of E waste management, Component of E waste management- Domestic e-waste disposal, E-waste Control measures - Reduction of waste at source	

Text Books

S.N	Title	Authors	Edition	Publisher
1	Text Book of Engineering Chemistry	S.S. Dara,		S. Chand and Company Ltd. New Delhi.
2	Textbook of Engineering Chemistry	P.C. Jain and Monica Jain		Dhanpat Rai and Sons, New Delhi.
3	Materials Chemistry	A.V. Bharati and Walekar,		Tech Max Publications, Pune.
4	E-waste Recycling and Management	Anish Khan, Inamuddin, Abdullah M. Ansiri		Springer

Reference Books

S.N	Title	Authors	Edition	Publisher
1	A Text book of Engineering Chemistry	Shashi Chawla		Dhanpat Rai & Sons, New Delhi
2	Applied Chemistry	N. Krishnamurthy:P. Vallinavagam. And K. Jeysubramanian		TMH
3	Applied Chemistry for Engineers	T.S. Gyngell		
4	Fuels and Combustion	Amir Circar		Orient Longmans
5	Fundamentals of Engineering Chemistry (Theory and Practice)	S. K. Singh		New Age Materials
6	Environmental Chemistry	B. K. Sharma		

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FIRST SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24AI101P	Engineering Chemistry and Environmental Science Lab	-	-	2	1	-	25	25	50

Course Objectives	Course Outcomes
<ul style="list-style-type: none"><input type="checkbox"/> To Make the students aware about various techniques available for Analysis of Material.<input type="checkbox"/> To Impart the skill of handling chemicals and apparatus.	<ul style="list-style-type: none">• List the proper procedures and regulations for safe handling and use of chemicals and can follow the proper procedures and regulations for safe handling when using different instruments.• Demonstrate the use of modern instrumentation, classical techniques, and properly record the results of their experiment.• Identify and solve chemical problems and explore new areas of research especially in fuel and lubricants.

Sr. No.	Practical based on Performance- Any FIVE
1	Synthesis of Bakelite
2	Synthesis of Conducting polymer (Polyaniline)
3	Determination of heavy metal from industrial effluent.
	Demonstration - Any ONE
4	Determination of turbidity from industrial effluent.
5	Determination of pH by using different methods.
	Virtual Experiment - Any ONE
6	Determination of Alkalinity of Water Sample.
7	Study of Lambert-Bears Law
8	Estimation of DO content of Water sample.
	Activity - Any One
1	Visit to e-waste recycling plant
2	Study of Air /Water Pollution Level at different Sites in Nagpur City.
3	Study of nearby industrial chemicals and safety measures

Text Books

S.N	Title	Authors	Edition	Publisher
1	A Textbook on experiment and calculation in engineering chemistry	S.S. Dara		S.Chand

Reference Books

S.N	Title	Authors	Edition	Publisher
1	Applied Chemistry theory and practical	O.P. Virmani and A.K. Narular		New Age International
2	Laboratory Manual on Engineering Chemistry	Dr. Subdharani		Dhanpat Rai Publishing

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FIRST SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24AI102T	Linear Algebra and Calculus	3	1	-	4	20	20	60	100

Course Objectives	Course Outcomes
<p>The goal of this paper is to introduce advanced concepts of</p> <ul style="list-style-type: none"> Matrix Algebra Multivariate Calculus Differential Equations Vector calculus 	<ul style="list-style-type: none"> Solve the system of linear equations using matrices. Identify engineering problems related to Matrices: Eigen value & Eigen vectors & Functions of Matrices. Understand the concept of multivariate calculus & apply the knowledge of applications of differentiation. Solve first order and higher order differential equations by various methods and apply these techniques to solve problems in engineering. Implement concept of vector calculus to solve engineering problems.
Unit I	[8Hrs]
Matrix Algebra : Introduction to matrices, Rank of a matrix, Consistency of system of linear equations, Linear and orthogonal transformations, Linear dependence of vectors.	
Unit II	[8Hrs]
Matrices : Characteristics equation, Cayley- Hamilton Theorem, Eigen values and Eigen vectors, Reduction to diagonal form, Reduction of quadratic form to canonical form by orthogonal transformation, Sylvester's theorem.	
Unit III	[8Hrs]
Multivariate Calculus : Functions of several variables and their partial derivatives, Chain rule and total differential coefficient, Jacobians and its properties, Maxima –Minima of functions of two variables, Lagrange's method of undetermined multipliers.	
Unit IV	[8Hrs]
Differential Equations : First order and first degree differential equations: Linear, Higher order differential equations with constant coefficients, Method of variation of parameters, Cauchy's homogeneous linear equation, Applications of differential equations.	
Unit V	[8Hrs]
Vector Calculus : Vector differentiation, Gradient, Directional derivatives, Divergence and Curl with their physical interpretation Solenoidal and irrotational motions, Scalar potential, Line integral & Work done.	

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Text Books

S.N	Title	Authors	Edition	Publisher
1	Higher Engineering Mathematics	B. S. Grewal		Khanna Publishers, New Delhi.
2	A Text Book of Applied Mathematics (Vol I & II)	P. N. Wartikar and J. N. Wartikar		Pune Vidyarthi Griha Prakashan, Pune
3	Higher Engineering Mathematics	H. K. Das and Er. Rajnish Verma		S. Chand & CO. Pvt. Ltd., New Delhi

Reference Books

S.N	Title	Authors	Edition	Publisher
1	Higher Engineering Mathematics	B.V. Ramana,	11 th	Tata McGraw Hill New Delhi
2	A Text Book of Engineering Mathematics	Peter O' Neil		Thomson Asia Pvt. Ltd., Singapore.
3	Advanced Engineering Mathematics	Erwin Kreyszig		John Wiley & Sons, New York.

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Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24AI103T	Logic Building and Problem Solving	3	1	-	4	20	20	60	100

Course Objectives	Course Outcomes
<p>This course is intended to</p> <ul style="list-style-type: none"> Make the student learn a programming language. Learn problem solving techniques. Teach the student to write programs in C and to solve the problems 	<p>Students will be able to</p> <ul style="list-style-type: none"> Learn Fundamentals of Computers and C programming language. Implement basic programs of decision making and loop control structure. Apply fundamentals of Functions and Pointers. Implement programs using Arrays and Strings. Interpret concept of Structures and various operations on files

Unit I : Problem Solving Using Computers	[9Hrs]
<p>Problem Solving: General Problem-Solving Concepts, Problem solving using computers, Problem solving steps. Program Design Tools: Algorithms, Flowcharts and Pseudo-codes, implementation of algorithms, algorithmic problem solving, simple strategies for developing algorithms (iteration, recursion). Programming Languages: Language as a tool, types of languages, the compilation process Overview of C Language: Introduction, Salient Features of C Language, Structure of a "C" Program. C Language Preliminaries: Keywords and Identifiers, Constants, Variables, Data Types, and Input Output Statements with suitable illustrative "C" Programs.</p>	
Unit II: Operators & Statements in C	[9Hrs]
<p>Assignment Operators, Relational and Logical Operators, Increment and Decrement Operators, Bitwise Operators, Ternary Operator, Type Conversion, Precedence and Associativity with suitable illustrative "C" Programs. Conditional/Decision Statements: if, if-else, Nested if-else, else-if ladder, and Switch Statement with suitable illustrative "C" Programs. Loop Control Statements: while, do-while and for with suitable illustrative "C" Programs.</p>	
Unit III: Functions & Pointer	[9Hrs]
<p>Introduction to Functions, benefits of functions, types of functions, Function calls, return vs exit (), Parameter Passing mechanisms, Call-by-Value, Recursion, Storage Classes Pointer variable, pointer declaration, Initialization of pointer, accessing variables through pointers, pointer arithmetic, pointers to pointers, void pointers</p>	
Unit IV: Array & Strings	[9Hrs]
<p>Introduction to Arrays, One-Dimensional Arrays, Two-Dimensional Arrays, Arrays and Functions Introduction to Strings, String I/O, String Operations with and without built-in functions (strlen(), strcmp(), strcat(), strcpy(), and strrev())</p>	
Unit V: Structure & File handling in C	[10Hrs]
<p>Introduction, declaration, initialization and its use. File opening modes, File Operations-File Opening, Closing File, read content of file, write onto the file, Copy one file to another file.</p>	

Text Books

Sr. No.	Title	Authors	Edition	Publisher
1.	Programming with C	Byron Gottfried	3rd	Schaum's Outlines Series
2	Programming in ANSI C	E. Balguruswamy	2nd	Tata Mc-Graw Hill
3	Programming Techniques Through 'C	M. G. Venkateshmurthy	2nd	Pearson

Reference Books

Sr. No.	Title	Authors	Edition	Publisher
1	The Complete Reference C	Herbert Schildt	4th	Tata Mc-Graw Hill
2.	The 'C' programming language	Kernighan and Ritchie	1st	Prentice Hall
3	LET US 'C'	Yashwant P. Kanetkar	1st	BPB

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**FIRST SEMESTER**

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
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24AI103P	Logic Building and Problem Solving Lab	-	-	2	1	-	25	25	50

Course Objectives	Course Outcomes
This course is intended to <ul style="list-style-type: none">Make the student learn a programming language.Learn problem solving techniques.Teach the student to write programs in C and to solve the problems	Students will be able to <ul style="list-style-type: none">Demonstrate Fundamentals of Computers and C programming languageImplement basic programs of decision making and loop control.Apply fundamentals of arrays and structuresImplement programs using functions and pointers.Implement concept of string and various operations on files

Sr. No.	List of Practical
1	Draw and run the flow charts using Raptor tool
2	a) Write a program to find sum and average of three numbers b) Write a program to calculate simple interest(SI) for a given principal (P), time (T), and rate of interest (R)(SI = P*T*R/100)
3.	Control Statements (Conditional): if and its Variants, switch.
4.	Control Statements (Looping): while, do..while, for Loop, continue & break.
5.	Arrays, One Dimensional Array: Declaration and Initialization, Accessing Array Elements.
6.	Two-Dimensional Array: Declaration and Initialization, Accessing Array Elements, Matrix Operations.
7.	To study Strings: Read & Write, "String.h" Predefined Functions.
8.	To study Functions: Definition, Syntax, Terminology, Function Declaration, Classification (Arguments and Return Type).
9	To study Pointers: Declarations, Types, Parameter passing techniques.
10	To study structures: declaration, initialization, accessing structure members.
11	To study Files: Definition, Opening, Closing of Files, Reading and Writing of Files.
12	Micro Project based on above labs.
OPEN ENDED PRACTICAL	
13	Bank management system using C Programming.
14	Snake Game designing using C programming

Text Books

Sr. No.	Title	Authors	Edition	Publisher
1.	Programming with C	Byron Gottfried	3rd	Schaum's Outlines Series
2	Programming in ANSI C	E. Balguruswamy	2 nd	Tata Mc-Graw Hill
3	Programming Techniques Through 'C	M. G. Venkateshmurthy	2 nd	Pearson

Reference Books

Sr. No.	Title	Authors	Edition	Publisher
1	The Complete Reference C	Herbert Schildt	4 th	Tata Mc-Graw Hill
2.	The 'C' programming language	Kernighan and Ritchie	1 st	Prentice Hall
3	LET US 'C'	Yashwant P. Kanetkar	1 st	BPB

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**FIRST SEMESTER**

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24AI104T	Introduction to AI	2		-	2	20	20	60	100

Course Objectives	Course Outcomes
<p>This course is intended to</p> <ul style="list-style-type: none">Learn what AI, its applications and use cases is and how it is transforming our lives.Explores the ethical considerations and challenges associated with artificial intelligence (AI) technologies.Examine the ethical implications of AI applications, including privacy, bias, accountability, transparency, and fairness.	<p>Students will be able to</p> <ul style="list-style-type: none">Comprehend the basic concepts of AI and machine learning.Learn how to build different AI projects.Understand the fundamental concepts and principles of AI ethics.Evaluate the impact of AI on societal values, privacy, and human rightsApply the knowledge of AI projects and prepare the case studies.

Unit I: Introduction	[7 Hrs]
What is data, The terminology of AI, machine learning, What makes an AI company, What machine learning can and cannot do, Non-technical explanation of deep learning, basics of neural networks, Examples of AI, Application domains of AI.	
Unit II: Building AI projects	[7Hrs]
Workflow of a machine learning project, Workflow of a data science project, how to use data, How to choose an AI project, Working with an AI team, How to process and visualize data, Technical tools for AI teams, use of python in AI related projects.	
Unit III: Introduction to AI Ethics	[7Hrs]
Definition of AI ethics, Ethical frameworks and principles in AI, Ethical Implications of AI: Privacy and data protection in AI systems, Bias and discrimination in AI algorithms, Explainability and transparency in AI decision-making	
Unit IV: AI and Society	[8Hrs]
A realistic view of AI, Discrimination / Bias, Adversarial attacks on AI, Adverse uses of AI, AI and developing economies, AI and jobs, AI and human values, AI and human rights	
Unit V: Case studies	[7 Hrs]
Case study: Smart speaker, Case study: Self-driving car, Example roles of an AI team, AI pitfalls to avoid, Survey of major AI application areas, Ethical considerations throughout the AI development life cycle	

Text Books

Sr. No.	Title	Authors	Edition	Publisher
1	Artificial Intelligence: A Modern Approach	Stuart Russell Peter Norvig	2 nd	Prentice Hall
2	Artificial Intelligence: The Basics	Kevin Warwick, Routledge	2 nd	Routledge
3	Ethics of Artificial Intelligence and Robotics	Vincent C. Müller	2 nd	Routledge

Reference Books

Sr. No.	Title	Authors	Edition	Publisher
1	Artificial Intelligence for Humans	Jeff Heaton	1st	Independent Publishing,
2	Principles of Artificial Intelligence Ethics	Dr.S.Suresh Kumar, Dr.Bomma Rama Krishna, Rama Bhadra Rao maddu	2 nd	PND

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Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24AI105P	AI Workshop – I (MATLAB for AI)	-	-	4	2	-	25	25	50

Course Objectives	Course Outcomes
<p>This course is intended to</p> <ul style="list-style-type: none">Learn arithmetic calculations for diverse applications.Manipulating matrices to solve complex problems.	<p>Students will be able to</p> <ul style="list-style-type: none">Perform arithmetic operations accurately and efficiently.Manipulate matrices proficiently for advanced mathematical applications.Visualize mathematical functions clearly using plotting techniques.Predict outcomes accurately using linear regression analysis.Apply basic image processing techniques effectively.

Sr. No	List of Practical
1	Basic Arithmetic Operations
2	Matrix Manipulation
3	Plotting Functions
4	Linear Regression
5	Image Processing Basics
6	Basic Neural Network Implementation
7	Basic Image Filtering
8	Text Processing
9	Micro based Project based on studied syllabus.
OPEN ENDED PRACTICAL	
10	Programs based on classification algorithms
11	Programs based on clustering algorithms.

Text Books

Sr. No.	Title	Authors	Edition	Publisher
1	Artificial Intelligence: A Modern Approach	Stuart Russell Peter Norvig	1 st	Prentice Hall
2	Artificial Intelligence: The Basics	Kevin Warwick, Routledge	2 nd	Routledge
3	Ethics of Artificial Intelligence and Robotics	Vincent C. Müller	2 nd	Routledge

Reference Books

Sr. No.	Title	Authors	Edition	Publisher
1	Artificial Intelligence for Humans	Jeff Heaton	1 st	Independent Publishing,
2	Principles of Artificial Intelligence Ethics	Dr.S. Suresh Kumar, Dr .Bomma Rama Krishna, Rama Bhadra Rao maddu	1 st	PND

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GROUP 1: SEMESTER I

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24AI106P	Business Communication Skills-I Lab	-	-	2	1	-	25	25	50

Course Objectives	Course Outcomes
<p>This course is intended</p> <ul style="list-style-type: none">To empower students to develop a career-oriented mindset while harnessing the power of LSRW skills.	<p>Students will be able to:</p> <ul style="list-style-type: none">Apply verbal and non-verbal skills to confidently and effectively deliver presentations.Prepare themselves for overall language ability through listening and reading tasks.Demonstrate formal writing skills.Draft impactful Resumes and Cover Letters.Prepare themselves for Personal Interviews.

Expt. No.	Title of the experiment
1	Presentation Skills
2	Poster Making (Product/ Event)
3	Reading Comprehension for Competitive Exams.
4	Writing Skills for Academic Purposes.
5	Listening Skills I
6	Business Correspondence I
7	Resume Writing and Cover Letter
8	Mock Interviews

Reference Books

S. N	Title	Authors	Edition	Publisher
1	Communication Skills for Engineers	C. Muralikrishna & Sunita Mishra	2nd Edition, 2011	Pearson India Education Services
2	Communication Skills	Dr. L. Bisen, Dr. B. Agrawal & Dr. N. T. Kalyani	1st Edition, 2021	Himalaya Publishing House
3	Barron's IELTS Superpack	Lin Lougheed	2012	Barrons Educational Series

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FIRST SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24AI107T	Indian Knowledge System	2	-	-	2	10	10	30	50

Course Objectives	Course Outcomes
<ul style="list-style-type: none">To introduce the origin, evolution and approach of Indian knowledge systemsTo understand the Indian knowledge approaches to various domains such as time, language, environment, management, life and mindTo appreciate the principles of thought process, reasoning, inferencing and sustainability in Indian knowledge systemsTo navigate knowledge sources of different disciplines of studies from a Vedic perspective	Students will be able to <ul style="list-style-type: none">Explain the origin, evolution and approach of IKS and build various practices to conserve and protect rich Indian KnowledgeDescribe importance of Indian Literature and will know about Indian ScholarsUnderstand ancient Indian traditions, practices and knowledge for conservation of resources

Unit I	[10 Hrs.]
Introduction and Management of Indian Knowledge System 1.1 Definition, Concept and Scope of IKS 1.2 IKS based approaches on Knowledge Paradigms 1.3 IKS in Ancient India and Modern India 1.4 Documentation and Preservation of IKS 1.5 Approaches for Conservation and Management of nature and Bio – Resources 1.6 Approaches and Strategies to protection and conservation of IKS	
Unit II	[12 Hrs.]
IKS and Indian Scholars, Indian Literature 2.1 Philosophy and Literature (Maharshi Vyas, Kanad, Pingala, Parasara, Banabhatta, Nagarjuna and Panini) 2.2 Mathematics and Astronomy (Aryabhata, Mahaviracharya, Bodhayana, Bhaskaracharya, Brahmagupta, Varahamihira) 2.3 Medicine and Yoga (Charaka, Susruta, Maharshi Patanjali and Dhanwantari) 2.4 Sahitya (Vedas, Upvedas (Ayurveda, Dhanurveda, Ghandarvaveda), Puran and Upanishad and Shad Darshan (Vedanta, Nyaya, Vaisheshik, Sankhya, Mimamsa, Yoga, Adhyatma, Meditation) 2.5 Shastra (Nyaya, Vyakarana, Krishi, Shilpa, Vastu, Natya, Sangeet)	
Unit III	[08 Hrs.]
Unique Traditional Practices and Applied Traditional knowledge 3.1 Myths, Rituals, Spirituals, Folk stories, Traditional Narratives 3.2 Agriculture, Land, Water and Soil Conservation and Management Practices 3.3 Vaidya (Traditional health Care system), Amchi Medicine system	

Text Books

S. N.	Title	Authors	Edition	Publisher
1	Indian Knowledge System: Introduction and Prospects	Acharya Shreyas Kurhekar	First	Sanskrit University, Ramtek
2	Indian Knowledge System Vol. I and II	Kapil Kapoor, Awadhesh Kumar Singh		D.K. Print World Ltd.
3	Traditional Knowledge System in India	Amit Jha		Atlantic Publisher

Reference Books / Resources

S. N.	Title	Authors	Edition	Publisher
1	Website of Indian Knowledge System Division, New Delhi			

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ARTIFICIAL INTELLIGENCE

SECOND SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation		
						CA	ESE	Total
24AI201P	Engineering Physics & Materials Science Lab	--	--	2	1	25	25	50

Course Objectives	Course Outcomes
This course is intended <ul style="list-style-type: none">To understand the basic laws of physics and their application in engineering and technology.To develop scientific temper and analytical capability.	Students will be able to <ul style="list-style-type: none">Verify principles/laws by selecting and using proper measuring instruments, interpret result and draw conclusions.Find various parameters using various properties of light.Apply the concepts of Semiconductors and Quantum Mechanics.

Expt. No.	Title of the experiment
1	Study of semiconductor diodes
2	Study of Phenomenon of Diffraction
3	Study of Interference
4	Study of Birefringence
5	Determination of Numerical Aperture (NA) of given Optical Fiber
6	Determination of Planck's Constant using LED
7	Guoy's Balance Method a) Determination of Magnetic Susceptibility of different magnetic materials. b) Identification of different types of Magnetic Materials
8	Study of Planck's Constant by means of LED
9	Determination of Curie Temperature of Ferromagnetic Material.
10	Study of Transistors.
11	Study of Hall Effect.
12	Experiment on 'Quantum Eraser'.
13	Demonstration of phenomena of Optics using Laser.

Text Books

S.N	Title	Authors	Edition	Publisher
1	Fundamentals of Physics	David Halliday, Robert Resnick and Jerle Walker	8e extended	John-Wiley India
2	A Textbook of Engineering Physics	Dr. M. N. Avdhanulu, Dr. P. G. Kshirsagar	Latest edition	S. Chand Publication.
3	Principles of Physics	David Halliday, Robert Resnick, Jearl Walker	10th Edition	John Wiley and Sons (2017)

Reference Books

S.N	Title	Authors	Edition	Publisher
1	Solid State Physics	Charles Kittel	Eighth edition	John Wiley & Sons, Inc
2	Solid State Physics	R.L. Singhal	Eighth edition	Kedarnath Ramnath
3	University Physics	Young and Freedman	Fifteenth edition	Pearson Education

Online Resources

1	https://www.britannica.com/science/semiconductor#ref233890
2	https://www.geeksforgeeks.org/semiconductors/
3	https://www.sciencedirect.com/topics/chemistry/magnetic-material

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**SECOND SEMESTER**

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24AI201T	Engineering Physics and Materials Science	2	-	-	2	10	10	30	50

Course Objectives	Course Outcomes
<p>This course is intended</p> <ul style="list-style-type: none">To understand the basic laws of physics and their application in engineering and technology.To develop scientific temper and analytical capability.	<p>Students will be able to</p> <ul style="list-style-type: none">Distinguish the types of solids on the basis of conductivity and acquire a brief idea about semiconductors and Magnetic MaterialsUnderstand the basics of Optical Fiber Communication.Interpret the concepts of Quantum Physics.

Unit I BASICS OF SOLID-STATE PHYSICS	[11 Hrs]
<p>Semiconductors: Free electron Theory (qualitative idea) and its features; Idea of band formation in solids, Classification of solids: Metal, Insulator, Semiconductor; Fermi Energy, Types - Intrinsic and Extrinsic Semiconductors, Applications of solid state devices - p-n junction diode and transistor.</p> <p>Magnetic materials: Terms and definitions, Types of magnetic materials, characteristics of Diamagnetic, Paramagnetic and Ferromagnetic Materials, Applications of soft and hard magnetic materials with a special emphasis on storage devices such as hard disk, floppy disk and magnetic tapes, advantages & disadvantages.</p>	
Unit II OPTICAL COMMUNICATION	[08 Hrs]
Introduction, Optical Fiber, Total Internal Reflection, Propagation of light through an Optical Fiber, Fractional Refractive Index Change, Numerical Aperture, Modes of Propagation, Classification of Optical Fibers, The Three types of fibers, Comparative characteristics, V-Number, Losses in Optical Fiber, Fiber Optic Communication System, Merits of Optical Fibers, Fiber Optic Sensors (Temperature sensor and Liquid Level detector)	
Unit III QUANTUM PHYSICS	[07 Hrs]
Dual nature, de-Broglie hypothesis, Wave packet, phase and group velocity, Uncertainty principle - physical significance and its application, Wave function - probability and normalization, Brief idea of application of quantum mechanics in quantum computing.	

Text Books

S.N	Title	Authors	Edition	Publisher
1	Fundamentals of Physics	David Halliday, Robert Resnick and Jerle Walker	8 th	John-Wiley India
2	Electronic Engineering Materials and Devices	John Allision	10 th	TMH
3	Engineering Physics	M. N. Avadhanulu	4 th	S. Chand & Co.

Reference Books

S.N	Title	Authors	Edition	Publisher
1	Solid State Physics	Charles Kittel	8 th	John Wiley & Sons, Inc
2	Optical Fiber Communication - Principles & Practice	John M. Senior	3 rd	Prentice Hall
3	Quantum Mechanics	Schiff	1 st	McGraw-Hill Book Company, Inc.

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**SECOND SEMESTER**

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24AI202T	Statistics and Probability	3	1	-	4	20	20	60	100

Course Objectives	Course Outcomes
To inculcate and strengthen students with adequate knowledge of <ul style="list-style-type: none">StatisticsProbability distributions	Students will be able to: <ul style="list-style-type: none">Apply numerical integration methods and find analytical solutions to difference equations.Identify, analyse and solve statistical problems.Describe the importance of probability theory in the field of engineering and prepare student to use it for analysis of data.Apply various concepts of joint distributions.Apply concept of probability distributions to engineering problems.

Unit I	[8hrs]
Finite Differences: Operator E and delta, Factorial Polynomial, Numerical integration: Trapezoidal rule, Simpson's 1/3 rule, Simpson's 3/8 rule, Difference equations with constant coefficients.	
Unit II	[8hrs]
Statistics: Fitting of straight line, parabola and exponential curves by method of least squares, Coefficient of correlation and lines of regressions, Rank correlation, multiple regression.	
Unit III	[8hrs]
Probability: Random Variable: Discrete & Continuous random Variable, Probability function, Distribution function, Baye's rule, Mathematical expectations, Variance and Standard deviation.	
Unit IV	[8hrs]
Joint probability: Joint probability function of discrete random variable, Marginal probability function and Conditional distribution of discrete random variable, Mathematical expectation of discrete random variable, Variance and Standard deviation, and Covariance of joint distribution.	
Unit V	[8hrs]
Probability Distributions: Binomial Distribution, Poison's Distribution, Normal Distribution.	

Text Books

S.N	Title	Authors	Edition	Publisher
1	Higher Engineering Mathematics	B. S. Grewal	4 th	Khanna Publishers, New Delhi.
2	Higher Engineering Mathematics	H. K. Dass and Er. Rajnish Verma		S. Chand & Co. Pvt. Ltd., New Delhi.
3	Advanced Engineering Mathematics	Erwin Kreyszig		John Wiley & Sons, New York.

Reference Books

S.N	Title	Authors	Edition	Publisher
1	Higher Engineering Mathematics	B. V. Ramana		Tata McGraw-Hill Publications, New Delhi.
2	Advanced Engineering Mathematics	C. R. Wylie & L. C. Barrett		Tata McGraw-Hill Publications, New Delhi.
3	A Text Book of Engineering Mathematics	Peter O' Neil		Thomson Asia Pvt. Ltd., Singapore.
4	Schaum's Outline of Probability and Statistics	John J. Schiller, R. Alu Srinivasan and Murray R. Spiegel	4 th	McGraw-Hill Education.

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**Semester II**

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24AI203T	Digital Logic and Computer Architecture	3	-	-	3	20	20	60	100

Course Objectives	Course Outcomes
<p>This course is intended</p> <ul style="list-style-type: none"> To teach various number systems, binary codes and their applications To facilitate students in designing a logic circuit. To familiarize the students the importance of error detection and error correction codes. To inculcate concepts of flipflop to simplify a Boolean expression 	<p>Students will be able to</p> <ul style="list-style-type: none"> Understand significance of number systems, conversions, binary codes Apply different simplification methods for minimizing Boolean functions Illustrate knowledge on design of various combinational circuits Illustrate the concept of sequential logic design, analyze the operation of flip-flops, registers, and counters Discuss the basic structure and organization of computers

Unit I Number Systems and Codes	[8Hrs]
Decimal, Binary, Octal, and Hexa-decimal number systems and their conversions, ASCII code, Excess-3 code, Gray code, Complement representation of negative numbers: Signed Magnitude, One's complement method, Two's complement method, Binary Arithmetic.	
Unit II Boolean Algebra	[8Hrs]
Boolean operations, Boolean functions, algebraic manipulations, min-terms and max-terms, sum-of products and product-of-sum representations, two-input logic gates, NAND/NOR implementations.	
Unit III Combinational Logic Design	[8Hrs]
Analysis of combinational circuits, Design Procedure - Binary Adder, Subtractor, BCD Adder, multiplier, comparator, decoders, encoders, multiplexers, demultiplexers, Code Converters.	
Unit IV Sequential Circuits	[8Hrs]
Latches: RS latch and JK latch, Flip-flops: RS, JK, D, T flip flops, Master-slave flip flops, Edge-triggered flip-flops. Shift registers, Universal Shift register.	
Unit V Finite State Machines	[8Hrs]
Finite State Machine Model, Design of Finite State Machines, System Resolution and Glitches, Design of Large Finite State Machines, Design of Finite State Machines with Complex Combinational Logic, Multi-Machine Designs, Generic Signal Generator Design Technique, Design of Symmetric-Phase Frequency Dividers, Finite State Machine Encoding Styles.	

Text Books

S.N	Title	Authors	Edition	Publisher
1	Switching Theory and Logic Design	Anand Kumar	2nd	PHI
2	Computer Organization and Architecture: Designing for Performance	William Stallings	10th	Pearson Education
3	Digital Electronics and Design with VHDL	Volnei A. Pedroni	1st	O'Really

Reference Books

S.N	Title	Authors	Edition	Publisher
1	Computer Organization and Design: The Hardware/Software Interface	David A. Patterson and John L. Hennessy	5th	Elsevier
2	Computer Systems Architecture.	M. Moris Mano	3rd	Pearson Education

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**SECOND SEMESTER**

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24AI204P	Foundation of Data Analysis Lab	-	-	2	1	-	25	25	50

Course Objectives	Course Outcomes
This course is intended <ul style="list-style-type: none">Make students understand about data representation techniques.Explore relationship between variables in data set.	Students will be able to <ul style="list-style-type: none">Demonstrate proficiency in collecting, preprocessing, and cleaning data from various sources using CSV formats.Develop analytical skills by applying Excel for basic statistical analysis and visualization of data trends.Use Ajelix to develop simple prediction models and analyze prediction outcomes based on cleaned data.Visualizing data using Excel charts and Ajelix visualization tools to communicate insights effectively.Enhance their problem-solving aptitude by applying data analysis techniques to real-world scenarios and drawing meaningful conclusions.

Sr. No.	List of Practical
1	Using Excel, analyze daily weather data collected in CSV format for trends and anomalies.
2	Utilize Excel to preprocess and visualize student exam scores stored in CSV format.
3	Predict movie ratings using Ajelix based on genre and cast data from CSV files.
4	Analyze health metrics from CSV surveys using Excel for visualization and insights.
5	Analyze CSV social media engagement data using Excel for visualization and trend identification.
6	Use Ajelix to segment customers based on purchase behaviour from CSV transaction data
7	Analyze energy usage trends from CSV data using Excel for visualization and prediction.
8	Predict traffic volume using Ajelix based on historical CSV sensor data.
9	Data Visualization tool using PowerBI, Tableau.
10.	Micro project based on above practical.
OPEN ENDED PRACTICAL	
11	Design dashboard using PowerBi Tools
12	Design Dashboard using Tableau Tools

Text Books

Sr. No.	Title	Authors	Edition	Publisher
1	Data Science and Analysis	V.K. Jain	2 nd	Khanna Publishing
2	Data Analysis: Using Statistics and Probability with R	Partha Sarathi Bishnu	2 nd	PHI Learning

Reference Books

Sr. No.	Title	Authors	Edition	Publisher
1	Data Mining: Concepts and Techniques	Jiawei Han, Michelle Kanber, Jian Pei. Morgan Kaufman	2 nd	Springer

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**SECOND SEMESTER**

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24AI204T	Foundation of Data Analysis	3	1	-	4	20	20	60	100

Course Objectives	Course Outcomes
<p>This course is intended</p> <ul style="list-style-type: none"> Make students understand about data representation techniques. Explore relationship between variables in data set. 	<p>Students will be able to</p> <ul style="list-style-type: none"> Understand the data analysis with context of the data. Explore and create insights for target audience. Summarize the metrics towards desired performance. Design and create data visualizations. Apply data visualization techniques in various domains.

Unit I Introduction to Data Analysis and Data Processing	[8Hrs]
Introduction to Data Analysis, Types of Data, Types of Variables, Describing Data with Tables and Graphs, Describing Data with Averages, Describing Variability, Normal Distributions and Standard (z) Scores, Defining research goals, retrieving data, Data preparation, Exploratory Data analysis, build the model, presenting findings and building applications, Data Mining, Data Warehousing, Basic Statistical descriptions of Data.	
Unit II Describing Relationships	[8Hrs]
Correlation, Scatter plots, correlation coefficient for quantitative data, computational formula for correlation coefficient, Regression, regression line, least squares regression line, Standard error of estimate, interpretation of r ² , multiple regression equations, regression towards the mean.	
Unit III Designing and delivering the storyline	[8Hrs]
Need of storytelling, the psychology and anatomy of storytelling, how data is communicated, understanding the target audience, impact of storytelling, Exploring and discovering data, case studies, Capturing the insights, valuable insights, focus of data points, evaluation of the data for better insights, defining the structure of the storyline, creation of the storyline for analysis, Format of the story, determining best visualization, selection of appropriate design, Ways of delivering the storyline, the narration, visuals: setting the scenes, polishing the scenes.	
Unit IV Foundation of Data Visualization	[8Hrs]
Data Pre-processing, Overview of Data Visualization, Need of data visualization, The Human Brain and Data Visualization, The Shapes of Data, Inputs for data visualization, Types of Visualizations: Cognitive vs Perceptual Design Distinction,	
Unit V Best Practices of Data Visualization	[8Hrs]
Examples of the Types of Visualizations, 5 big data visualization categories: temporal, hierarchical, network, multidimensional and geospatial, Practicing Good Ethics in Data Visualization, Ineffective Visuals and How to Improve Them, Principles of Visual Perception, Color as a Pre-Attentive Attribute, Strategic Use of Contrast, Tools for Visualizing: PowerBI, Tableau etc	

Text Books

Sr. No.	Title	Authors	Edition	Publisher
1	Storytelling with data	Cole nussbaumer knafic	1 st	Wiley
2	Fundamentals of Data Visualization	Claus O. Wilke	2 nd	O'Reilly Media

Reference Books

Sr. No.	Title	Authors	Edition	Publisher
1	Effective Data Storytelling: How to Drive Change with Data	Narrative and Visuals	1 st	Wiley

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**SECOND SEMESTER**

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24AI205P	AI Workshop – II	-	-	2	1	-	25	25	50

Course Objectives	Course Outcomes
<p>This course is intended</p> <ul style="list-style-type: none"> To introduce students to intermediate Python programming concepts and libraries. To familiarize students with essential libraries and frameworks in Python for data analysis and visualization. To enable students to implement basic machine learning algorithms using Python libraries. To develop students' proficiency in using NumPy for numerical computations and data manipulation 	<p>Students will be able to</p> <ul style="list-style-type: none"> Demonstrate proficiency in using NumPy for numerical computations, including matrix operations and array manipulation. Utilize Pandas for reading, cleaning, and analyzing data from various file formats such as CSV and JSON. Create visually appealing plots and diagrams using Matplotlib, including scatter plots, bar graphs, histograms, and pie charts. Apply Seaborn library for advanced data visualization techniques such as pair plots, heatmap, and different types of plots. Understand the concepts of SciPy constants, optimizers, and sparse data, and apply them to solve scientific computing problems.

Sr. No.	List of Practical
1.	Implementation of Basic introduction to libraries and frameworks in Python
2.	Implementation of Pandas
3.	Implementation of Matplotlib
4.	Implementation of Seaborn
5.	Implementation of SciPy
6.	Implementation of Scikit Learn
7.	Micro based Project based on studied syllabus.
OPEN ENDED PRACTICAL	
8.	Implementation of Classification algorithms using Scikit Learn library
9.	Implementation of Neural Networks using Scikit Learn Library

Text Books

S.N	Title	Authors	Edition	Publisher
1	Introduction to Machine Learning With Python	Andreas C. Müller, Sarah Guido	1 st	O'Reilly Media
2.	Python Crash Course	Eric Matthes	3 rd	No starch press
3.	Let Us Python	Aditya Kanetka, Yashavant Kanetkar	6th	bpb

Reference Books

S.N	Title	Authors	Edition	Publisher
1	Learn AI with Python	Gaurav Leekha	1 st	Paperback
2	Python Machine Learning	Sebastian Raschka and Vahid Mirjalili	2 nd	Packt

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ARTIFICIAL INTELLIGENCE

SECOND SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24AI206P	Business Communication Skills II Lab	-	-	2	1	-	25	25	50

Course Objectives	Course Outcomes
To empower students to develop a career oriented mindset while harnessing the power of LSRW skills.	Students would be able to: 1. Participate in Group Discussions. 2. Improve their reading and formal writing skills. 3. Develop upon their listening skills to engage in meaningful conversations. 4. Develop oratory skills to engage and inform audiences. 5. Prepare themselves for participating in business meetings.

Expt. No.	Title of the experiment
1	Group Discussion
2	Reading for Competitive Exams II
3	Listening Skills II
4	Presenting a TED Talk
5	Media Interaction
6	Business Correspondence II
7	Report Writing
8	Mock Meeting

Reference Books

S. N	Title	Authors	Edition	Publisher
1.	Communication Skills for Engineers	C. Muralikrishna & Sunita Mishra	2nd Edition, 2011	Pearson India Education Services
2.	Communication Skills	Dr. L. Bisen, Dr. B. Agrawal & Dr. N. T. Kalyani	1st Edition, 2021	Himalaya Publishing House
3.	Barron's IELTS Superpack	Lin Lougheed	2012	Barrons Educational Series

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ARTIFICIAL INTELLIGENCE

SEMESTER II

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24AI207T	Design Thinking	2	-	-	2	10	10	30	50

Course Objectives	Course Outcomes
<ul style="list-style-type: none">Learn design thinking concepts and principlesUse design thinking methods in every stage of the problemLearn the different phases of design thinkingApply various methods in design thinking to different problems	<ul style="list-style-type: none">Define key concepts of design thinkingPractice design thinking in all stages of problem solvingApply design thinking approach to real world problems

Unit I	[10 Hrs]
INTRODUCTION: Why Design? - Four Questions, Ten Tools - Principles of Design Thinking - The process of Design Thinking - How to plan a Design Thinking project. UNDERSTAND, OBSERVE AND DEFINE THE PROBLEM: Search field determination - Problem clarification - Understanding of the problem – Problem analysis- Reformulation of the problem - Observation Phase - Empathetic design - Tips for observing - Methods for Empathetic Design - Point-of-View Phase - Characterization of the target group - Description of customer needs.	
Unit II	[10 Hrs]
IDEATION AND PROTOTYPING: Ideate Phase - The creative process and creative principles - Creativity techniques - Evaluation of ideas - Prototype Phase – Lean Startup Method for Prototype Development - Visualization and presentation techniques.	
Unit III	[10 Hrs]
TESTING AND IMPLEMENTATION :Test Phase - Tips for interviews - Tips for surveys - Kano Model - Desirability Testing - How to conduct workshops - Requirements for the space - Material requirements - Agility for Design Thinking. FUTURE: Design Thinking meets the corporation – The New Social Contract –Design Activism – Designing tomorrow.	

Text Books

S.N	Title	Authors	Edition	Publisher
1.	Handbook of Design Thinking - Tips & Tools for how to design thinking	Christian Mueller-Roterberg	2021	Independently Published
2.	Change by Design: How Design Thinking Transforms Organizations and Inspires Innovation	Tim Brown	2019	HarperCollins

Reference Books

S.N	Title	Authors	Edition	Publisher
1.	Design Thinking for Strategic Innovation	Idris Mootee		Wiley

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COMPUTER ENGINEERING

GROUP 1: SEMESTER I

Sr No	Course Category	Course Code	Course Title	Hours per Week			Credits	Maximum Marks				No. of Hrs for ESE
				L	T	P		Mid-Sem Examination	Continual Assessment	End Sem Examination	Total	
1	BSC	24CE101T	Engineering Chemistry and Environmental Science	2	-	-	2	10	10	30	50	1.5
2	BSC	24CE101P	Engineering Chemistry and Environmental Science Lab	-	-	2	1	-	25	25	50	-
3	BSC	24CE102T	Linear Algebra and Calculus	3	1	-	4	20	20	60	100	3
4	ESC	24CE103T	Logic building with C	3	-	-	3	20	20	60	100	3
5	ESC	24CE103P	Logic building with C Lab	-	-	2	1	-	25	25	50	-
6	PCC	24CE104T	Concept in Computer Engineering-I	3	-	-	3	20	20	60	100	3
7	PCC	24CE105T	Competitive Programming - I	2	-	-	2	10	10	30	50	1.5
8	AEC	24CE106P	Business Communication Skills I Lab	-	-	2	1	-	25	25	50	-
9	IKS	24CE107T	Indian Knowledge Systems	2	-	-	2	10	10	30	50	1.5
10	SEC	24CE141P	Career Development - I	-	-	2	1	-	50	-	50	-
11	CC	24CE108T	Co-curricular Courses - I	2	-	-	2	-	50	-	50	-
Total				17	1	8	22	90	265	345	700	13.5

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COMPUTER ENGINEERING

GROUP 1: SEMESTER II

Sr No	Course Category	Course Code	Course Title	Hours per Week			Credits	Maximum Marks				No. of Hrs for ESE
				L	T	P		Mid-Sem Examination	Continual Assessment	End Semester Examination	Total	
1	BSC	24CE201T	Engineering Physics and Materials Science	2	-	-	2	10	10	30	50	1.5
2	BSC	24CE201P	Engineering Physics and Materials Science Lab	-	-	2	1	-	25	25	50	-
3	BSC	24CE202T	Statistics and Probability	3	1	-	4	20	20	60	100	3
4	ESC	24CE203T	Problem Solving with Python	3	-	-	3	20	20	60	100	3
5	ESC	24CE203P	Problem Solving with Python Lab	-	-	2	1	-	25	25	50	-
6	PCC	24CE204T	Modern Web Technologies	3	-	-	3	20	20	60	100	3
7	PCC	24CE205T	Competitive Programming – II	2	-	-	2	10	10	30	50	1.5
8	AEC	24CE206P	Business Communication Skills – II Lab	-	-	2	1	-	25	25	50	-
9	SEC	24CE241P	Career Development – II	-	-	2	1	-	50	-	50	-
10	SEC	24CE207T	Design Thinking	2	-	-	2	10	10	30	50	1.5
11	CC	24CE208T	Co-curricular Courses – II	2	-	-	2	-	50	-	50	-
Total				17	1	8	22	90	265	345	700	13.5

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**GROUP 1: SEMESTER I**

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24CE101T	Engineering Chemistry and Environmental Science	2	-	-	2	10	10	30	50

Course Objectives	Course Outcomes
This course is intended <ul style="list-style-type: none">To acquaint the students with the basic phenomenon, concepts, knowledge and understanding of the fundamental principles of chemistry.To develop necessary skills and abilities to succeed in engineering education, research, Industry, environment and social context.	Students will be able to <ul style="list-style-type: none">Develop innovative ideas for use of advanced materials in sustainable development.Apply the principles of green Chemistry for sustainable developmentUnderstand the environmental impacts of e-waste & apply concepts of e-waste management.

Unit I Advanced Materials -**[8 Hrs]**

Introduction-Need for Development
Biodegradable polymers- PLA, PCL - Synthesis, Properties and Applications,
Conducting Polymers- Polypyrrole, PANI Synthesis, Properties and Applications.
Liquid Crystal Polymers- Types, Properties and Applications.

[8 Hrs]**Unit II Green Chemistry**

Green Chemistry- Introduction, Principles of Green Chemistry with example, Green Reagents- Super Critical Fluid (CO₂)- Properties and Applications, Green Building-Introduction, Components, Green Crackers- Introduction, Types, Advantages, Bio Catalysis- Definition and examples. Carbon Credit, Carbon Sequestration, Carbon Trade exchange- CC market and CT platform.

Unit III E-waste Management**[8 Hrs]**

Introduction. E- Waste; composition and generation. E-waste pollutants, E waste hazardous properties, Effects of pollutant (E-waste) on human health and surrounding environment, Basic principles of E waste management, Component of E waste management- Domestic e-waste disposal, E-waste Control measures - Reduction of waste at source

Text Books

S.N	Title	Authors	Edition	Publisher
1	Text Book of Engineering Chemistry	S.S. Dara,		S. Chand and Company Ltd. New Delhi.
2	Textbook of Engineering Chemistry	P.C. Jain and Monica Jain		Dhanpat Rai and Sons, New Delhi.
3	Materials Chemistry	A.V. Bharati and Walekar,		Tech Max Publications, Pune.
4	E-waste Recycling and Management	Anish Khan, Inamuddin, Abdullah M. Ansiri		Springer

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Reference Books

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1	A Text book of Engineering Chemistry	Shashi Chawla		Dhanpat Rai & Sons, New Delhi
2	Applied Chemistry	N. Krishnamurthy:P. Vallinavagam. K. Jeysubramanian		TMH
3	Applied Chemistry for Engineers	T.S. Gyngell		
4	Fuels and Combustion	Amir Circar		Orient Longmans
5	Fundamentals of Engineering Chemistry (Theory and Practice)	S. K. Singh		New Age Materials
6	Environmental Chemistry	B. K. Sharma		

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COMPUTER ENGINEERING

GROUP 1: SEMESTER I

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24CE101P	Engineering Chemistry and Environmental Science Lab	-	-	2	1	-	25	25	50

Course Objectives	Course Outcomes
<p>This course is intended</p> <ul style="list-style-type: none">To Make the students aware about various techniques available for Analysis of Material.To Impart the skill of handling chemicals and apparatus.	<p>Students will be able to</p> <ul style="list-style-type: none">List the proper procedures and regulations for safe handling and use of chemicals and can follow the proper procedures and regulations for safe handling when using different instruments.Demonstrate the use of modern instrumentation, classical techniques, and properly record the results of their experiment.Identify and solve chemical problems and explore new areas of research especially in fuel and lubricants.

Expt. No. Experiments based on Performance- Any FIVE

- 1 Synthesis of Bakelite
- 2 Synthesis of Conducting polymer (Polyaniline)
- 3 Determination of heavy metal from industrial effluent.

Demonstration - Any ONE

- 4 Determination of turbidity from industrial effluent.
- 5 Determination of pH by using different methods.

Virtual Experiment - Any ONE

- 6 Determination of Alkalinity of Water Sample.
- 7 Study of Lambert-Bears Law
- 8 Estimation of DO content of Water sample.

Activity - Any One

- 1 Visit to e-waste recycling plant
- 2 Study of Air /Water Pollution Level at different Sites in Nagpur City.
- 3 Study of nearby industrial chemicals and safety measures

Text Books

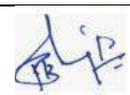
S.N	Title	Authors	Edition	Publisher
1	A Textbook on experiment and calculation in engineering chemistry	S.S. Dara		S.Chand

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Reference Books

S.N	Title	Authors	Edition	Publisher
1	Applied Chemistry theory and practical	O.P. Virmani and A.K. Narular		New Age International
2	Laboratory Manual on Engineering Chemistry	Dr. Subdharani		Dhanpat Rai Publishing

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Computer Engineering

GROUP 1: SEMESTER I

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24CE102T	Linear Algebra and Calculus	3	1	-	4	20	20	60	100

Course Objectives	Course Outcomes
<p>The goal of this course is to introduce advanced concepts of</p> <ul style="list-style-type: none">● Matrix Algebra● Multivariate Calculus● Differential Equations● Vector calculus	<ul style="list-style-type: none">● Solve the system of linear equations using matrices.● Identify engineering problems related to Matrices: Eigen value & Eigen vectors & Functions of Matrices.● Understand the concept of multivariate calculus & apply the knowledge of applications of differentiation.● Solve first order and higher order differential equations by various methods and apply these techniques to solve problems in engineering.● Implement concept of vector calculus to solve engineering problems.

Unit I [8Hrs]

Matrix Algebra: Introduction to matrices, Rank of a matrix, Consistency of system of linear equations, Linear and orthogonal transformations, Linear dependence of vectors.

Unit II [8Hrs]

Matrices: Characteristics equation, Cayley- Hamilton Theorem, Eigen values and Eigen vectors, Reduction to diagonal form, Reduction of quadratic form to canonical form by orthogonal transformation, Sylvester's theorem.

Unit III [8Hrs]

Multivariate Calculus: Functions of several variables and their partial derivatives, Chain rule and total differential coefficient, Jacobians and its properties, Maxima –Minima of functions of two variables, Lagrange's method of undetermined multipliers.

Unit IV [8Hrs]

Higher Order Differential Equations: First order and first degree differential equations: Linear, Higher order differential equations with constant coefficients, Method of variation of parameters, Cauchy's homogeneous linear equation, Applications of differential equations.

Unit V [8Hrs]

Vector Calculus: Vector differentiation, Gradient, Directional derivatives, Divergence and Curl with their physical interpretation Solenoidal and irrotational motions, Scalar potential, Line integral & Work done.

Text Books

S.N	Title	Authors	Edition	Publisher
1	Higher Engineering Mathematics	B. S. Grewal		Khanna Publishers, New Delhi.
2	A Text Book of Applied Mathematics (Vol I & II)	P. N. Wartikar and J. N. Wartikar		Pune Vidyarthi Griha Prakashan, Pune
3	Higher Engineering Mathematics	H. K. Das and Er. Rajnish Verma		S. Chand & CO. Pvt. Ltd., New Delhi

Reference Books

S.N	Title	Authors	Edition	Publisher
1	Higher Engineering Mathematics	B.V. Ramana,	11th	Tata McGraw Hill New Delhi
2	A Text Book of Engineering Mathematics	Peter O' Neil		Thomson Asia Pvt. Ltd., Singapore.
3	Advanced Engineering Mathematics	Erwin Kreyszig		John Wiley & Sons, New York.

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**GROUP 1: SEMESTER I**

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24CE103T	Logic Building With C	3	-	-	3	20	20	60	100

Course Objectives	Course Outcomes
This course is intended <ul style="list-style-type: none">To make the student learn a programming language.To learn problem solving techniques.To teach the student to write programs in C and to solve the problems	Students will be able to <ul style="list-style-type: none">Understand Fundamentals of Computers and C programming languageImplement basic programs of decision making and loop control structureImplement programs using functions and pointersUnderstand fundamentals of arrays and stringsUnderstand concept of structures and various operations on files

Unit I**[6 Hrs]****Fundamentals of Computers:** internal structure of Computer, its assembly, Software and its types, Translators, programming languages.**Introduction and Structure of 'C' Programming:** Algorithms and Flowchart, Characteristics of algorithm, Data types, Operators, Input-output Functions**Unit II****[8Hrs]****Decision Making Control Structures:** if, if-else, nested if statements, Conditional operators (? Operator), Switch Case Statement**Loop Control Structures:** for loop, while loop, do-while loop, break and continue statement**Unit III****[8Hrs]****Functions:** Introduction to functions, why use function, Scope rule of function, implementation of functions, use of library function (math.h), recursion.**Pointers:** declaration & its use, Types of Pointers, Call by Value, Call by Reference.**Unit IV****[7Hrs]****One Dimension and Two Dimension arrays:** creation of array, declaration, initialization and displaying the elements, linear search and binary search. Read & display the matrix on the screen, matrix manipulation operations like addition, multiplication.**Strings:** Introduction to string, basic operations on string strlen, strcpy, strcmp, strcmp.**Unit V****[7Hrs]****Structures:** Introduction, declaration, initialization and its use.**File handling in C:** File opening modes, File operations-File Opening, Closing File, read content of file, Write onto the file, Copy one file to another file.**Text Books**

S.N	Title	Authors	Edition	Publisher
1	Programming in ANSI C	E. Balguruswamy	2 nd	Tata Mc-Graw Hill
2	Programming Techniques Through 'C'	M. G. Venkateshmurthy	2 nd	Pearson
3	LET US 'C'	Yashwant P. Kanetkar	1 st	BPB
4	Programming With C	Byron S. Gottfried	2 nd	Schaum Series
5	How to solve it by Computer	R.G. Dromey	1 st	Pearson Education

Reference Books

S.N	Title	Authors	Edition	Publisher
1	The Complete Reference C	Herbert Schildt	4 th	Tata Mc-Graw Hill
2	The 'C' programming language	Kernighan and Ritchie	1 st	Prentice Hall
3	Programming and Problem Solving	M. Sprankle	2 nd	Pearson Education

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COMPUTER ENGINEERING

GROUP 1: SEMESTER I

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24CE103P	Logic Building with C Lab	-	-	2	1	-	25	25	50

Course Objectives	Course Outcomes
This course is intended <ul style="list-style-type: none">To make the student learn a programming language.To learn problem solving techniques.To teach the student to write programs in C and to solve the problems	Students will be able to <ul style="list-style-type: none">Understand Fundamentals of Computers and C programming languageImplement basic programs of decision making and loop control structureImplement programs using functions and pointersUnderstand fundamentals of arrays and stringsUnderstand concept of structures and various operations on files

Expt. No.	Experiments based on
1	To study Fundamentals of Computer and Introduction to Programming Languages
2	To study Control Statements (Conditional): if and its Variants, switch
3	To study Control Statements (Looping): while, do..while, for Loop, continue & break
4	To study Arrays, One Dimensional Array: Declaration and Initialization, Accessing Array Elements
5	To study Two-Dimensional Array: Declaration and Initialization, Accessing Array Elements, Matrix operations
6	To study Strings: Read & Write, "String.h" Predefined Functions
7	To study Functions: Definition, Syntax, Terminology, Function Declaration, Classification (Arguments and Return Type)
8	To study Pointers: Declarations, Types, Parameter passing techniques
9	To study structures: declaration, initialization, accessing structure members
10	To study Files: Definition, Opening, Closing of Files, Reading and Writing of Files

Text Books

S.N	Title	Authors	Edition	Publisher
1	Programming in ANSI C	E. Balguruswamy	2 nd	Tata Mc-Graw Hill
2	Programming Techniques Through 'C'	M. G. Venkateshmurthy	2 nd	Pearson
3	LET US 'C'	Yashwant P. Kanetkar	1 st	BPB
4	Programming With C	Byron S. Gottfried	2 nd	Schaum Series
5	How to solve it by Computer	R.G. Dromey	1 st	Pearson Education

Reference Books

S.N	Title	Authors	Edition	Publisher
1	The Complete Reference C	Herbert Schildt	4 th	Tata Mc-Graw Hill
2	The 'C' programming language	Kernighan and Ritchie	1 st	Prentice Hall
3	Programming and Problem Solving	M. Sprankle	2 nd	Pearson Education

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**GROUP 1: SEMESTER I**

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24CE104T	Concepts in Computer Engineering-I	3	-	-	3	20	20	60	100

Course Objectives	Course Outcomes
This course is intended <ul style="list-style-type: none">To remember the basics of Computer and Computer history.To understand the utility of programming languages.To learn basics of computer software and Operating Systems.	Students will be able to <ul style="list-style-type: none">Understand the utility of computer input/ output units and memory.Study the evolution of computer systems through generations along with the types of computer systems.Recognize the need and use of programming language constructs like algorithms and flowcharts for problem solving.Understand computer Software and its use in logic building.Learn basic concepts of Operating Systems and Open-source technology.

Unit I**[7 Hrs]****INPUT/OUTPUT UNITS AND COMPUTER MEMORY:**

Description of computer, input and output unit, Memory cell, Memory organization, Primary memory, Secondary Memory, Serial access memory, Physical devices used to construct memory, Magnetic hard disk

Unit II**[7 Hrs]****COMPUTER GENERATIONS:**

First generation computers, Second generation computers, Third generation computers, Fourth generation computers, Fifth generation computers, Moore's Law, Classification of computers, Parallel computer systems, Distributed computer systems.

Unit III**[7 Hrs]****COMPUTER LANGUAGES:**

Algorithms, Flowcharts, why programming languages? Characteristics of good programming languages, Machine level language, Assembly language, Middle level language – C, Factors affecting the choice of the languages, High level programming languages.

Unit IV**[7 Hrs]****COMPUTER SOFTWARES:**

Introduction to computer software, Types of computer software, System management programs, System development programs, Unique application programs, Problem solving, Structuring the logic, Developing a program.

Unit V**[8 Hrs]****OPERATING SYSTEMS AND OPEN-SOURCE TECHNOLOGY:**

Need of operating system, Definition of operating system, Types of operating system, Operating systems – UNIX, MAC OS, LINUX (Ubuntu, Fedora) and WINDOWS, Open source: History and Open-source software development, Proprietary vs open source licensing model, FOSS, GNU project.

Text Books

S.N	Title	Authors	Edition	Publisher
1	Fundamentals of Computers	V. Rajaraman	IV th	PHI
2	Fundamentals of Computers	Balguruswamy	I st	McGraw Hill Education

Reference Books

S.N	Title	Authors	Edition	Publisher
1	Operating Systems	Achyut Godbole & Atul Kahate	3 rd	McGraw Hill Education
2	Open Source Technology	Kailash Vadera & Bhavesh Gandhi	I st	Laxmi Publications

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GROUP 1: SEMESTER I

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24CE105T	Competitive Programming - I	2	-	-	2	10	10	30	50

Course Objectives	Course Outcomes
<p>This course is intended to</p> <ul style="list-style-type: none">Understand the fundamental aspects of problem-solving in computer scienceUnderstand various fundamental algorithmsEnhance critical thinking and problem-solving skills by approaching computational problems systematically	<p>Students will be able to</p> <ul style="list-style-type: none">understand the fundamentals of problem-solving in computer science and the role of algorithms as a technology in computing.apply algorithms to solve a variety of computational problems efficientlyunderstand factoring methods and number computations

Unit I

[9 Hrs]

Introduction: Problem solving aspects, Top down design, implementation of algorithm, program verification. The Role of Algorithms in Computing, Algorithms as a technology, Analyzing algorithms, Designing algorithms, Asymptotic notation.

Unit II

[9 Hrs]

Fundamental Algorithms: Exchanging the values of two variables, Counting, Summation of a set of numbers, Factorial Computation, Sine function computation, Generating of the Fibonacci sequence, Reversing the digits of an integer, Base Conversion, Character to number conversion.

Unit III

[8 Hrs]

Factoring Methods: Finding the square root of a number, the smallest Divisor of an integer, the greatest common divisor of two integers, generating prime numbers, computing the prime factors of an integer, generation of pseudo random numbers, raising a number to a large power, computing the nth Fibonacci Number.

Text Books

S.N	Title	Authors	Edition	Publisher
1	How to solve it by Computer	R. G. Dromey		Prentice-Hall India EEE Series.
2	Structure and Interpretation of Computer Programs	Harold Abelson and Gerald Sussman		MIT Press

Reference Books

S.N	Title	Authors	Edition	Publisher
1	The Art of Computer Programming	Donald E. Knuth	3	Addison Wesley Longman

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GROUP 1: SEMESTER I

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24CE106P	Business Communication Skills-I Lab	-	-	2	1	-	25	25	50

Course Objectives	Course Outcomes
<p>This course is intended</p> <ul style="list-style-type: none">To empower students to develop a career-oriented mindset while harnessing the power of LSRW skills.	<p>Students will be able to:</p> <ul style="list-style-type: none">Apply verbal and non-verbal skills to confidently and effectively deliver presentations.Prepare themselves for overall language ability through listening and reading tasks.Demonstrate formal writing skills.Draft impactful Resumes and Cover Letters.Prepare themselves for Personal Interviews.

Expt. No.	Title of the experiment
1	Presentation Skills
2	Poster Making (Product/ Event)
3	Reading Comprehension for Competitive Exams.
4	Writing Skills for Academic Purposes.
5	Listening Skills I
6	Business Correspondence I
7	Resume Writing and Cover Letter
8	Mock Interviews

Reference Books

S. N	Title	Authors	Edition	Publisher
1	Communication Skills for Engineers	C. Muralikrishna & Sunita Mishra	2nd Edition, 2011	Pearson India Education Services
2	Communication Skills	Dr. L. Bisen, Dr. B. Agrawal & Dr. N. T. Kalyani	1st Edition, 2021	Himalaya Publishing House
3	Barron's IELTS Superpack	Lin Lougheed	2012	Barrons Educational Series

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**GROUP 1: SEMESTER I**

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24CE107T	Indian Knowledge System	2	-	-	2	10	10	30	50

Course Objectives	Course Outcomes
Students will be able to <ul style="list-style-type: none">To introduce the origin, evolution and approach of Indian knowledge systemsTo understand the Indian knowledge approaches to various domains such as time, language, environment, management, life and mindTo appreciate the principles of thought process, reasoning, inferencing and sustainability in Indian knowledge systemsTo navigate knowledge sources of different disciplines of studies from a Vedic perspective	Students will be able to <ul style="list-style-type: none">Explain the origin, evolution and approach of IKS and build various practices to conserve and protect rich Indian KnowledgeDescribe importance of Indian Literature and will know about Indian ScholarsUnderstand ancient Indian traditions, practices and knowledge for conservation of resources

Unit I**[10 Hrs.]****Introduction and Management of Indian Knowledge System**

- 1.1 Definition, Concept and Scope of IKS
- 1.2 IKS based approaches on Knowledge Paradigms
- 1.3 IKS in Ancient India and Modern India
- 1.4 Documentation and Preservation of IKS
- 1.5 Approaches for Conservation and Management of nature and Bio – Resources
- 1.6 Approaches and Strategies to protection and conservation of IKS

[12 Hrs.]**Unit II****IKS and Indian Scholars, Indian Literature**

- 2.1 Philosophy and Literature (Maharshi Vyas, Kanad, Pingala, Parasar, Banabhatta, Nagarjuna and Panini)
- 2.2 Mathematics and Astronomy (Aryabhata, Mahaviracharya, Bodhayan, Bhaskaracharya, Brahmagupta, Varahamihira)
- 2.3 Medicine and Yoga (Charak, Susruta, Maharshi Patanjali and Dhanwantari)
- 2.4 Sahitya (Vedas, Upvedas (Ayurveda, Dhanurveda, Ghandarvaveda), Puran and Upnishad and Shad Darshan (Vedanta, Vaisheshik, Sankhya, Mimamsa, Yoga, Adhyatma, Meditation)
- 2.5 Shastra (Nyaya, Vyakarana, Krishi, Shilp, Vastu, Natya, Sangeet)

[08 Hrs.]**Unit III****Unique Traditional Practices and Applied Traditional knowledge**

- 3.1 Myths, Rituals, Spirituals, Folk stories, Traditional Narratives
- 3.2 Agriculture, Land, Water and Soil Conservation and Management Practices
- 3.3 Vaidya (Traditional health Care system), Amchi Medicine system

Text Books

S. N.	Title	Authors	Edition	Publisher
1	Indian Knowledge System: Introduction and Prospects	Acharya Shreyas Kurhekar	First	Sanskrit University, Ramtek
2	Indian Knowledge System Vol. I and II	Kapil Kapoor, Awadhesh Kumar Singh		D.K. Print World Ltd.
3	Traditional Knowledge System in India	Amit Jha		Atlantic Publisher

Reference Books / Resources

S. N.	Title	Authors	Edition	Publisher
1	Website of Indian Knowledge System Division, New Delhi			

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**GROUP 1: SEMESTER II**

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24CE201T	Engineering Physics and Materials Science	2	--	--	2	10	10	30	50

Course Objectives	Course Outcomes
This course is intended <ul style="list-style-type: none">To understand the basic laws of physics and their application in engineering and technology.To develop scientific temper and analytical capability.	Students will be able to <ul style="list-style-type: none">Distinguish the types of solids on the basis of conductivity and acquire a brief idea about semiconductors and Magnetic MaterialsUnderstand the applications of Semiconductors & Magnetic Materials.Explain the structure of Crystals.Interpret the concepts of Quantum Mechanics.

Unit I: BASICS OF SOLID-STATE PHYSICS	{11Hrs}
Semiconductors: Free electron Theory (qualitative idea) and its features; Idea of band formation in solids, Classification of solids: Metal, Insulator, Semiconductor; Fermi Energy, Types - Intrinsic and Extrinsic Semiconductors, Applications of solid state devices - p-n junction diode and transistor. Magnetic materials: Terms and definitions, Types of magnetic materials, characteristics of Diamagnetic, Paramagnetic and Ferromagnetic Materials, Applications of soft and hard magnetic materials with a special emphasis on storage devices such as hard disk, floppy disk and magnetic tapes, advantages & disadvantages.	
Unit II OPTICAL COMMUNICATION	[08 Hrs]
Introduction, Optical Fiber, Total Internal Reflection, Propagation of light through an Optical Fiber, Fractional Refractive Index Change, Numerical Aperture, Modes of Propagation, Classification of Optical Fibers, The Three types of fibers, Comparative characteristics, V-Number, Losses in Optical Fiber, Fiber Optic Communication System, Merits of Optical Fibers, Fiber Optic Sensors (Temperature sensor and Liquid Level detector)	
Unit III QUANTUM PHYSICS	[07 Hrs]
Dual nature, de-Broglie hypothesis, Wave packet, phase and group velocity, Uncertainty principle - physical significance and its application, Wave function - probability and normalization, Brief idea of application of quantum mechanics in quantum computing	

Text Books

S.N	Title	Authors	Edition	Publisher
1	Fundamentals of Physics	David Halliday, Robert Resnick and Jerle Walker	8e extended	John-Wiley India
2	Electronic Engineering Materials and Devices	John Allision	10 th edition reprint	TMH
3	Engineering Physics	M. N. Avadhanulu	Latest edition	S. Chand & Co.

Reference Books

S.N	Title	Authors	Edition	Publisher
1	Solid State Physics	Charles Kittel	Eighth edition	John Wiley & Sons, Inc
2	Optical Fiber Communication - Principles & Practice	John M. Senior	3 rd Edition	Prentice Hall
3	Quantum Mechanics	Schiff	First Edition	McGraw-Hill Book Company, Inc.

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**GROUP 1: SEMESTER II**

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation		
						CA	ESE	Total
24CE201P	Engineering Physics & Materials Science Lab	--	--	2	1	25	25	50

Course Objectives	Course Outcomes
This course is intended <ul style="list-style-type: none">To understand the basic laws of physics and their application in engineering and technology.To develop scientific temper and analytical capability.	Students will be able to <ul style="list-style-type: none">Verify principles/laws by selecting and using proper measuring instruments, interpret result and draw conclusions.Find various parameters using various properties of light.Apply the concepts of Semiconductors and Quantum Mechanics.

Expt. No.	Title of the experiment
1	Study of semiconductor diodes
2	Study of Phenomenon of Diffraction
3	Study of Interference
4	Study of Birefringence
5	Determination of Numerical Aperture (NA) of given Optical Fiber
6	Determination of Planck's Constant using LED
7	Guoy's Balance Method a) Determination of Magnetic Susceptibility of different magnetic materials. b) Identification of different types of Magnetic Materials
8	Study of Planck's Constant by means of LED
9	Determination of Curie Temperature of Ferromagnetic Material.
10	Study of Transistors.
11	Study of Hall Effect.
12	Experiment on 'Quantum Eraser'.
13	Demonstration of phenomena of Optics using Laser.

Text Books

S.N	Title	Authors	Edition	Publisher
1	Fundamentals of Physics	David Halliday, Robert Resnick and Jerle Walker	8e extended	John-Wiley India
2	A Textbook of Engineering Physics	Dr. M. N. Avdhanulu, Dr. P. G. Kshirsagar	Latest edition	S. Chand Publication.
3	Principles of Physics	David Halliday, Robert Resnick, Jearl Walker	10th Edition	John Wiley and Sons (2017)

Reference Books

S.N	Title	Authors	Edition	Publisher
1	Solid State Physics	Charles Kittel	Eighth edition	John Wiley & Sons, Inc
2	Solid State Physics	R.L. Singhal	Eighth edition	Kedarnath Ramnath
3	University Physics	Young and Freedman	Fifteenth edition	Pearson Education

Online Resources

1	https://www.britannica.com/science/semiconductor#ref233890
2	https://www.geeksforgeeks.org/semiconductors/
3	https://www.sciencedirect.com/topics/chemistry/magnetic-material

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GROUP 1: SEMESTER II

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE 20	CA 20	ESE 60	Total 100
24CE202T	Statistics and Probability	3	1	-	4				

Course Objectives	Course Outcomes
<p>This course is intended: To inculcate and strengthen students with adequate knowledge of Statistics and Probability distributions.</p>	<p>Students will be able to:</p> <ul style="list-style-type: none"> • Apply numerical integration methods and find analytical solutions to difference equations. • Identify, analyse and solve statistical problems. • Describe the importance of probability theory in the field of engineering and prepare student to use it for analysis of data. • Apply various concepts of joint distributions. • Apply concept of probability distributions to engineering problems.

Unit I [8hrs]

Finite Differences: Operator E and delta, Factorial Polynomial, Numerical integration: Trapezoidal rule, Simpson's 1/3 rule, Simpson's 3/8 rule, Difference equations with constant coefficients.

Unit II [8hs]

Statistics: Fitting of straight line, parabola and exponential curves by method of least squares, Coefficient of correlation and lines of regressions, Rank correlation, multiple regression.

Unit III [8hrs]

Probability: Random Variable: Discrete & Continuous random Variable, Distribution function, Baye's rule, Mathematical expectations, Variance and Standard deviation.

Unit IV [8hrs]

Joint probability: Joint probability function of discrete random variable, Marginal probability function and Conditional distribution of discrete random variable, Mathematical expectation of discrete random variable, Variance and Standard deviation, and Covariance of joint distribution.

Unit V [8hrs]

Probability Distributions: Binomial Distribution, Poison's Distribution, Normal Distribution, exponential distribution.

Text Books

S.N	Title	Authors	Edition	Publisher
1	Higher Engineering Mathematics	B. S. Grewal	40 th	Khanna Publishers, New Delhi.
2	Higher Engineering Mathematics	H. K. Dass and Er. Rajnish Verma		S. Chand & Co. Pvt. Ltd., New Delhi.
3	Advanced Engineering Mathematics	Erwin Kreyszig		John Wiley & Sons, New York.

Reference Books

S.N	Title	Authors	Edition	Publisher
1	Higher Engineering Mathematics	B. V. Ramana		Tata McGraw-Hill Publications, New Delhi.
2	Advanced Engineering Mathematics	C. R. Wylie & L. C. Barrett		Tata McGraw-Hill Publications, New Delhi.
3	A Text Book of Engineering Mathematics	Peter O' Neil		Thomson Asia Pvt. Ltd., Singapore.
4	Schaum's Outline of Probability and Statistics	John J. Schiller, R. Alu Srinivasan and Murray . Spiegel	4 th	McGraw-Hill Education.

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**GROUP 1: SEMESTER II**

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24CE203T	Problem Solving with Python	3	-	-	3	20	20	60	100

Course Objectives	Course Outcomes
This course is intended <ul style="list-style-type: none">To Focuses on paradigms of programming language.To study various python programming concepts	Student will able to <ul style="list-style-type: none">Understand the concept of problem- and problem-solving algorithm.Analysis the program using fundamentals of python.Develop a python code using sequential concept.Develop a python code using non- sequential concept.Implement the program using conditional and looping

Unit I:	[8Hrs]
Algorithmic Problem Solving: 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).	
Unit II:	[8Hrs]
Python interpreter and interactive mode: Values and types: int, float, Boolean, string, and list; variables, expressions, statements, Tuple assignment, precedence of operators, comments; modules and functions, function definition and use, flow of execution, parameters and arguments;	
Unit III:	[8Hrs]
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	
Unit IV:	[8Hrs]
Dictionaries: Operations and methods; advanced list processing – list comprehension; Object Oriented Programming: Classes and objects-inheritance, polymorphism	
Unit V	[8Hrs]
File Handling and Exception Handling: Overview of exception classes and Types: try, except, finally: File processing: reading and Writing files, Recent Trends in Python	

Text Books

S.N	Title	Authors	Edition	Publisher
1	Python Programming using problem solving Approach	Reema Theraja	First Edition, 2017.	Oxford University Press
2	A Byte of Python	C. H. Swaroop	Edition2.1	Swaroop C H

Reference Books

S.N	Title	Authors	Edition	Publisher
1	Python: The Complete Reference	Martin C. Brown	First Edition, 2017.	Oxford University Press

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COMPUTER ENGINEERING

GROUP 1: SEMESTER II

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24CE203P	Problem Solving with Python Lab	-	-	2	1	-	25	25	50

Course Objectives	Course Outcomes
This course is intended <ul style="list-style-type: none">● Focuses of paradigms of programming language.● Enhancing programming environment.● To study various programming language● To study the python as one of the important programming languages	Student will able to <ul style="list-style-type: none">● Develop a program using python operators● Develop a python code using sequential concept.● Develop a python code using non- sequential concept.● Implement the program using conditional and looping

Expt. No.	Title of the experiment
1	(A). Installation of Latest Python version from Genuine Website, its installation process, path setting & its testing. (B) Implementation of some python program on interaction mode
2	Introduction to inbuilt IDE. Implementation of python programming in batch mode
3	Implementation of Python programming on various conditional operators
4	Implementation of Python programming on various arithmetic operators
5	Implementation of Python programming on various Loops
6	Implementation of Python programming on functions
7	Implementation of Python programming on List, Tuples & Dictionary
8	Implementation of Python programming on Object Oriented Programming concepts
9	Implementation of Python programming on File Handling
10	Mini Project

Text Books

S.N	Title	Authors	Edition	Publisher
1	Python Programming using problem solving Approach	Reema Theraja	First Edition, 2017.	Oxford University Press
2	A Byte of Python	C. H. Swaroop	Edition2.1	Swaroop C H

Reference Books

S.N	Title	Authors	Edition	Publisher
1	Python: The Complete Reference	Martin C. Brown	First Edition, 2017.	Oxford University Press

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COMPUTER ENGINEERING

GROUP 1: SEMESTER II

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24CE204T	Modern Web Technologies	3	-	-	3	20	20	60	100

Course Objectives	Course Outcomes
<p>This course is intended to</p> <ul style="list-style-type: none"> Understand the fundamental concepts of web development, including the structure and syntax of HTML, and the role of HTML in creating web pages Acquire knowledge of basic website structure and layout principles for effective web page design. understanding of the need for CSS in web development and its role in styling HTML elements 	<p>Students will be able to</p> <ul style="list-style-type: none"> create well-structured and semantically correct web pages using HTML demonstrate proficiency in incorporating multimedia elements and table structure design more complex and interactive web pages using advanced HTML topics such as div elements, classes, IDs, iframes, and forms Understand modern website development tools through case studies

Unit I	[8 Hrs]
Introduction to HTML: Overview of the Internet and World Wide Web, Basics of HTML - Structure, Syntax, and Elements, Text Formatting and Semantic Markup, HTML Lists - Ordered and unordered.	
Unit II	[8 Hrs]
Basic HTML Topics: Hyperlinks, HTML Media - Images, audio, video, youtube, HTML Tables - Border, Size, Header, Padding & Spacing, Colspan & Rowspan, Table Styling, Table Colgroup	
Unit III	[8 Hrs]
Advance HTML Topics: HTML Div, HTML classes, HTML Id, HTML Iframes, HTML Form - Form attributes, Form elements, Input Types, Input Attributes, Website structure	
Unit IV	[8 Hrs]
Style Sheet: Need for CSS, Introduction to CSS, CSS Syntax and Selectors, Types of CSS - Inline, External CSS, Internal CSS (Text Formatting, Colors, Backgrounds, Box Model: Margins, Borders, Padding)	
Unit V	[8 Hrs]
Case Studies on Website Development Tools: Wordpress, VIX, SquareSpace	

Text Books

S.N	Title	Authors	Edition	Publisher
1	HTML and CSS: Design and Build Websites	Jon Duckett		

Reference Books

S.N	Title	Authors	Edition	Publisher
1	Head First HTML and CSS	Elisabeth Robson and Eric Freeman		

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GROUP 1: SEMESTER II

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24CE205T	Competitive Programming – II	2	-	-	2	10	10	30	50

Course Objectives	Course Outcomes
<p>This course is intended to</p> <ul style="list-style-type: none"> Understand Fundamental Algorithms and Data Structures Master Text Processing and Pattern Searching Enhance Problem-Solving Skills 	<p>Students will be able to</p> <ul style="list-style-type: none"> Understand the underlying principles of data structures and abstract data types (ADT) be able to apply them in solving computational problems. Understand how to manipulate arrays and apply various sorting techniques such as selection sort and insertion sort, and utilize binary search and hash search algorithms for efficient data retrieval. Identify features unique to object-oriented languages, and demonstrate the benefits and applications of object-oriented programming.

Unit I	[9 Hrs]
<p>Data Structures and Algorithms Basics: Introduction: basic terminologies, elementary data organizations, data structure operations; abstract data types (ADT) and their characteristics. Array ADT: definition, operations and representations – row-major and column-major.</p>	
Unit II	[9 Hrs]
<p>Array Techniques: Array order Reversal, Array counting or Histogramming, Finding the maximum number in a set, removal of duplicates from an ordered array, partitioning an array, Finding the kth smallest Element Longest monoton sub sequence</p> <p>Merging: the two-way merge. Sorting: Sorting by selection, sorting by exchange, sorting by insertion, sorting by diminishing increment, sorting by partitioning. Searching: binary search, hash search.</p>	
Unit III	[8 Hrs]
<p>Object Oriented concepts: Introduction to structured programming language, procedural programming language, object oriented paradigms, features of object oriented programming language-abstraction, encapsulation, polymorphism, inheritance, benefits and applications.</p>	

Text Books

S.N	Title	Authors	Edition	Publisher
1	How to solve it by Computer	R. G. Dromey		Prentice-Hall India EEE Series.
2	Fundamentals of Data Structures in C	Ellis Horowitz, Sartaj Sahni & Susan Anderson-Freed	Second	Universities Press

Reference Books

S.N	Title	Authors	Edition	Publisher
1	The Art of Computer Programming	Donald E. Knuth	3	Addison Wesley Longman
2	Object Oriented Programming	E. Balaguruswami		McGraw Hill

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GROUP 1: SEMESTER II

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24CE206P	Business Communication Skills- II Lab	-	-	2	1	-	25	25	50

Course Objectives	Course Outcomes
<p>This course is intended to:</p> <ul style="list-style-type: none">To empower students to develop a career-oriented mindset while harnessing the power of LSRW skills.	<p>Students would be able to:</p> <ul style="list-style-type: none">Participate in Group Discussions.Improve their reading and formal writing skills.Develop upon their listening skills to engage in meaningful conversations.Develop oratory skills to engage and inform audiences.Prepare themselves for participating in business meetings.

Expt. No.	Title of the experiment
1	Group Discussion
2	Reading for Competitive Exams II
3	Listening Skills II
4	Presenting a TED Talk
5	Media Interaction
6	Business Correspondence II
7	Report Writing
8	Mock Meeting

Reference Books

S. N	Title	Authors	Edition	Publisher
1	Communication Skills for Engineers	C. Muralikrishna & Sunita Mishra	2nd Edition, 2011	Pearson India Education Services
2	Communication Skills	Dr. L. Bisen, Dr. B. Agrawal & Dr. N. T. Kalyani	1st Edition, 2021	Himalaya Publishing House
3	Barron's IELTS Superpack	Lin Lougheed	2012	Barrons Educational Series

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COMPUTER ENGINEERING

SECOND SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24CE207T	Design Thinking	2	-	-	2	10	10	30	50

Course Objectives	Course Outcomes
<ul style="list-style-type: none">Learn design thinking concepts and principlesUse design thinking methods in every stage of the problemLearn the different phases of design thinkingApply various methods in design thinking to different problems	<ul style="list-style-type: none">Define key concepts of design thinkingPractice design thinking in all stages of problem solvingApply design thinking approach to real world problems

Unit I	[10 Hrs]
INTRODUCTION: Why Design? - Four Questions, Ten Tools - Principles of Design Thinking - The process of Design Thinking - How to plan a Design Thinking project. UNDERSTAND, OBSERVE AND DEFINE THE PROBLEM: Search field determination - Problem clarification - Understanding of the problem - Problem analysis- Reformulation of the problem - Observation Phase - Empathetic design - Tips for observing - Methods for Empathetic Design - Point-of-View Phase - Characterization of the target group - Description of customer needs.	
Unit II	[10 Hrs]
IDEATION AND PROTOTYPING: Ideate Phase - The creative process and creative principles - Creativity techniques - Evaluation of ideas - Prototype Phase - Lean Startup Method for Prototype Development - Visualization and presentation techniques.	
Unit III	[10 Hrs]
TESTING AND IMPLEMENTATION :Test Phase - Tips for interviews - Tips for surveys - Kano Model - Desirability Testing - How to conduct workshops - Requirements for the space - Material requirements - Agility for Design Thinking. FUTURE: Design Thinking meets the corporation - The New Social Contract -Design Activism - Designing tomorrow.	

Text Books

S.N	Title	Authors	Edition	Publisher
1.	Handbook of Design Thinking - Tips &Tools for how to design thinking	Christian Mueller-Roterberg	2021	Independently Published
2.	Change by Design: How Design Thinking Transforms Organizations and Inspires Innovation	Tim Brown	2019	HarperCollins

Reference Books

S.N	Title	Authors	Edition	Publisher
1.	Design Thinking for Strategic Innovation	Idris Mootee		Wiley

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GROUP 1: SEMESTER I

Sr No	Course Category	Course Code	Course Title	Hours per Week			Credits	Maximum Marks			Total	No of Hrs for ESE
				L	T	P		Mid-Sem Examination	Continual Assessment	End Sem Examination		
1	BSC	24CS101T	Engineering Chemistry and Environmental Science	2	-	-	2	10	10	30	50	1.5
2	BSC	24CS101P	Engineering Chemistry and Environmental Science Lab	-	-	2	1	-	25	25	50	-
3	BSC	24CS102T	Linear Algebra and Calculus	3	1	-	4	20	20	60	100	3
4	PCC	24CS103T	Logic Building using C	3	1	-	4	20	20	60	100	3
5	PCC	24CS103P	Logic Building using C Lab	-	-	2	1	-	25	25	50	-
6	PCC	24CS104T	Basics of Computer Architecture	3	-	-	3	20	20	60	100	3
7	PCC	24CS105P	Computer Workshop-I			2	1	-	25	25	50	-
8	AEC	24CS106P	Business Communication Skills I Lab	-	-	2	1	-	25	25	50	-
9	IKS	24CS107T	Indian Knowledge Systems	2	-	-	2	10	10	30	50	1.5
10	SEC	24CS141P	Career Development I	-	-	2	1	-	50	-	50	-
11	CC	24CS108T	Co-curricular Courses – I	2	-	-	2	-	50	-	50	-
Total				15	2	10	22	80	280	340	700	12

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GROUP 1: SEMESTER II

Sr No	Course Category	Course Code	Course Title	Hours per Week			Credits	Maximum Marks			Total	No of Hrs for ESE
				L	T	P		Mid-Sem Examination	Continual Examination	End Sem Examination		
1	BSC	24CS201T	Engineering Physics and Materials Science	2	-	-	2	10	10	30	50	1.5
2	BSC	24CS201P	Engineering Physics and Materials Science Lab	-	-	2	1	-	25	25	50	-
3	BSC	24CS202T	Statistics and Probability	3	1	-	4	20	20	60	100	3
4	PCC	24CS203T	Programming in Python	3	1	-	4	20	20	60	100	3
5	PCC	24CS203P	Programming in Python Lab	-	-	2	1	-	25	25	50	-
6	PCC	24CS204T	Introduction to Computer Network	3	-	-	3	20	20	60	100	3
7	PCC	24CS205P	Computer Workshop – II	-	-	2	1	-	25	25	50	-
8	AEC	24CS206P	Business Communication Skills – II Lab	-	-	2	1	-	25	25	50	-
9	SEC	24CS241P	Career Development – II	-	-	2	1	-	50	-	50	-
10	PEC	24CS207T	Design Thinking	2	-	-	2	10	10	30	50	1.5
11	CC	24CS208T	Co-curricular Courses – II	2	-	-	2	-	50	-	50	-
Total				15	2	10	22	80	280	340	700	12

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COMPUTER SCIENCE & ENGINEERING (CYBER SECURITY)****FIRST SEMESTER**

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24CS101T	Engineering Chemistry and Environmental Science	2	-	-	2	10	10	30	50

Course Objectives	Course Outcomes
This course is intended <ol style="list-style-type: none">To acquaint the students with the basic phenomenon, concepts, knowledge and understanding of the fundamental principles of chemistry.To develop necessary skills and abilities to succeed in engineering education, research, Industry, environment and social context.	Students will be able to <ul style="list-style-type: none">Develop innovative ideas for use of advanced materials in sustainable development.Apply the principles of green Chemistry for sustainable developmentUnderstand the environmental impacts of e-waste & apply concepts of e-waste management.

Unit I Advanced Materials -**[8 Hrs]**

Introduction-Need for Development, Biodegradable polymers- PLA, PCL - Synthesis, Properties and Applications, Conducting Polymers- Polypyrrole, PANI Synthesis, Properties and Applications. Liquid Crystal Polymers- Types, Properties and Applications.

[8 Hrs]**Unit II Green Chemistry**

Green Chemistry- Introduction, Principles of Green Chemistry with example, Green Reagents- Super Critical Fluid (CO₂)- Properties and Applications, Green Building-Introduction, Components, Green Crackers- Introduction, Types, Advantages, Bio Catalysis- Definition and examples. Carbon Credit, Carbon Sequestration, Carbon Trade exchange platform.

Unit III E-waste Management

Introduction. E- Waste; composition and generation. E-waste pollutants, E waste hazardous properties, Effects of pollutant (E-waste) on human health and surrounding environment, Basic principles of E waste management, Component of E waste management- Domestic e-waste disposal, E-waste Control measures - Reduction of waste at source

[8 Hrs]**Text Books**

S. N	Title	Authors	Edition	Publisher
1	Text Book of Engineering Chemistry	S.S. Dara,		S. Chand and Company Ltd. New Delhi.
2	Textbook of Engineering Chemistry	P.C. Jain and Monica Jain		Dhanpat Rai and Sons, New Delhi.
3	Materials Chemistry	A.V. Bharati and Walekar,		Tech Max Publications, Pune.
4	E-waste Recycling and Management	Anish Khan, Inamuddin, Abdullah M. Ansiri		Springer

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FIRST SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24CS101P	Engineering Chemistry and Environmental Science Lab	-	-	2	1	-	25	25	50
Course Objectives					Course Outcomes				
<ul style="list-style-type: none">To Make the students aware about various techniques available for Analysis of Material.To Impart the skill of handling chemicals and apparatus.					<ul style="list-style-type: none">List the proper procedures and regulations for safe handling and use of chemicals and can follow the proper procedures and regulations for safe handling when using different instruments.Demonstrate the use of modern instrumentation, classical techniques, and properly record the results of their experiment.Identify and solve chemical problems and explore new areas of research especially in fuel and lubricants.				

Expt. No.	Experiments based on Performance- Any FIVE
1	Synthesis of Bakelite
2	Synthesis of Conducting polymer (Polyaniline)
3	Determination of heavy metal from industrial effluent.
	Demonstration - Any ONE
4	Determination of turbidity from industrial effluent.
5	Determination of pH by using different methods.
	Virtual Experiment - Any ONE
6	Determination of Alkalinity of Water Sample.
7	Study of Lambert-Bears Law
8	Estimation of DO content of Water sample.
	Activity - Any One
1	Visit to e-waste recycling plant
2	Study of Air /Water Pollution Level at different Sites in Nagpur City.
3	Study of nearby industrial chemicals and safety measures

Text Books

S.N	Title	Authors	Edition	Publisher
1	A Textbook on experiment and calculation in engineering chemistry	S.S. Dara		S.Chand

Reference Books

S.N	Title	Authors	Edition	Publisher
1	Applied Chemistry theory and practical	O.P. Virmani and A.K. Narular		New Age International
2	Laboratory Manual on Engineering Chemistry	Dr. Subdharani		Dhanpat Rai Publishing

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FIRST SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24CS102T	Linear Algebra and Calculus	3	1	-	4	20	20	60	100

Course Objectives	Course Outcomes
<ul style="list-style-type: none">The goal of this paper is to introduce advanced concepts of<ol style="list-style-type: none">Matrix AlgebraMultivariate CalculusDifferential EquationsVector calculus	<ul style="list-style-type: none">Solve the system of linear equations using matrices.Identify engineering problems related to Matrices: Eigen value & Eigen vectors & Functions of Matrices.Understand the concept of multivariate calculus & apply the knowledge of applications of differentiation.Solve first order and higher order differential equations by various methods and apply these techniques to solve problems in engineering.Implement concept of vector calculus to solve engineering problems.

Unit I [8 Hrs]
Matrix Algebra: Introduction to matrices, Rank of a matrix, Consistency of system of linear equations, Linear and orthogonal transformations, Linear dependence of vectors.
Unit II [8 Hrs]
Matrices: Characteristics equation, Cayley- Hamilton Theorem, Eigen values and Eigen vectors, Reduction to diagonal form, Reduction of quadratic form to canonical form by orthogonal transformation, Sylvester's theorem.
Unit III [8 Hrs]
Multivariate Calculus: Functions of several variables and their partial derivatives, Chain rule and total differential coefficient, Jacobians and its properties, Maxima –Minima of functions of two variables, Lagrange's method of undetermined multipliers.
Unit IV [8 Hrs]
Differential Equations: First order and first degree differential equations: Linear, Higher order differential equations with constant coefficients, Method of variation of parameters, Cauchy's homogeneous linear equation, Applications of differential equations.
Unit V [8 Hrs]
Vector Calculus: Vector differentiation, Gradient, Directional derivatives, Divergence and Curl with their physical interpretation Solenoidal and irrotational motions, Scalar potential, Line integral & Work done.

Text Books

S. N	Title	Authors	Edition	Publisher
1	Higher Engineering Mathematics	B. S. Grewal		Khanna Publisher
2	A Text Book of Applied Mathematics	P. N. Wartikar and J. N. Wartikar		Pune Vidyarthi Griha Prakashan, Pune
3	Higher Engineering Mathematics	H. K. Das and Er. Rajnish		S.Chand & CO. Pvt. Ltd., New Delhi

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Reference Books

S.N	Title	Authors	Edition	Publisher
1	Higher Engineering Mathematics	B.V. Ramana,	11th reprint, 2010.	Tata McGraw Hill New Delhi
2	A Text Book of Engineering Mathematics	Peter O' Neil		Thomson Asia Pvt. Ltd., Singapore.
3	Advanced Engineering Mathematics	Erwin Kreyszig		John Wiley & Sons, New York.

Online Resources

1	https://archive.nptel.ac.in/courses/111/101/111101115/#
2	https://www.coursera.org/learn/matrix-algebra-engineers

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FIRST SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24CS103T	Logic Building using C	3	1	-	4	20	20	60	100

Course Objectives	Course Outcomes
<p>This course is intended to</p> <ul style="list-style-type: none">Understand the basic principles of C programming language.Develop C programming skills.Develop debugging skills using any publicly available IDE.	<p>Students will be able to</p> <ul style="list-style-type: none">Implement basic programs of decision making and loop control structureUnderstand fundamentals of arrays and stringsImplement programs using functions and pointersDevelop programs using concept of structuresImplement various operations on files

Unit I [4 Hrs]

Introduction to 'C' Programming: Data types, Operators, Input-output Functions, if, if-else, nested if statements, Conditional operators (Operator), Switch Case Statement

Loop Control Structures: for loop, while loop, do-while loop, break and continue statement

Unit II [6Hrs]

One Dimension and Two Dimension arrays: creation of array, declaration, initialization and displaying the elements. Read & display the matrix on the screen, matrix manipulation operations like addition, multiplication.

Strings: Introduction to string, basic operations on string.

Unit III [6Hrs]

Functions: Introduction to functions, why use function, Scope rule of function, storage classes, implementation of functions, use of library function, recursion.

Pointers: declaration & its use, Types of Pointers, Call by Value, Call by Reference.

Unit IV [4Hrs]

Structures: Introduction, declaration, initialization, Accessing Structure Members, Storage of Structures in Memory, Reading and Displaying Structure Variables.

Unit V [4Hrs]

File handling in C: File opening modes, File operations-File Opening, Closing File, read content of file, Write onto the file, Copy one file to another file.

Text Books

S.N	Title	Authors	Edition	Publisher
1	Programming in ANSI C	E. Balguruswamy	2 nd	Tata Mc-Graw Hill
2	Programming Techniques Through 'C'	M. G. Venkateshmurthy	2 nd	Pearson Education
3	LET US 'C'	Yashwant P. Kanetkar	1 st	BPB
4	Programming With C	Byron S. Gottfried	2 nd	Schaum Series

Reference Books

S.N	Title	Authors	Edition	Publisher
1	The Complete Reference C	Herbert Schildt	4 th	Tata Mc-Graw Hill
2	The 'C' programming language	Kernighan and Ritchie	1 st	Prentice Hall
3	Programming and Problem Solving	M. Sprankle	2 nd	Pearson Education

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COMPUTER SCIENCE & ENGINEERING (CYBER SECURITY)

FIRST SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24CS103P	Logic Building using C Lab	-	-	2	1	-	25	25	50

Course Objectives	Course Outcomes
This course is intended <ul style="list-style-type: none">● To make the students learn a programming language.● To learn problem solving techniques.● To teach the student to write C programs and to solve the problems.	Student will able to <ul style="list-style-type: none">● Develop problem solving logic.● Analyse and design problems.● Understand the fundamentals of C Programs.● Implement decision making control structures.● Implement loop control structures.

Expt. No.	Title
1	To study Number System.
2	To study problem solving techniques.
3	To study operators and variables.
4	To study simple If and If-else statement.
5	To study If-else if ladder and nested If control structures.
6	To study Switch-case statement.
7	To study While loop structure.
8	To study Do-while loop structure.
9	To study for loop structure.
10	To study Nested loops, break and continue statement.

Text Books

Sno	Title	Authors	Edition	Publisher
1	Programming in ANSI C	E. Balguruswamy	2 nd	Tata Mc-Graw Hill
2	Programming Techniques Through 'C'	M. G. Venkateshmurthy	2 nd	Pearson
3	Let Us 'C'	Yashwant P. Kanetkar	1 st	BPB
4	Programming With C	Byron S. Gottfried	2 nd	Schaum Series
5	How to solve it by Computer	R. G. Dromey	1 st	Pearson Education

Reference Books

Sno	Title	Authors	Edition	Publisher
1	The Complete Reference C	Herbert Schildt	4 th	Tata Mc-Graw Hill
2	The 'C' programming language	Kernighan and Ritchie	1 st	Prentice Hall
3	Programming and Problem Solving	M. Sprinkle	2 nd	Pearson Education

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FIRST SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24CS104T	Basics of Computer Architecture	3	-	-	3	20	20	60	100

Course Objectives	Course Outcomes
<p>This course is intended</p> <ul style="list-style-type: none">To provide understanding of design of Computer Architecture and organization.To provide understanding of issues involved in design of control unit.To understand the concepts of memory organization and its interfacing.	<p>Students will be able to</p> <ul style="list-style-type: none">analyze and describe different computer architectures.Solve various computer arithmetic problemsand analyze the complete execution of instruction using different control units.understand I/O device interfacing.Understand computer memory hierarchy and multiprocessor systems

Unit I	[7 Hrs]
Basic structure of computers: A Brief History of computers Designing for Performance Von Neumann Architecture, Computer Components, Interconnection Structures, Bus Interconnection, Addressing modes, Instruction Set Architecture (Instruction set based classification of processor i.e. RISC, CISC, RISC vs CISC Comparison).	
Unit II	[7 Hrs]
Arithmetic Unit : Addition & subtraction of signed numbers, Booths Multiplication Algorithm, Restoring Division Algorithm, Non - Restoring Division Algorithm, Floating point operations	
Unit III	[8 Hrs]
Processing unit : Machine Instruction characteristics, types of operands, types of operations, Instruction formats, Instruction types, Processor organization, Register Organization	
Control unit : Hardwired control unit, Microprogrammed control unit	
Unit IV	[7 Hrs]
Pipelining : Instruction cycles, Instruction Pipelining, Hazards, Multiple bus organization, I/O Organization: Input/output Systems, Memory Mapped I/O, I/O Mapped I/O, Programmed I/O, Interrupt Driven I/O, Direct Memory Access (DMA)	
Unit V	[7 Hrs]
Memory Systems: Memory Hierarchy, Cache memory, Main Memory, Virtual memory, Secondary storage - RAID, Memory Interleaving Multiprocessor Systems : Basic concept, Shared memory multiprocessor systems	

Text Books

S.N	Title	Authors	Edition	Publisher
1	Computer Organization & Architecture	William Stallings	8 th Edition	Prentice Hall
2	Computer Organization	Carl Hamacher	5 th Edition	McGraw Hill

Reference Books

S.N	Title	Authors	Edition	Publisher
1	Computer Architecture: A	John L. Hennessy,	6th Edition	Elsevier Science Quantitative Approach

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FIRST SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24CS105P	Computer Workshop-I	-	-	2	1	-	25	25	50

Course Objectives	Course Outcomes
<p>This course is intended</p> <ul style="list-style-type: none">To develop an ability to design and implement static and dynamic websiteChoose best technologies for solving web client/server problemsCreate conforming web pagesUnderstand, analyze and create XML documents and XML Schema	<p>Students will be able to</p> <ul style="list-style-type: none">Design and implement dynamic websites with good aesthetic sense of designing and latest technical know-how'sCreate web pages using HTML and Cascading Styles sheetsAnalyze a web page and identify its elements and attributesCreate XML documents and XML Schema

Expt. No.	Title of the experiment
1	Write a HTML program for the demonstration of Lists. a. Unordered List b. Ordered List c. Definition List d. Nested List
2	Write a HTML program for demonstrating Hyperlinks. a. Navigation from one page to another. b. Navigation within the page.
3	Write a HTML program for the demonstration of Tables a. Write a HTML program for time-table. b. Write an HTML code to display your education details in a tabular format.
4	Write an HTML code to create a Home page having three links: a. About Us, b. Our Services and c. Contact Us. Create separate web pages for the three links using frames
5	Write a HTML program for the demonstration of static web pages a. Write an HTML code to create a login form. On submitting the form, the user should get navigated to a profile page. b. Write an HTML code to create a Registration Form. On submitting the form, the user should be asked to login with this new credential.
6	Write a HTML program to develop a static Web Page for: a. CatLog b. shopping cart.
7	Write HTML for demonstration of cascading stylesheets. a. Embedded stylesheets. b. External stylesheets. c. Inline styles.
8	Write a program for implementing XML document for CUSTOMER DETAILS and create internal and external Document Type Definition to validate XML for CUSTOMER DETAILS?
9	Write an XML for person information and access the data using XSL.
10	Write a program to display contents of XML file in a table using Extensible Style Sheets
11	Write an HTML code to create your Institute website, Department Website and Tutorial website for specific subject.

Text Books

S.N	Title	Authors	Edition	Publisher
1	HTML 5 in simple steps	Kogent Learning Solutions Inc.		Dreamtech Press
2	HTML Black Book	Steven Holzner		Coriolis, 2000

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FIRST SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24CS106P	Business Communication Skills I Lab	-	-	2	1	-	25	25	50

Course Objectives	Course Outcomes
To empower students to develop a career-oriented mindset while harnessing the power of LSRW skills.	Students will be able to: 1. apply verbal and non-verbal skills to confidently and effectively deliver presentations. 2. prepare themselves for overall language ability through listening and reading tasks. 3. demonstrate formal writing skills. 4. draft impactful Resumes and Cover Letters. 5. prepare themselves for Personal Interviews.

Expt. No.	Title of the experiment
1	Presentation Skills
2	Poster Making (Product/ Event)
3	Reading Comprehension for Competitive Exams.
4	Writing Skills for Academic Purposes.
5	Listening Skills I
6	Business Correspondence I
7	Resume Writing and Cover Letter
8	Mock Interviews

Reference Books:

S. N	Title	Authors	Edition	Publisher
1	Communication Skills for Engineers	C. Muralikrishna & Sunita Mishra	2nd Edition, 2011	Pearson India Education Services
2	Communication Skills	Dr. L. Bisen, Dr. B. Agrawal & Dr. N. T. Kalyani	1st Edition, 2021	Himalaya Publishing House
3	Barron's IELTS Superpack	Lin Lougheed	2012	Barrons Educational Series

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FIRST SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24CS107T	Indian Knowledge System	2	-	-	2	10	10	30	50

Course Objectives	Course Outcomes
Students will be able to <ul style="list-style-type: none">To introduce the origin, evolution and approach of Indian knowledge systemsTo understand the Indian knowledge approaches to various domains such as time, language, environment, management, life and mindTo appreciate the principles of thought process, reasoning, inferencing and sustainability in Indian knowledge systemsTo navigate knowledge sources of different disciplines of studies from a Vedic perspective	Students will be able to <ul style="list-style-type: none">Explain the origin, evolution and approach of IKS and build various practices to conserve and protect rich Indian KnowledgeDescribe importance of Indian Literature and will know about Indian ScholarsUnderstand ancient Indian traditions, practices and knowledge for conservation of resources

Unit I

[10 Hrs.]

Introduction and Management of Indian Knowledge System

- 1.1 Definition, Concept and Scope of IKS
- 1.2 IKS based approaches on Knowledge Paradigms
- 1.3 IKS in Ancient India and Modern India
- 1.4 Documentation and Preservation of IKS
- 1.5 Approaches for Conservation and Management of nature and Bio – Resources
- 1.6 Approaches and Strategies to protection and conservation of IKS

[12 Hrs.]

Unit II

IKS and Indian Scholars, Indian Literature

- 2.1 Philosophy and Literature (Maharshi Vyas, Kanad, Pingala, Parasar, Banabhatta, Nagarjuna and Panini)
- 2.2 Mathematics and Astronomy (Aryabhatta, Mahaviracharya, Bodhayan, Bhaskaracharya, Brahmagupta, Varahamihira)
- 2.3 Medicine and Yoga (Charak, Susruta, Maharshi Patanjali and Dhanwantari)
- 2.4 Sahitya (Vedas, Upvedas (Ayurveda, Dhanurveda, Ghandarvaveda), Puran and Upnishad and Shad Darshan (Vedanta, Vaisheshik, Sankhya, Mimamsa, Yoga, Adhyatma, Meditation)
- 2.5 Shastra (Nyaya, Vyakarana, Krishi, Shilp, Vastu, Natya, Sangeet)

[08 Hrs.]

Unit III

Unique Traditional Practices and Applied Traditional knowledge

- 3.1 Myths, Rituals, Spirituals, Folk stories, Traditional Narratives
- 3.2 Agriculture, Land, Water and Soil Conservation and Management Practices
- 3.3 Vaidya (Traditional health Care system), Amchi Medicine system

Text Books

S. N.	Title	Authors	Edition	Publisher
1	Indian Knowledge System: Introduction and Prospects	Acharya Shreyas Kurhekar	First	Sanskrit University, Ramtek
2	Indian Knowledge System Vol. I and II	Kapil Kapoor, Awadhesh Kumar Singh		D.K. Print World Ltd.
3	Traditional Knowledge System in India	Amit Jha		Atlantic Publisher

Reference Books / Resources

S. N.	Title	Authors	Edition	Publisher
1	Website of Indian Knowledge System Division, New Delhi			

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SEMESTER II

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24CS201T	Engineering Physics and Materials Science	2	-	-	2	10	10	30	50

Course Objectives	Course Outcomes
This course is intended	Distinguish the types of solids on the basis of conductivity and acquire a brief idea about semiconductors and Magnetic Materials
To understand the basic laws of physics and their application in engineering and technology.	Understand the basics of Optical Fiber Communication.
To develop scientific temper and analytical capability	Interpret the concepts of Quantum Physics.

Unit I BASICS OF SOLID-STATE PHYSICS

[11 HRS]

Semiconductors: Free electron Theory (qualitative idea) and its features; Idea of band formation in solids, Classification of solids: Metal, Insulator, Semiconductor; Fermi Energy, Types - Intrinsic and Extrinsic Semiconductors, Applications of solid state devices - p-n junction diode and transistor.

Magnetic materials: Terms and definitions, Types of magnetic materials, characteristics of Diamagnetic, Paramagnetic and Ferromagnetic Materials, Applications of soft and hard magnetic materials with a special emphasis on storage devices such as hard disk, floppy disk and magnetic tapes, advantages & disadvantages.

Unit II OPTICAL COMMUNICATION

[08 Hrs]

Introduction, Optical Fiber, Total Internal Reflection, Propagation of light through an Optical Fiber, Fractional Refractive Index Change, Numerical Aperture, Modes of Propagation, Classification of Optical Fibers, The Three types of fibers, Comparative characteristics, V-Number, Losses in Optical Fiber, Fiber Optic Communication System, Merits of Optical Fibers, Fiber Optic Sensors (Temperature sensor and Liquid Level detector)

Unit III QUANTUM PHYSICS

[07 Hrs]

Dual nature, de-Broglie hypothesis, Wave packet, phase and group velocity, Uncertainty principle - physical significance and its application, Wave function - probability and normalization, Brief idea of application of quantum mechanics in quantum computing.

Text Books

S.N	Title	Authors	Edition	Publisher
1	Fundamentals of Physics	David Halliday, Robert Resnick and Jerle Walker	8e extended	John-Wiley India
2	Electronic Engineering Materials and Devices	John Allision	10th edition reprint	TMH
3	Engineering Physics	M. N. Avadhanulu	Latest edition	S. Chand & Co.

Reference Books

S.N	Title	Authors	Edition	Publisher
1	Solid State Physics	Charles Kittel	Eighth edition	John Wiley & Sons, Inc
2	Optical Fiber Communication - Principles & Practice	John M. Senior	3rd Edition	Prentice Hall
3	Quantum Mechanics	Schiff	First Edition	McGraw-Hill Book Company, Inc.

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GROUP 1: SEMESTER II

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation		
						CA	ESE	Total
24CS201P	Engineering Physics & Materials Science Lab	--	--	2	1	25	25	50

Course Objectives	Course Outcomes
This course is intended <ul style="list-style-type: none">To understand the basic laws of physics and their application in engineering and technology.To develop scientific temper and analytical capability.	Students will be able to <ul style="list-style-type: none">Verify principles/laws by selecting and using proper measuring instruments, interpret result and draw conclusions.Find various parameters using various properties of light.Apply the concepts of Semiconductors and Quantum Mechanics.

Expt. No.	Title of the experiment
1	Study of semiconductor diodes
2	Study of Phenomenon of Diffraction
3	Study of Interference
4	Study of Birefringence
5	Determination of Numerical Aperture (NA) of given Optical Fiber
6	Determination of Planck's Constant using LED
7	Guoy's Balance Method a) Determination of Magnetic Susceptibility of different magnetic materials. b) Identification of different types of Magnetic Materials
8	Study of Planck's Constant by means of LED
9	Determination of Curie Temperature of Ferromagnetic Material.
10	Study of Transistors.
11	Study of Hall Effect.
12	Experiment on 'Quantum Eraser'.
13	Demonstration of phenomena of Optics using Laser.

Text Books

S.N	Title	Authors	Edition	Publisher
1	Fundamentals of Physics	David Halliday, Robert Resnick and Jerle Walker	8e extended	John-Wiley India
2	A Textbook of Engineering Physics	Dr. M. N. Avdhanulu, Dr. P. G. Kshirsagar	Latest edition	S. Chand Publication.
3	Principles of Physics	David Halliday, Robert Resnick, Jearl Walker	10th Edition	John Wiley and Sons (2017)

Reference Books

S.N	Title	Authors	Edition	Publisher
1	Solid State Physics	Charles Kittel	Eighth edition	John Wiley & Sons, Inc
2	Solid State Physics	R.L. Singhal	Eighth edition	Kedarnath Ramnath
3	University Physics	Young and Freedman	Fifteenth edition	Pearson Education

Online Resources

1	https://www.britannica.com/science/semiconductor#ref233890
2	https://www.geeksforgeeks.org/semiconductors/
3	https://www.sciencedirect.com/topics/chemistry/magnetic-material

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SECOND SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24CS202T	Statistics and Probability	3	1	-	4	20	20	60	100

Course Objectives

To inculcate and strengthen students with adequate knowledge of

- Statistics
- Probability distributions

Course Outcomes

Students will be able to:

- Apply numerical integration methods and find analytical solutions to difference equations.
- Identify, analyse and solve statistical problems.
- Describe the importance of probability theory in the field of engineering and prepare student to use it for analysis of data.
- Apply various concepts of joint distributions.
- Apply concept of probability distributions to engineering problems.

Unit I

[8hrs]

Finite Differences: Operator E and delta, Factorial Polynomial, Numerical integration: Trapezoidal rule, Simpson's 1/3 rule, Simpson's 3/8 rule, Difference equations with constant coefficients.

Unit II

[8hs]

Statistics: Fitting of straight line, parabola and exponential curves by method of least squares, Coefficient of correlation and lines of regressions, Rank correlation, multiple regression.

Unit III

[8hrs]

Probability: Random Variable: Discrete & Continuous random Variable, Probability function, Distribution function, Baye's rule, Mathematical expectations, Variance and Standard deviation.

Unit IV

[8hrs]

Joint probability: Joint probability function of discrete random variable, Marginal probability function and Conditional distribution of discrete random variable, Mathematical expectation of discrete random variable, Variance and Standard deviation, and Covariance of joint distribution.

Unit V

[8hrs]

Probability Distributions: Binomial Distribution, Poison's Distribution, Normal Distribution.

Text Books

S.N	Title	Authors	Edition	Publisher
1	Higher Engineering Mathematics	B. S. Grewal	40 th	Khanna Publishers, New Delhi.
2	Higher Engineering Mathematics	H. K. Dass and Er. Rajnish Verma		S. Chand & Co. Pvt. Ltd., New Delhi.
3	Advanced Engineering Mathematics	Erwin Kreyszig		John Wiley & Sons, New York.

Reference Books

S.N	Title	Authors	Edition	Publisher
1	Higher Engineering Mathematics	B. V. Ramana		Tata McGraw-Hill Publications, New Delhi.
2	Advanced Engineering Mathematics	C. R. Wylie & L. C. Barrett		Tata McGraw-Hill Publications, New Delhi.
3	A Text Book of Engineering Mathematics	Peter O' Neil		Thomson Asia Pvt. Ltd., Singapore.
4	Schaum's Outline of Probability and Statistics	John J. Schiller, R. Alu Srinivasan and Murray R. Spiegel	4 th	McGraw-Hill Education.

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SECOND SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24CS203T	Programming in Python	3	1	-	4	20	20	60	100

Course objectives	Course Outcomes
<p>This course is intended</p> <ul style="list-style-type: none"> Introduce the basic principles and concepts of python programming, and how python programming concepts are useful in problem-solving. Write clear and effective python code. To perform file operations to read and write data in files. To create applications using Python Programming. 	<p>Students will be able to</p> <ul style="list-style-type: none"> Develop essential programming skills in computer programming concepts like data types. Examine Python syntax and semantics and be fluent in the use of Python flow control and functions. Illustrate the process of structuring the data using lists, tuples, and dictionaries. Demonstrate using built-in functions and operations to navigate the file system. Interpret the concepts of user-defined functions in Python.

Unit I [8Hrs]

Introduction and Syntax of Python Program: Features of Python, Applications of Python in Cyber Security, Python building blocks - Identifiers, Keywords, Indentation, Variables, Comments, Python variables. Python Data Types: Numbers, String, Tuples, Lists, Dictionary. Declaration and use of datatypes, Built-in Functions.

Unit II [8Hrs]

Python Operators and Control Flow statements: Basic Operators: Arithmetic, Comparison/ Relational, Assignment, Logical, Bitwise, Membership, Identity operators, Python Operator Precedence. Control Flow: Conditional Statements (if, if...else, nested if), Looping in python (while loop, for loop, nested loops), loop manipulation using continue, pass, break, else.

Unit III [8Hrs]

Sequential Data Types:

String: Concept, escape characters, String special operations, String formatting operator, Built-in String methods.

Lists: Defining lists, accessing values in lists, deleting values in lists, updating lists, Basic List Operations, and Built-in List functions.

Tuples: Accessing values in Tuples, deleting values in Tuples, and updating Tuples, Basic Tuple operations, and

Unit IV [8Hrs]

Non-Sequential Data Types:

Sets: Accessing values in Set, deleting values in Set, and updating Sets, Basic Set operations, Built-in Set functions.

Dictionaries: Accessing values in Dictionary, deleting values in Dictionary, and updating Dictionary, Basic Dictionary operations, Built-in Dictionaries functions.

Unit V [8Hrs]

Python Functions: Use of Python built-in functions (e.g., type/data conversion functions, math functions etc.), user-defined functions: Function definition, Function call, function arguments and parameter passing, Return statement, Scope of Variables: Global variable and Local Variables.

Text Books

S.N	Title	Authors	Edition	Publisher
1	Python for Everybody: Exploring Data Using Python 3	Charles R. Severance	1st Edition	CreateSpace Independent Publishing Platform, 2016.
2	Think Python: How to Think Like a Computer Scientist	Allen B. Downey	2nd Edition	Green Tea Press, 2015.
3	Python Programming	Ch Satyanarayana	1st Edition	universities press (India) private limited 2018.

Reference Books

S.N	Title	Authors	Edition	Publisher
1	Python Programming using the problem-solving approach	Reema Thareja	2nd Edition	Oxford university press, 2017
2	Programming Python	Mark Lutz	4 Edition	O'Reilly Media,

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Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24CS203P	Programming in Python Lab	-	-	2	1	-	25	25	50

Course Objectives	Course Outcomes
This course is intended <ul style="list-style-type: none"> To Focuses on paradigms of programming language. To Enhancing programming environment. To study various programming language. To study the python as one of the important programming language 	Student will able to <ul style="list-style-type: none"> Develop a program using python operators Develop a python code using sequential concept. Develop a python code using non- sequential concept. Implement the program using conditional and looping

Expt. No.	Title
1	(A).Installation of Latest Python version from Genuine Website, its installation process, path setting & its testing. (B) Implementation of some python program on interaction mode
2	Introduction to inbuilt IDE. Implementation of python programming in batch mode.
3	Implementation of Python programming on various conditional operators.
4	Implementation of Python programming on various arithmetic operators.
5	Implementation of Python programming on various Loops.
6	Implement a program to find the greatest number among 3 number entered by user.
7	Implementation of Python programming on List.
8	Implementation of Python programming on Tuples
9	Implementation of Python programming on Dictionary
10	Implementation of Python programming on functions
11	Develop a Mini project using python.

Text Books

S.N	Title	Authors	Edition	Publisher
1	Python Programming using problem solving Approach	Reema Theraja	First Edition, 2017.	Oxford University Press
2	A Byte of Python	C. H. Swaroop	Edition 2.1	Swaroop C H

Reference Books

Reference Books	Title	Authors	Edition	Publisher
1	Python: The Complete Reference	Martin C. Brown	First Edition, 2017.	Oxford University Press

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SECOND SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24CS204T	Introduction to Computer Network	3	-	-	3	20	20	60	100

Course Objectives	Course Outcomes
This course is intended <ul style="list-style-type: none"> To provide knowledge of basic concepts in data communication & Network. To provide knowledge of Network Architecture & Interfaces. To provide knowledge of Signal transmission in network 	Students will be able to <ul style="list-style-type: none"> To understand the basic concept of data communication model. To understand the network connection topologies and types. To understand Network architecture and design issues. To understand Network connections and its types. To understand types of signals and transmission.

Unit I [8Hrs]
Introduction to Data Communication- Data Communication model, Components of Data Communication system, Data representation, Types of communication, need & components of computer networks, advantages & disadvantages computer networks,

Unit II [8 Hrs]
Network: Types of connection and topologies, types of networks (LAN, MAN, PAN, WAN), Internet working concepts.

Unit III [8 Hrs]
Network Layered Model: Emergence of Layered Architecture, Network Architecture, Design issues for the Layers, Interfaces and Services, Service primitives,

Unit IV [8 Hrs]
Reference Models: Connection Oriented and Connectionless types of services, OSI Reference Model & architecture, TCP/IP reference model, types of addressing, type of network devices

Unit V [8Hrs]
Physical Layer: Types of signals, Transmission Mode, Transmission Impairment, Data rate Limits, Line Coding digital-to-digital conversion methods, types of transmission media, Switching techniques.

Text Books

S.N	Title	Authors	Edition	Publisher
1	Fundamentals of Data Structure	Horowitz and Sahani		CBS Publications
2	Data Structures using	Tanenbaum		C Pearson Education
3	Data structure and Algorithm	Lafore		BPB Publication

Reference Books

S.N	Title	Authors	Edition	Publisher
1	Data Structure and Program Design in C	Kruse, Leung and Tondo		PHI
2	Schaum's outline: Data Structures	Seymour Lipschutz		Tata Mc Graw Hill
3	An Introduction to DS with applications	Trembley and sorenson		Mc Graw Hill

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B. Tech. Scheme of Examination & Syllabus 2024-25 COMPUTER SCIENCE & ENGINEERING (CYBER SECURITY)

SECOND SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24CS205P	Computer Workshop -II	-	-	2	1	-	25	25	50

Course Objectives	Course Outcomes
<p>This course is intended</p> <ul style="list-style-type: none">To provide understanding of basics of object oriented programmingTo enable students to understand features of object oriented programming language.To develop program using object oriented programming language	<p>Students will be able to</p> <ul style="list-style-type: none">Realize the difference between the top-down and bottom-up approach along with thinking in terms of objects.Analyze and apply the object-oriented concepts during the development of solution for the given problemIllustrate the use of class abstraction, packaging and runtime error handling.

Expt. No.	Title of the experiment
1	Program to implement concept of class and object
2	Program to implement constructor & destructor
3	Program to implement inheritance
4	Program to implement polymorphism
5	Program to implement copy constructor & assignment operator
6	Program to implement abstract class
7	Program to implement interface
8	Program to implement package
9	Program to implement dynamic binding
10	Program to implement exception handling
11	Programming Assignment - Design and develop a module

Text Books

S.N	Title	Authors	Edition	Publisher
1	Programming with Java	Primer, E.Balaguruswamy	6th Edition	TMH
2	The Complete Reference Java	Herbert Schildt	7th Edition	Tata McGraw Hill

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COMPUTER SCIENCE AND ENGINEERING(CYBER SECURITY)

SECOND SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24CS206P	Business Communication Skills II Lab	-	-	2	1	-	25	25	50

Course Objectives	Course Outcomes
To empower students to develop a career-oriented mindset while harnessing the power of LSRW skills.	Students would be able to: 1. Participate in Group Discussions. 2. Improve their reading and formal writing skills. 3. Develop upon their listening skills to engage in meaningful conversations. 4. Develop oratory skills to engage and inform audiences. 5. Prepare themselves for participating in business meetings.

Expt. No.	Title of the experiment
1	Group Discussion
2	Reading for Competitive Exams II
3	Listening Skills II
4	Presenting a TED Talk
5	Media Interaction
6	Business Correspondence II
7	Report Writing
8	Mock Meeting

Reference Books

S. N	Title	Authors	Edition	Publisher
1.	Communication Skills for Engineers	C. Muralikrishna & Sunita Mishra	2nd Edition, 2011	Pearson India Education Services
2.	Communication Skills	Dr. L. Bisen, Dr. B. Agrawal & Dr. N. T. Kalyani	1st Edition, 2021	Himalaya Publishing House
3.	Barron's IELTS Superpack	Lin Lougheed	2012	Barrons Educational Series

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COMPUTER SCIENCE & ENGINEERING(CYBER SECURITY)



SECOND SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
						24CS207T	Design Thinking	2	-

Course Objectives	Course Outcomes
<ol style="list-style-type: none"> Learn design thinking concepts and principles Use design thinking methods in every stage of the problem Learn the different phases of design thinking Apply various methods in design thinking to different problems 	<ol style="list-style-type: none"> Define key concepts of design thinking Practice design thinking in all stages of problem solving Apply design thinking approach to real world problems

Unit I	[10 Hrs]
INTRODUCTION: Why Design? - Four Questions, Ten Tools - Principles of Design Thinking - The process of Design Thinking - How to plan a Design Thinking project. UNDERSTAND, OBSERVE AND DEFINE THE PROBLEM: Search field determination - Problem clarification - Understanding of the problem – Problem analysis- Reformulation of the problem - Observation Phase - Empathetic design - Tips for observing - Methods for Empathetic Design - Point-of-View Phase - Characterization of the target group - Description of customer needs.	
Unit II	[10 Hrs]
IDEATION AND PROTOTYPING: Ideate Phase - The creative process and creative principles - Creativity techniques - Evaluation of ideas - Prototype Phase - Lean Startup Method for Prototype Development - Visualization and presentation techniques.	
Unit III	[10 Hrs]
TESTING AND IMPLEMENTATION : Test Phase - Tips for interviews - Tips for surveys - Kano Model - Desirability Testing - How to conduct workshops - Requirements for the space - Material requirements - Agility for Design Thinking. FUTURE: Design Thinking meets the corporation – The New Social Contract – Design Activism – Designing tomorrow.	

Text Books

S.N	Title	Authors	Edition	Publisher
1.	Handbook of Design Thinking - Tips & Tools for how to design thinking	Christian Mueller-Roterberg	2021	Independently Published
2.	Change by Design: How Design Thinking Transforms Organizations and Inspires Innovation	Tim Brown	2019	HarperCollins

Reference Books

S.N	Title	Authors	Edition	Publisher
1.	Design Thinking for Strategic Innovation	Idris Mootee		Wiley

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COMPUTER SCIENCE AND BUSINESS SYSTEM

GROUP 1: SEMESTER I

Sr No	Course Category	Course Code	Course Title	Hours per Week			Credits	Mid-Sem Examination	Maximum Marks			
				L	T	P			Continual Assessment	End Sem Examination	Total	
1	BSC	24CB101T	Discrete Mathematics	3	-	-	3	20	20	60	100	3
2	BSC	24CB101P	Discrete Mathematics Lab	-	-	2	1	-	25	25	50	-
3	BSC	24CB102T	Introductory Topics in Statistics, Probability and Calculus	3	-	-	3	20	20	60	100	3
4	PCC	24CB103T	Fundamentals of Computer Science	3	-	-	3	20	20	60	100	3
5	PCC	24CB103P	Fundamentals of Computer Science Lab	-	-	4	2	-	25	25	50	1.5
6	ESC	24CB104T	Principles of Electrical Engineering	2	-	-	2	10	10	30	50	1.5
7	ESC	24CB104P	Principles of Electrical Engineering Lab	-	-	2	1	-	25	25	50	-
8	BSC	24CB105T	Physics for Computing Science	2	-	-	2	10	10	30	50	
9	BSC	24CB105P	Physics for Computing Science Lab	-	-	2	1	-	25	25	50	
10	BSC	24CB106T	Business Communication and Value Science - I	1	-	-	1	10	10	30	50	1.5
11	BSC	24CB106P	Business Communication and Value Science – I Lab	-	-	2	1	-	25	25	50	
12	CC	24CB107T	Co-curricular Courses - I	2			2	-	50		50	
Total				16	0	12	22	90	265	395	750	14

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Computer Science and Business System

GROUP 1: SEMESTER II

Sr No	Course Category	Course Code	Course Title	Hours per Week			Credits	Maximum Marks				Duration
				L	T	P		Mid-Sem Examination	Continual Assessment	End Sem Examination	Total	
1	BSC	24CB201T	Linear Algebra	3	-	-	3	20	20	60	100	3
2	BSC	24CB201P	Linear Algebra Lab	-	-	2	1	-	25	25	50	-
3	BSC	24CB202T	Statistical Methods and Modelling	4	-	-	4	20	20	60	100	3
4	PCC	24CB203T	Data Structures and Algorithms	3	-	-	3	20	20	60	100	3
5	PCC	24CB203P	Data Structures and Algorithms Lab	-	-	4	2	-	25	25	50	-
6	ESC	24CB204T	Principles of Electronics	2	-	-	2	10	10	30	50	1.5
7	ESC	24CB204P	Principles of Electronics Lab	-	-	2	1	-	25	25	50	-
8	BSC	24CB205T	Fundamentals of Economics	2	-	-	2	10	10	30	50	1.5
9	BSC	24CB206T	Business Communication & Value Science – II	2	-	-	2	10	10	30	50	1.5
10	BSC	24CB207T	Environmental Sciences	2	-	-	-	-	Audit Course			
11	CC	24CB208T	Co-curricular Courses – II	2	-	-	2	-	50	-	50	-
Total				20	0	8	22	90	215	345	650	13.5

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**FIRST SEMESTER**

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24CB101T	Discrete Mathematics	3	-	-	3	20	20	60	100

Course Objectives	Course Outcomes
<p>The aim of this course is</p> <ul style="list-style-type: none">To understand the concepts of graph theory and related algorithm concepts.To understand the concepts of algebraic structures, logic, set theory.	<p>On completion of the course, students will be able to</p> <ul style="list-style-type: none">Apply Boolean algebra in Logic gates and Karnaugh mapIdentify various types of sets, relations and algebraic structuresApply counting techniques to solve combinatorial problemsIdentify and apply concepts of graph theory and graph colouringApply logical thinking skills.

Unit I : Boolean algebra:	[8Hrs]
Introduction of Boolean algebra, truth table, basic logic gate, basic postulates of Boolean algebra, principle of duality, canonical form, Karnaugh map.	
Unit II : Abstract algebra:	[8Hrs]
Set, relation, group, ring, field.	
Unit III : Combinatorics:	[8Hrs]
Basic counting, balls and bins problems, generating functions, recurrence relations. Proof techniques, principle of mathematical induction, pigeonhole principle	
Unit IV : Graph Theory:	[8Hrs]
Graphs and digraphs, complement, isomorphism, connectedness and reachability, adjacency matrix, Eulerian paths and circuits in graphs and digraphs, Hamiltonian paths and circuits in graphs and tournaments, trees; Planar graphs, Euler's formula, dual of a planer graph, independence number and clique number, chromatic number, statement of Four- color theorem.	
Unit V : Logic :	[8Hrs]
Propositional calculus - propositions and connectives, syntax; Semantics truth assignments and truth tables, validity and satisfiability, tautology; Adequate set of connectives; Equivalence and normal forms; Compactness and resolution; Formal reducibility natural deduction system and axiom system; Soundness and completeness.	

Text Books

S.N	Title	Authors	Edition	Publisher
1.	Discrete Mathematical Structures	Kolman, Busby & Ross	3rd	PHI
2.	Discrete Mathematical Structures with Applications to Computer Science	Tremblay & Manohar		Tata McGraw- Hill.

Reference Books

S.N	Title	Authors	Edition	Publisher
1.	Discrete Maths for Computer Scientists & Mathematicians	Mott, Kandel, Baker		Pearson
2.	Discrete Mathematics	Lipschutz	2nd	McGraw Hill Professional,
3.	Elements of Discrete Mathematics	C. L. Liu		McGraw Hill Education India.
4.	Digital Logic & Computer Design	M. Morris Mano		Pearson

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Computer Science & Business Systems

FIRST SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24CB101P	Discrete Mathematics Lab	--	--	2	1	-	25	25	50

Course Objectives	Course Outcomes
<p>The Course is intended to:</p> <ul style="list-style-type: none">To provide hands-on experience of applying the concepts of discrete mathematics relevant to the study of science and engineering.To develop skills to obtain the results of discrete mathematics through programming and compare the results obtained with theoretical calculations.	<p>Students will be able to:</p> <ul style="list-style-type: none">Use Sage to carry out basic mathematical operationsCreate truth tables for propositional calculus and Boolean expressions and analyse the arguments.Perform various operations of setsExecute operations and algorithms in Graph theoryObtain combinatorial results

List of Experiments:-

Experiment No.	List of Experiment
1	To use Sage as a calculator for basic mathematical operations
2	To construct truth tables & verify validity, satisfiability and logical equivalence in propositional calculus.
3	To implement operations in sets
4	To implement functions and operations involving graphs
5	To implement graph algorithms
6	To solve recurrence relations using Sage

Text Books

S.N	Title	Authors	Edition	Publisher
1	Discrete Mathematics	Lipschutz	2nd	McGraw Hill Professional,
2	Discrete Mathematical Structures	Kolman, Busby & Ross	3rd	PHI
3	Discrete Mathematical Structures with Applications to Computer Science	Tremblay & Manohar		Tata McGraw- Hill.

Reference Books

S.N	Title	Authors	Edition	Publisher
1	Discrete Maths for Computer Scientists & Mathematicians	Mott, Kandel, Baker		Pearson
2	Elements of Discrete Mathematics	C. L. Liu		McGraw Hill Education India.

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Computer Science & Business Systems

FIRST SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24CB102T	Introductory Topics in Statistics, Probability and Calculus	3	--	--	3	20	20	60	100

Course Objectives	Course Outcomes
<ul style="list-style-type: none"> To study the basic probability concepts and have a well – founded knowledge of standard distributions which can be used to describe real life phenomena To learn the concepts of evaluation using statistical analysis To acquaint with the concepts of calculus needed for problems in all engineering disciplines 	<p>Students will be able to:</p> <ul style="list-style-type: none"> Understand the basics of Statistics and types of data. Interpret the graphical representation of data in Statistics and solve Statistical problems. Recall the concepts of basic Probability. Apply concept of Probability distributions to Engineering problems & use them in cluster analysis of similar binary variable. Evaluate double & triple integrals to compute Area, Mass, Center of gravity for two dimensional and volume for three-dimensional solid structure.

Unit I	[5Hrs]
Introduction to Statistics: Definition of Statistics. Basic objectives. Applications in various branches of science with examples. Collection of Data: Internal and external data, Primary and secondary Data. Population and sample, Representative sample.	
Unit II	[8Hrs]
Descriptive Statistics: Classification and tabulation of univariate data, graphical representation, Frequency curves, Frequency Polygon, Pie Charts. Descriptive measures: Central tendency (Mean, Mode, Median) and dispersion. Bivariate data. Summarization, marginal and conditional frequency distribution(Problems only), Scatter diagram: Linear regression – Fitting of curve by Least squares method – correlation (Karl Pearson's)- Rank correlation (Spearman's).	
Unit III	[6Hrs]
Probability: Concept of experiments, sample space, event. Definition of Combinatorial Probability, Definition of Conditional Probability, Baye's Theorem (statement only) – simple Problems. Random variable, Expected values and moments: Mathematical expectation and its properties (statements only), Moments (first four moments about Mean & origin) and their properties, Moment generating function -Definition & simple problems, Definition & simple properties of coefficient of Skewness & Kurtosis.	
Unit IV	[8Hrs]
Probability distributions: Discrete & continuous distributions- Binomial, Poisson and Geometric distributions, Uniform, Exponential, Normal, Chi-square, t, F distributions.	
Unit V	[8Hrs]
Calculus: Basic concepts of Differential and Integral calculus - evaluation of elementary Double and Triple integrals (cartesian Coordinates), Application of Double Integral (Area, Mass, Center of Gravity) and Triple integral (Volume) [Cartesian Coordinates].	

Text Books

S.N	Title	Authors	Edition	Publisher
1	Introduction of Probability Models	S. M. Ross		Academic Press, N.Y.
2	Fundamentals of Statistics, Vol. I & II	A. Goon, M. Gupta and B. Dasgupta		World Press
3	Higher Engineering Mathematics	B. S. Grewal		Khanna Publication, Delhi

Reference Books

S.N	Title	Authors	Edition	Publisher
1	Applied Mathematics, Vol. I & II	P. N. and J. N. Wartikar		Vidarthi Prakashan
2	Advanced Engineering Mathematics, (Second Edition)	M. D. Greenberg		Pearson Education
3	Advanced Engineering Mathematics, (Seventh Edition)	Peter V. O'Neil		Thomson Learning
4	Probability and Statistics for Engineers, (Fourth Edition)	I. R. Miller, J.E. Freund and R. Johnson		PHI

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FIRST SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24CB103T	Fundamentals of Computer Science	3	-	-	3	20	20	60	100

Course Objectives	Course Outcomes
1. To understand problem solving concepts. 2. To learn operators and expressions in C. 3. To gain knowledge about the control structures in C. 4. To write C programs using arrays, functions, pointers, structures and files. 5. To learn Unix system interface and programming method.	CO1: To understand simple algorithms for arithmetic and logical problems CO2: To understand different types of loops. Structured & unstructured programming. CO3: To design C Programs using basic programming constructs, arrays and strings CO4: To develop applications in C using functions, pointers, and structures CO5: To do input/output and File handling in C

Unit I	[8Hrs]
Types Operator and Expressions with discussion of variable naming and Hungarian Notation: Variable Names, Data Type and Sizes (Little Endian Big Endian), Constants, Declarations, Arithmetic Operators, Relational Operators, Logical Operators, Type Conversion, Increment Decrement Operators, Bitwise Operators, Assignment Operators and Expressions, Precedence and Order of Evaluation, proper variable naming and Hungarian Notation.	
Unit II	[8Hrs]
Control Flow with discussion on structured and unstructured programming: Statements and Blocks, If-Else-If, Switch, Loops – while, do, for, break and continue, goto labels, structured and un- structured programming.	
Unit III	[8Hrs]
Functions and Program Structure with discussion on standard library: Basics of functions, parameter passing and returning type, C main return as integer, External, Auto, Local, Static, Register Variables, Scope Rules, Block structure, Initialization, Recursion, Pre-processor, Standard Library Functions, and return types.	
Unit IV	[8Hrs]
Pointers and Arrays: Pointers and address, Pointers and Function Arguments, Pointers and Arrays, Address Arithmetic, character Pointers and Functions, Pointer Arrays, Pointer to Pointer, Multi-dimensional array and Row/column major formats, Initialization of Pointer Arrays, Command line arguments, Pointer to functions, complicated declarations and how they are evaluated. Structures: Basic Structures, Structures and Functions, Array of structures, Pointer of structures, Self-referral structures, Table look up, typedef, unions, Bit-fields	
Unit V	[8Hrs]
Input and Output: Standard I/O, Formatted Output – printf, Formated Input – scanf, Variable length argument list, file access including FILE structure, fopen, stdin, stdout and stderr, Error Handling including exit, perror and error.h, Line I/O, related miscellaneous functions.	

Text Books

S.N	Title	Authors	Edition	Publisher
1	The C Programming Language	B. W. Kernighan and D. M. Ritchi	Second Edition	PHI
2	Programming in C	B. Gottfried	Second Edition	Schaum Outline Series
S.N	Title	Authors	Edition	Publisher
1	C: The Complete Reference	Herbert Schildt	Fourth Edition	McGraw Hill
2	Let Us C	Yashavant Kanetkar		BPB Publications

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Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation		
						CA	ESE	Total
24CB103P	Fundamentals of Computer Science Lab	-	-	4	2	25	25	50

Course Objectives	Course Outcomes
1. To understand problem solving concepts. 2. To learn operators and expressions in C. 3. To gain knowledge about the control structures in C. 4. To write C programs using arrays, functions, pointers, structures and files. 5. To learn Unix system interface and programming method.	CO1: To understand simple algorithms for arithmetic and logical problems CO2: To understand different types of loops. Structured & unstructured programming. CO3: To design C Programs using basic programming constructs, arrays and strings CO4: To develop applications in C using functions , pointers and structures CO5: To do input/output and File handling in C CO6: To learn some basic Unix system interface

List of Experiments: Various problem statements can be implemented in below mentioned objectives

Sr. No.	Aim of Practical
1	To study and implement conditional statement along with logical operators
2	To study and implement the concept of loops in C
3	To study and implement nested for loop.
4	To study and implement various patterns using nested for loops.
5	To understand the concept of while loop, do-while loop, and break and continue keywords.
6	To understand the concept of menu-driven programming.
7	To understand the concept of 1 dimensional array and 2-dimensional array
8	To understand the concept of functions in C
9	To understand the concept of pointers
10	To understand the concept of structures

Text Books

S.N	Title	Authors	Edition	Publisher
1	The C Programming Language	B. W. Kernighan and D. M. Ritchi	Second Edition	PHI
2	Programming in C	B. Gottfried	Second Edition	Schaum Outline Series

Reference Books

S.N	Title	Authors	Edition	Publisher
	C: The Complete Reference	Herbert Schildt	Fourth Edition	McGraw Hill
	Let Us C	Yashavant Kanetkar		BPB Publications

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Computer Science and Business Systems

FIRST SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24CB104T	Principles of Electrical Engineering	2	-	-	2	10	10	30	50

Course Objectives	Course Outcomes
1. To remember the basic concepts in dc circuits by applying laws & network theorems. 2. To analyze the electrical circuit parameters of ac circuits 3. To understand the signal measuring devices.	CO1 Understand and apply knowledge of laws & network theorems to solve electrical networks CO2 Know the basic concepts of AC Circuit CO3 Understand the basics of measuring instruments

Unit I :DC Circuit	[4Hrs]
Concept of work, power, energy .current-voltage relation, voltage source and current sources, ideal and practical sources, Kirchhoff-s laws and applications to network solutions using mesh and nodal analysis, Simplifications of networks using series-parallel, Star/Delta transformation. Superposition theorem.	
Unit II : AC Circuit	[6Hrs]
Concept of AC, AC waveform definitions, form factor, peak factor, phasor representation in polar and rectangular form, concept of impedance, admittance, complex power, power factor, single phase and three phase concept, , magnetic field and Faraday's law. Magnetic materials and B-H curve, Study of R-L, R-C, RLC series circuit, R-L-C parallel circuit	
Unit III : Measurements and Sensors	[4Hrs]
Measurements and Sensors: Measuring devices/sensors and transducers (Piezoelectric and thermo-couple) related to electrical signals, Elementary methods for the measurement of electrical quantities in DC and AC systems (Current & Single-phase power). Concept of indicating and integrating instruments.	

Text Books

S. N.	Title	Authors	Edition	Publisher
1	Electric Machinery	A. E. Fitzgerald, Kingsely Jr Charles, D. Umans Stephen	6 th	Tata McGraw Hill.
2	A Textbook of Electrical Technology (Vol. I)	B. L. Theraja		S. Chand and Company Ltd., New Delhi.
3	Basic Electrical Engineering	V. K. Mehta		S. Chand and Company Ltd., New Delhi.
4	Theory and Problems of Basic Electrical Engineering	J. Nagrath and Kothari	2 nd	Prentice Hall of India Pvt. Ltd.

Reference Books

S. N.	Title	Authors	Edition	Publisher
1	Basic of Electrical Engineering	T. K. Nagsarkar and M. S. Sukhija		Oxford University Press, 2011.
2	Introduction to Electrodynamics	D. J. Griffiths	4 th	Cambridge University Press.
3	Engineering Circuit Analysis	William H. Hayt & Jack E. Kemmerly		McGraw-Hill Book Company Inc.

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Computer Science and Business Systems

FIRST SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24CB104P	Principles of Electrical Engineering Lab	-	-	2	1	-	25	25	50

Course Objectives	Course Outcomes
<ul style="list-style-type: none">To remember the basic concepts in dc circuits by applying laws & network theorems.To analyze the electrical circuit parameters of ac circuits3. To understand the signal measuring devices.	<ul style="list-style-type: none">Understand and apply knowledge of laws & network theorems to solve electrical networksKnow the basic concepts of AC CircuitUnderstand the basics of measuring instruments

Expt. No.	Title of the experiment
1	To verify Kirchhoff's voltage law.
2	To verify Kirchhoff's current law.
3	To verify Superposition Theorem.
4	To study series RLC Circuit.
5	To study balanced three phase AC Circuit.
6	To plot B-H Curve of a magnetic material
7	To study the operation of Fuse & MCB (Safety Device).
8	Visit to Programmable Logic Controller (PLC) lab.

Text Books

S.N	Title	Authors	Edition	Publisher
1	Electric Machinery	A. E. Fitzgerald, Kingsley Jr Charles, D. Umans Stephen,	6th	Tata McGraw Hill.
2	A Textbook of Electrical Technology, (vol. I)	B. L. Theraja, Chand and Company Ltd., New Delhi.	vol. I	Chand and Company Ltd., New Delhi.
3	Basic Electrical Engineering	V. K. Mehta		S. Chand and Company Ltd., New Delhi.

Reference Books

S.N	Title	Authors	Edition	Publisher
1	Basic of Electrical Engineering	T. K. Nagsarkar and M. S. Sukhija		Oxford University Press, 2011.
3	Engineering Circuit Analysis,	William H. Hayt & Jack E. Kemmerly,		McGraw-Hill Book Company Inc.

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**FIRST SEMESTER**

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24CB105T	Physics for Computing Science	2	--	--	2	10	10	30	50

Course Objectives	Course Outcomes
This course is intended 1. To understand the basic laws of physics and their application in engineering and technology. 2. To develop scientific temper and analytical capability.	Students will be able to ● Describe Laws of Thermodynamics and Concepts of Oscillations. ● Describe various phenomenon of Optics and basic concepts of Electromagnetism. ● Describe the properties and applications of various types of LASERS and Optical Fibers.

Unit I THERMODYNAMICS AND OSCILLATIONS	[08 Hrs]
Thermodynamics-Zero-th law of thermodynamics, first law of thermodynamics, brief discussion on application of 1st law, second law of thermodynamics and concept of Engine, entropy, change in entropy in reversible and irreversible processes Oscillations- Periodic motion-simple harmonic motion-characteristics of simple harmonic motion. Resonance-definition, damped harmonic oscillator – heavy, critical and light damping.	
Unit II OPTICS & ELECTROMAGNETISM	[09 Hrs]
Interference- Principle of superposition, types of interference- -Newton's rings. Diffraction-Two kinds of diffraction, Difference between interference and diffraction. Polarization of light: Polarization - plane, elliptical and circularly polarized light, Brewster's law, double refraction. Electromagnetism: Maxwell's equation in vacuum and non-conducting medium. Continuity Equations for Current Densities.	
Unit III LASER AND FIBER OPTICS	[09 Hrs]
Einstein's theory of matter radiation interaction and A and B coefficients; amplification of light by population inversion, different types of lasers: Ruby Laser, CO2 Laser; Properties of laser beams: mono- chromaticity, coherence, directionality and brightness, applications of lasers in engineering. Fiber optics and Applications, Types of optical fibers.	

Text Books

S.N	Title	Authors	Edition	Publisher
1	Fundamentals of Physics	David Halliday, Robert Resnick and Jerle Walker	8e extended	John-Wiley India
2	Electronic Engineering Materials and Devices	John Allision	edition 10th reprint	TMH
3	Engineering Physics	M. N. Avadhanulu	Latest edition	S. Chand & Co.

Reference Books

S.N	Title	Authors	Edition	Publisher
1	Solid State Physics	Charles Kittel	Eighth edition	John Wiley & Sons, Inc
2	Solid State Physics	R.L. Singhal	Eighth edition	Kedarnath Ramnath
3	Optics	AjoyGhatak	Fifth Edition	, Tata McGraw Hill

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**FIRST SEMESTER**

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24CB105P	Physics for Computing Science Lab	--	--	2	1	-	25	25	50

Course Objectives	Course Outcomes
This course is intended 1. To understand the basic laws of physics and their application in engineering and technology. 2. To develop scientific temper and analytical capability.	Students will be able to <ul style="list-style-type: none">• Verify principles/laws by selecting and using proper measuring instruments, interpret result and draw conclusions.• Find various parameters using various properties of light.• Apply the concepts of Semiconductors and Magnetic Materials.• Apply the concepts of Quantum Physics.• Apply the concepts of Thermodynamics.

Expt. No.	Title of the experiment
1	Magnetic field along the axis of current carrying coil – Stewart and Gee.
2	Determination of Hall coefficient of semi-conductor.
3	Determination of Plank constant.
4	Determination of wave length of light by Laser diffraction method.
5	Determination of wave length of light by Newton's Ring method.
6	Determination of laser and optical fiber parameters.
7	Determination of Stefan's Constant.

Text Books

S.N	Title	Authors	Edition	Publisher
1	Fundamentals of Physics	David Halliday, Robert Resnick and Jerle Walker	8e extended	John-Wiley India
2	A Textbook of Engineering Physics	Dr. M. N. Avdhanulu, Dr. P. G. Kshirsagar	Latest edition	S. Chand Publication.
3	Principles of Physics	David Halliday, Robert Resnick, Jearl Walker	10th Edition	John Wiley and Sons (2017)

Reference Books

S.N	Title	Authors	Edition	Publisher
1	Solid State Physics	Charles Kittel	Eighth edition	John Wiley & Sons, Inc
2	Solid State Physics	R.L. Singhal	Eighth edition	Kedarnath Ramnath
3	University Physics	Young and Freedman	Fifteenth edition	Pearson Education

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Computer Science and Business Systems

FIRST SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24CB106T	Business Communication and Value Science - I	1	-	-	1	10	10	30	50

Course Objectives	Course Outcomes
<p>Introduction to business communication, while developing self-awareness and confidence.</p> <p>Reviewing essentials of Business communication and application of communication skills.</p> <p>Separate focus on appreciation and application of Life Skills.</p>	<p>By the end of the semester the students should be able to:</p> <ol style="list-style-type: none"> 1. Recognize the need of life skills and values. 2. Recognize own strengths and opportunities. 3. Apply communication skills and life skills to different situations. 4. Identify and apply the basic tenets of communication.

Unit I Grammar	[8Hrs]
<p>Applications of tenses</p> <p>Synonyms and Antonyms</p> <p>Subject Verb Agreement</p> <p>Transformation of sentences</p> <p>Idioms and phrases</p>	
Unit II Self Analysis and Goal Setting	[8Hrs]
<p>SWOT analysis - of self and in organizational context</p> <p>SMART Goal setting</p> <p>Introduction to life skills - empathy, sympathy, decision making and problem solving</p> <p>Discussion about concepts such as – leadership – team work – managing stress – motivating people.</p> <p>Listening Skills: Importance of listening skills, Difference between listening and hearing, types of listening</p>	
Unit III Reading and Writing Skills	[8Hrs]
<p>Email writing: Formal and informal emails</p> <p>Written Communication: Summary writing, story writing</p> <p>Project: Create a podcast on a topic that will interest college students</p>	

Reference Books

S.N	Title	Authors	Edition	Publisher
1	Business Communication	Dr. Saroj Hiremath	-	-
2	English vocabulary in use	Alan Mc'carthy and O'dell	-	-

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Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24CB106P	Business Communication and Value Science – I Lab	-	-	2	1	-	25	25	50

Course Objectives	Course Outcomes
To empower students to develop a career oriented mindset while harnessing the power of LSRW skills.	Students will be able to: <ol style="list-style-type: none"> 1. apply verbal and non-verbal skills to confidently and effectively deliver presentations. 2. prepare themselves for overall language ability through listening and reading tasks. 3. demonstrate formal writing skills. 4. draft impactful Resumes and Cover Letters. 5. prepare themselves for Personal Interviews.

Expt. No.	Title of the experiment
1	Presentation Skills
2	Poster Making (Product/ Event)
3	Reading Comprehension for Competitive Exams.
4	Writing Skills for Academic Purposes.
5	Listening Skills I
6	Business Correspondence I
7	Resume Writing and Cover Letter
8	Mock Interviews

Reference Books

S.N	Title	Authors	Edition	Publisher
1.	Communication Skills for Engineers	C. Muralikrishna & Sunita Mishra	2nd Edition, 2011	Pearson India Education Services
2.	Communication Skills	Dr. L. Bisen, Dr. B. Agrawal & Dr. N. T. Kalyani	1st Edition, 2021	Himalaya Publishing House
3.	Barron's IELTS Superpack	Lin Lougheed	2012	Barrons Educational Series

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Computer Science & Business Systems

SECOND SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24CB201T	Linear Algebra	3	--	--	3	20	20	60	100

Course Objectives	Course Outcomes
<ul style="list-style-type: none">To analyze and solve system of linear equations and to understand the concepts of independence of vectors.To diagonalize the symmetric and non symmetric matrix using singular value decomposition and principal component analysis.	<p>Students will be able to:</p> <ul style="list-style-type: none">Relate characteristic of solution of a linear system to determinant.Test for independence of vectors and find the rank of a matrix.Find the dimension and basis of a vector space.Solve algebraic eigen value problem.Utilize singular value decomposition and principal component analysis to characterize and analyze matrices..

Unit I	[8Hrs]
Matrix Algebra - I: Introduction to Matrices and Determinants; Solution of Linear Equations; Cramer's rule; Inverse of a Matrix.	
Unit II	[8Hrs]
Matrix Algebra - II : Vectors and linear combinations; Rank of a matrix; Gaussian elimination; LU Decomposition; Solving Systems of Linear Equations using the tools of Matrices.	
Unit III	[8Hrs]
Vector Space: Vector space; Dimension; Basis; Orthogonality; Projections; Gram-Schmidt orthogonalization and QR decomposition.	
Unit IV	[8Hrs]
Linear Transformation: Eigenvalues and Eigenvectors; Positive definite matrices; Linear transformations; Hermitian and unitary matrices;	
Unit V	[8Hrs]
Singular value decomposition & Application: Singular value decomposition and Principal component analysis (Non-credit and optional); Introduction to their applications in Image Processing and Machine Learning (one or two classes).	

Text Books

S.N	Title	Authors	Edition	Publisher
1	Higher Engineering Mathematics	B.S. Grewal	-	Khanna Publisher

Reference Books

S.N	Title	Authors	Edition	Publisher
1	Advanced Engineering Mathematics	Peter V. O'Neil	7 th edition	Cengage Learning
2	Advanced Engineering Mathematics	Michael D. Greenberg	2 nd edition	Pearson
3	Introduction to linear algebra	Gilbert Strang	5 th edition	Wellesley- Cambridge Press
4	Applied Mathematics (Vol. I & II)	P.N. Wartikar, J.N. Wartikar	-	Pune Vidyarthi Griha
5	Digital Image Processing	R C Gonzalez & R E Woods	-	Pearson

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SECOND SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24CB201P	Linear Algebra Lab	--	--	2	1	-	25	25	50

Course Objectives	Course Outcomes
<p>The Course is intended to:</p> <ul style="list-style-type: none">To provides crucial to many areas of computer science, including graphics, image processing, cryptography,To reflects the deep connection between the discrete nature of matrix mathematics and digital technology.	<p>Students will be able to:</p> <ul style="list-style-type: none">Understand the basic concepts in the modern presentation of geometry.Perform the solution of linear system of linear equations.Apply the knowledge of linear algebra to find eigen values and eigen vectors.Characterize a set of vectors in terms of linear combination, their span and how they are related to each other geometrically.Construct the range and null space of a linear transformation.Apply linear algebra concepts to model, solve and analyze real world problems.

List of Experiments:-

Experiment No.	List of Experiment
1	Perform elementary matrix and linear algebra.
2	Find the solution of system of linear equations by various methods
3	Find the eigen values and eigen vectors for the given matrix
4	Find the linear combination, basis and span.
5	Find the range space and null space of linear transformation.
6	Single Value Decomposition with Sage math and its application.

Text Books

S.N	Title	Authors	Edition	Publisher
1	Computational Mathematics with SageMath	Paul Zimmermann	-	SIAM Publications Library.

Reference Books

S.N	Title	Authors	Edition	Publisher
1	Linear Algebra	Seymour Lipschutz & Marc Lars Lipson	Fourth Edition	Schaum"s Outline Series Mc graw-Hill
2	Linear Algebra	KENNETH HOFFMAN & RAY KUNZE	Second Edition	PearsonIN

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SECOND SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24CB202T	Statistical Methods and Modelling	4	--	--	4	20	20	60	100

Course Objectives	Course Outcomes
<ul style="list-style-type: none"> To study the Linear Statistical Models. To learn the concept of testing hypothesis using Statistical Analysis. To understand the fundamental concepts of estimation methods. 	<p>Students will be able to:</p> <ul style="list-style-type: none"> Remember the basic concepts of Linear Statistical models. Interpret the results of Bivariate and Multivariate Regression and Correlation Analysis, for forecasting and also perform ANOVA, F – Test. Learn the concept of testing of hypothesis using statistical analysis. Apply non parametric methods in estimation. Apply the knowledge of time series analysis in Economics and Engineering.

Unit I	[12 Hrs]
Linear Statistical Models: Linear regression and correlation. Standard multiple regression models with emphasis on detection of collinearity, outliers, non-normality and autocorrelation, Validation of model assumptions. Multiple correlation, Analysis of variance (one way, two way with as well as without interaction)	
Unit II	[10 Hrs]
Sampling Techniques: Random sampling. Sampling from finite and infinite populations. Estimates and standard error (sampling with replacement and sampling without replacement), Sampling distribution of sample mean, stratified random sampling	
Unit III	[10 Hrs]
Estimation: Point estimation, criteria for good estimates (un-biasedness, consistency), Methods of estimation including maximum likelihood estimation.	
Test of hypothesis: Concept & formulation, Type I and Type II errors, Neyman Pearson lemma, Procedures of testing	
Unit IV	[10 Hrs]
Non-parametric Inference: Comparison with parametric inference, Use of order statistics. Sign test, Wilcoxon signed rank test, Mann-Whitney test, Run test, Kolmogorov-Smirnov test. Spearman's and Kendall's test.	
Unit V	[10 Hrs]
Basics of Time Series Analysis & Forecasting: Stationary, ARIMA Models: Identification, Estimation and Forecasting.	

Text Books

S.N	Title	Authors	Edition	Publisher
1	Probability and Statistics for Engineers	I.R. Miller, J.E. Freund and R. Johnson	4 th	PHI
2	Fundamentals of Statistics, Vol. I & II	A. Goon, M. Gupta and B. Dasgupta		World Press
3	The Analysis of Time Series: An Introduction	Chris Chatfield	6 th	Chapman & Hall

Reference Books

S.N	Title	Authors	Edition	Publisher
1	Introduction to Linear Regression Analysis	D.C. Montgomery & E. Peck	6 th	Wiley
2	Introduction to the Theory of Statistics	A.M. Mood, F.A. Graybill & D.C. Boes	3 rd	McGraw Hill Education
3	Applied Regression Analysis	N. Draper & H. Smith	3 rd	Wiley

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Computer Science & Business Systems

SECOND SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24CB203T	Data Structures and Algorithms	3	--	--	3	20	20	60	100

Course Objectives	Course Outcomes
<ul style="list-style-type: none"> To understand the fundamental terminologies and concepts related to algorithm and data organization, including algorithm specification, recursion, performance analysis, and asymptotic notation To develop proficiency in programming style and refinement of coding, including time-space trade-offs, testing, and data abstraction. To acquire knowledge of linear & non linear data structures and to understand the various representations, operations, and applications of both data structures. Learn the searching and sorting algorithms used for various data structures, and to understand the basics of file organization Understand basics of graph terminology & representations, graph search, traversal algorithms & complexity analysis. 	<ul style="list-style-type: none"> Understand and explain the fundamental terminologies, concepts, and principles related to algorithm and data organization, Develop proficiency in programming using linear data structures Develop an understanding of non-linear data structures Demonstrate the ability to implement searching and sorting algorithms on various data structures, Demonstrate proficiency in implementing file organization and to understand the basics of graph terminologies and representations, graph search and traversal algorithms, and complexity analysis.

Unit I	[8Hrs]
Basic Terminologies and Introduction to Algorithm & Data Organization: Algorithm specification, Recursion, Performance analysis, Asymptotic Notation - The Big-O, Omega and Theta notation, Programming Style, Refinement of Coding - Time-Space Trade Off, Testing, Data Abstraction	
Unit II	[8Hrs]
Linear Data Structure: Array, Stack, Queue, Linked-list and its types, Various Representations, Operations & Applications of Linear Data Structures.	
Unit III	[8Hrs]
Non-linear Data Structure: Trees (Binary Tree, Threaded Binary Tree, Binary Search Tree, B & B+ Tree, AVL Tree, Splay Tree) and Graphs (Directed, Undirected), Various Representations, Operations & Applications of Non-Linear Data Structures.	
Unit IV	[8Hrs]
Searching and Sorting on Various Data Structures: Sequential Search, Binary Search, Comparison Trees, Breadth First Search, Depth First Search Insertion Sort, Selection Sort, Shell Sort, Divide and Conquer Sort, Merge Sort, Quick Sort, Heap sort, Introduction to Hashing.	
Unit V	[8Hrs]
Files & Graphs: Files: Organization (Sequential, Direct, Indexed Sequential, Hashed) and various types of accessing schemes. Graph: Basic Terminologies and Representations, Graph search and traversal algorithms and complexity analysis.	

Text Books

S.N	Title	Authors	Edition	Publisher
1	Fundamentals of Data Structures	E. Horowitz, S. Sahni	2 nd edition	University Press
2	Data Structures and Algorithms	A. Aho, J. Hopperoft.	1 st edition	Pearson

Reference Books

S.N	Title	Authors	Edition	Publisher
1	The Art of Computer Programming: Fundamental Algorithms	Donald E. Knuth	1st edition	Cengage Learning
2	Introduction to Algorithms	Cormen, Leiserson	3 rd edition	The MIT Press

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**SECOND SEMESTER**

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24CB203P	Data Structures and Algorithms Lab	-	-	4	2	-	25	25	50

Course Objectives	Course Outcomes
<ul style="list-style-type: none">To understand the fundamental terminologies and concepts related to algorithm and data organization, including algorithm specification, recursion, performance analysis, and asymptotic notationTo develop proficiency in programming style and refinement of coding, including time-space trade-offs, testing, and data abstraction.To acquire knowledge of linear & non linear data structures and to understand the various representations, operations, and applications of both data structures.Learn the searching and sorting algorithms used for various data structures, and to understand the basics of file organizationUnderstand the basics of graph terminologies and representations, graph search and traversal algorithms, and complexity analysis.	<ul style="list-style-type: none">Understand and explain the fundamental terminologies, concepts, and principles related to algorithm and data organization,Develop proficiency in programming using linear data structuresDevelop an understanding of non-linear data structuresDemonstrate the ability to implement searching and sorting algorithms on various data structures,Demonstrate proficiency in implementing file organization and to understand the basics of graph terminologies and representations, graph search and traversal algorithms, and complexity analysis.

List of Experiments:

Experiment No.	List of Experiment
1	To analyse recursion
2	To implement various searching techniques
3	To understand & implement the concept of linked list
4	To implement operations on linear data structures
5	To implement operations on non linear data structures
6	To implement sorting algorithms having worst case complexity of $O(n^2)$

Text Books

S.N	Title	Authors	Edition	Publisher
01	Fundamentals of Data Structures	E. Horowitz, S. Sahni	2 nd edition	University Press
02	Data Structures and Algorithms	A. Aho, J. Hopperoft.	1 st edition	Pearson

Reference Books

S.N	Title	Authors	Edition	Publisher
01	The Art of Computer Programming: Fundamental Algorithms	Donald E. Knuth	1st edition	Cengage Learning
02	Introduction to Algorithms	Cormen, Leiserson	3rd edition	The MIT Press

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Computer Science & Business Systems

SECOND SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24CB204T	Principles of Electronics	2	--	--	2	10	10	30	50

Course Objectives	Course Outcomes
<ul style="list-style-type: none"> Develop a thorough understanding of the working principles, characteristics, and applications of P-N junction diodes, with an emphasis on analyzing and designing rectifier circuits for practical use. Analyze the construction, working principles, and configurations of Bipolar Junction Transistors (BJTs), Field Effect Transistors (FETs), and Metal-Oxide-Semiconductor Field-Effect Transistors (MOSFETs), and apply this understanding to evaluate their applications in circuits. Understand the fundamental concepts of analog and digital electronics, including signal types, logic gates, combinational circuits, and sequential circuits, and apply this knowledge to design and analyze their practical applications in electronic systems. 	<ul style="list-style-type: none"> Analyze the V-I characteristics of P-N junction diodes and design efficient rectifier circuits, including half-wave and full-wave rectifiers, with and without filters, to evaluate their performance in various electronic applications. Understand the input and output characteristics of BJTs, FETs, and MOSFETs, analyze their configurations, and apply this knowledge to design and evaluate transistor-based electronic circuits for various applications. Differentiate between analog and digital signals, understand the functionality of logic gates, design combinational circuits such as multiplexers and demultiplexers, and analyze sequential circuits like S-R and JK flip-flops to apply them effectively in practical applications.

Unit I	[9 Hrs]
Diode Basics & its applications: Basic diode and its application, Working of P-N junction diode, forward and reverse biased P-N junction, V-I Characteristics of P-N Junction (both forward and reverse biased) Diode applications: Rectifier circuits: Half wave rectifier (Numerical with capacitor filter), full wave rectifier.	
Unit II	[8 Hrs]
Transistor Basics & its Applications: Transistor Basics & its Applications: Working of BJT, Transistor as an amplifier (CE), CE-I/P and O/P characteristics, Working of Field Effect Transistors, difference between FET & BJT, Construction & working of MOSFET, CMOS: Basic Principles	
Unit III	[9 Hrs]
Basics of Digital and Analog Electronics: Difference between analog and digital signal, Basic logic gates, Universal gates, Special gates (XOR & XNOR), Difference between combinational & sequential circuits, Multiplexers and Demultiplexers, Difference between Latch & Flip Flop, Flip Flops: S-R Flip Flop, JK Flip Flop, Basics of operational amplifier, Parameters of Op-Amp (Ideal & Practical).	

Text Books

S.N	Title	Authors	Edition	Publisher
1	Microelectronics Circuits	Adel S. Sedra and Kenneth Carless Smith	7 th	Oxford University Press
2	Millman's Integrated Electronics	Jacob Millman, Christos Halkias, Chetan Parikh	2 nd	Mc Graw Hill Education
3	Digital Logic & Computer Design	M. Morris Mano	1 st	Pearson

Reference Books

S.N	Title	Authors	Edition	Publisher
1	Principles of Electronics	V K Mehta & Rohit Mehta	12 th	S. Chand
2	Electronic Devices and Circuit Theory	Robert L. Boylestad, Louis Nashelsky.	9 th	Pearson
3	Electronic Principles	Albert Paul Malvino	9 th	TMH
4	Electronics Circuits: Discrete & Integrated,	D Schilling C Belove T Apelewicz R Saccardi.	3 rd	MC Graw Hill

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COMPUTER SCIENCE & BUSINESS SYSTEMS

SECOND SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24CB204P	Principles of Electronics Lab	-	-	2	1	-	25	25	50

Course Objectives	Course Outcomes
<ul style="list-style-type: none">Develop a thorough understanding of the working principles, characteristics, and applications of P-N junction diodes, with an emphasis on analyzing and designing rectifier circuits for practical use.Analyze the construction, working principles, and configurations of Bipolar Junction Transistors (BJTs), Field Effect Transistors (FETs), and Metal-Oxide-Semiconductor Field-Effect Transistors (MOSFETs), and apply this understanding to evaluate their applications in electronic circuits.Understand the fundamental concepts of analog and digital electronics, including signal types, logic gates, combinational circuits, and sequential circuits, and apply this knowledge to design and analyze their practical applications in electronic systems.	<ul style="list-style-type: none">Analyze the V-I characteristics of P-N junction diodes and design efficient rectifier circuits, including half-wave and full-wave rectifiers, with and without filters, to evaluate their performance in various electronic applications.Understand the input and output characteristics of BJTs, FETs, and MOSFETs, analyze their configurations, and apply this knowledge to design and evaluate transistor-based electronic circuits for various applications.Differentiate between analog and digital signals, understand the functionality of logic gates, design combinational circuits such as multiplexers and demultiplexers, and analyze sequential circuits like S-R and JK flip-flops to apply them effectively in practical applications.

List of Experiments:

Experiment No.	List of Experiment
1	To study the Forward bias characteristic of PN junction Diode.
2	To observe the waveforms of Half Wave Rectifier.
3	To observe the waveforms of Full Wave Rectifier
4	To study the output characteristics of transistor in Common Emitter Configuration.
5	To study Drain Characteristic of FET.
6	To study the basic gates, universal gates, special gates.
7	To study and understand the Multiplexer and demultiplexer.
8	To study and understand the S-R Flip Flop in digital circuits.

Text Books

S.N	Title	Authors	Edition	Publisher
1	Microelectronics Circuits	Sedra and Smith	7 th	Oxford University Press
2	Millman's Integrated Electronics	Millman, Halkias & Parikh	2 nd	Mc Graw Hill
3	Digital Logic & Computer Design	M. Morris Mano	1 st	Pearson

Reference Books

S.N	Title	Authors	Edition	Publisher
1	Electronic Devices and Circuit Theory	Boylestad & Nashelsky.	9 th	Pearson
2	Electronic Principles	Albert Paul Malvino	9 th	TMH
3	Electronics Circuits: Discrete & integrated	Schilling, Belove	3 rd	MC Graw Hill

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Computer Science & Business Systems

SECOND SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24CB205T	Fundamentals of Economics	2	-	-	2				
						10	10	30	50

Course Objectives	Course Outcomes
<ol style="list-style-type: none">To develop students critical thinking and analytical abilities around concepts of economicsTo make students understand key economic principles, micro economics, macroeconomics, economics theories and relate it to the industry and economy of country	<ol style="list-style-type: none">Apply the concept of demand analysis and consumer behaviour.Apply concept of theory of Production and market structures in industry.Interpret the concept of national income. Interpret business cycles and monetary and fiscal policy of government.

Unit I	[9 Hrs]
Microeconomics: Principles of Demand and Supply - Supply Curves of Firms - Elasticity of supply ; Demand Curves of Households - Elasticity of Demand - Welfare Analysis - Consumers' and Producers' Surplus - Price Ceilings and Price Floors; Consumer Behaviour - Axioms of Choice - Budget Constraints and Indifference Curves	
Unit II	[9 Hrs]
Applications - Tax and Subsidies - Theory of Production - Production Function - Cost Minimization; Cost Curves - Total, Average and Marginal Costs - Long Run and Short Run Costs; Equilibrium of a Firm Under Perfect Competition; Monopoly and Monopolistic Competition.	
Unit III	[8 Hrs]
Macroeconomics: National Income and its Components - GNP, NNP, GDP, NDP; Consumption Function- Money - Definitions; Demand for Money - Transactionary and Speculative Demand; Business Cycles - Monetary and Fiscal Policy - Central Bank and the Government	

Text Books

S.N	Title	Authors	Edition	Publisher
1	Microeconomics	Pindyck, Robert S.	8 th	Pearson
2	Macroeconomics	Dornbusch, Fischer	11 th	McGraw-Hill
3	Economics	Samuelson, Nordhaus	20 th	McGraw-Hill

Reference Books

S.N	Title	Authors	Edition	Publisher
1	Intermediate Microeconomics	Hal R, Varian	8 th	W. W. Norton & Company
2	Principles of Macroeconomics, N. Gregory Mankiw.	N. Gregory Mankiw.	7 th	Worth Publishers

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Computer Science & Business Systems

SECOND SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24CB206T	Business Communication & Value Science - II	2	--	--	2	10	10	30	50

Course Objectives	Course Outcomes
<ul style="list-style-type: none"> Develop effective writing, reading, presentation and group discussion skills. Help students identify personality traits and develop as a better team player Introduce them to concepts of morality, behavior, diversity and inclusion 	Students will be able to: <ul style="list-style-type: none"> Understand and apply tools of structured written communication, basics of presentation and techniques of reading skills Understand concept of morality, diversity and importance of feedback. Identify individual personality types and diversity to communicate effectively in teams.

Unit I	[9 Hrs]
Leadership oriented Learning (LOL): Creating and launching an E-magazine. Team based project on social issue (towards LOL) Basics of presentation and effective techniques to make presentations. Public speaking - Approach, Voice and Confidence. Creating impactful communication through Ad design Making and delivery of presentation on NGO (social cause)	

Unit II	[9 Hrs]
Reading Comprehension and Tools of Structured Written Communication: Tools of reading comprehension - scanning, skimming and intensive reading. Common errors, Good and bad Writing, punctuation rules, Effective use of words - one word for many Effective use of words – analogies Paragraph arrangement	

Unit III	[8 Hrs]
Understanding team and diversity: Understanding team, and introduction to Belbin's team roles. Concept of outward and inward behaviour. Big 5 personality traits. Group Discussion - do, dont's and importance. Concept of morality and diversity in society Correlate morality and diversity with NGO project. Expression through Storytelling, skits and blogs.	

Reference Books

S.N	Title	Authors	Edition	Publisher
1	Organisational Behaviour	Fred Luthans	12th	McGraw Hill
2	Oxford Guide to effective writing and speaking	Seely, John	2009 Edition	Oxford Press
3	Advertising and IMC: Principles and Practice	Moriarty, N. Mitchell, W, Wells	2016	Pearson Education India

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SECOND SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24CB207T	Environmental Sciences	2	--	--	-	Audit			

Course Objectives	Course Outcomes
<ul style="list-style-type: none"> This course provides an integrated and interdisciplinary approach to the study of environment and solutions to environmental problems. This course will spread awareness among the students about environmental issues and shall alert them to find solutions for sustainable development 	<ul style="list-style-type: none"> Students will be able to explain about importance of people's awareness about Environment Student will explain natural sources available and its importance. Student will be able to explain about Ecosystem and pollution problem. Students will be able to categorize and describe Biodiversity. Students will be able to explain about significance of environmental laws.

Unit I	[5 Hrs]
Introduction: Definition, scope and importance; Need for public awareness -Institutions in environment, people in environment.	
Unit II	[5 Hrs]
Natural Resources: Renewable and non-renewable and associated problems; Role of an individual in conservation of natural resources; equitable use of resources for sustainable lifestyles.	
Unit III	[8 Hrs]
Ecosystems and Environment Pollution: Concept of an ecosystem - understanding ecosystems, ecosystem degradation, resource utilization, Structure and functions of an ecosystem- producers, consumers) and decomposers.Ecological succession; Food chains, food webs and ecological pyramids; Ecosystem types - characteristic features, structure:, and functions of forest, grassland, desert and aquatic ecosystems. Pollution-Definition; Causes, effects and control measures of air, water, soil, marine, noise and thermal pollutions and nuclear hazards. Role of individual and institutions in prevention of pollution.	
Unit IV	[6 Hrs]
Bio-diversity: Introduction - biodiversity; at genetic, species and ecosystem levels Bio-geographic classification of India Value of biodiversity - Consumptive use value, productive use .value, social, ethical, moral, aesthetic and optional value of biodiversity. India as a mega-diversity nation; hotspots of biodiversity Threats to bio-diversity - habitat loss, poaching of wildlife, man-wild life conflicts. Common endangered and endemic plant and animal species of India. Insitu and Exsitu conservation of biodiversity.	
Unit V	[6 Hrs]
Social Issues and Environmental Laws: Concept of Sustainable development, Water conservation, rain water harvesting, watershed management, Resettlement and rehabilitation of people; its problems and concerns. Environmental Laws (brief idea only) Environment Protection Act, Air (Prevention and Control of Pollution) Act, Water (Prevention and control of Pollution) Act, Wildlife Protection Act, Forest Conservation Act, Issues involved in enforcement of environmental legislation. Different government initiatives (brief idea only)- National ambient air quality standard 2009, Swachh Bharat Abhiyan, National afforestation program and Act- 2016, National River conservation plan and National Ganga River basin authority, Formation of National Green Tribunal.	

Text Books

S.N	Title	Authors	Edition	Publisher
1	A Text Book of Environmental Studies for Undergraduate Courses	I Erach Bharucha, University	1 st	Press (India) Pvt. Ltd.
2	Environmental Studies	Dr.Suresh Dhameja,	1 st	S.K.Kataria and Sons
3	Environmental Studies	J.P.Sharma	1 st	University Science Press

Reference Books

S.N	Title	Authors	Edition	Publisher
1	Fundamental concepts in Environmental studies	D.D.Mishra	1 st	S.Chand
2	Environmental Problems and solutions	D.K.Asthana	3 rd	Mira Asthana, S.Chand
3	Bio-Diversity	M.S.Swaminathan	1 st	Macmillan India Ltd

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CIVIL ENGINEERING

GROUP 2: SEMESTER I

Sr. No	Course Category	Course Code	Course Title	Hours per Week			Credits	Maximum Marks				No of Hours for ESE
				L	T	P		Mid-Sem Examination	Continual Assessment	End Sem Examination	Total	
1	BSC	24CV101T	Applied Physics	2	-	-	2	10	10	30	50	1.5
2	BSC	24CV101P	Applied Physics Lab	-	-	2	1	-	25	25	50	-
3	BSC	24CV102T	Linear Algebra and Calculus	3	1	-	4	20	20	60	100	3
4	PCC	24CV103T	Engineering Mechanics	3	1	-	4	20	20	60	100	3
5	PCC	24CV103P	Engineering Mechanics Lab	-	-	2	1	-	25	25	50	-
6	ESC	24CV104T	Logic building with C	3	-	-	3	20	20	60	100	3
7	ESC	24CV104P	Logic building with C Lab	-	-	2	1	-	25	25	50	-
8	AEC	24CV105P	Business Communication Skills I Lab	-	-	2	1	-	25	25	50	-
9	ESC	24CV106T	Design Thinking	2	-	-	2	10	10	30	50	1.5
10	SEC	24CV141P	Career Development I	-	-	2	1	-	50	-	50	-
11	CC	24CV107T	Co-curricular Courses - I	2	-	-	2	-	50	-	50	-
Total				15	2	10	22	80	280	340	700	12

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CIVIL ENGINEERING

GROUP 2: SEMESTER II

Sr. No	Course Category	Course Code	Course Title	Hours per Week			Credits	Maximum Marks				No of Hours for ESE
				L	T	P		Mid-Sem Examination	Continual Assessment	End Sem Examination	Total	
1	BSC	24CV201T	Applied Chemistry	2	-	-	2	10	10	30	50	1.5
2	BSC	24CV201P	Applied Chemistry Lab	-	-	2	1	-	25	25	50	-
3	BSC	24CV202T	Statistics and Transforms	3	1	-	4	20	20	60	100	3
4	ESC	24CV203T	Engineering Graphics	2	-	-	2	10	10	30	50	1.5
5	ESC	24CV203P	Engineering Graphics Lab	-	-	2	1	-	25	25	50	-
6	ESC	24CV204T	Basics of Electrical & Electronics	2	-	-	2	10	10	30	50	1.5
7	ESC	24CV204P	Basics of Electrical & Electronics Lab	-	-	2	1	-	25	25	50	-
8	PCC	24CV205T	Construction Materials & Techniques	3	-	-	3	20	20	60	100	3
9	AEC	24CV206P	Business Communication Skills – II Lab		-	2	1	-	25	25	50	-
10	IKS	24CV207T	Indian Knowledge System	2	-	-	2	10	10	30	50	1.5
11	SEC	24CV241P	Career Development – II		-	2	1	-	50	-	50	-
12	CC	24CV208T	Co-curricular Courses – II	2			2	-	50	-	50	-
Total				16	1	10	22	80	280	340	700	12

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FIRST SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24CV101T	Applied Physics	2	--	--	2	10	10	30	50

Course Objectives	Course Outcomes
This course is intended <ul style="list-style-type: none">To understand the basic laws of physics and their application in engineering and technology.To develop scientific temper and analytical capability.	Students will be able to <ul style="list-style-type: none">Explain the structure of Crystals.Understand the types and applications of Magnetic Materials.Distinguish the types of solids on the basis of conductivity and acquire a brief idea about semiconductors and its applications

Unit I CRYSTAL STRUCTURE	[10 Hrs]
Space lattice, Crystal structure, Unit cell, Types of unit cell, Characteristics of SC, BCC and FCC unit cell, Miller Indices, Interplanar distance and its derivation, Diffraction of X-rays - Braggs' Law and its applications.	
Unit II MAGNETIC MATERIALS	[08 Hrs]
Terms and definitions, Types of magnetic materials, characteristics of Diamagnetic, Paramagnetic and Ferromagnetic Materials, Applications of soft and hard magnetic materials.	
Unit III SEMICONDUCTORS	[08 Hrs]
Free electron Theory (qualitative idea) and its features; Idea of band formation in solids, Classification of solids: Metal, Insulator, Semiconductor; Fermi Energy, Types - Intrinsic and Extrinsic Semiconductors, Application of Extrinsic Semiconductors - p-n junction diode	

Text Books

S.N	Title	Authors	Edition	Publisher
1	Fundamentals of Physics	David Halliday, Robert Resnick and Jerle Walker	8 th extended	John-Wiley India
2	Electronic Engineering Materials and Devices	John Allision	10 th edition reprint	TMH
3	Engineering Physics	M. N. Avadhanulu	Latest edition	S. Chand & Co.

Reference Books

S.N	Title	Authors	Edition	Publisher
1	Solid State Physics	Charles Kittel	Eighth edition	John Wiley & Sons, Inc
2	Solid State Physics	R.L. Singhal	Eighth edition	Kedarnath Ramnath
3	Quantum Mechanics	Schiff	First Edition	McGraw-Hill Book Company, Inc.

Online Resources

1	https://www.britannica.com/science/semiconductor#ref233890
2	https://www.geeksforgeeks.org/semiconductors/
3	https://www.sciencedirect.com/topics/chemistry/magnetic-material
4	https://www.livescience.com/33816-quantum-mechanics-explanation.html

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**FIRST SEMESTER**

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24CV101P	Applied Physics Lab	--	--	2	1	-	25	25	50

Course Objectives	Course Outcomes
This course is intended <ul style="list-style-type: none">To understand the basic laws of physics and their application in engineering and technology.To develop scientific temper and analytical capability.	Students will be able to <ul style="list-style-type: none">Verify principles/laws by selecting and using proper measuring instruments interpret result and draw conclusions.Find various parameters using various properties of light.Apply the concepts of Semiconductors and Magnetic Materials.

Expt. No.	Title of the experiment
1	Study of semiconductor diodes
2	Study of Phenomenon of Diffraction
3	Study of Interference
4	Study of Birefringence
5	Guoy's Balance Method a) Determination of Magnetic Susceptibility of different magnetic materials. b) Identification of different types of Magnetic Materials
6	Study of Planck's Constant by means of LED
7	Determination of Curie Temperature of Ferromagnetic Material.
8	Study of Transistors.
9	Study of Hall Effect.
10	Experiment on 'Quantum Eraser'.
11	Demonstration of phenomena of Optics using Laser.

Text Books

S.N	Title	Authors	Edition	Publisher
1	Fundamentals of Physics	David Halliday, Robert Resnick and Jerle Walker	8e extended	John-Wiley India
2	A Textbook of Engineering Physics	Dr. M. N. Avadhanulu, Dr. P. G. Kshirsagar	Latest edition	S. Chand Publication.
3	Principles of Physics	David Halliday, Robert Resnick, Jearl Walker	10th Edition	John Wiley and Sons

Reference Books

S.N	Title	Authors	Edition	Publisher
1	Solid State Physics	Charles Kittel	Eighth edition	John Wiley & Sons,
2	Solid State Physics	R.L. Singhal	Eighth edition	Kedarnath Ramnath
3	University Physics	Young and Freedman	Fifteenth edition	Pearson Education

Online Resources

1	https://www.britannica.com/science/semiconductor#ref233890
2	https://www.geeksforgeeks.org/semiconductors/
3	https://www.sciencedirect.com/topics/chemistry/magnetic-material

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Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24CV102T	Linear Algebra and Calculus	3	1	-	4	20	20	60	100

Course Objectives	Course Outcomes
The goal of this paper is to introduce advanced concepts of 1. Matrix Algebra 2. Multivariate Calculus 3. Differential Equations Vector calculus.	Students will be able to- 1. Solve the system of linear equations using matrices. 2. Identify engineering problems related to Matrices: Eigen value & Eigen vectors & Functions of Matrices. 3. Understand the concept of multivariate calculus & apply the knowledge of applications of differentiation. 4. Solve first order and higher order differential equations by various methods and apply these techniques to solve problems in engineering. 5. Implement concept of vector calculus to solve engineering problems.

Unit I : Matrix Algebra	[8Hrs]
Introduction to matrices, Rank of a matrix, Consistency of system of linear equations, Linear and orthogonal transformations, Linear dependence of vectors.	
Unit II: Matrices	[8Hrs]
Characteristics equation, Cayley- Hamilton Theorem, Eigen values and Eigen vectors, Reduction to diagonal form, Reduction of quadratic form to canonical form by orthogonal transformation, Sylvester's theorem.	
Unit III: Multivariate Calculus	[8Hrs]
Functions of several variables and their partial derivatives, Chain rule and total differential coefficient, Jacobians and its properties, Maxima – Minima of functions of two variables, Lagrange's method of undetermined multipliers.	
Unit IV: Differential Equations	[8Hrs]
First order and first degree differential equations: Linear, Higher order differential equations with constant coefficients, Method of variation of parameters, Cauchy's homogeneous linear equation, Applications of differential equations.	
Unit V: Vector Calculus	[8Hrs]
Vector differentiation, Gradient, Directional derivatives, Divergence and Curl with their physical interpretation Solenoidal and irrotational motions, Scalar potential, Line integral & Work done.	

Text Books

S.N	Title	Authors	Edition	Publisher
1	Higher Engineering Mathematics	B. S. Grewal		Khanna Publishers, New Delhi.
2	A Text Book of Applied Mathematics (Vol I & II)	P. N. Wartikar and J. N. Wartikar		Pune Vidyarthi Griha Prakashan, Pune
3	Higher Engineering Mathematics	H. K. Das and Er. Rajnish Verma		S. Chand & CO. Pvt. Ltd., New Delhi

Reference Books

S.N	Title	Authors	Edition	Publisher
1	Higher Engineering Mathematics	B.V. Ramana,	11th reprint, 2010.	Tata McGraw Hill New Delhi
2	A Text Book of Engineering Mathematics	Peter O' Neil		Thomson Asia Pvt. Ltd., Singapore.
3	Advanced Engineering Mathematics	Erwin Kreyszig		John Wiley & Sons, New York.

Online Resources

1	https://archive.nptel.ac.in/courses/111/101/111101115/#
2	https://www.coursera.org/learn/matrix-algebra-engineers

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FIRST SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24CV103T	Engineering Mechanics	3	1	-	4	20	20	60	100

Course Objectives	Course Outcomes
<ol style="list-style-type: none"> To develop students' ability to analyze the problems involving forces, moments with their applications. To analyse the member forces in trusses To make students to learn the effect of friction on different planes To develop the student's ability to find out the centre of gravity and moment of inertia and their applications. To make the students learn about kinetics and their applications. 	<ol style="list-style-type: none"> Compute the resultant of a force system and resolution of a force Comprehend the action for forces, moments, and other types of loads on rigid bodies and compute the reactive forces. Analyse the statically determinate trusses and Compute frictional resistance offered by different planes Locate the centroid and compute the area moment of inertia of sections Analyze the bodies in motion

Unit I	[8 Hrs]
Resultant of coplanar force system: Basic dimensions and units, Classification of force system, principle of transmissibility of a force, composition of forces, resolution of a force, moment, Principle of moments, couple, Resultant of coplanar concurrent force	
Unit II	[8 Hrs]
Equilibrium of coplanar force system: Free body diagrams, Equilibrium of coplanar concurrent force system, Lami's theorem, Equilibrium of coplanar parallel force system, types of beams, types of loadings, types of supports, Equilibrium of coplanar non-concurrent force system, support reactions of statically determinate beams subjected to various types of loads, Numerical examples.	
Unit III	[7 Hrs]
Analysis of Trusses: Introduction, Classification of trusses, analysis of plane perfect trusses by the method of joints, Numerical examples. Friction: Introduction, laws of Coulomb friction, equilibrium of blocks on horizontal plane, equilibrium of blocks on inclined plane, ladder friction, wedge friction Numerical examples.	
Unit IV	[7 Hrs]
Centroid of Plane areas: Introduction, centroids standard shapes and simple built up sections, Numerical examples. Area Moment of inertia of plane areas: Introduction, Rectangular moment of inertia, polar moment of inertia, product of inertia, radius of gyration, parallel axes theorem, perpendicular axis theorem, Area moment of inertia of standard shapes, Area moment of inertia of simple built up sections, Numerical examples.	
Unit V	[8 Hrs]
Kinetics: Introduction, D'Alembert's principle of dynamic equilibrium and its application in-plane motion and connected bodies including pulleys & surfaces, Numerical examples. Impact of Elastic Bodies: Impulse momentum theorem, Work Energy expression, Numerical examples	

Text Books

S.N	Title	Authors	Edition	Publisher
1	Engineering Mechanics	Timoshenko S, Young D. H., Rao J. V	-	McGraw Hill
2	Engineering Mechanics	Bhavikatti S S	-	New Age International
3	Engineering Mechanics (Statics & Dynamics)	P. B. Kulkarni & M. P. Singh	-	

Reference Books

S.N	Title	Authors	Edition	Publisher
1	Mechanics for Engineers, Statics and Dynamics	Beer F.P. and Johnston E. R.	-	Pearson Press
2	Engineering Mechanics	Bhavikatti S S	-	New Age International

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Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24CV103P	Engineering Mechanics Lab	-	-	2	1	-	25	25	50
Course Objectives		Course Outcomes							
-		At the end of the course, students will be able to- 1. Apply the basic concepts of applied mechanics for solution of problems on planar force system. 2. Analyze pin jointed truss frame structure and beam structure analytically and graphically. 3. Evaluate the dynamic variables of kinetics of particles and simple lifting machine							

Minimum EIGHT experiments to be performed from the list as below

Expt. No.	Title of the experiment
1	To find determine the support reactions of a Simply Supported Beam experimentally and analytically.
2	To determine the forces in the members of a Jib Crane Apparatus experimentally and graphically.
3	To determine the coefficient of friction between two surfaces of different material on Plane Friction Apparatus.
4	To determine the coefficient of friction of Coil Friction Apparatus.
5	To determine the forces in members of a Shear Leg Apparatus experimentally and manually.
6	To determine the mass moment of inertia of a fly wheel using Fly Wheel Apparatus
7	To determine efficiency and law of machine of Differential Axle & Wheel machine.
8	To determine efficiency and Law of machine of Single Purchase Crab machine.
9	To determine efficiency and Law of machine of Double Purchase Crab machine.
10	To find support reactions of a simply supported beam using graphical method and hand calculation.

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FIRST SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24CV104T	Logic Building With C	3	-	-	3	20	20	60	100

Course Objectives	Course Outcomes
This course is intended <ul style="list-style-type: none"> ● To make the student learn a programming language. ● To learn problem solving techniques. ● To teach the student to write programs in C and to solve the problems 	Students will be able to <ul style="list-style-type: none"> ● Understand Fundamentals of Computers and C programming language ● Implement basic programs of decision making and loop control structure ● Implement programs using functions and pointers ● Understand fundamentals of arrays and strings ● Understand concept of structures and various operations on files

Unit I	[6 Hrs]
Fundamentals of Computers: internal structure of Computer, its assembly, Software and its types, Translators, programming languages. Introduction and Structure of 'C' Programming: Algorithms and Flowchart, Characteristics of algorithm, Data types, Operators, Input-output Functions	
Unit II	[8Hrs]
Decision Making Control Structures: if, if-else, nested if statements, Conditional operators (? Operator), Switch Case Statement Loop Control Structures: for loop, while loop, do-while loop, break and continue statement	
Unit III	[8Hrs]
Functions: Introduction to functions, why use function, Scope rule of function, implementation of functions, use of library function (math.h), recursion. Pointers: declaration & its use, Types of Pointers, Call by Value, Call by Reference.	
Unit IV	[7Hrs]
One Dimension and Two Dimension arrays: creation of array, declaration, initialization and displaying the elements, linear search and binary search. Read & display the matrix on the screen, matrix manipulation operations like addition, multiplication. Strings: Introduction to string, basic operations on string strlen, strcpy, strcmp, strcmp.	
Unit V	[6Hrs]
Structures: Introduction, declaration, initialization and its use. File handling in C: File opening modes, File operations-File Opening, Closing File, read content of file, Write onto the file, Copy one file to another file.	

Text Books

S.N	Title	Authors	Edition	Publisher
1	Programming in ANSI C	E. Balguruswamy	2 nd	Tata Mc-Graw Hill
2	Programming Techniques Through 'C'	M. G. Venkateshmurthy	2 nd	Pearson
3	LET US 'C'	Yashwant P. Kanetkar	1 st	BPB
4	Programming With C	Byron S. Gottfried	2 nd	Schaum Series
5	How to solve it by Computer	R.G. Dromey	1 st	Pearson Education

Reference Books

S.N	Title	Authors	Edition	Publisher
1	The Complete Reference C	Herbert Schildt	4 th	Tata Mc-Graw Hill
2	The 'C' programming language	Kernighan and Ritchie	1 st	Prentice Hall
3	Programming and Problem Solving	M. Sprankle	2 nd	Pearson Education

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CIVIL ENGINEERING

FIRST SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24CV104P	Logic Building With C Lab	-	-	2	1	-	25	25	50

Course Objectives	Course Outcomes
<p>This course is intended</p> <ul style="list-style-type: none">● To make the student learn a programming language.● To learn problem solving techniques.● To teach the student to write programs in C and to solve the problems	<p>Students will be able to</p> <ul style="list-style-type: none">● Understand Fundamentals of Computers and C programming language● Implement basic programs of decision making and loop control structure● Implement programs using functions and pointers● Understand fundamentals of arrays and strings● Understand concept of structures and various operations on files

Expt. No.	List of Experiments
1	To study Fundamentals of Computer and Introduction to Programming Languages
2	To study Control Statements (Conditional): if and its Variants, s witch
3	To study Control Statements (Looping): while, do While, for Loop, continue & break
4	To study Arrays, One Dimensional Array: Declaration and Initialization, Accessing Array Elements
5	To study Two Dimensional Array: Declaration and Initialization, Accessing Array Elements, Matrix operations
6	To study Strings: Read & Write, "String.h" Predefined Functions
7	To study Functions: Definition, Syntax, Terminology, Function Declaration, Classification (Arguments and Return Type)
8	To study Pointers: Declarations, Types, Parameter passing techniques
9	To study structures: declaration, initialization, accessing structure members
10	To study Files: Definition, Opening, Closing of Files, Reading and Writing of Files

Text Books

S.N	Title	Authors	Edition	Publisher
1	Programming in ANSI C	E. Balguruswamy	2 nd	Tata Mc-Graw Hill
2	Programming Techniques Through 'C'	M. G. Venkateshmurthy	2 nd	Pearson
3	LET US 'C'	Yashwant P. Kanetkar	1 st	BPB
4	Programming With C	Byron S. Gottfried	2 nd	Schaum Series
5	How to solve it by Computer	R.G. Dromey	1 st	Pearson Education

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S.N	Title	Authors	Edition	Publisher
1	The Complete Reference C	Herbert Schildt	4 th	Tata Mc-Graw Hill
2	The 'C' programming language	Kernighan and Ritchie	1 st	Prentice Hall
3	Programming and Problem Solving	M. Sprankle	2 nd	Pearson Education

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FIRST SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24CV105P	Business Communication Skills I Lab	-	-	2	1	-	25	25	50

Course Objectives	Course Outcomes
<p>This course is intended</p> <ul style="list-style-type: none">To empower students to develop a career oriented mindset while harnessing the power of LSRW skills.	<p>Students will be able to</p> <ol style="list-style-type: none">Apply verbal and non-verbal skills to confidently and effectively deliver presentations.Prepare themselves for overall language ability through listening and reading tasks.Demonstrate formal writing skills.Draft impactful resumes and cover letters.Prepare themselves for personal interviews.

Expt. No.	Title of the experiment
1	Presentation Skills
2	Poster Making (Product/ Event)
3	Reading Comprehension for Competitive Exams.
4	Writing Skills for Academic Purposes.
5	Listening Skills I
6	Business Correspondence I
7	Resume Writing and Cover Letter
8	Mock Interviews

Reference Books

S.N	Title	Authors	Edition	Publisher
1	Communication Skills for Engineers	C. Muralikrishna & Sunita Mishra	2nd Edition, 2011	Pearson India Education Services
2	Communication Skills	Dr. L. Bisen, Dr. B. Agrawal & Dr. N. T. Kalyani	1st Edition, 2021	Himalaya Publishing House
3	Barron's IELTS Superpack	Lin Lougheed	2012	Barrons Educational Series

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FIRST SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24CV106T	Design Thinking	2	-	-	2	10	10	30	50

Course Objectives	Course Outcomes
<ol style="list-style-type: none">Learn design thinking concepts and principlesUse design thinking methods in every stage of the problemLearn the different phases of design thinkingApply various methods in design thinking to different problems	<ol style="list-style-type: none">Define key concepts of design thinkingPractice design thinking in all stages of problem solvingApply design thinking approach to real world problems

Unit I	[10 Hrs]
INTRODUCTION: Why Design? - Four Questions, Ten Tools - Principles of Design Thinking - The process of Design Thinking - How to plan a Design Thinking project. UNDERSTAND, OBSERVE AND DEFINE THE PROBLEM: Search field determination - Problem clarification - Understanding of the problem - Problem analysis- Reformulation of the problem - Observation Phase - Empathetic design - Tips for observing - Methods for Empathetic Design - Point-of-View Phase - Characterization of the target group - Description of customer needs.	
Unit II	[10 Hrs]
IDEATION AND PROTOTYPING: Ideate Phase - The creative process and creative principles - Creativity techniques - Evaluation of ideas - Prototype Phase - Lean Startup Method for Prototype Development - Visualization and presentation techniques.	
Unit III	[10 Hrs]
TESTING AND IMPLEMENTATION :Test Phase - Tips for interviews - Tips for surveys - Kano Model - Desirability Testing - How to conduct workshops - Requirements for the space - Material requirements - Agility for Design Thinking. FUTURE: Design Thinking meets the corporation - The New Social Contract - Design Activism - Designing tomorrow.	

Text Books

S.N	Title	Authors	Edition	Publisher
1.	Handbook of Design Thinking - Tips & Tools for how to design thinking	Christian Mueller-Roterberg	2021	Independently Published
2.	Change by Design: How Design Thinking Transforms Organizations and Inspires Innovation	Tim Brown	2019	HarperCollins

Reference Books

S.N	Title	Authors	Edition	Publisher
1.	Design Thinking for Strategic Innovation	Idris Mootee		Wiley

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GROUP II: SEMESTER II

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24CV201T	Applied Chemistry	2	-	-	2	10	10	30	50

Course Objectives	Course Outcomes
<p>This course is intended</p> <ol style="list-style-type: none">To acquaint the students with the basic phenomenon, concepts, knowledge and understanding of the fundamental principles of chemistry.To develop necessary skills and abilities to succeed in engineering education, research, Industry, environment and social context.	<p>Students will be able to</p> <ul style="list-style-type: none">Analyse and Compare parameter necessary for various treatment of water.Apply the Basic concepts of Electrochemistry in protection of engineering materialApply the principles of green Chemistry for sustainable development and analyse the impact of industrial pollution and its control.

Unit I Water Technology-	[9 Hrs]
Hardness of water, Numericals on Hardness, Industrial water treatment- Boiler Troubles- Carry over, Caustic embrittlement, Boiler corrosion, Scale & Sludge formation External treatments - Softening of water by Zeolite process and De-mineralization process, Numericals on Zeolite process. Desalination of sea water- Electro dialysis and Reverse Osmosis process-Principle, methods and advantages	
Unit II Electrochemical Phenomenon & Corrosion	[9 Hrs]
Introduction- brief idea about electrochemical & galvanic series; Electrolytic & Electrochemical Cell; Construction, working & Advantages of Li Ion Battery, Fuel Cell, Photochemical Cell. Corrosion- Introduction, Factors affecting corrosion, Types of corrosion, Corrosion prevention- Material & Design selection & Cathodic protection	
Unit III Green Chemistry & Waste Management-	[8 Hrs]
Green Chemistry- Introduction, Principles of Green Chemistry with example, Green Reagents- Super Critical Fluid (CO ₂)- Properties and Applications, Green Crackers- Introduction, Advantages, Bio Catalysis- Definition and examples. Carbon Credit, Carbon Sequestration Waste Management- Solid, Nuclear & e-waste: Sources, Impact & its control	

Text Books

S.N	Title	Authors	Edition	Publisher
1	Text Book of Engineering Chemistry	S.S. Dara,	New	S. Chand and Company Ltd. New Delhi.
2	Textbook of Engineering Chemistry	P.C. Jain and Monica Jain	Sixth	Dhanpat Rai and Sons, New Delhi.
3	E-waste Recycling and Management	Anish Khan, Inamuddin, Abdullah M. Ansiri	Ist	Springer

Reference Books

S.N	Title	Authors	Edition	Publisher
1	A Text book of Engineering Chemistry	Shashi Chawla	Ist	DhanpatRai& Sons, New Delhi
2	Applied Chemistry	N. Krishnamurthy:P. Vallinavagam. And K. Jeysubramanian	Ist	TMH
3	Environmental Chemistry	B. K. Sharma	Ist	Krishna Prakashan Media (P) Ltd.

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GROUP II : SEMESTER II

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24CV201P	Applied Chemistry Lab	-	-	2	1	-	25	25	50

Course Objectives	Course Outcomes
<ol style="list-style-type: none">To Make the students aware about various techniques available for Analysis of Material.To Impart the skill of handling chemicals and apparatus.	<ul style="list-style-type: none">List the proper procedures and regulations for safe handling and use of chemicals and can follow the proper procedures and regulations for safe handling when using different instruments.Demonstrate the use of modern instrumentation, classical techniques, and properly record the results of their experiment.Identify and solve chemical problems and explore new areas of research especially in fuel and lubricants.

Expt. No.	Experiments based on Performance - Any FOUR
1	Determination of Hardness (Total, Permanent & Temporary) of Water Sample by Complexometric method
2	Determination of heavy metal from industrial effluent by colorimeter
3	Determination of Flash point by using Cleveland Open cup flash point apparatus / Abel's Close cup apparatus / Pensky Marten close cup apparatus
4	Determination of viscosity of lubricating oil at different temperature by Redwood Viscometer No.1 OR No. 2
5	Proximate analysis of coal -Determination of % of Moisture, Volatile Matter and Ash in coal sample
Demonstration - Any ONE	
1	Measurement of pH of sample from different sources by Digital pH Meter.
2	Determination of turbidity from industrial effluent.
Virtual Experiment - Any ONE	
1	Determination of Alkalinity of Water Sample.
5	Estimation of DO content of Water sample.
Activity - Any ONE	
1	Study of nearby industrial chemicals and safety measures.
2	Study of Air /Water Pollution Level at different Sites in Nagpur City.
3	Visit to Water Treatment Plant/Effluent Treatment Plant

Text Books

S.N	Title	Authors	Edition	Publisher
1	A Textbook on experiment and calculation in engineering chemistry	S.S. Dara	9th	S.Chand

Reference Books

S.N	Title	Authors	Edition	Publisher
1	Applied Chemistry theory and practical	O.P. Virmani and A.K. Narular	1st	New Age International
2	Laboratory Manual on Engineering Chemistry	Dr. Subdharani	1st	Dhanpat Rai Publishing

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GROUP II : SEMESTER II

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24CV202T	Statistics and Transforms	3	1	-	4	20	20	60	100

Course Objectives	Course Outcomes
To inculcate and strengthen students with adequate knowledge of <ul style="list-style-type: none"> Statistics Integral Transforms 	Students will be able to: <ul style="list-style-type: none"> Apply numerical integration methods and find analytical solutions to difference equations. Identify, analyse and solve statistical problems. Identify and solve practical problems by using Laplace Transforms. Solve and analyze practical problems with their physical and graphical interpretation by using Laplace Transforms. Apply Fourier Transform to analyse input-output relationships of signals.

Unit I	[8 hrs]
Finite Differences: Operator E and delta, Factorial Polynomial, Numerical integration: Trapezoidal rule, Simpson's 1/3 rule, Simpson's 3/8 rule, Difference equations with constant coefficients.	
Unit II	[8 hrs]
Statistics: Fitting of straight line, parabola and exponential curves by method of least squares, Coefficient of correlation and lines of regressions, Rank correlation, multiple regression.	
Unit III	[8 hrs]
Laplace Transform –I : Definition, properties, Evaluation of Integrals by Laplace Transform.	
Unit IV	[8 hrs]
Laplace Transform –II : Inverse Laplace Transform and its properties, Convolution theorem(Statement only), Unit Step Function, Periodic function, Applications of Laplace Transform.	
Unit V	[8 hrs]
Fourier Series and Fourier Transform: Introduction to Fourier series , Concept of even and odd function , Definition, properties, Fourier Integral Theorem, Relation with Laplace Transform, Applications of Fourier Transform.	

Text Books

S.N	Title	Authors	Edition	Publisher
1	Higher Engineering Mathematics	B. S. Grewal	40 th	Khanna Publishers, New Delhi.
2	Higher Engineering Mathematics	H. K. Dass and Er. Rajnish Verma		S. Chand & Co. Pvt. Ltd., New Delhi.
3	Advanced Engineering Mathematics	Erwin Kreyszig		John Wiley & Sons, New York.

Reference Books

S.N	Title	Authors	Edition	Publisher
1	Higher Engineering Mathematics	B. V. Ramana		Tata McGraw-Hill Publications, New Delhi.
2	Advanced Engineering Mathematics	C. R. Wylie & L. C. Barrett		Tata McGraw-Hill Publications, New Delhi.
3	A Text Book of Engineering Mathematics	Peter O' Neil		Thomson Asia Pvt. Ltd., Singapore.
4	A Text Book of applied Mathematics- Volume -II	P.N. Wartikar & J.N. Wartikar		Poona Vidyarthi Griha Prakashan

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Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24CV203T	Engineering Graphics	2	-	-	2	10	10	30	50

Course Objectives	Course Outcomes
<ul style="list-style-type: none"> To expose the students to the area of Engineering Graphics. To enable the student to communicate effectively through technical drawings. 	Students will be able to <ul style="list-style-type: none"> Recognize the application of drawing standards, construct engineering curves and orthographic projections of lines. Construct orthographic projections of Planes and solids. Apply concepts of projections and convert pictorial isometric views to orthographic views. And vice versa.

Unit I	[9Hrs]
Introduction to Engineering Graphics: Types of lines, standard layout, Lettering, Standard representation of dimensions. Types of Curves - Ellipse, Parabola, Hyperbola, Cycloid, involute and Spiral. Construction of Ellipse (Arcs of circles method), Parabola (Rectangle Method) and Hyperbola (Rectangle Method) Introduction to Orthographic projections- Projection of Points and Lines in the first quadrant. [Problem-solving on lines inclined to one reference plane].	
Unit II	[9Hrs]
Projection of Planes- Projection of planes in the first quadrant. Problem-solving on planes inclined to one reference plane. Projection of Solids- Projection of solids in the first quadrant. Problem-solving for the solids with an axis inclined to one reference plane.	
Unit III	[8Hrs]
Introduction to Orthographic drawings: Conversion of Pictorial / Isometric drawings of machine components to Orthographic drawings. Introduction to Isometric drawings: Isometric concepts of Isometric axes, Isolines, Isometric scale, Isometric projection and Isometric view. Construction of Isometric drawings and views from a given orthographic view.	

Text Books

S.N	Title	Authors	Edition	Publisher
1.	Engineering Drawing	N. D. Bhatt	-	Charotor Publishing House
2.	Engineering Drawing	D. N. Johle	-	Tata McGraw-Hill Publishing

Reference Books

S.N	Title	Authors	Edition	Publisher
1.	Fundamentals of Engineering Drawing	Luzadder Warren J, Duff John	-	PHI publications

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GROUP II: SEMESTER II

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24CV203P	Engineering Graphics Lab	-	-	2	1	-	25	25	50

Course Objectives	Course Outcomes
<ul style="list-style-type: none">To expose the students to the area of Engineering Graphics.To enable the student to communicate effectively through technical drawings.	<p>Students will be able to</p> <ul style="list-style-type: none">Apply engineering drawing standards and construct engineering curves and orthographic projections of lines.Construct orthographic projections of Planes and solids.Apply concepts of projections and convert pictorial views to orthographic views through pencil drawings and CAD.Apply concepts of projections and construct isometric views through pencil drawings and CAD.

A minimum of eight experiments to be performed

Expt. No.	Title of the experiment
1	Pencil drawings on Engineering Curves
2	Pencil drawings on Projection of Lines
3	Pencil drawings on Projection of Planes
4	Pencil drawings on Projection of Solids
5	Pencil drawings on Orthographic projections
6	Pencil drawings on Isometric Views / Projection
7	Computer-Aided Drawing on Orthographic Views
8	Computer-Aided Drawing on Isometric Views

Text Books

S.N	Title	Authors	Edition	Publisher
1.	Engineering Drawing	N. D. Bhatt	-	Charotar Publishing House
2.	Engineering Drawing	D. N. Johle	-	Tata McGraw-Hill Publishing

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S.N	Title	Authors	Edition	Publisher
1.	Fundamentals of Engineering Drawing	Luzadder Warren J, Duff John		PHI publications

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Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24CV204T	Basics of Electrical and Electronics	2	-	-	2	10	10	30	50

Course Objectives	Course Outcomes
The goal of this course is to introduce advanced concepts of 1. To understand the fundamentals of Electrical & Electronics engineering. 2. To summarize and apply the basic concepts of Electrical & Electronics engineering.	Students will be able to ● Solve DC circuits using Ohm's Law, and Kirchhoff's Laws, and analyze series and parallel connections for current, voltage, and resistance. ● Analyze R-L-C circuits under A.C. excitation and evaluate resonance conditions in series R-L-C circuits. ● Explain the characteristics and applications of P-N junction diodes, transistors, and other electronic devices, design simple digital circuits using Boolean algebra and logic
Unit I	[9Hrs]
DC Electric Circuit: Introduction to Voltage, Current, Resistor, Power and Energy, Ohm's Law, Series, and Parallel Connections with Numerical, Types of Electrical Energy Sources: Ideal and Practical Independent Sources, and Kirchhoff's Laws with Numerical.	
Unit II	[9Hrs]
AC Electric Circuit: Generation of Single Phase A.C. Power, A.C. Fundamentals, Steady-state behavior of R-L-C circuit with excitation and Numerical, Resonance in Series R-L-C circuit and Numerical.	
Unit III	[8Hrs]
Introduction to Electronic Devices: Types of Semiconductors, P-N Junction, V-I Characteristics of P-N junction diode, Applications: LED, photodiode, Zener diode, Bipolar Junction Transistor: types, configuration and applications, phototransistor, solar cell. Digital Electronics: Number system- binary, decimal, hexadecimal, Logic gates, Boolean Algebra.	

Text Books:

S. No.	Title	Authors	Edition	Publisher
1	Basic and Advance Electrical Engineering	Gaurav Gadge	-----	Electro-Tech Publication, Satara
2	A Text Book of Electrical Technology	B. L. Theraja and A. K. Theraja	(Volume I, II & III)	S. Chand and Company
3	Modern Digital Electronics	R. P. Jain	4 th Edition	Mc-Graw Hill Education,

Reference Books:

S. No.	Title	Authors	Edition	Publisher
1	Electronic Devices and Circuits	N. Suresh Kumar	4 th Edition	Mc-Graw Hill Education Pvt. Ltd. New Delhi
2	Integrated Electronics	J. Millman, C. Halkias	4 th Edition	Mc-Graw Hill Education
3	Fundamentals of Digital Circuits	A. Anand Kumar	-----	PHI Learning Pvt. Ltd.

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SECOND SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24CV204P	Basics of Electrical and Electronics Lab	-	-	2	1	-	25	25	50

Course Objectives	Course Outcomes
<p>The goal of this course is to introduce advanced concepts of</p> <ol style="list-style-type: none">To understand the fundamentals of Electrical & Electronics engineering.To summarize and apply the basic concepts of Electrical & Electronics engineering.	<p>Students will be able to</p> <ul style="list-style-type: none">Solve DC circuits using Ohm's Law, and Kirchoff's Laws, and analyze series and parallel connections for current, voltage, and resistance.Analyze R-L-C circuits under A.C. excitation and evaluate resonance conditions in series R-L-C circuits.Explain the characteristics and applications of P-N junction diodes, transistors, and other electronic devices, design simple digital circuits using Boolean algebra and logic gates, and convert numbers between binary, decimal, and hexadecimal systems.

Expt. No.	Title of the experiment
1	To verify the effective resistance of a series-parallel resistance circuit.
2	To verify Kirchoff's Current Law for a D.C. Circuit.
3	To verify Kirchoff's Voltage Law for a D.C. Circuit.
4	Calculate Ohmic Parameters (R, X _L , X _C , and Z) of series A.C. Circuit.
5	Measurement of Power and calculation of Power Factor of series A.C. Circuit.
6	To verify resonant condition in the series R-L-C circuit.
7	To study Light Emitting Diode (LED) circuit with LDR.
8	To study and verify the Truth Table of Basic Gates.
9	To study and verify the Truth Table of NAND and NOR as Universal Gates.

Text Books

S. N	Title	Authors	Edition	Publisher
1	Basic Electrical Engineering	V. K. Mehta	II	S. Chand
2	Getting started with MATLAB	Rudra Pratap	III	Oxford

Reference Books

S. N	Title	Authors	Edition	Publisher
1	Electrical Technology	B. L. Theraja	II	S. Chand

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GROUP II : SEMESTER II

Course Code	Course Name	Th	Tu	Pr	Credit	Evaluation			
						MSE	CA	ESE	Total
24CV205T	Construction Materials & Techniques	3	-	-	3	20	20	60	100
Course Objectives		Course Outcomes							
Fundamental of cement concrete. Construction equipment, construction techniques and safety methods, Building components.		At the end of the course, students will be able to- 1. Explain various constituents of cement and concrete. 2. Understand various types of structure. 3. Understand construction methods for various types of structure. 4. Apply various equipment and machinery used in construction. 5. Recognise new techniques used in construction, evaluation and safety methods adopted in construction industry.							
Unit I									[8 Hrs]
Introduction to Cement and Concrete: Various types of cement, mortar, Ready mix concrete, self-compacting concrete, light weight concrete and fiber reinforced concrete, ultra-high-performance concrete.									
Unit II									[8 Hrs]
Type of structure: Load bearing, Frame & Composite. Sub Structure: - Necessity and types of foundations, Footings and its Types, and Introduction to Underwater Construction.									
Unit III									[8 Hrs]
Super structure: - Introduction to Stone Masonry and Brick Masonry, formwork and its types, pointing and plastering, roofs, painting, arches, lintels, stairs, etc.									
Unit IV									[8 Hrs]
Introduction to construction Equipment: Various construction equipment with its advantages, disadvantages and its uses.									
Unit V									[8 Hrs]
New Construction Techniques: Pre - Engineered Building and its Application & Advantages. Safety in Construction Operations: Introduction to various types of Hazards and its Safety measurement on construction site.									

Text Books

S.N	Title	Authors	Edition	Publisher
1	Concrete Technology	M.S.Shetty	6th	S. Chand & Company, Limited
2	Building Construction	S.C.Rangwala	32nd	Charotar Publishing House Pvt. Ltd.

Reference Books

S.N	Title	Authors	Edition	Publisher
1.	Construction Planning, Equipment and methods	Peurifoy	-	Tata McGraw Hill Publication
2.	Construction Technology	Sankar S.K. and Saraswati S.	-	Oxford University Press, New Delhi
3.	Building Construction	Sushil Kumar	19th	Standard Publisher Distributors, New Delhi
4.	Elements of Civil Engineering	S. S. Bhavikatti	-	Vikas Publishing House Pvt Limited
5.	SP 70 (2001): Handbook on Construction Safety Practices	BIS	-	BIS

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GROUP II : SEMESTER II

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24CV206P	Business Communication Skills II Lab	-	-	2	1	-	25	25	50

Course Objectives	Course Outcomes
To empower students to develop a career-oriented mindset while harnessing the power of LSRW skills.	Students would be able to: 1. Participate in Group Discussions. 2. Improve their reading and formal writing skills. 3. Develop upon their listening skills to engage in meaningful conversations. 4. Develop oratory skills to engage and inform audiences. 5. Prepare themselves for participating in business meetings.

Expt. No.	Title of the experiment
1	Group Discussion
2	Reading for Competitive Exams II
3	Listening Skills II
4	Presenting a TED Talk
5	Media Interaction
6	Business Correspondence II
7	Report Writing
8	Mock Meeting

Reference Books

S. N	Title	Authors	Edition	Publisher
1.	Communication Skills for Engineers	C. Muralikrishna & Sunita Mishra	2nd Edition, 2011	Pearson India Education Services
2.	Communication Skills	Dr. L. Bisen, Dr. B. Agrawal & Dr. N. T. Kalyani	1st Edition, 2021	Himalaya Publishing House
3.	Barron's IELTS Superpack	Lin Lougheed	2012	Barrons Educational Series

Online Resources

1	https://ieltsliz.com/
2	https://www.englishclub.com/business-english/
3	https://www.indiabix.com/verbal-ability/questions-and-answers/
4	https://prepinsta.com/interview-preparation/?utm_source=home+page&utm_medium=navigation

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CIVIL ENGINEERING

GROUP II : SEMESTER II

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
24CV207T	Indian Knowledge System	2	-	-	2	MSE	CA	ESE	Total
						10	10	30	50
Course Objectives					Course Outcomes				
This course is intended <ul style="list-style-type: none">To introduce the origin, evolution and approach of Indian knowledge systemsTo understand the Indian knowledge approaches to various domains such as time, language, environment, management, life and mindTo appreciate the principles of thought process, reasoning, inferencing and sustainability in Indian knowledge systemsTo navigate knowledge sources of different disciplines of studies from a Vedic perspective					Students will be able to <ul style="list-style-type: none">Explain the origin, evolution and approach of IKS and build various practices to conserve and protect rich Indian KnowledgeDescribe importance of Indian Literature and will know about Indian ScholarsUnderstand ancient Indian traditions, practices and knowledge for conservation of resources				

Unit I	[10 Hrs.]
Introduction and Management of Indian Knowledge System 1.1 Definition, Concept and Scope of IKS 1.2 IKS based approaches on Knowledge Paradigms 1.3 IKS in Ancient India and Modern India 1.4 Documentation and Preservation of IKS 1.5 Approaches for Conservation and Management of nature and Bio – Resources 1.6 Approaches and Strategies to protection and conservation of IKS	
Unit II	[12 Hrs.]
IKS and Indian Scholars, Indian Literature 2.1 Philosophy and Literature (Maharshi Vyas, Kanad, Pingala, Parasar, Banabhatta, Nagarjuna and Panini) 2.2 Mathematics and Astronomy (Aryabhatta, Mahaviracharya, Bodhayan, Bhaskaracharya, Bramhagupta, Varahamihira) 2.3 Medicine and Yoga (Charak, Susruta, Maharshi Patanjali and Dhanwantari) 2.4 Sahitya (Vedas, Upvedas (Ayurveda, Dhanurveda, Ghandarvaveda), Puran and Upnishad and Shad Darshan (Vedanta, Nyay, Vaisheshik, Sankhya, Mimamsa, Yoga, Adhyatma, Meditation) 2.5 Shastra (Nyaya, Vyakarana, Krishi, Shilp, Vastu, Natya, Sangeet)	
Unit III	[08 Hrs.]
Unique Traditional Practices and Applied Traditional knowledge 3.1 Myths, Rituals, Spirituals, Folk stories, Traditional Narratives 3.2 Agriculture, Land, Water and Soil Conservation and Management Practices 3.3 Vaidya (Traditional health Care system), Amchi Medicine system	

Text Books

S. N.	Title	Authors	Edition	Publisher
1	Indian Knowledge System: Introduction and Prospects	Acharya Shreyas Kurhekar	First	Sanskrit University, Ramtek
2	Indian Knowledge System Vol. I and II	Kapil Kapoor, Awadhesh Kumar Singh		D.K. Print World Ltd.
3	Traditional Knowledge System in India	Amit Jha		Atlantic Publisher

Reference Books / Resources

S. N.	Title	Authors	Edition	Publisher
1	Website of Indian Knowledge System Division, New Delhi			

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GROUP 1: SEMESTER I

	Course Category	CourseCode	Course Title	Hours per Week			Credits	Mid-Sem Examination	Maximum Marks			
				L	T	P			Continual Assessment	End Sem Examination	Total	
1.	BSC	24DS101T	Engineering Chemistry and Environmental Science	2	-	-	2	10	10	30	50	1.5
2.	BSC	24DS101P	Engineering Chemistry and Environmental Science Lab	-	-	2	1	-	25	25	50	-
3.	BSC	24DS102T	Linear Algebra and Calculus	3	1	-	4	20	20	60	100	3
4.	ESC	24DS103T	Logic building using C	3	-	-	3	20	20	60	100	3
5.	ESC	24DS103P	Logic building using C Lab	-	-	2	1	-	25	25	50	-
6.	ESC	24DS104T	Digital Electronics	3	-	-	3	20	20	60	100	3
7.	ESC	24DS104P	Digital Electronics Lab	-	-	2	1	-	25	25	50	-
8.	PCC	24DS105P	Data Science workshop – I	-	-	2	1	-	25	25	50	-
9.	AEC	24DS106P	Business Communication Skills I Lab	-	-	2	1	-	25	25	50	-
10.	IKS	24DS107T	Indian Knowledge Systems	2	-	-	2	10	10	30	50	1.5
11.	SEC	24DS141P	Career Development I	-	-	2	1	-	50	-	50	-
12.	CC	24DS108T	Co-curricular Courses - I	2	-	-	2	-	50	-	50	-
Total				15	1	12	22	80	305	365	750	12

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GROUP 1: SEMESTER II

Sr No	Course Category	Course Code	Course Title	Hours per Week			Credits	Maximum Marks				Duration
				L	T	P		Mid-Sem Examination	Continual Assessment	End Sem Examination	Total	No. of Hrs for ESE
1	BSC	24DS201T	Engineering Physics and Materials Science	2	-	-	2	10	10	30	50	1.5
2	BSC	24DS201P	Engineering Physics and Materials Science Lab	-	-	2	1	-	25	25	50	-
3	BSC	24DS202T	Statistics and Probability	3	1	-	4	20	20	60	100	3
4	PCC	24DS203T	Data Structures	3	-	-	3	20	20	60	100	3
5	PCC	24DS203P	Data Structures Lab	-	-	2	1	-	25	25	50	-
6	PCC	24DS204T	Introduction to Data Science	3	-	-	3	20	20	60	100	3
7	PCC	24DS205P	Data Science Workshop – II	-	-	2	2	-	25	25	50	-
8	AEC	24DS206P	Business Communication Skills – II Lab	-	-	2	1	-	25	25	50	-
9	SEC	24DS241P	Career Development – II	-	-	2	1	-	50	-	50	-
10	ESC	24DS207T	Design Thinking	2	-	-	2	10	10	30	50	1.5
11	CC	24DS208T	Co-curricular Courses – II	2	-	-	2	-	50	-	50	-
Total				15	1	10	22	80	280	340	700	12

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**FIRST SEMESTER**

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						CA	MSE	ESE	Total
24DS101T	Engineering Chemistry and Environmental Science	2	-	-	2	10	10	30	50

Course Objectives	Course Outcomes
This course is intended 1. To acquaint the students with the basic phenomenon, concepts, knowledge and understanding of the fundamental principles of chemistry. 2. To develop necessary skills and abilities to succeed in engineering education, research, Industry, environment and social context.	Students will be able to <ul style="list-style-type: none">● Develop innovative ideas for use of advanced materials in sustainable development.● Apply the principles of green Chemistry for sustainable development● Understand the environmental impacts of e-waste & apply concepts of e-waste management.
Unit I Advanced Material- Introduction-Need for Development Biodegradable polymers- PLA, PCL - Synthesis, Properties and Applications, Conducting Polymers- Polypyrrole, PANI Synthesis, Properties and Applications., Liquid Crystal Polymers- Types, Properties and Applications.	[8 Hrs]
Unit II Green Chemistry Green Chemistry- Introduction, Principles of Green Chemistry with example, Green Reagents- Super Critical Fluid (CO ₂)- Properties and Applications, Green Building-Introduction, Components, Green Crackers- Introduction, Types, Advantages, Bio Catalysis- Definition and examples. Carbon Credit, Carbon Sequestration, Carbon Trade exchange platform.	[8 Hrs]
Unit III E-waste Management Introduction. E- Waste; composition and generation. E-waste pollutants, E waste hazardous properties, Effects of pollutant (E-waste) on human health and surrounding environment, Basic principles of E waste management, Component of E waste management- Domestic e-waste disposal, E-waste Control measures - Reduction of waste at source	[8 Hrs]

Text Books

S.N	Title	Authors	Edition	Publisher
1	Text Book of Engineering Chemistry	S.S. Dara,	New	S. Chand and Company Ltd. New Delhi.
2	Textbook of Engineering Chemistry	P.C. Jain and Monica Jain	Sixth	Dhanpat Rai and Sons, New Delhi.
3	E-waste Recycling and Management	Anish Khan, Inamuddin, Abdullah M. Ansiri	1st	Springer

Reference Books

S.N	Title	Authors	Edition	Publisher
1	A Text book of Engineering Chemistry	Shashi Chawla	1st	Dhanpat Rai & Sons, New Delhi
2	Applied Chemistry	N. Krishnamurthy:P. Vallinavagam.	1st	TMH
3	Environmental Chemistry	B. K. Sharma	1st	Krishna Prakashan Media (P) Ltd.

Online Resources

1	suchitanimbalkar@gnomio.com
2	kkhandarka@gnomio.com
3	mmjstudents@wordpress.com
4	iyotithakre@gnomio.com

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**FIRST SEMESTER**

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation		
						CA	ESE	Total
24DS101P	Engineering Chemistry and Environmental Science Lab			2	1	25	25	50
Course Objectives		Course Outcomes						
1. To Make the students aware about various techniques available for Analysis of Material. 2. To Impart the skill of handling chemicals and apparatus.		<ul style="list-style-type: none">List the proper procedures and regulations for safe handling and use of chemicals and can follow the proper procedures and regulations for safe handling when using different instruments.Demonstrate the use of modern instrumentation, classical techniques, and properly record the results of their experiment.Identify and solve chemical problems and explore new areas of research especially in fuel and lubricants.						

Expt. No.	Experiments based on Performance
1	Synthesis of Bakelite
2	Synthesis of Conducting polymer (Polyaniline)
3	Determination of heavy metal from industrial effluent.
	Virtual Experiment - Any THREE
4	Electro gravimetric estimation of metal
5	Estimation of e-waste (Cadmium)
6	Determination of Alkalinity of Water Sample.
7	Study of Lambert-Bears Law
	Demonstration - Any ONE
8	Determination of turbidity from industrial effluent.
9	Determination of pH by using different methods.
	Activity - Any One
1	Visit to e-waste recycling plant
2	Study of Air /Water Pollution Level at different Sites in Nagpur City.
3	Study of nearby industrial chemicals and safety measures

Text Books

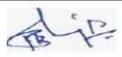
S.N	Title	Authors	Edition	Publisher
1	A Textbook on experiment and calculation in engineering chemistry	S.S. Dara	9th	S.Chand

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Reference Books

S.N	Title	Authors	Edition	Publisher
1	Applied Chemistry theory and practical	O.P. Virmani and A.K.	Ist	New Age International
2	Laboratory Manual on Engineering Chemistry	Dr. Subdharani	Ist	Dhanpat Rai Publishing

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Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						CA	MSE	ESE	Total
24DS102T	Linear Algebra and Calculus	3	1	-	4	20	20	60	100

Course Objectives	Course Outcomes
<ul style="list-style-type: none"> The goal of this paper is to introduce advanced concepts of <ol style="list-style-type: none"> Matrix Algebra Multivariate Calculus Differential Equations Vector calculus 	<ul style="list-style-type: none"> Solve the system of linear equations using matrices. Identify engineering problems related to Matrices: Eigen value & Eigen vectors & Functions of Matrices. Understand the concept of multivariate calculus & apply the knowledge of applications of differentiation. Solve first order and higher order differential equations by various methods and apply these techniques to solve problems in engineering. Implement concept of vector calculus to solve engineering problems.
Unit I	[8Hrs]
Matrix Algebra: Introduction to matrices, Rank of a matrix, Consistency of system of linear equations, Linear and orthogonal transformations, Linear dependence of vectors.	
Unit II	[8Hrs]
Matrices: Characteristics equation, Cayley- Hamilton Theorem, Eigen values and Eigen vectors, Reduction to diagonal form, Reduction of quadratic form to canonical form by orthogonal transformation, Sylvester's theorem.	
Unit III	[8Hrs]
Multivariate Calculus: Functions of several variables and their partial derivatives, Chain rule and total differential coefficient, Jacobians and its properties, Maxima –Minima of functions of two variables, Lagrange's method of undetermined multipliers.	
Unit IV	[8Hrs]
Differential Equations: First order and first degree differential equations: Linear, Higher order differential equations with constant coefficients, Method of variation of parameters, Cauchy's homogeneous linear equation, Applications of differential equations.	
Unit V	[8Hrs]
Vector Calculus: Vector differentiation, Gradient, Directional derivatives, Divergence and Curl with their physical interpretation Solenoidal and irrotational motions, Scalar potential, Line integral & Work done.	

Text Books

S.N	Title	Authors	Edition	Publisher
1	Higher Engineering Mathematics	B. S. Grewal		Khanna Publishers, New Delhi.
2	A Text Book of Applied Mathematics (Vol I & II)	P. N. Wartikar and J. N. Wartikar		Pune Vidyarthi Griha Prakashan, Pune
3	Higher Engineering Mathematics	H. K. Das and Er. Rajnish		S. Chand & CO. Pvt. Ltd., New Delhi

Reference Books

S.N	Title	Authors	Edition	Publisher
1	Higher Engineering Mathematics	B.V. Ramana,	11th reprint	Tata McGraw Hill New Delhi
2	A Text Book of Engineering Mathematics	Peter O' Neil		Thomson Asia Pvt. Ltd, Singapore.
3	Advanced Engineering Mathematics	Erwin Kreyszig		John Wiley & Sons, New York.

Online Resources

1	https://archive.nptel.ac.in/courses/111/101/111101115/#
2	https://www.coursera.org/learn/matrix-algebra-engineers

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FIRST SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24DS103T	Logic building using C	3	-	-	3	20	20	60	100

Course Objectives	Course Outcomes
<p>This course is intended</p> <ul style="list-style-type: none"> To make the student learn a programming language. To learn problem solving techniques. To teach the student to write programs in C and to solve the problems 	<p>Students will be able to</p> <ul style="list-style-type: none"> Develop problem solving logic. Understand the fundamentals of C Programs. Implement decision making control structures. Implement arrays, Implement pointers and structures,

Unit I	[7Hrs]
<p>Logic Building: Mathematical Preliminaries: Numbers, Number System, sum, product, powers, factorials, Fibonacci numbers, Armstrong numbers. Problem solving techniques: Modular, Top-down, Bottom-up, Structured Programming, advantages and disadvantages. Information Structures: Array, Linked List, Trees, Graphs.</p>	
Unit II	[7Hrs]
<p>Algorithms and Flowcharts: Characteristics, Advantages and Disadvantages of algorithms, pseudo-code conventions, Characteristics of flowcharts, flowchart symbols, Advantages and Disadvantages of flowcharts.</p>	
Unit III	[7Hrs]
<p>Fundamentals of C: C Character Set, Identifiers, Keywords, Data Types, Constants, Variables, Declarations, Expressions, Statements, Symbolic Constants. Operators and Expressions: Arithmetic Operators, Unary Operators, Relational and Logical Operators, Decision Control Statement-if, if-else, Nested if-else statement, Switch case, Loops and Writing and evaluation of conditionals and consequent branching.</p>	
Unit IV	[7Hrs]
<p>Functions: User defined and Library Functions, Parameter passing in functions, call by value, Passing arrays to functions: call by reference. Recursion: As a different way of solving problems. Example programs, such as Finding Factorial, Fibonacci series, Ackerman function.</p>	
Unit V	[7Hrs]
<p>Structures: Defining structures, Array of Structures Pointers: Introduction to pointers, Defining pointers, Pointer arithmetic, pointer operators, Use of Pointers in self-referential structures</p>	

Text Books

S.N	Title	Authors	Edition	Publisher
1	Programming in ANSI C	E. Balguruswamy	1	Tata Mc-Graw Hill
2	Programming Techniques Through 'C'	M. G. Venkateshmurthy	1	Pearson
3	Let Us 'C'	Yashwant P. Kanetkar	1	BPB

Reference Books

S.N	Title	Authors	Edition	Publisher
1	The Complete Reference C	Herbert Schildt	4	Tata Mc-Graw Hill
2	The 'C' programming language	Kernighan and Ritchie	1 st	Prentice Hall

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FIRST SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24DS103P	Logic building using C Lab	-	-	2	1	-	25	25	50

Course Objectives	Course Outcomes
<p>This course is intended</p> <ul style="list-style-type: none">● To understand the fundamentals of C programming● To learn problem solving techniques.● To teach the student different data structures to write programs in C	<p>Students will be able to</p> <ul style="list-style-type: none">● Understand the fundamentals of c programming● Choose the loops and decision making for the given problem.● Implement different operations on arrays● Design functions to solve the given problem● Implement pointers, structures

Expt. No.	Title of the experiment
1	Write a program to calculate basic arithmetic operations.
2	Write a program to calculate electricity bill using number of units consumed and rate per unit.
3	Write a program to find the maximum of three numbers.
4	Write a program to create patterns using conditional branches.
5	Create a calculator using switch case statement.
6	Write a program to swap values using call by value and reference.
7	Write a program to use the function for factorial of a number.
8	Write a program to show information of a student using structure.

Text Books

S.N	Title	Authors	Edition	Publisher
1	Programming With C	Byron S. Gottfried	2 nd	Schaum Series
2	How to solve it by Computer	R.G. Dromey	1 st	Pearson Education

Reference Books

S. N	Title	Authors	Edition	Publisher
1	Programming and Problem Solving	M. Sprankle	2 nd	Pearson Education

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FIRST SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						CA	MSE	ESE	Total
24DS104T	Digital Electronics	3	-	-	3	20	20	60	100

Course Objectives	Course Outcomes
This course is intended <input type="checkbox"/> To acquire the basic knowledge of digital logic levels <input type="checkbox"/> Application of knowledge to understand digital electronics circuits. <input type="checkbox"/> To impart how to design Digital Circuits.	Students will be able to <input type="checkbox"/> represent numerical values in various number systems <input type="checkbox"/> demonstrate the knowledge of: logic gates, Boolean algebra, DeMorgan's Theorems, Karnaugh map. <input type="checkbox"/> analyze and design digital combinational circuits <input type="checkbox"/> analyze and design sequential digital circuits. <input type="checkbox"/> represent and understand Digital Integrated logic Circuits

Unit I	[7Hrs]
Number systems & codes: Binary Number base conversion, Octal & hexadecimal numbers, complements, signed binary numbers, binary codes-BCD codes, gray codes, ASCII Character Code, Codes for serial data transmission & storage	
Unit II	[7Hrs]
Boolean Algebra & Logic gates: Axiomatic definition of Boolean Algebra .Property of Boolean Algebra, Boolean functions, Canonical & standard form, Basic Logic Gates: AND, OR, NOT, NAND, NOR, XOR, XNOR, Karnaugh Maps (K-Maps)	
Unit III	[7Hrs]
Combinational Logic: Combinational Circuits; Binary Adder-subtractor, Decimal Adder, Binary Multiplier, comparator, Multiplexers and demultiplexers, Decoders, Encoders, Multipliers,	
Unit IV	[7Hrs]
Sequential Circuits Sequential Logic Circuits: RS, Clocked RS, D, JK, Master Slave JK, T Flip-Flops, Shift Registers, Types of Shift Registers, Counters, Ripple Counter, Synchronous Counters, Asynchronous Counters, Up-Down Counter.	
Unit V	[7Hrs]
Digital Integrated logic Circuits: Digital Logic Design Using Hardware Description Languages (HDL)- RTL, DTL, TTL, ECL, MOS & C-MOS Logic circuits,. Switch level modeling with HDL	

Text Books

S.N	Title	Authors	Edition	Publisher
1.	Digital Design	M. Morris Mano, Michael D. Ciletti	5th Edition	Pearson Education
2.	Digital Electronics: Principles, Devices and Applications	Anil K. Maini	2	John Wiley & Sons, Ltd

Reference Books

S. N	Title	Authors	Edition	Publisher
1.	Digital Fundamentals –A Systems Approach	Thomas L. Floyd	1	Pearson
2.	Fundamentals of Logic Design	Charles H. Roth	5	Cengage Learning

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FIRST SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24DS104P	Digital Electronics Lab	-	-	2	1	-	25	25	50

Course Objectives	Course Outcomes
<p>This course is intended</p> <ul style="list-style-type: none">□ To introduce the basic concepts and laws involved in the Boolean algebra and logic families and digital circuits.□ To familiarize with the different logic gates, and combinational and sequential circuits utilized in the different digital circuits and systems.	<p>Students will be able to</p> <ul style="list-style-type: none">□ understand the Combinational Circuits using Logic Gates.□ design Arithmetic and Logical Circuits.□ demonstrate understanding of flip-flops & Sequential circuits

Expt . No.	Title of the experiment
1	To verify the truth table of different logic gates.
2	Implement and verify the NAND & NOR gates as universal gates.
3	Construct and verify the truth tables for Half Adder and Full Adder circuits.
4	Examine and validate the truth tables for Multiplexers and Demultiplexers.
5	Assess and verify the truth tables for different types of flip-flops.
6	Design and implement a 4-bit ripple counter and validate its functionality.
7	Write and execute an Assembly Language Program (ALP) for the addition and subtraction of two 16-bit numbers.
8	Develop a mini-project that integrates the above concepts.

Text Books

S.N	Title	Authors	Edition	Publisher
1	Digital Integrated Electronics	Herbert Taub	1	McGraw Hill.
2	Digital Logic and Computer Design	Morris Mano	2	PHI

Reference Books

S. N	Title	Authors	Edition	Publisher
1.	Digital Electronics Logic and System	James Bingnell, Robert Donovan	1	McGraw Hill.

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FIRST SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24DS105P	Data Science Workshop - I	-	-	2	1	-	25	25	50

Course Objectives	Course Outcomes
<p>This course is intended</p> <ul style="list-style-type: none">Perform Basic of Excel.Implement Basics and advance functions for calculation.Demonstrate how to organize raw data using Excel.Design and implement Statistical Analysis using Excel.Develop Advance Excel for descriptive and predictive analysis.	<p>Students will be able to</p> <ul style="list-style-type: none">Learn a foundational understanding of Excel, including data entry, formatting, and navigation.Able to perform basic arithmetic operations and use fundamental Excel functionsLearn to organize raw data by sorting, filtering, and using Excel's data validation tools..Students will be able to visualize data using charts, graphs.

Expt . No.	Title of the experiment
1	Introduction to MS Excel files, Workbooks, Worksheets, Columns and Rows.
2	To Implement different functions in Excel.
3	To perform data analysis using Pie Charts, Bar Chart, Column Chart, Line and Column Chart.
4	Using what if Analysis Tools i)Goal seek ii)Scenario Manager iii)Data table
5	To perform Data Validation on number, Date, Time, Text and list
6	To create and format a pivot table in MS Excel.
7	To search for a value in one column or row based on a given value in another column using vlookup and Hlookup in Excel.

Text Books

S.N	Title	Authors	Edition	Publisher
1	Microsoft Excel 2019 Bible	Michael Alexander, Richard Kusleika, and John Walkenbach	1 st Edition	Wiley
2	Excel 2019: The Missing Manual	Matthew MacDonald	1 st Edition	O'Reilly Media

Reference Books

S. N	Title	Authors	Edition	Publisher
1.	Excel 2019 All-in-One For Dummies	Alexander Dmitrienko and David L. Poole	1 st Edition	imprint of John Wiley & Sons
2.	Statistical Analysis: Microsoft Excel 2016	Peter Bruce and Andrew Bruce	5 th Edition	Que Publishing

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COMPUTER SCIENCE & ENGINEERING (DATA SCIENCE)

FIRST SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24DS106P	Business Communication Skills I Lab	-	-	2	1	-	25	25	50

Course Objectives	Course Outcomes
<ul style="list-style-type: none">To empower students to develop a career-oriented mindset while harnessing the power of LSRW skills.	<p>Students will be able to:</p> <ul style="list-style-type: none">apply verbal and non-verbal skills to confidently and effectively deliver presentations.prepare themselves for overall language ability through listening and reading tasks.demonstrate formal writing skills.draft impactful Resumes and Cover Letters.prepare themselves for Personal Interviews.

Practical No.	Practical based on
1	Presentation Skills
2	Poster Making (Product/ Event)
3	Reading Comprehension for Competitive Exams.
4	Writing Skills for Academic Purposes.
5	Listening Skills I
6	Business Correspondence I
7	Resume Writing and Cover Letter
8	Mock Interviews

Reference Books:

S. N	Title	Authors	Edition	Publisher
1	Communication Skills for Engineers	C. Muralikrishna & Sunita Mishra	2nd Edition, 2011	Pearson India Education Services
2	Communication Skills	Dr. L. Bisen, Dr. B. Agrawal & Dr. N. T. Kalyani	1st Edition, 2021	Himalaya Publishing House
3	Barron's IELTS Superpack	Lin Lougheed	2012	Barrons Educational Series

Online Resources:

1	https://ieltsliz.com/
2	https://www.englishclub.com/business-english/
3	https://www.indiabix.com/verbal-ability/questions-and-answers/
4	https://prepinsta.com/interview-preparation/?utm_source=home+page&utm_medium=navigation
5	https://www.skillsyouneed.com/presentation-skills.html

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FIRST SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						CA	MSE	ESE	Total
24DS107T	Indian Knowledge System	2	-	-	2	10	10	30	50

Course Objectives	Course Outcomes
<ul style="list-style-type: none"> To introduce the origin, evolution and approach of Indian knowledge systems. To understand the Indian knowledge approaches to various domains such as time, language, environment, management, life and mind. To appreciate the principles of thought process, reasoning, inferencing and sustainability in Indian knowledge systems. To navigate knowledge sources of different disciplines of studies from a Vedic perspective. 	<p>Students will be able to</p> <ul style="list-style-type: none"> Explain the origin, evolution and approach of Indian knowledge systems. Describe importance of Indian Literature and will know about Indian Scholars. Understand ancient Indian traditions, practices and knowledge for conservation of resources. Understand and build various practices to conserve and protect rich Indian Knowledge.

Unit I [10 Hrs.]

<p>Introduction and Management of Indian Knowledge System</p> <p>1.1 Definition, Concept and Scope of IKS 1.2 IKS based approaches on Knowledge Paradigms 1.3 IKS in Ancient India and Modern India 1.4 Documentation and Preservation of IKS 1.5 Approaches for Conservation and Management of nature and Bio – Resources 1.6 Approaches and Strategies to protection and conservation of IKS</p>

Unit II [12 Hrs.]

<p>IKS and Indian Scholars, Indian Literature</p> <p>2.1 Philosophy and Literature (Maharshi Vyas, Kanad, Pingala, Parasar, Banabhatta, Nagarjuna and Panini) 2.2 Mathematics and Astronomy (Aryabhata, Mahaviracharya, Bodhayan, Bhaskaracharya, Brahmagupta, Varahamihira) 2.3 Medicine and Yoga (Charak, Susruta, Maharshi Patanjali and Dhanwantari) 2.4 Sahitya (Vedas, Upvedas (Ayurveda, Dhanurveda, Ghandarvaveda), Puran and Upnishad and Shad Darshan (Vedanta, Nyay, Vaisheshik, Sankhya, Mimamsa, Yoga, Adhyatma, Meditation) 2.5 Shastra (Nyaya, Vyakarana, Krishi, Shilp, Vastu, Natya, Sangeet)</p>

Unit III [08 Hrs.]

<p>Unique Traditional Practices and Applied Traditional knowledge</p> <p>3.1 Myths, Rituals, Spirituals, Folk stories, Traditional Narratives 3.2 Agriculture, Land, Water and Soil Conservation and Management Practices 3.3 Vaidya (Traditional health Care system), Amchi Medicine system</p>

Text Books

S.N	Title	Authors	Edition	Publisher
1	Introduction To Indian Knowledge System: Concepts and Applications	Mahadevan, B., Bhat, Vinayak Rajat, Nagendra Pavana R. N.	-	PHI Learning Pvt. Ltd.
2	Indian Knowledge System Vol. I and II	Kapil Kapoor, Awadhesh Kumar Singh	-	D.K. Print World Ltd.
3	Traditional Knowledge System in India	Amit Jha	-	Atlantic Publisher

Online Resources

1	https://iksindia.org/
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GROUP I : SEMESTER II

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24DS201T	Engineering Physics and Materials Science	2	-	-	2	10	10	30	50

Course Objectives	Course Outcomes
<p>This course is intended</p> <ul style="list-style-type: none">To understand the basic laws of physics and their application in engineering and technology.To develop scientific temper and analytical capability.	<p>Students will be able to</p> <ul style="list-style-type: none">Distinguish the types of solids on the basis of conductivity and acquire a brief idea about semiconductors and Magnetic MaterialsUnderstand the basics of Optical Fiber Communication.Interpret the concepts of Quantum Physics.

Unit I BASICS OF SOLID-STATE PHYSICS [11 Hrs]

Semiconductors: Free electron Theory (qualitative idea) and its features; Idea of band formation in solids, Classification of solids: Metal, Insulator, Semiconductor; Fermi Energy, Types - Intrinsic and Extrinsic Semiconductors, Applications of solid state devices - p-n junction diode and transistor.

Magnetic materials: Terms and definitions, Types of magnetic materials, characteristics of Diamagnetic, Paramagnetic and Ferromagnetic Materials, Applications of soft and hard magnetic materials with a special emphasis on storage devices such as hard disk, floppy disk and magnetic tapes, advantages & disadvantages.

Unit II OPTICAL COMMUNICATION [08 Hrs]

Introduction, Optical Fiber, Total Internal Reflection, Propagation of light through an Optical Fiber, Fractional Refractive Index Change, Numerical Aperture, Modes of Propagation, Classification of Optical Fibers, The Three types of fibers, Comparative characteristics, V-Number, Losses in Optical Fiber, Fiber Optic Communication System, Merits of Optical Fibers, Fiber Optic Sensors (Temperature sensor and Liquid Level detector)

Unit III QUANTUM PHYSICS [07 Hrs]

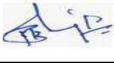
Dual nature, de-Broglie hypothesis, Wave packet, phase and group velocity, Uncertainty principle - physical significance and its application, Wave function - probability and normalization, Brief idea of application of quantum mechanics in quantum computing.

Text Books

S.N	Title	Authors	Edition	Publisher
1	Fundamentals of Physics	David Halliday, Robert Resnick and Jerle Walker	8e extended	John-Wiley India
2	Electronic Engineering Materials and Devices	John Allision	10 th edition reprint	TMH
3	Engineering Physics	M. N. Avadhanulu	Latest edition	S. Chand & Co.

Reference Books

S.N	Title	Authors	Edition	Publisher
1	Solid State Physics	Charles Kittel	Eighth edition	John Wiley & Sons, Inc
2	Optical Fiber Communication - Principles & Practice	John M. Senior	3 rd Edition	Prentice Hall
3	Quantum Mechanics	Schiff	First Edition	McGraw-Hill Book Company, Inc.

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COMPUTER SCIENCE AND ENGINEERING (DATA SCIENCE)

SECOND SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation		
						CA	ESE	Total
24DS201P	Engineering Physics & Materials Science Lab	--	--	2	1	25	25	50

Course Objectives	Course Outcomes
This course is intended <ul style="list-style-type: none">To understand the basic laws of physics and their application in engineering and technology.To develop scientific temper and analytical capability.	Students will be able to <ul style="list-style-type: none">Verify principles/laws by selecting and using proper measuring instruments, interpret result and draw conclusions.Find various parameters using various properties of light.Apply the concepts of Semiconductors and Quantum Mechanics.

Expt. No.	Title of the experiment
1	Study of semiconductor diodes
2	Study of Phenomenon of Diffraction
3	Study of Interference
4	Study of Birefringence
5	Determination of Numerical Aperture (NA) of given Optical Fiber
6	Determination of Planck's Constant using LED
7	Guoy's Balance Method a) Determination of Magnetic Susceptibility of different magnetic materials. b) Identification of different types of Magnetic Materials
8	Study of Planck's Constant by means of LED
9	Determination of Curie Temperature of Ferromagnetic Material.
10	Study of Transistors.
11	Study of Hall Effect.
12	Experiment on 'Quantum Eraser'.
13	Demonstration of phenomena of Optics using Laser.

Text Books

S.N	Title	Authors	Edition	Publisher
1	Fundamentals of Physics	David Halliday, Robert Resnick and Jerle Walker	8e extended	John-Wiley India
2	A Textbook of Engineering Physics	Dr. M. N. Avdhanulu, Dr. P. G. Kshirsagar	Latest edition	S. Chand Publication.
3	Principles of Physics	David Halliday, Robert Resnick, Jearl Walker	10th Edition	John Wiley and Sons (2017)

Reference Books

S.N	Title	Authors	Edition	Publisher
1	Solid State Physics	Charles Kittel	Eighth edition	John Wiley & Sons, Inc
2	Solid State Physics	R.L. Singhal	Eighth edition	Kedarnath Ramnath
3	University Physics	Young and Freedman	Fifteenth edition	Pearson Education

Online Resources

1	https://www.britannica.com/science/semiconductor#ref233890
2	https://www.geeksforgoeks.org/semiconductors/
3	https://www.sciencedirect.com/topics/chemistry/magnetic-material

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GROUP I : SEMESTER II

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24DS202T	Statistics and Probability	3	1	-	4	20	20	60	100

Course Objectives	Course Outcomes
To inculcate and strengthen students with adequate knowledge of <ul style="list-style-type: none"> Statistics Probability distributions 	Students will be able to: <ul style="list-style-type: none"> Apply numerical integration methods and find analytical solutions to difference equations. Identify, analyse and solve statistical problems. Describe the importance of probability theory in the field of engineering and prepare student to use it for analysis of data. Apply various concepts of joint distributions. Apply concept of probability distributions to engineering problems.

Unit I	[8hrs]
Finite Differences: Operator E and delta, Factorial Polynomial, Numerical integration: Trapezoidal rule, Simpson's 1/3 rule, Simpson's 3/8 rule, Difference equations with constant coefficients.	
Unit II	[8hs]
Statistics: Fitting of straight line, parabola and exponential curves by method of least squares, Coefficient of correlation and lines of regressions, Rank correlation, multiple regression.	
Unit III	[8hrs]
Probability: Random Variable: Discrete & Continuous random Variable, Probability function, Distribution function, Baye's rule, Mathematical expectations, Variance and Standard deviation.	
Unit IV	[8hrs]
Joint probability: Joint probability function of discrete random variable, Marginal probability function and Conditional distribution of discrete random variable, Mathematical expectation of discrete random variable, Variance and Standard deviation, and Covariance of joint distribution.	
Unit V	[8hrs]
Probability Distributions: Binomial Distribution, Poison's Distribution, Normal Distribution.	

Text Books

S.N	Title	Authors	Edition	Publisher
1	Higher Engineering Mathematics	B. S. Grewal	40 th	Khanna Publishers, New Delhi.
2	Higher Engineering Mathematics	H. K. Dass and Er. Rajnish Verma		S. Chand & Co. Pvt. Ltd., New Delhi.
3	Advanced Engineering Mathematics	Erwin Kreyszig		John Wiley & Sons, New York.

Reference Books

S.N	Title	Authors	Edition	Publisher
1	Higher Engineering Mathematics	B. V. Ramana		Tata McGraw-Hill Publications, New Delhi.
2	Advanced Engineering Mathematics	C. R. Wylie & L. C. Barrett		Tata McGraw-Hill Publications, New Delhi.
3	A Text Book of Engineering Mathematics	Peter O' Neil		Thomson Asia Pvt. Ltd., Singapore.
4	Schaum's Outline of Probability and Statistics	John J. Schiller, R. Alu Srinivasan and Murray	4 th	McGraw-Hill Education.

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GROUP I : SEMESTER II

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24DS203T	Data Structures	3	-	-	3	20	20	60	100

Course Objectives	Course Outcomes
<p>This course is intended</p> <ul style="list-style-type: none"> To provide knowledge of basic concepts in data structures and algorithms To emphasize the application of data structures in developing and implementing efficient programs and algorithms. To understand the construct and analysis various data structures and abstract data types. 	<p>Students will be able to</p> <ul style="list-style-type: none"> Understand the fundamental concepts of data structures and implement sorting and searching algorithm Implement linked lists and sparse matrix representation using linked lists. classify & demonstrate the use of different data structures like stack, queue, postfix expressions using stack-based algorithms. Create binary trees, binary search trees, tree traversals, and explore advanced tree structures. apply algorithms for graph and implement symbol tables using hash and tree structures.

Unit I	[8Hrs]
Introduction: - Concept of Data structures, Time and space analysis of algorithms, Big oh and theta notations and omega notations, Average, best- and worst-case analysis Searching and sorting techniques- Linear search, Binary search, Indexed search, Insertion sort, selection sort, Bubble Sort, radix Sort, Merge Sort, Quick Sort.	
Unit II	[8Hrs]
Linked Lists: Singly linked list, Implementation of linked list using static and dynamic memory allocation, operations on linked list, polynomial representations and manipulations are using linked list, circular linked list, doubly linked list, Generalized list, sparse matrix, polynomial.	
Unit III	[8Hrs]
Stack and Queue - Array representation of stacks, Implementation of stack using linked lists, Queues, Dequeue, Circular queue, Polish notation, Application of stack & queue: Conversion from Infix to Postfix, Evaluation of postfix expressions, Priority Queues.	
Unit IV	[7Hrs]
Trees: Basic Terminology, Basic trees, Binary tree representations, threaded storage representation, binary tree traversals, binary search trees, Application of trees. Preliminary treatment of AVL Trees, B- Trees.	
Unit V	[9Hrs]
Graphs: Definition & terminology, Graph representation: matrix representation of Graph, List of structure, other representation of graphs, Breadth First Search, Depth First Search, Spanning trees, shortest path algorithm, topological sorting. Symbol Tables: static tree tables, dynamic tree tables, hash tables.	

Text Books

S.N	Title	Authors	Edition	Publisher
1	Fundamentals of Data Structure	Horowitz and Sahani		CBS Publications
2	Data Structures using	Tanenbaum		C Pearson Education
3	Data structure and Algorithm	Lafore		BPB Publication

Reference Books

S. N	Title	Authors	Edition	Publisher
1.	Data Structure and Programme Design in C	Kruse, Leung and Tondo		PHI
2.	Schaum's outline: Date Structures	Seymour Lipschutz		Tata Mc Graw Hill

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GROUP I: SEMESTER II

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24DS203P	Data Structures Lab	-	-	2	1	-	25	25	50

Course Objectives	Course Outcomes
<p>This course is intended</p> <ul style="list-style-type: none">To provide knowledge of basic concepts in data structures and algorithms.To emphasize the application of data structures in developing and implementing efficient programs and algorithms.To understand the construct and analysis various data structures and abstract data types.	<p>Students will be able to</p> <ul style="list-style-type: none">Implement the basic data structures and implement sorting and searching algorithmImplement linked lists and sparse matrix representation using linked lists.demonstrate the use of different data structures like stack, queue, postfix expressions using stack-based algorithms.Create binary trees, binary search trees, tree traversals, and explore advanced tree structures.apply algorithms for graph and implement symbol tables using hash and tree structures.

Expt . No.	Title of the experiment
1	To design and implement basic C program using arrays & structures.
2	To implement a Menu driven program for linear & Binary search methods and demonstrate their constraints.
3	a) To implement a program for bubble and selection sort and analyze their performances. b) To implement a program for quick sort and analyze their performances.
4	To implement a Program to demonstrate the working of a stack.
5	To implement a Program to demonstrate the working of a Queue
6	To implement a Program to apply the concepts of linked list
7	To implement the non linear data structure binary tree
8	To implement BFS and DFS in graph

Text Books

S.N	Title	Authors	Edition	Publisher
1	Fundamentals of Data Structure	Horowitz and Sahani		CBS Publications
2	Data Structures using	Tanenbaum		C Pearson Education
3	Data structure and Algorithm	Lafore		BPB Publication

Reference Books

S. N	Title	Authors	Edition	Publisher
1	Data Structure and Programme Design in C	Kruse, Leung and Tondo		PHI
2	Schaum's outline: Date Structures	Seymour Lipschutz		Tata Mc Graw Hill
1.	An Introduction to DS with applications	Trembley and sorenson		Mc Graw Hill

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GROUP I : SEMESTER II

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24DS204T	Introduction to Data Science	3	-	-	3	20	20	60	100

Course Objectives	Course Outcomes
This course aims to provide students with introductory knowledge of several data science techniques that can be used for data analysis	Student will be able to <ul style="list-style-type: none">• Demonstrate basic data science concepts• Apply pre-processing techniques on collected data• Perform analysis of data• Develop data model• Evaluate the data model

Unit I	[8Hrs]
Introduction: Introduction to Data Science – Evolution of Data Science – Data Science Roles – Stages in a Data Science Project – Applications of Data Science in various fields – Data Security Issues.	
Unit II	[8Hrs]
Data Collection and Data Pre-Processing: Data Collection Strategies – Data Pre-Processing Overview – Data Cleaning – Data Integration and Transformation – Data Reduction – Data Discretization.	
Unit III	[8Hrs]
Exploratory Data Analytics: Descriptive Statistics – Mean, Standard Deviation, Skewness and Kurtosis – Box Plots – Pivot Table – Heat Map – Correlation Statistics – ANOVA.	
Unit IV	[8Hrs]
Building and evaluation of models for: Association analysis, Recommendation systems, Time Series Data and Text Analysis, Measures for In-sample Evaluation - Prediction and Decision Making.	
Unit V	[8Hrs]
Generalization Error – Out-of-Sample Evaluation Metrics – Cross Validation – Overfitting – Under Fitting and Model Selection – Testing Multiple Parameters by using Grid Search.	

Text Books

S.N	Title	Authors	Edition	Publisher
1	Smarter Decisions : The Intersection of IoT and Data Science	Jojo Moolayil		PACKT
2	Doing Data Science	Cathy O'Neil, Rachel Schutt		O'Reilly
3	Data Science and Big data Analytics	David Dietrich, Barry Heller, Beibei Yang		EMC 2013

Reference Books

S. N	Title	Authors	Edition	Publisher
1.	Practical Data Science with R	Nina Zumel, John Mount.		Manning
2.	Data Science for business	F. Provost, T Fawcett		

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GROUP I : SEMESTER II

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24DS205P	Data Science Workshop – II	-	-	4	2	-	25	25	50

Course Objectives	Course Outcomes
This course is intended <input type="checkbox"/> Master the use of the R and RStudio interactive environment <input type="checkbox"/> Explore and understand how to use the R documentation <input type="checkbox"/> Explore different data types and data structures in R language <input type="checkbox"/> Understand how to create and manipulate data in R language	Students will be able to <ul style="list-style-type: none"> • explore different R language constructs • install RStudio and will use it for writing R- programs • perform R documentation • create and manipulate data in R language

Expt . No.	Title of the experiment
1	Study of basic Syntax's in R and data analysis using MS-Excel
2	Implement of vector data objects operations using R Programming
3	Study and Implement matrix, array and factors in R Programming
4	Write a R program to create a list containing strings, numbers, vectors and a logical values
5	Implement and use data frames in R Programming
6	Create Sample (Dummy) Data in R and perform data manipulation with R
7	Write a R program to extract first two rows from a given data frame
8	Write a R program to sort a given data frame by multiple column(s).

Text Books

S.N	Title	Authors	Edition	Publisher
1	R for Data Science	Hadley Wickham and Ganett Gorlemund	1st Edition	O'Reilly
2	The Art of R Programming-A Tour of Statistical Software Design	Norman Matlott	1st Edition	No Starch Press

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GROUP I : SEMESTER II

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24DS206P	Business Communication Skills – II Lab	-	-	2	1	-	25	25	50

Course Objectives	Course Outcomes
To empower students to develop a career-oriented mindset while harnessing the power of LSRW skills.	Students would be able to: <ul style="list-style-type: none">• Participate in Group Discussions.• Improve their reading and formal writing skills.• Develop upon their listening skills to engage in meaningful conversations.• Develop oratory skills to engage and inform audiences.• Prepare themselves for participating in business meetings.

Expt. No.	Title of the experiment
1	Group Discussion
2	Reading for Competitive Exams II
3	Listening Skills II
4	Presenting a TED Talk
5	Media Interaction
6	Business Correspondence II
7	Report Writing
8	Mock Meeting

Reference Books

S. N	Title	Authors	Edition	Publisher
1.	Communication Skills for Engineers	C. Muralikrishna & Sunita Mishra	2nd Edition, 2011	Pearson India Education Services
2.	Communication Skills	Dr. L. Bisen, Dr. B. Agrawal & Dr. N. T. Kalyani	1st Edition, 2021	Himalaya Publishing House
3.	Barron's IELTS Superpack	Lin Lougheed	2012	Barrons Educational Series

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GROUP I : SEMESTER II

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24DS207T	Design Thinking	2	-	-	2	10	10	30	50

Course Objectives	Course Outcomes
<ul style="list-style-type: none"> Learn design thinking concepts and principles Use design thinking methods in every stage of the problem Learn the different phases of design thinking Apply various methods in design thinking to different problems 	<ul style="list-style-type: none"> Define key concepts of design thinking Practice design thinking in all stages of problem solving Apply design thinking approach to real world problems

Unit I	[10 Hrs]
INTRODUCTION: Why Design? - Four Questions, Ten Tools - Principles of Design Thinking - The process of Design Thinking - How to plan a Design Thinking project. UNDERSTAND, OBSERVE AND DEFINE THE PROBLEM: Search field determination - Problem clarification - Understanding of the problem - Problem analysis- Reformulation of the problem - Observation Phase - Empathetic design - Tips for observing - Methods for Empathetic Design - Point-of-View Phase - Characterization of the target group - Description of customer needs.	
Unit II	[10 Hrs]
IDEATION AND PROTOTYPING: Ideate Phase - The creative process and creative principles - Creativity techniques - Evaluation of ideas - Prototype Phase - Lean Startup Method for Prototype Development - Visualization and presentation techniques.	
Unit III	[10 Hrs]
TESTING AND IMPLEMENTATION :Test Phase - Tips for interviews - Tips for surveys - Kano Model - Desirability Testing - How to conduct workshops - Requirements for the space - Material requirements - Agility for Design Thinking. FUTURE: Design Thinking meets the corporation - The New Social Contract - Design Activism - Designing tomorrow.	

Text Books

S.N	Title	Authors	Edition	Publisher
1.	Handbook of Design Thinking - Tips & Tools for how to design thinking	Christian Mueller-Roterberg	2021	Independently Published
2.	Change by Design: How Design Thinking Transforms Organizations and Inspires Innovation	Tim Brown	2019	HarperCollins

Reference Books

S.N	Title	Authors	Edition	Publisher
1.	Design Thinking for Strategic Innovation	Idris Mootee		Wiley

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ELECTRICAL ENGINEERING

GROUP 2: SEMESTER I

Sr No	Course Category	Course Code	Course Title	Hours per Week			Credits	Maximum Marks				No. of Hrs for ESE
				L	T	P		Mid-Sem Examination	Continual Assessment	End Sem Examination	Total	
1	BSC	24EE101T	Applied Physics	2	-	-	2	10	10	30	50	1.5
2	BSC	24EE101P	Applied Physics Lab	-	-	2	1	-	25	25	50	-
3	BSC	24EE102T	Linear Algebra and Calculus	3	1	-	4	20	20	60	100	3
4	PCC	24EE103T	Basic Electrical Engineering	3	1	-	4	20	20	20	100	3
5	PCC	24EE103P	Basic Electrical Engineering Lab	-	-	2	1	-	25	25	50	-
6	ESC	24EE104T	Engineering Graphics	3	-	-	3	20	20	60	100	3
7	ESC	24EE104P	Engineering Graphics Lab	-	-	2	1	-	25	25	50	-
8	AEC	24EE105P	Business Communication Skills I Lab	-	-	2	1	-	25	25	50	-
9	ESC	24EE106T	Design Thinking	2	-	-	2	10	10	30	50	1.5
10	SEC	24EE141P	Career Development I	-	-	2	1	-	50	-	50	-
11	CC	24EE107T	Co-curricular Courses - I	2	-	-	2	-	50	-	50	-
Total				15	2	10	22	80	280	300	700	12

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ELECTRICAL ENGINEERING

GROUP 2: SEMESTER II

Sr No	Course Category	Course Code	Course Title	Hours per Week			Credits	Maximum Marks				No. of Hrs for ESE
				L	T	P		Mid-Sem Examination	Continual Assessment	End Semester Examination	Total	
1	BSC	24EE201T	Applied Chemistry	2	-	-	2	10	10	30	50	1.5
2	BSC	24EE201P	Applied Chemistry Lab	-	-	2	1	-	25	25	50	-
3	BSC	24EE202T	Statistics and Transforms.	3	1	-	4	20	20	60	100	3
4	PCC	24EE203T	Electrical Measurement and Instrumentation	3	1	-	4	20	20	60	100	3
5	PCC	24EE203P	Electrical Measurement and Instrumentation Lab	-	-	2	1	-	25	25	50	-
6	ESC	24EE204T	Basic Electronics Circuits	3	-	-	3	20	20	60	100	3
7	ESC	24EE204P	Basic Electronics Circuits Lab	-	-	2	1	-	25	25	50	-
8	AEC	24EE205P	Business Communication Skills – II Lab	-	-	2	1	-	25	25	50	-
9	SEC	24EE241P	Career Development – II	-	-	2	1	-	50	-	50	-
10	IKS	24EE206T	Indian Knowledge System	2	-	-	2	10	10	30	50	1.5
11	CC	24EE207T	Co-curricular Courses – II	2			2	-	50	-	50	-
Total				15	2	10	22	80	280	340	700	12

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FIRST SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24EE101T	Applied Physics	2	--	--	2	10	10	30	50

Course Objectives	Course Outcomes
<p>This course is intended</p> <ul style="list-style-type: none">To understand the basic laws of physics and their application in engineering and technology.To develop scientific temper and analytical capability.	<p>Students will be able to</p> <ul style="list-style-type: none">Explain the structure of Crystals.Understand the types and applications of Magnetic Materials.Distinguish the types of solids on the basis of conductivity and acquire a brief idea about semiconductors and its applications

Unit I CRYSTAL STRUCTURE	[10 Hrs]
Space lattice, Crystal structure, Unit cell, Types of unit cell, Characteristics of SC, BCC and FCC unit cell, Miller Indices, Interplanar distance and its derivation, Diffraction of X-rays - Braggs' Law and its applications.	
Unit II MAGNETIC MATERIALS	[08 Hrs]
Terms and definitions, Types of magnetic materials, characteristics of Diamagnetic, Paramagnetic and Ferromagnetic Materials, Applications of soft and hard magnetic materials.	
Unit III SEMICONDUCTORS	[08 Hrs]
Free electron Theory (qualitative idea) and its features; Idea of band formation in solids, Classification of solids: Metal, Insulator, Semiconductor; Fermi Energy, Types - Intrinsic and Extrinsic Semiconductors, Application of Extrinsic Semiconductors - p-n junction diode	

Text Books

S.N	Title	Authors	Edition	Publisher
1	Fundamentals of Physics	David Halliday, Robert Resnick and Jerle Walker	8 th extended	John-Wiley India
2	Electronic Engineering Materials and Devices	John Allision	10 th edition reprint	TMH
3	Engineering Physics	M. N. Avadhanulu	Latest edition	S. Chand & Co.

Reference Books

S.N	Title	Authors	Edition	Publisher
1	Solid State Physics	Charles Kittel	Eighth edition	John Wiley & Sons, Inc
2	Solid State Physics	R.L. Singhal	Eighth edition	Kedarnath Ramnath
3	Quantum Mechanics	Schiff	First Edition	McGraw-Hill Book Company, Inc.

Online Resources

1	https://www.britannica.com/science/semiconductor#ref233890
2	https://www.geeksforgeeks.org/semiconductors/
3	https://www.sciencedirect.com/topics/chemistry/magnetic-material
4	https://www.livescience.com/33816-quantum-mechanics-explanation.html

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Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24EE101P	Applied Physics Lab	--	--	2	1	-	25	25	50

Course Objectives	Course Outcomes
<p>This course is intended</p> <ul style="list-style-type: none">To understand the basic laws of physics and their application in engineering and technology.To develop scientific temper and analytical capability.	<p>Students will be able to</p> <ul style="list-style-type: none">Verify principles/laws by selecting and using proper measuring instruments, interpret result and draw conclusions.Find various parameters using various properties of light.Apply the concepts of Semiconductors and Magnetic Materials.

Expt. No.	Title of the experiment
1	Study of semiconductor diodes
2	Study of Phenomenon of Diffraction
3	Study of Interference
4	Study of Birefringence
5	Guoy's Balance Method a) Determination of Magnetic Susceptibility of different magnetic materials. b) Identification of different types of Magnetic Materials
6	Study of Planck's Constant by means of LED
7	Determination of Curie Temperature of Ferromagnetic Material.
8	Study of Transistors.
9	Study of Hall Effect.
10	Experiment on 'Quantum Eraser'.
11	Demonstration of phenomena of Optics using Laser.

Text Books

S.N	Title	Authors	Edition	Publisher
1	Fundamentals of Physics	David Halliday, Robert Resnick and Jerle Walker	8e extended	John-Wiley India
2	A Textbook of Engineering Physics	Dr. M. N. Avadhanulu, Dr. P. G. Kshirsagar	Latest edition	S. Chand Publication.
3	Principles of Physics	David Halliday, Robert Resnick, Jearl Walker	10th Edition	John Wiley and Sons (2017)

Reference Books

S.N	Title	Authors	Edition	Publisher
1	Solid State Physics	Charles Kittel	Eighth edition	John Wiley & Sons, Inc
2	Solid State Physics	R.L. Singhal	Eighth edition	Kedarnath Ramnath
3	University Physics	Young and Freedman	Fifteenth edition	Pearson Education

Online Resources

1	https://www.britannica.com/science/semiconductor#ref233890
2	https://www.geeksforgeeks.org/semiconductors/
3	https://www.sciencedirect.com/topics/chemistry/magnetic-material

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FIRST SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24EE102T	Linear Algebra and Calculus	3	1	-	4	20	20	60	100

Course Objectives	Course Outcomes
<ul style="list-style-type: none"> The goal of this paper is to introduce advanced concepts of <ol style="list-style-type: none"> Matrix Algebra Multivariate Calculus Differential Equations Vector calculus 	<ul style="list-style-type: none"> Solve the system of linear equations using matrices. Identify engineering problems related to Matrices: Eigen value & Eigen vectors & Functions of Matrices. Understand the concept of multivariate calculus & apply the knowledge of applications of differentiation. Solve first order and higher order differential equations by various methods and apply these techniques to solve problems in engineering. Implement concept of vector calculus to solve engineering problems.
Unit I	[8Hrs]
Matrix Algebra: Introduction to matrices, Rank of a matrix, Consistency of system of linear equations, Linear and orthogonal transformations, Linear dependence of vectors.	
Unit II	[8Hrs]
Matrices: Characteristics equation, Cayley- Hamilton Theorem, Eigen values and Eigen vectors, Reduction to diagonal form, Reduction of quadratic form to canonical form by orthogonal transformation, Sylvester's theorem.	
Unit III	[8Hrs]
Multivariate Calculus: Functions of several variables and their partial derivatives, Chain rule and total differential coefficient, Jacobians and its properties, Maxima – Minima of functions of two variables, Lagrange's method of undetermined multipliers.	
Unit IV	[8Hrs]
Differential Equations: First order and first degree differential equations: Linear, Higher order differential equations with constant coefficients, Method of variation of parameters, Cauchy's homogeneous linear equation, Applications of differential equations.	
Unit V	[8Hrs]
Vector Calculus: Vector differentiation, Gradient, Directional derivatives, Divergence and Curl with their physical interpretation Solenoidal and irrotational motions, Scalar potential, Line integral & Work done.	

Text Books

S.N	Title	Authors	Edition	Publisher
1	Higher Engineering Mathematics	B. S. Grewal		Khanna Publishers, New Delhi.
2	A Text Book of Applied Mathematics (Vol I & II)	P. N. Wartikar and J. N. Wartikar		Pune Vidyarthi Griha Prakashan, Pune
3	Higher Engineering Mathematics	H. K. Das and Er. Rajnish Verma		S. Chand & CO. Pvt. Ltd., New Delhi

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S.N	Title	Authors	Edition	Publisher
1	Higher Engineering Mathematics	B.V. Ramana,	11th reprint, 2010.	Tata McGraw Hill New Delhi
2	A Text Book of Engineering Mathematics	Peter O' Neil		Thomson Asia Pvt. Ltd., Singapore.
3	Advanced Engineering Mathematics	Erwin Kreyszig		John Wiley & Sons, New York.

Online Resources

1	https://archive.nptel.ac.in/courses/111/101/111101115/#
2	https://www.coursera.org/learn/matrix-algebra-engineers

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FIRST SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24EE103T	Basic Electrical Engineering	3	1	-	4	20	20	60	100

Course Objectives	Course Outcomes
<ul style="list-style-type: none"> The goal of this course is 1. To understand the basic fundamentals of Electrical Circuits and Magnetic Circuit. 2. To summarize and apply the basic concepts of Electrical Power System 3. To understand basics of Electrical Machines 	Students will be able to <ul style="list-style-type: none"> Identify and analyse different electric circuits and magnetic circuits Understand the basics of single phase and three phase fundamentals. Understand the properties of single phase transformer and analyse its efficiency and regulation Recognize & Understand, the working of DC Generators and Motors Understand the basics of Electrical Power System

Unit I [10Hrs]

ELECTRIC & MAGNETIC CIRCUITS

EMF, Potential difference, current, power, Energy (Definition & Units SI), Ohms Law, Types of sources (Current & Voltage), Ideal and Practical Sources (Independent Sources only), Superposition theorem with DC source. Kirchhoff's Laws (KVL, KCL) statement & Numerical, Flux, flux density, flux intensity, MMF, reluctance, permeance, permeability, Analogy with Electric Circuits, Simple Calculations for series composite magnetic circuits.

Unit II [8Hrs]

AC CIRCUITS

Generation of single phase voltage, Average and RMS value for sinusoidal waveform, periodic function, phasor representation of sinusoidal electrical quantities, reactance, impedance, power and energy in AC circuit, simple numerical on series and parallel AC circuit, concept and importance of power factor, resonance in series circuits. Principle of Generation of three phase voltage, Phase sequence, Star & Delta Connected three phase system, Voltage, Current & Power relations for Balanced three phase system only (With numerical)

Unit III [6Hrs]

TRANSFORMER

Construction and principle of single-phase transformer, Ideal and Practical Transformer, operation at no load and on load, phasor diagram, equivalent circuit, losses, efficiency and regulation, O.C. & S.C. test, condition for maximum efficiency

Unit IV [6Hrs]

DC MACHINES

Generator : Construction, Basic principle & operation, Types of Generator, Characteristics
 Motor : Types, Characteristics of shunt & series, speed control of d.c. shunt & series motor, Starting of DC motors, three point and four point starters, losses and efficiency, Applications.

Unit V [6Hrs]

Introduction to Electrical Power System:

Introduction to Power Generation (Thermal, Hydro, and Solar) with block schematic presentation.
 Utilization of Electrical Energy: Necessity of equipment earthing, Importance of Fuses, Basic operation of MCB, ELCB (RCCB), tariff, types of tariff & calculation of household electricity bill.

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Text Books

S.N	Title	Authors	Edition	Publisher
1	A Text Book of Electrical Technology	B. L. Theraja and A. K. Theraja,	(Volume I, II & III)	S. Chand and Company
2	Basic Electrical Engineering	D. P. Kothari and I. J. Nagrath	4 th Edition	Tata McGraw Hill, 2010
3	Basic Electrical Engineering	D. C. Kulshreshtha	4 th Edition,	McGraw Hill, 2009

Reference Books

S.N	Title	Authors	Edition	Publisher
1	Fundamentals of Electrical Engineering	L. S. Bobrow	4 th Edition,	Oxford University Press, 2011
2	Electrical and Electronics Technology	E. Hughes		Pearson, 2010

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FIRST SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24EE103P	Basic Electrical Engineering	-	-	2	1	-	25	25	50

Course Objectives	Course Outcomes
<p>This course is intended</p> <ul style="list-style-type: none">To study performance of Electric circuits.To study performance of Transformer.To study performance of DC Machines.	<p>Students will be able to</p> <ul style="list-style-type: none">To identify various laws for simplification of electric circuitTo discuss characteristics of AC circuitsTo illustrate the tests performed on transformerTo discuss characteristics of DC Motor

Expt. No. (Any 08)	Title of the experiment (Any 08)
1	To verify KVL and KCL
2	To verify Superposition Theorem
3	To plot B-H curve of the given magnetic material
4	To study RLC series circuit
5	To study RLC Parallel circuit
6	To study the balanced Three phase system for star and delta connected balanced load.
7	To Perform speed control of DC shunt motor by varying field current
8	To Perform speed control of DC shunt motor by varying armature voltage
9	To find efficiency and regulation of single phase transformer by using direct loading test.
10	To Perform open circuit and short circuit test on 1-Phase Transformer
11	To plot magnetization characteristics of DC Generator
12	Study of Ammeter, Voltmeter, Wattmeter, Earthing, Fuse and various electric devices

Text Books

S.N	Title	Authors	Edition	Publisher
1	Laboratory Courses in Electrical Engineering	R.L. Kharbanda and S. G. Tarnekar		
2	Laboratory manual of Electrical Machines	D.P.Kothari and B.S. Umre		
3	Electrical Technology Volume I	B. L. Thareja		
4	Electrical Technology Volume II	B. L. Thareja		

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FIRST SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24EE104T	Engineering Graphics	3	-	-	3	20	20	60	100

Course Objectives	Course Outcomes
<ul style="list-style-type: none">To expose the students to the area of Engineering Graphics.To enable the student to communicate effectively through technical drawings.	<p>Students will be able to</p> <ul style="list-style-type: none">Recognize the application of drawing standards, construct engineering curves and orthographic projections of lines.Construct orthographic projections of Planes and solids.Apply concepts of orthographic projections to construct the Development of Lateral surfaces of sections of solids.Apply concepts of projections and convert pictorial views to orthographic views.Apply concepts of projections and construct isometric views.

Unit I	[8Hrs]
Introduction to Engineering Graphics: Types of lines, standard layout, Lettering, Standard representation of dimensions. Types of Curves - Ellipse, Parabola, Hyperbola, Cycloid, involute and Spiral. Construction of Ellipse (Arcs of circles method), Parabola (Rectangle Method) and Hyperbola (Rectangle Method) Introduction to Orthographic projections- Projection of Points and Lines in the first quadrant. [Problem-solving on lines inclined to one reference plane].	
Unit II	[8Hrs]
Projection of Planes- Projection of planes in the first quadrant. Problem-solving on planes inclined to one reference plane. Projection of Solids- Projection of solids in the first quadrant. Problem-solving for the solids with an axis inclined to one reference plane.	
Unit III	[8Hrs]
Development of lateral Surfaces for Section of solids: Introduction to Sectional Planes, Section of solids, Method of development, Development of lateral surfaces of right solids including Prisms, Cylinders, Pyramids & Cone cut by different section planes.	
Unit IV	[8Hrs]
Introduction to Orthographic drawings: Conversion of Pictorial / Isometric drawings of machine components to Orthographic drawings.	
Unit V	[8Hrs]
Introduction to Isometric drawings: Isometric concepts of Isometric axes, Isolines, Isometric scale, Isometric projection and Isometric view. Construction of Isometric drawings and views from a given orthographic view.	

Text Books

S.N	Title	Authors	Edition	Publisher
1.	Engineering Drawing	N. D. Bhatt	-	Charotar Publishing House
2.	Engineering Drawing	D. N. Johle	-	Tata McGraw-Hill Publishing

Reference Books

S.N	Title	Authors	Edition	Publisher
1.	Fundamentals of Engineering Drawing	Luzadder Warren J, Duff John		PHI publications

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FIRST SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24EE104P	Engineering Graphics Lab	-	-	2	1	-	25	25	50

Course Objectives	Course Outcomes
<ul style="list-style-type: none">To expose the students to the area of Engineering Graphics.To enable the student to communicate effectively through technical drawings.	<p>Students will be able to</p> <ul style="list-style-type: none">Apply engineering drawing standards and construct engineering curves and orthographic projections of lines.Construct orthographic projections of Planes and solids.Apply orthographic projection concepts to construct the Development of Lateral surfaces of sections of solids.Apply concepts of projections and convert pictorial views to orthographic views through pencil drawings and CAD.Apply concepts of projections and construct isometric views through pencil drawings and CAD.

A minimum of eight experiments to be performed

Expt. No.	Title of the experiment
1	Pencil drawings on Engineering Curves
2	Pencil drawings on Projection of Lines
3	Pencil drawings on Projection of Planes
4	Pencil drawings on Projection of Solids
5	Pencil drawings on the Development of Lateral surfaces
6	Pencil drawings on Orthographic Views
7	Pencil drawings on Isometric Views / Projection
8	Computer-Aided Drawing on Orthographic Views
9	Computer-Aided Drawing on Isometric Views

Text Books

S.N	Title	Authors	Edition	Publisher
1.	Engineering Drawing	N. D. Bhatt	-	Charotar Publishing House
2.	Engineering Drawing	D. N. Johle	-	Tata McGraw-Hill Publishing

Reference Books

S.N	Title	Authors	Edition	Publisher
1.	Fundamentals of Engineering Drawing	Luzadder Warren J, Duff John		PHI publications

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FIRST SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24EE105P	Business Communication Skills I Lab	-	-	2	1	-	25	25	50

Course Objectives	Course Outcomes
<ul style="list-style-type: none"> To empower students to develop a career-oriented mindset while harnessing the power of LSRW skills. 	<p>Students will be able to:</p> <ul style="list-style-type: none"> apply verbal and non-verbal skills to confidently and effectively deliver presentations. prepare themselves for overall language ability through listening and reading tasks. demonstrate formal writing skills. draft impactful Resumes and Cover Letters. prepare themselves for Personal Interviews.

Practical No.	Practical based on
1	Presentation Skills
2	Poster Making (Product/ Event)
3	Reading Comprehension for Competitive Exams.
4	Writing Skills for Academic Purposes.
5	Listening Skills I
6	Business Correspondence I
7	Resume Writing and Cover Letter
8	Mock Interviews

Reference Books:

S. N	Title	Authors	Edition	Publisher
1	Communication Skills for Engineers	C. Muralikrishna & Sunita Mishra	2nd Edition, 2011	Pearson India Education Services
2	Communication Skills	Dr. L. Bisen, Dr. B. Agrawal & Dr. N. T. Kalyani	1st Edition, 2021	Himalaya Publishing House
3	Barron's IELTS Superpack	Lin Lougheed	2012	Barrons Educational Series

Online Resources:

1	https://ieltsliz.com/
2	https://www.englishclub.com/business-english/
3	https://www.indiabix.com/verbal-ability/questions-and-answers/
4	https://prepinsta.com/interview-preparation/?utm_source=home+page&utm_medium=navigation
5	https://www.skillsyouneed.com/presentation-skills.html

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Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24EE106T	Design Thinking	2	-	-	2	10	10	30	50

Course Objectives	Course Outcomes
<ol style="list-style-type: none">Learn design thinking concepts and principlesUse design thinking methods in every stage of the problemLearn the different phases of design thinkingApply various methods in design thinking to different problems	<ol style="list-style-type: none">Define key concepts of design thinkingPractice design thinking in all stages of problem solvingApply design thinking approach to real world problems

Unit I	[10 Hrs]
INTRODUCTION: Why Design? - Four Questions, Ten Tools - Principles of Design Thinking - The process of Design Thinking - How to plan a Design Thinking project. UNDERSTAND, OBSERVE AND DEFINE THE PROBLEM: Search field determination - Problem clarification - Understanding of the problem - Problem analysis- Reformulation of the problem - Observation Phase - Empathetic design - Tips for observing - Methods for Empathetic Design - Point-of-View Phase - Characterization of the target group - Description of customer needs.	
Unit II	[10 Hrs]
IDEATION AND PROTOTYPING: Ideate Phase - The creative process and creative principles - Creativity techniques - Evaluation of ideas - Prototype Phase - Lean Startup Method for Prototype Development - Visualization and presentation techniques.	
Unit III	[10 Hrs]
TESTING AND IMPLEMENTATION :Test Phase - Tips for interviews - Tips for surveys - Kano Model - Desirability Testing - How to conduct workshops - Requirements for the space - Material requirements - Agility for Design Thinking. FUTURE: Design Thinking meets the corporation - The New Social Contract - Design Activism - Designing tomorrow.	

Text Books

S.N	Title	Authors	Edition	Publisher
1.	Handbook of Design Thinking - Tips & Tools for how to design thinking	Christian Mueller-Roterberg	2021	Independently Published
2.	Change by Design: How Design Thinking Transforms Organizations and Inspires Innovation	Tim Brown	2019	HarperCollins

Reference Books

S.N	Title	Authors	Edition	Publisher
1.	Design Thinking for Strategic Innovation	Idris Mootee		Wiley

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Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24EE201T	Applied Chemistry	2	0		2	10	10	30	50

Course Objectives	Course Outcomes
<p>This course is intended</p> <ol style="list-style-type: none">To acquaint the students with the basic phenomenon, concepts, knowledge and understanding of the fundamental principles of chemistry.To develop necessary skills and abilities to succeed in engineering education, research, Industry, environment and social context.	<p>Students will be able to</p> <ul style="list-style-type: none">Analyse and Compare parameter necessary for various treatment of water.Apply the Basic concepts of Electrochemistry in protection of engineering materialApply the principles of green Chemistry for sustainable development and analyse the impact of industrial pollution and its control.

Unit I Water Technology-	[9 Hrs]
Hardness of water, Numericals on Hardness, Industrial water treatment- Boiler Troubles- Carry over, Caustic embrittlement, Boiler corrosion, Scale & Sludge formation External treatments - Softening of water by Zeolite process and De-mineralization process, Numericals on Zeolite process. Desalination of sea water- Electro dialysis and Reverse Osmosis process-Principle, methods and advantages	
Unit II Electrochemical Phenomenon & Corrosion	[9 Hrs]
Introduction- brief idea about electrochemical & galvanic series; Electrolytic & Electrochemical Cell; Construction, working & Advantages of Li Ion Battery, Fuel Cell, Photochemical Cell. Corrosion- Introduction, Factors affecting corrosion, Types of corrosion, Corrosion prevention- Material & Design selection & Cathodic protection	
Unit III Green Chemistry & Waste Management-	[8 Hrs]
Green Chemistry- Introduction, Principles of Green Chemistry with example, Green Reagents- Super Critical Fluid (CO ₂)- Properties and Applications, Green Crackers- Introduction, Advantages, Bio Catalysis- Definition and examples. Carbon Credit, Carbon Sequestration Waste Management- Solid, Nuclear & e-waste: Sources, Impact & its control	

Text Books

S.N	Title	Authors	Edition	Publisher
1	Text Book of Engineering Chemistry	S.S. Dara,	New	S. Chand and Company Ltd. New Delhi.
2	Textbook of Engineering Chemistry	P.C. Jain and Monica Jain	Sixth	Dhanpat Rai and Sons, New Delhi.
3	E-waste Recycling and Management	Anish Khan, Inamuddin, Abdullah M. Ansiri	1st	Springer

Reference Books

S.N	Title	Authors	Edition	Publisher
1	A Text book of Engineering Chemistry	Shashi Chawla	1st	Dhanpat Rai & Sons, New Delhi
2	Applied Chemistry	N. Krishnamurthy:P. Vallinavagam. And K. Jeysubramanian	1st	TMH
3	Environmental Chemistry	B. K. Sharma	1st	Krishna Prakashan Media (P) Ltd.

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**SECOND SEMESTER**

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24EE201P	Applied Chemistry Lab	-	-	1	1	-	25	25	50

Course Objectives	Course Outcomes
<p>This course is intended</p> <ul style="list-style-type: none">To Make the students aware about various techniques available for Analysis of Material.To Impart the skill of handling chemicals and apparatus.	<p>Students will be able to</p> <ul style="list-style-type: none">List the proper procedures and regulations for safe handling and use of chemicals and can follow the proper procedures and regulations for safe handling when using different instruments.Demonstrate the use of modern instrumentation, classical techniques, and properly record the results of their experiment.Identify and solve chemical problems and explore new areas of research especially in fuel and lubricants.

Expt. No.	Experiments based on Performance - Any FOUR
1	Determination of Hardness (Total, Permanent & Temporary) of Water Sample by Complexometric method
2	Determination of heavy metal from industrial effluent by colorimeter
3	Determination of Flash point by using Cleveland Open cup flash point apparatus / Abel's Close cup apparatus / Pensky Marten close cup apparatus
4	Determination of viscosity of lubricating oil at different temperature by Redwood Viscometer No.1 OR No. 2
5	Proximate analysis of coal -Determination of % of Moisture, Volatile Matter and Ash in coal sample
Demonstration - Any ONE	
1	Measurement of pH of sample from different sources by Digital pH Meter.
2	Determination of turbidity from industrial effluent.
Virtual Experiment - Any ONE	
1	Determination of Alkalinity of Water Sample.
2	Estimation of DO content of Water sample.
Activity - Any ONE	
1	Study of nearby industrial chemicals and safety measures.
2	Study of Air /Water Pollution Level at different Sites in Nagpur City.
3	Visit to Water Treatment Plant/Effluent Treatment Plant

Text Books

S.N	Title	Authors	Edition	Publisher
1	A Textbook on experiment and calculation in engineering chemistry	S.S. Dara	9th	S.Chand

Reference Books

S.N	Title	Authors	Edition	Publisher
1	Applied Chemistry theory and practical	O.P. Virmani and A.K. Narular	Ist	New Age International
2	Laboratory Manual on Engineering Chemistry	Dr. Subdharani	Ist	Dhanpat Rai Publishing

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SECOND SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24EE202T	Statistics & Transforms	3	1	0	4	20	20	60	100

Course Objectives	Course Outcomes
To inculcate and strengthen students with adequate knowledge of <ul style="list-style-type: none"> Statistics Integral Transforms 	Students will be able to: <ul style="list-style-type: none"> Apply numerical integration methods and find analytical solutions to difference equations. Identify, analyse and solve statistical problems. Identify and solve practical problems by using Laplace Transforms. Solve and analyze practical problems with their physical and graphical interpretation by using Laplace Transforms. Apply Fourier Transform to analyse input-output relationships of signals.

Unit I	[8hrs]
Finite Differences: Operator E and delta, Factorial Polynomial, Numerical integration: Trapezoidal rule, Simpson's 1/3 rule, Simpson's 3/8 rule, Difference equations with constant coefficients.	
Unit II	[8hrs]
Statistics: Fitting of straight line, parabola and exponential curves by method of least squares, Coefficient of correlation and lines of regressions, Rank correlation, multiple regression.	
Unit III	[8hrs]
Laplace Transform –I : Definition, properties, Evaluation of Integrals by Laplace Transform.	
Unit IV	[8hrs]
Laplace Transform –II : Inverse Laplace Transform and its properties, Convolution theorem(Statement only), Unit Step Function, Periodic function, Applications of Laplace Transform.	
Unit V	[8hrs]
Fourier Transform and Fourier Transform: Introduction to Fourier series , Concept of even and odd function , Definition, properties, Fourier Integral Theorem, Relation with Laplace Transform, Applications of Fourier Transform.	

Text Books

S.N	Title	Authors	Edition	Publisher
1	Higher Engineering Mathematics	B. S. Grewal	40 th	Khanna Publishers, New Delhi.
2	Higher Engineering Mathematics	H. K. Dass and Er. Rajnish Verma		S. Chand & Co. Pvt. Ltd., New Delhi.
3	Advanced Engineering Mathematics	Erwin Kreyszig		John Wiley & Sons, New York.

Reference Books

S.N	Title	Authors	Edition	Publisher
1	Higher Engineering Mathematics	B. V. Ramana		Tata McGraw-Hill Publications, New Delhi.
2	Advanced Engineering Mathematics	C. R. Wylie & L. C. Barrett		Tata McGraw-Hill Publications, New Delhi.
3	A Text Book of Engineering Mathematics	Peter O' Neil		Thomson Asia Pvt. Ltd., Singapore.
4	A Text Book of applied Mathematics- Volume -II	P.N. Wartikar & J.N. Wartikar		Poona Vidyarthi Griha Prakashan

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SECOND SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation		
						CA	ESE	Total
24EE203T	Electrical Measurement and Instrumentation	3	1		4	CA	ESE	Total
						40	60	100

Course Objectives	Course Outcomes
<p>This course is intended</p> <ul style="list-style-type: none">To learn different instruments used for measurement of various electrical quantities.To learn DC & AC Bridges, CT and PT, Power and Energy measurement.To learn different instruments used for measurement of various non-electrical quantities.	<p>Students will be able to</p> <ul style="list-style-type: none">use appropriate type of measuring instrument for particular application.calculate the value of unknown resistance, inductance, capacitance.calculate power and energy in electric circuits.explain transducers used for different applications.explain measurement of various non-electric quantities.

Unit I	[8Hrs]
Measuring Instruments: - Principle of Galvanometer, Moving Iron (MI), PMMC and Dynamo meter type instruments (Numerical on MI and PMMC). Calibration. Loading effect of instruments, Errors in measurement (Basic Statistical analysis: Mean, Standard deviation, etc.). Special Instruments: Single phase Power Factor meter (any one type), Single phase Frequency meter (any one type), Synchroscope (Modified).	
Unit II	[8Hrs]
Measurement of RLC Elements: - Measurement of Resistance: classification, Measurement of medium resistance :- Wheatstone Bridge. Low resistance: - Kelvin's Double Bridge. High resistance: - Ohmmeter, Insulation Tester & loss of charge method. Earth resistance: - Earth tester. Balanced condition in AC Bridge, Measurement of inductance using Maxwell's inductance-capacitance bridge, Measurement of Capacitance using Schering's, Hays bridge.	
Unit III	[8Hrs]
Measurement of Power and Energy: - Principle of Measurement of active, reactive and apparent power in single and poly-phase circuits. Principle of Measurement of Energy in single and poly-phase circuits. Instrument transformers: General theory & extension of range using CT & PT, errors in instrument transformers, applications of instrument transformers for metering.	
Unit IV	[08Hrs]
Digital Instruments and Transducers: - Introduction to digital meters: Measurement of voltage, current, Phase, Time. Piezoelectric transducer, Strain gauges, load cell, Seismic instruments, Accelerometer.	
Unit V	[8 Hrs]
Measurement of Non-electric quantities: - Measurement of Temperature, measurement of torque, measurement of flow, measurement of motion and measurement of pressure.	

Text Books

S.N	Title	Authors	Edition	Publisher
1	Electrical & Electronics Measurements & Instrumentation	A. K. Sawhney	5 th revise	DHANPAT RAI & sons
2	Electronic Instrumentation & Measurement Technique	W. D. Cooper	New	Prentice Hall
3	Mechanical and Industrial Measurements	R. K. Jain	New	Khanna Publishers

Reference Books

S.N	Title	Authors	Edition	Publisher
1	Measurement System Application and Design	E.O. Doebelin	New	Mcgraw-Hill
2	Instrumentation for Engineering Measurements	Dalley Railey, Mc Conne	New	John Wiley & Sons
3	Electrical Instrumentation	H. S. Kalsi	2 nd revised	Tata Mcgraw-Hill education

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SECOND SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation		
						CA	ESE	Total
24EE203P	Electrical Measurement and Instrumentation Lab	-	-	2	1	25	25	50

Course Objectives	Course Outcomes
<p>This course is intended</p> <ul style="list-style-type: none">To learn different instruments used for measurement of various electrical quantities.To learn DC & AC Bridges, CT and PT, Power and Energy measurement.To learn different instruments used for measurement of various non-electrical quantities.	<p>Students will be able to</p> <ul style="list-style-type: none">measure unknown resistance using DC Bridges and loss of charge method.measure value of unknown capacitance and inductance using AC bridges.measure electrical power using watt-meter.measure electrical power using CT & PT.measure non-electrical quantity using suitable transducer.

Expt. No. (Any 08)	Title of the experiment (Any 08)
1	Measurement of Low resistance using Kelvin Double Bridge.
2	Measurement of high resistance by loss of charge method.
3	Measurement of medium resistance using Wheatstone Bridge.
4	To determine the Inductance of unknown coil by Maxwell's bridge.
5	To determine the Capacitance of an unknown Capacitor by Schering Bridge.
6	To determine the Inductance of unknown coil by Hay's bridge.
7	To determine electrical power by two watt-meter method.
8	Measurement of electrical power using CT and PT.
9	Study of single phase energy meter.
10	Study of Resistance Temperature Detector.
11	Measurement of displacement using LVDT.
12	Study of measurement of Torque.
13	Measurement of pressure using Bourdon Tube.

Text Books

S.N	Title	Authors	Edition	Publisher
1	Electrical & Electronics Measurements & Instrumentation	A. K. Sawhney	5 th revise	DHANPAT RAI & sons
2	Electronic Instrumentation & Measurement Technique	W. D. Cooper	New	Prentice Hall
3	Mechanical and Industrial Measurements	R. K. Jain	New	Khanna Publishers

Reference Books

S.N	Title	Authors	Edition	Publisher
1	Measurement System Application and Design	E.O. Doebelin	New	Mcgraw-Hill
2	Instrumentation for Engineering Measurements	Dalley Railey, Mc Conne	New	John Wiley & Sons
3	Electrical Instrumentation	H. S. Kalsi	2 nd revised	Tata Mcgraw-Hill education

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SECOND SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24EE204T	Basic Electronics Circuits	3	-	-	3	20	20	60	100

Course Objectives	Course Outcomes
<p>This course is intended</p> <ul style="list-style-type: none"> To introduce basic electronic circuit made up of diodes and transistors. To understand analysis and design of basic digital circuits and linear integrated circuits. 	<p>Students will be able to</p> <ul style="list-style-type: none"> Explain basic applications of diodes. Describe basic applications of transistor. Analyse & classify basic digital electronics. Identify basic digital circuits Explain basic analog circuits

Unit I Basic diode and its applications [8Hrs]

Zener diode voltage regulator, p-n junction diode clipping and clamper circuits, HWR and full wave bridge rectifier with and without C-filter

Unit II Basic transistor and its applications [8Hrs]

Npn BJT working, input and output characteristics of CE configuration, Transistor as a switch, Transistor as an amplifier CE configuration (all npn)

Unit III Basics of digital electronics [8Hrs]

Number system and conversion, binary addition and subtraction by ones and twos complement method, binary, BCD, gray codes conversions, basic gate (AND, OR, NOT), Universal gate (NAND, NOR), special gate (EXOR, EXNOR), Boolean algebra theorems De Morgans proof, classification of digital logic families TTL, CMOS and ECL

Unit IV Basic digital circuits [8Hrs]

K-map upto 4-variables, combinational and sequential circuits, half and full adder, half and full subtractor, decoder and encoder ICs, code converters, one bit memory cell, latch and flip flop, SR, D, JK, T flip flops, JK master slave flip flop

Unit V Basic analog circuits [8Hrs]

Block diagram of an op-amp, pin out of IC741, various parameters and definitions ideal and non ideal, open loop, close loop, inverting, non inverting and differential configurations, concept of virtual short and ground

Text Books

S.N	Title	Authors	Edition	Publisher
1	Electronic principles	V.K.Mehta	XII	S.Chand
2	Digital Circuits	Anand Kumar	IV	PHI
3	Operational Amplifiers	Ramakant Gaikwad	IV	PHI

Reference Books

S.N	Title	Authors	Edition	Publisher
1	Integrated Electronics, ,	J. Millman, C. Halkias,	4 th Edition,	Mc-Graw Hill Education
2	Fundamentals of Digital Circuits	R.Tinder	2 nd Edition	Wiley

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SECOND SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24EE204P	Basic Electronic Circuits Lab	-	-	2	1	-	25	25	50

Course Objectives	Course Outcomes
<p>This course is intended</p> <ul style="list-style-type: none">To understand the basic applications of diodes and transistors.To summarize and apply the basic concepts of digital circuits and analog circuits.	<p>Student will able to</p> <ul style="list-style-type: none">Develop diode circuits on bread board.Verify working of transistor circuits.Study basic digital circuits and basic analog circuits

Expt. No.	Title
1	To perform Zener diode voltage regulator on breadboard.
2	To perform diode clipping and clamping circuits.
3	To perform input and output characteristics of CE configuration.
4	To perform a transistor as an amplifier.
5	To implement NAND gate using discrete components.
6	To verify the truth tables of basic gates ,universal gates and special gates.
7	To perform half and full adder.
8	To perform an inverting amplifier.

Text Books

S. N	Title	Authors	Edition	Publisher
1	Electronics laboratory primer	S.Poornachandra	2 nd	S.Chand
2	Electronics & communication	B.Sasikala	2 nd	Vikas

Reference Books

S. N	Title	Authors	Edition	Publisher
1	Integrated Electronics, ,	J. Millman, C. Halkias,	4 th Edition,	Mc-Graw Hill Education
2	Fundamentals of Digital Circuits	A. Anand Kumar,	4 th Edition,	PHI Learning Pvt. Ltd.

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SECOND SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation		
						CA	ESE	Total
24EE205P	Business Communication Skills – II Lab	-	-	2	1	25	25	50

Course Objectives	Course Outcomes
<ul style="list-style-type: none">To empower students to develop a career-oriented mindset while harnessing the power of LSRW skills.	Students would be able to: <ul style="list-style-type: none">Participate in Group Discussions.Improve their reading and formal writing skills.Develop upon their listening skills to engage in meaningful conversations.Develop oratory skills to engage and inform audiences.Prepare themselves for participating in business meetings.

Expt. No.	Title of the experiment
1	Group Discussion
2	Reading for Competitive Exams II
3	Listening Skills II
4	Presenting a TED Talk
5	Media Interaction
6	Business Correspondence II
7	Report Writing
8	Mock Meeting

Reference Books

S. N	Title	Authors	Edition	Publisher
1.	Communication Skills for Engineers	C. Muralikrishna & Sunita Mishra	2nd Edition, 2011	Pearson India Education Services
2.	Communication Skills	Dr. L. Bisen, Dr. B. Agrawal & Dr. N. T. Kalyani	1st Edition, 2021	Himalaya Publishing House
3.	Barron's IELTS Superpack	Lin Lougheed	2012	Barrons Educational Series

Online Resources

1	https://ieltsliz.com/
2	https://www.englishclub.com/business-english/
3	https://www.indiabix.com/verbal-ability/questions-and-answers/
4	https://prepinsta.com/interview-preparation/?utm_source=home+page&utm_medium=navigation

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GROUP II : SEMESTER II

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24EE206T	Indian Knowledge System	2	-	-	2	10	10	30	50
Course Objectives					Course Outcomes				
<p>This course is intended</p> <ul style="list-style-type: none"> To introduce the origin, evolution and approach of Indian knowledge systems To understand the Indian knowledge approaches to various domains such as time, language, environment, management, life and mind To appreciate the principles of thought process, reasoning, inferencing and sustainability in Indian knowledge systems To navigate knowledge sources of different disciplines of studies from a Vedic perspective 					<p>Students will be able to</p> <ul style="list-style-type: none"> Explain the origin, evolution and approach of IKS and build various practices to conserve and protect rich Indian Knowledge Describe importance of Indian Literature and will know about Indian Scholars Understand ancient Indian traditions, practices and knowledge for conservation of resources 				

Unit I	[10 Hrs.]
Introduction and Management of Indian Knowledge System	
1.1 Definition, Concept and Scope of IKS 1.2 IKS based approaches on Knowledge Paradigms 1.3 IKS in Ancient India and Modern India 1.4 Documentation and Preservation of IKS 1.5 Approaches for Conservation and Management of nature and Bio – Resources 1.6 Approaches and Strategies to protection and conservation of IKS	
Unit II	[12 Hrs.]
IKS and Indian Scholars, Indian Literature	
2.1 Philosophy and Literature (Maharshi Vyas, Kanad, Pingala, Parasar, Banabhatta, Nagarjuna and Panini) 2.2 Mathematics and Astronomy (Aryabhatta, Mahaviracharya, Bodhayan, Bhaskaracharya, Brahmagupta, Varahamihira) 2.3 Medicine and Yoga (Charak, Susruta, Maharshi Patanjali and Dhanwantari) 2.4 Sahitya (Vedas, Upvedas (Ayurveda, Dhanurveda, Ghandarvaveda), Puran and Upnishad and Shad Darshan (Vedanta, Nyay, Vaisheshik, Sankhya, Mimamsa, Yoga, Adhyatma, Meditation) 2.5 Shastra (Nyaya, Vyakarana, Krishi, Shilp, Vastu, Natya, Sangeet)	
Unit III	[08 Hrs.]
Unique Traditional Practices and Applied Traditional knowledge	
3.1 Myths, Rituals, Spirituals, Folk stories, Traditional Narratives 3.2 Agriculture, Land, Water and Soil Conservation and Management Practices 3.3 Vaidya (Traditional health Care system), Amchi Medicine system	

Text Books

S. N.	Title	Authors	Edition	Publisher
1	Indian Knowledge System: Introduction and Prospects	Acharya Shreyas Kurhekar	First	Sanskrit University, Ramtek
2	Indian Knowledge System Vol. I and II	Kapil Kapoor, Awadhesh Kumar Singh		D.K. Print World Ltd.
3	Traditional Knowledge System in India	Amit Jha		Atlantic Publisher

Reference Books / Resources

S. N.	Title	Authors	Edition	Publisher
1	Website of Indian Knowledge System Division, New Delhi			

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ELECTRONICS AND TELECOMMUNICATION ENGINEERING

GROUP 2: SEMESTER I

Sr No	Course Category	Course Code	Course Title	Hours per Week			Credits	Maximum Marks				No of Hours for ESE
				L	T	P		Mid-Sem Examination	Continual Assessment	End Sem Examination	Total	
1	BSC	24ET101T	Applied Physics	2	-	-	2	10	10	30	50	1.5
2	BSC	24ET101P	Applied Physics Lab	-	-	2	1	-	25	25	50	-
3	BSC	24ET102T	Linear Algebra and Calculus	3	1	-	4	20	20	60	100	3
4	PCC	24ET103T	Digital Electronics	3	1	-	4	20	20	60	100	3
5	PCC	24ET103P	Digital Electronics Lab	-	-	2	1	-	25	25	50	-
6	ESC	24ET104T	Basics of Electronic Engineering	2	-	-	2	10	10	30	50	1.5
7	ESC	24ET105P	Logic building using C lab	-	-	4	2	-	25	25	50	-
8	AEC	24ET106P	Business Communication Skills I Lab	-	-	2	1	-	25	25	50	-
9	ESC	24ET107T	Design Thinking	2	-	-	2	10	10	30	50	1.5
10	SEC	24ET141P	Career Development I	-	-	2	1	-	50	-	50	-
11	CC	24ET108T	Co-curricular Courses – I	2			2	-	50	-	50	-
Total				14	2	12	22	70	270	310	650	10.5

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GROUP 2: SEMESTER II

Sr No	Course Category	Course Code	Course Title	Hours per Week			Credits	Maximum Marks				No of Hours for ESE
				L	T	P		Mid-Sem Examination	Continual Assessment	End Sem Examination	Total	
1	BSC	24ET201T	Applied Chemistry	2	-	-	2	10	10	30	50	1.5
2	BSC	24ET201P	Applied Chemistry Lab	-	-	2	1	-	25	25	50	-
3	BSC	24ET202T	Statistics & Transforms	3	1	-	4	20	20	60	100	3
4	PCC	24ET203T	Electronic Devices & Circuits	3	1	-	4	20	20	60	100	3
5	PCC	24ET203P	Electronic Devices & Circuits Lab	-	-	2	1	-	25	25	50	-
6	ESC	24ET204T	Basics of Electrical Engineering	2	-	-	2	10	10	30	50	1.5
7	ESC	24ET205P	Electronic Workshop Lab – I	-	-	4	2	-	25	25	50	-
8	AEC	24ET206P	Business Communication Skills – II Lab	-	-	2	1	-	25	25	50	-
9	IKS	24ET207T	Indian Knowledge System	2	-	-	2	10	10	30	50	1.5
10	SEC	24ET241P	Career Development – II	-	-	2	1	-	50	-	50	-
11	CC	24ET208T	Co-curricular Courses – II	2	-	-	2	-	50	-	50	-
Total				14	2	12	22	70	270	310	650	10.5

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Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24ET101T	Applied Physics	2	--	--	2	10	10	30	50

Course Objectives	Course Outcomes
This course is intended, 1. To understand the basic laws of physics and their application in engineering and technology. 2. To develop scientific temper and analytical capability.	Students will be able to, 1. Explain the structure of Crystals. 2. Understand the types and applications of Magnetic Materials. 3. Distinguish the types of solids on the basis of conductivity and acquire a brief idea about semiconductors and its applications

Unit I CRYSTAL STRUCTURE	[10 Hrs]
Space lattice, Crystal structure, Unit cell, Types of unit cell, Characteristics of SC, BCC and FCC unit cell, Miller Indices, Interplanar distance and its derivation, Diffraction of X-rays - Braggs' Law and its applications.	
Unit II MAGNETIC MATERIALS	[08 Hrs]
Terms and definitions, Types of magnetic materials, characteristics of Diamagnetic, Paramagnetic and Ferromagnetic Materials, Applications of soft and hard magnetic materials.	
Unit III SEMICONDUCTORS	[08 Hrs]
Free electron Theory (qualitative idea) and its features; Idea of band formation in solids, Classification of solids: Metal, Insulator, Semiconductor; Fermi Energy, Types - Intrinsic and Extrinsic Semiconductors, Application of Extrinsic Semiconductors - p-n junction diode	

Text Books

S.N	Title	Authors	Edition	Publisher
1	Fundamentals of Physics	David Halliday, Robert	8 th extended	John-Wiley India
2	Electronic Engineering Materials	John Allision	10 th edition reprint	TMH
3	Engineering Physics	M. N. Avadhanulu	Latest edition	S. Chand & Co.

Reference Books

S.N	Title	Authors	Edition	Publisher
1	Solid State Physics	Charles Kittel	Eighth edition	John Wiley & Sons, Inc
2	Solid State Physics	R.L. Singhal	Eighth edition	Kedarnath Ramnath
3	Quantum Mechanics	Schiff	First Edition	McGraw-Hill Book Company,

Online Resources

1	https://www.britannica.com/science/semiconductor#ref233890
2	https://www.geeksforgeeks.org/semiconductors/
3	https://www.sciencedirect.com/topics/chemistry/magnetic-material
4	https://www.livescience.com/33816-quantum-mechanics-explanation.html

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Course	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24ET101P	Applied Physics Lab	--	--	2	1	-	25	25	50

Course Objectives	Course Outcomes
<p>This course is intended</p> <ul style="list-style-type: none"> To understand the basic laws of physics and their application in engineering and technology. To develop scientific temper and analytical capability. 	<p>Students will be able to</p> <ul style="list-style-type: none"> Verify principles/laws by selecting and using proper measuring instruments, interpret result and draw conclusions. Find various parameters using various properties of light. Apply the concepts of Semiconductors and Magnetic Materials.

Expt. No.	Title of the experiment
1	Study of semiconductor diodes
2	Study of Phenomenon of Diffraction
3	Study of Interference
4	Study of Birefringence
5	Guoy's Balance Method a) Determination of Magnetic Susceptibility of different magnetic materials. b) Identification of different types of Magnetic Materials
6	Study of Planck's Constant by means of LED
7	Determination of Curie Temperature of Ferromagnetic Material.
8	Study of Transistors.
9	Study of Hall Effect.
10	Experiment on 'Quantum Eraser'.
11	Demonstration of phenomena of Optics using Laser.

Text Books

S.N	Title	Authors	Edition	Publisher
1	Fundamentals of Physics	David Halliday, Robert Resnick and Jerle Walker	8e extended	John-Wiley India
2	A Textbook of Engineering Physics	Dr. M. N. Avadhanulu, Dr. P. G. Kshirsagar	Latest edition	S. Chand Publication.
3	Principles of Physics	David Halliday, Robert Resnick, Jearl Walker	10th Edition	John Wiley and Sons

Reference Books

S.N	Title	Authors	Edition	Publisher
1	Solid State Physics	Charles Kittel	Eighth edition	John Wiley & Sons,
2	Solid State Physics	R.L. Singhal	Eighth edition	Kedarnath Ramnath
3	University Physics	Young and Freedman	Fifteenth edition	Pearson Education

Online Resources

1	https://www.britannica.com/science/semiconductor#ref233890
2	https://www.geeksforgeeks.org/semiconductors/
3	https://www.sciencedirect.com/topics/chemistry/magnetic-material

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Course	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24ET102T	Linear Algebra and Calculus	3	1	0	4	20	20	60	100

Course Objectives	Course Outcomes
To introduce advanced concepts of	1. Solve the system of linear equations using matrices.
1. Matrix Algebra	2. Identify engineering problems related to Matrices: Eigen value & Eigen vectors & Functions of Matrices.
2. Multivariate Calculus	3. Understand the concept of multivariate calculus & apply the knowledge of applications of differentiation.
3. Differential Equations	4. Solve first order and higher order differential equations by various methods and apply these techniques to solve problems in engineering.
4. Vector calculus	5. Implement concept of vector calculus to solve engineering problems.
Unit I	[8Hrs]
Matrix Algebra: Introduction to matrices, Rank of a matrix, Consistency of system of linear equations, Linear and orthogonal transformations, Linear dependence of vectors.	
Unit II	[8Hrs]
Matrices: Characteristics equation, Cayley- Hamilton Theorem, Eigen values and Eigen vectors, Reduction to diagonal form, Reduction of quadratic form to canonical form by orthogonal transformation, Sylvester's theorem.	
Unit III	[8Hrs]
Multivariate Calculus: Functions of several variables and their partial derivatives, Chain rule and total differential coefficient, Jacobians and its properties, Maxima –Minima of functions of two variables, Lagrange's method of undetermined multipliers.	
Unit IV	[8Hrs]
Differential Equations: First order and first degree differential equations: Linear, Higher order differential equations with constant coefficients, Method of variation of parameters, Cauchy's homogeneous linear equation, Applications of differential equations.	
Unit V	[8Hrs]
Vector Calculus: Vector differentiation, Gradient, Directional derivatives, Divergence and Curl with their physical interpretation Solenoidal and irrotational motions, Scalar potential, Line integral & Work done.	

Text Books

S.	Title	Authors	Edition	Publisher
1	Higher Engineering Mathematics	B. S. Grewal		Khanna Publishers, New Delhi.
2	A Text Book of Applied Mathematics (Vol I & II)	P. N. Wartikar and J. N. Wartikar		Pune Vidyarthi Griha Prakashan, Pune
3	Higher Engineering Mathematics	H. K. Das and Er.		S. Chand & CO. Pvt. Ltd., New Delhi

Reference Books

S.N	Title	Authors	Edition	Publisher
1	Higher Engineering Mathematics	B.V. Ramana,	11th reprint, 2010.	Tata McGraw Hill New
2	A Text Book of Engineering	Peter O' Neil		Thomson Asia Pvt. Ltd.,
3	Advanced Engineering Mathematics	Erwin Kreyszig		John Wiley & Sons,

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Course	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24ET103T	Digital Electronics	3	1	-	4				
						20	20	60	100

Course Objectives	Course Outcomes
<ul style="list-style-type: none"> To acquaint students with various basic digital gates used in digital system and develop logical circuits using Boolean gates, construction of various combinational and sequential logic circuits using basic gates. The student will be able to analyze, design, and evaluate digital circuits of medium complexity and differentiate various logic families. 	<ol style="list-style-type: none"> Explain the fundamental concepts and use the basic logic gates and various reduction techniques of digital logic circuit. Analyze, design and implement combinational logic circuits. Analyze, design and implement sequential circuits Analyze, design and implement various sequential circuits and its applications Categorize, summarize different logic families and analyze digital system design using PLD

Unit I Number System and Logic Simplification [6 Hrs]

Analog V/s Digital systems, Number Systems, Digital Codes – Binary, Octal, decimal, Hex, ASCII, BCD, Gray, Ex -3, Conversion, Boolean Algebra, Logic Gates, standard representations for logic functions, k map representation of logic functions (SOP & POS forms), minimization of logical functions for min-terms and max-terms (up to 4 variables), don't care conditions

Unit II Combinational Circuits [8Hrs]

Adders, Subtractor, Parity generators/checkers, Multiplexers and their use in combinational logic designs, multiplexer trees, Demultiplexers, Encoders & Decoders, BCD - to 7 segment decoder, Binary Code converters

Unit III Sequential Circuits [8Hrs]

1 Bit Memory Cell, Clocked SR, JK, MS J-K flip flop, D and T flip-flops. Use of preset and clear terminals, Excitation Table for flip flops. Conversion of flip flops.

Unit IV Application of Sequential Circuits [8Hrs]

Registers, shift registers, Counters (ring counters, twisted ring counters, ripple counters) up/down counters, synchronous counters.

Unit V Logic Families and Semiconductor [8Hrs]

Logic families TTL, ECL, CMOS and their characteristics – Fan-In, Fan-Out, Propagation Delay, Power dissipation, Noise Margin, Timing issues. Comparison of different logic Families. Memory elements (RAM, ROM, EPROM, EEPROM, NVRAM, SRAM, DRAM, Synchronous SRAM, DDR and QDR SRAM, Content Addressable Memory) Concept of Programmable logic devices, Logic implementation using Programmable Devices.

Text Books

S.	Title	Authors	Edition	Publisher
1	Fundamentals of digital circuits	Kumar, A Anand	--	Prentice hall of India private
2	Digital Design	M. Morris Mano, Michael D. Ciletti	--	Pearson, 2013
3	Digital circuits and logic design	Lee, Samuel	--	Prentice Hall Of India private limited

Reference Books

S.N	Title	Authors	Edition	Publisher
1	Digital Electronics: Principles, Devices	A. K. Maini		Wiley, 2007
2	Integrated electronics: Analog and	Millman, Jacob		TMH

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Course	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24ET103P	Digital Electronics Lab	-	-	2	1	--	25	25	50

Course Objectives	Course Outcomes
To acquire knowledge of digital electronics and implement digital logic circuits.	<ol style="list-style-type: none"> 1. Identify the various digital ICs and understand its operation 2. Analyze, design, illustrate and implement combinational logic circuits 3. Design and implement sequential circuits like flip flops, registers, counters 4. Develop medium complexity logic circuits.

Expt. No.	Title of the experiment
1	To verify the truth table of different Logic Gates.
2	To study and verify the NAND and NOR gates as a universal gate.
3	To implementation of Half adder and Full Adder and to verify their truth table.
4	To Implement full adder using 4:1 MUX and verify truth table of 1:4 DEMUX
5	To study and verify truth table of Encoder and Decoder.
6	To study and verify the truth table of different types of Flip-flops
7	To study the functioning of Up/Down counter,
8	Design and Simulation of Arithmetic Logic Unit
9	Mini Project: Design of Code converters on Breadboard.

Reference Books

Lab Manual

S.N	Title	Authors	Edition	Publisher
1	Digital Electronics: Principles, Devices	A. K. Maini		Wiley, 2007
2	Integrated electronics: Analog and	Millman, Jacob		TMH

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Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24ET104T	Basics of Electronics Engineering	2	-	-	2	10	10	30	50

Course Objectives	Course Outcomes
<ol style="list-style-type: none">To introduce the fundamental concepts of electronics and communication systems.To familiarize students with basic electronic components, devices, and circuit theories.To provide hands-on experience in analyzing and designing simple electronic circuits.	<p>After completion of the course students are able to,</p> <ol style="list-style-type: none">Grasp the principles of operation of different types diodes, transistors and their applications.Analyze basic electronic circuits and their applications.Acquire knowledge of communication systems.

UNIT- I Diodes and it's applications	[10Hrs]
Structure and Working Principle of diode, Types of Diodes (e.g., PN Junction, Zener, Light Emitting), Diode Characteristics and Applications, Diode Circuits (e.g., Rectifiers, Clipping, and Clamping Circuits), Photodiode	
Unit -II Bipolar Junction Transistor	[8Hrs]
BJT Types, Operation: NPN Transistor and PNP Transistor, Modes of Operation: Active, Cut-off, and Saturation, CE Characteristics, Application: Amplifier, switch. Introduction to Power amplifier, Principle of positive & negative feedback in electronic circuits.	
Unit -III Communication Fundamentals	[6Hrs]
Signal-Noise-Distortion, Introduction to Communication Systems, Basic Types of Modulation: AM, FM, PM, Signal to noise ratio, Modulation index, Transmission and Reception of Signals, Applications in Modern Telecommunication	

Handson : Diode and Transistor Characteristics, Rectifier Circuit: Build and analyze half-wave and full-wave rectifier circuits

Text Books

S.N	Title	Authors	Edition	Publisher
1	Electronic devices and circuits	J. Millman and Halkias	2	TMH Publications
2	Electronic Devices & Circuit Theory	Boylestad & Nashelsky	2	PHI publications.
3	Electronic devices and circuits	Salivahanan, Suresh Kumar, Vallavaraj	3	TMH Publications

Reference Books

S.N	Title	Authors	Edition	Publisher
1	Integrated Electronics, Analog & Digital Circuits & Systems	J. Millman and Halkias	2	TMH Publications
2	Electronics Principles	Albert Malvino	3	TMH Publications.
3	Electronics Circuits Discrete and Integrated ckt	Schilling & Beloove	--	TMH Publications.

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Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24ET105P	Logic building using C lab	-	-	4	2	--	25	25	50

Course Objectives	Course Outcomes
<p>To develop problem-solving skills by applying programming techniques.</p> <p>To impart knowledge on using arrays and strings for data manipulation.</p> <p>To understand the use of structures for organizing complex data.</p> <p>To learn how to handle files for data storage and manipulation.</p>	<ul style="list-style-type: none">• Write basic C programs to perform simple tasks such as printing output, performing arithmetic operations, and calculating simple interest.• Develop programs using loops (for, while, do-while) to handle repetitive tasks efficiently.• Create and utilize user-defined functions to promote code reusability and modularity.• Perform searching and sorting operations on arrays.• Develop programs to copy contents from one file to another, demonstrating proficiency in file handling.

Expt. No.	Topics
1	Basic Programs: Hello World, Arithmetic Operations, Simple Interest Calculation
2	Control Structures: Programs using if-else
3	Control Structures: switch-case
4	Control Structures: loops
5	Functions: Programs on user-defined functions, recursive functions
6	Arrays and Strings: Programs on searching, sorting, string manipulation
7	Pointers: Pointer arithmetic, arrays and pointers, dynamic memory allocation
8	Structures: Defining and using structures, array of structures, structures and functions
9	File Handling: File read/write operations, copying contents from one file to another

References

S.No.	Title	Authors	Edition	Publisher
1.	Programming In Ansi C	E. Balagurusamy	5th	Tata McGraw - Hill Education
2.	The C programming Language	Brian W. Kernighan and Dennis M. Ritchie	2 nd	Prentice-Hall
3.	Let Us C	Yashavant Kanetkar	5th	Bpb

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Course	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24ET106P	Business Communication Skills I Lab	-	-	2	1	..	25	25	50

Course Objectives	Course Outcomes
<ul style="list-style-type: none">To empower students to develop a career-oriented mindset while harnessing the power of LSRW skills.	Students will be able to: <ul style="list-style-type: none">apply verbal and non-verbal skills to confidently and effectively deliver presentations.prepare themselves for overall language ability through listening and reading tasks.demonstrate formal writing skills.draft impactful Resumes and Cover Letters.prepare themselves for Personal Interviews.

Practical No.	Practical based on
1	Presentation Skills
2	Poster Making (Product/ Event)
3	Reading Comprehension for Competitive Exams.
4	Writing Skills for Academic Purposes.
5	Listening Skills I
6	Business Correspondence I
7	Resume Writing and Cover Letter
8	Mock Interviews

Reference Books:

S. N	Title	Authors	Edition	Publisher
1	Communication Skills for Engineers	C. Muralikrishna &	2nd Edition,	Pearson India Education
2	Communication Skills	Dr. L. Bisen, Dr. B. Agrawal & Dr. N. T. Kalyani	1st Edition, 2021	Himalaya Publishing House
3	Barron's IELTS Superpack	Lin Lougheed	2012	Barrons Educational

1	https://ieltsliz.com/
2	https://www.englishclub.com/business-english/
3	https://www.indiabix.com/verbal-ability/questions-and-answers/
4	https://prepinsta.com/interview-preparation/?utm_source=home+page&utm_medium=navigation
5	https://www.skillsyouneed.com/presentation-skills.html

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Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24ET107T	Design Thinking	2	-	-	2	10	10	30	50

Course Objectives	Course Outcomes
<ol style="list-style-type: none">Learn design thinking concepts and principlesUse design thinking methods in every stage of the problemLearn the different phases of design thinkingApply various methods in design thinking to different problems	<ol style="list-style-type: none">Define key concepts of design thinkingPractice design thinking in all stages of problem solvingApply design thinking approach to real world problems

Unit I	[10 Hrs]
INTRODUCTION: Why Design? - Four Questions, Ten Tools - Principles of Design Thinking - The process of Design Thinking - How to plan a Design Thinking project. UNDERSTAND, OBSERVE AND DEFINE THE PROBLEM: Search field determination - Problem clarification - Understanding of the problem - Problem analysis- Reformulation of the problem - Observation Phase - Empathetic design - Tips for observing - Methods for Empathetic Design - Point-of-View Phase - Characterization of the target group - Description of customer needs.	
Unit II	[10 Hrs]
IDEATION AND PROTOTYPING: Ideate Phase - The creative process and creative principles - Creativity techniques - Evaluation of ideas - Prototype Phase - LeanStartup Method for Prototype Development - Visualization and presentation techniques.	
Unit III	[10 Hrs]
TESTING AND IMPLEMENTATION : Test Phase - Tips for interviews - Tips for surveys - Kano Model - Desirability Testing - How to conduct workshops - Requirements for the space - Material requirements - Agility for Design Thinking. FUTURE: Design Thinking meets the corporation - The New Social Contract - Design Activism - Designing tomorrow.	

Text Books

S.N	Title	Authors	Edition	Publisher
1.	Handbook of Design Thinking - Tips & Tools for how to design thinking	Christian Mueller-Roterberg	2021	Independently Published
2.	Change by Design: How Design Thinking Transforms Organizations and Inspires Innovation	Tim Brown	2019	HarperCollins

Reference Books

S.N	Title	Authors	Edition	Publisher
1.	Design Thinking for Strategic Innovation	Idris Mootee		Wiley

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GROUP II : SEMESTER II

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24ET201T	Applied Chemistry	2	-	-	2	10	10	30	50

Course Objectives	Course Outcomes
<p>This course is intended</p> <ol style="list-style-type: none">To acquaint the students with the basic phenomenon, concepts, knowledge and understanding of the fundamental principles of chemistry.To develop necessary skills and abilities to succeed in engineering education, research, Industry, environment and social context.	<p>Students will be able to</p> <ul style="list-style-type: none">Analyse and Compare parameter necessary for various treatment of water.Apply the Basic concepts of Electrochemistry in protection of engineering materialApply the principles of green Chemistry for sustainable development and analyse the impact of industrial pollution and its control.

Unit I Water Technology-	[9 Hrs]
Hardness of water, Numericals on Hardness, Industrial water treatment- Boiler Troubles- Carry over, Caustic embrittlement, Boiler corrosion, Scale & Sludge formation External treatments - Softening of water by Zeolite process and De-mineralization process, Numericals on Zeolite process. Desalination of sea water- Electro dialysis and Reverse Osmosis process-Principle, methods and advantages	
Unit II Electrochemical Phenomenon & Corrosion	[9 Hrs]
Introduction- brief idea about electrochemical & galvanic series; Electrolytic & Electrochemical Cell; Construction, working & Advantages of Li Ion Battery, Fuel Cell, Photochemical Cell. Corrosion- Introduction, Factors affecting corrosion, Types of corrosion, Corrosion prevention- Material & Design selection & Cathodic protection	
Unit III Green Chemistry & Waste Management-	[8 Hrs]
Green Chemistry- Introduction, Principles of Green Chemistry with example, Green Reagents- Super Critical Fluid (CO ₂)- Properties and Applications, Green Crackers- Introduction, Advantages, Bio Catalysis- Definition and examples. Carbon Credit, Carbon Sequestration Waste Management- Solid, Nuclear & e-waste: Sources, Impact & its control	

Text Books

S.N	Title	Authors	Edition	Publisher
1	Text Book of Engineering Chemistry	S.S. Dara,	New	S. Chand and Company Ltd. New Delhi.
2	Textbook of Engineering Chemistry	P.C. Jain and Monica Jain	Sixth	Dhanpat Rai and Sons, New Delhi.
3	E-waste Recycling and Management	Anish Khan, Inamuddin, Abdullah M. Ansiri	Ist	Springer

Reference Books

S.N	Title	Authors	Edition	Publisher
1	A Text book of Engineering Chemistry	Shashi Chawla	Ist	Dhanpat Rai & Sons, New Delhi
2	Applied Chemistry	N. Krishnamurthy: P. Vallinavagam. And K. Jeysubramanian	Ist	TMH
3	Environmental Chemistry	B. K. Sharma	Ist	Krishna Prakashan Media (P) Ltd.

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GROUP II : SEMESTER II

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24ET201P	Applied Chemistry Lab	-	-	2	1	-	25	25	50

Course Objectives	Course Outcomes
1. To Make the students aware about various techniques available for Analysis of Material. 2. To Impart the skill of handling chemicals and apparatus.	<ul style="list-style-type: none"> List the proper procedures and regulations for safe handling and use of chemicals and can follow the proper procedures and regulations for safe handling when using different instruments. Demonstrate the use of modern instrumentation, classical techniques, and properly record the results of their experiment. Identify and solve chemical problems and explore new areas of research especially in fuel and lubricants.

Expt. No.	Experiments based on Performance - Any FOUR
1	Determination of Hardness (Total, Permanent & Temporary) of Water Sample by Complexometric method
2	Determination of heavy metal from industrial effluent by colorimeter
3	Determination of Flash point by using Cleveland Open cup flash point apparatus / Abel's Close cup apparatus / Pensky Marten close cup apparatus
4	Determination of viscosity of lubricating oil at different temperature by Redwood Viscometer No.1 OR No. 2
5	Proximate analysis of coal -Determination of % of Moisture, Volatile Matter and Ash in coal sample
Demonstration - Any ONE	
1	Measurement of pH of sample from different sources by Digital pH Meter.
2	Determination of turbidity from industrial effluent.
Virtual Experiment - Any ONE	
1	Determination of Alkalinity of Water Sample.
5	Estimation of DO content of Water sample.
Activity - Any ONE	
1	Study of nearby industrial chemicals and safety measures.
2	Study of Air /Water Pollution Level at different Sites in Nagpur City.
3	Visit to Water Treatment Plant/Effluent Treatment Plant

Text Books

S.N	Title	Authors	Edition	Publisher
1	A Textbook on experiment and calculation in engineering chemistry	S.S. Dara	9 th	S.Chand

Reference Book

S.N	Title	Authors	Edition	Publisher
1	Applied Chemistry theory and practical	O.P. Virmani and A.K. Narular	1st	New Age International
2	Laboratory Manual on Engineering Chemistry	Dr. Subdharani	1st	Dhanpat Rai Publishing

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GROUP II: SEMESTER II

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24ET202T	Statistics & Transforms	3	1	-	4				
						20	20	60	100

Course Objectives	Course Outcomes
To inculcate and strengthen students with adequate knowledge of <ul style="list-style-type: none"> Statistics Integral Transforms 	Students will be able to: <ul style="list-style-type: none"> Apply numerical integration methods and find analytical solutions to difference equations. Identify, analyse and solve statistical problems. Identify and solve practical problems by using Laplace Transforms. Solve and analyze practical problems with their physical and graphical interpretation by using Laplace Transforms. Apply Fourier Transform to analyse input-output relationships of signals.

Unit I	[8hrs]
Finite Differences: Operator E and delta, Factorial Polynomial, Numerical integration: Trapezoidal rule, Simpson's 1/3 rule, Simpson's 3/8 rule, Difference equations with constant coefficients.	
Unit II	[8hrs]
Statistics: Fitting of straight line, parabola and exponential curves by method of least squares, Coefficient of correlation and lines of regressions, Rank correlation, multiple regression.	
Unit III	[8hrs]
Laplace Transform –I : Definition, properties, Evaluation of Integrals by Laplace Transform.	
Unit IV	[8hrs]
Laplace Transform –II : Inverse Laplace Transform and its properties, Convolution theorem(Statement only), Unit Step Function, Periodic function, Applications of Laplace Transform.	
Unit V	[8hrs]
Fourier Transform and Fourier Transform: Introduction to Fourier series , Concept of even and odd function , Definition, properties, Fourier Integral Theorem, Relation with Laplace Transform, Applications of Fourier Transform.	

Text Books

S.N	Title	Authors	Edition	Publisher
1	Higher Engineering Mathematics	B. S. Grewal	40 th	Khanna Publishers, New Delhi.
2	Higher Engineering Mathematics	H. K. Dass and Er. Rajnish Verma		S. Chand & Co. Pvt. Ltd., New Delhi.
3	Advanced Engineering Mathematics	Erwin Kreyszig		John Wiley & Sons, New York.

Reference Books

S.N	Title	Authors	Edition	Publisher
1	Higher Engineering Mathematics	B. V. Ramana		Tata McGraw-Hill Publications, New Delhi.
2	Advanced Engineering Mathematics	C. R. Wylie & L. C. Barrett		Tata McGraw-Hill Publications, New Delhi.
3	A Text Book of Engineering Mathematics	Peter O' Neil		Thomson Asia Pvt. Ltd., Singapore.
4	A Text Book of applied Mathematics- Volume -II	P.N. Wartikar & J.N. Wartikar		Poona Vidyarthi Griha Prakashan

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ELECTRONICS & TELECOMMUNICATION ENGINEERING

GROUP II: SEMESTER II

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24ET203T	Electronic Devices & Circuits	3	1	0	4	20	20	60	100

Course Objectives	Course Outcomes
1.To introduce basics of Transistor Biasing	1. Compare Transistor biasing Techniques & Illustrate the importance of Stability Factor
2.To study applications of Transistor as an oscillator, Amplifier	2. Analyze different types of power amplifier & Explain basics of oscillators and Multivibrators
3.To introduce basics FET & MOSFET	3. Demonstrate FET and MOSFET Characteristics
4.To Introduce CMOS Technology Basics To Introduce POWER Semiconductor Devices	4. Outline CMOS construction & Operation and List applications of CMOS
	5. Classify Thyristor & Explain basic operation of SCR, DIAC & TRIAC

Unit I: Bipolar Junction Transistor Biasing	[8hrs]
Need for biasing, Q point, Biasing methods and circuits- Fixed bias, collector-to-base bias, voltage-divider bias., stability factor, Thermal stability	
Unit II : Transistorized Oscillator, Multivibrator, and Power amplifiers	[8hrs]
Introduction and classification of power amplifier-Class A, B, AB, and C , Switching, Oscillator-RC, LC, and Crystal Oscillators.Types & Operation Transistorized Multivibrators	
Unit III: Field Effect Transistors (FET) and Applications	[8hrs]
FET- Overview and types, Construction and operation, Characteristics & Parameter. FET Biasing. MOSFET- Types, Construction and operation, Characteristics, Applications of MOSFET	
Unit IV: Complementary Metal-Oxide-Semiconductor	[8hrs]
Basic CMOS Structure, CMOS Operation, Fabrication, Characteristics, Advantages of CMOS, Applications of CMOS (Min 4 applications)	
Unit V : Introduction to Power Semiconductor Devices:	[8hrs]
Thyristor Classification, Basic structure, operation & characteristics of- SCR, DIac, TRAIC, Latching and holding currents, turn- on and turn-off processes and IGBT.	

Text Book:

S.N	Title	Authors	Edition	Publisher
1	Electronic devices and circuits	J. Millman and Halkias	2	TMH Publications
2	Power Electronics	M.D. Singh, K.B. Khanchandani	2	TMH Publications
3	Electronic devices and circuits	Salivahanan, Suresh Kumar, Vallavaraj	3	TMH publications.

Reference Books

S.N	Title	Authors	Edition	Publisher
1	Integrated Electronics, Analog & Digital Circuits & Systems	J. Millman and Halkias	2	TMH Publications
2	Electronics Principles	Albert Malvino Schilling	3	TMH Publications
3	Electronics Circuits Discrete and Integrated ckt	& Beloove	-	TMH publications.

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GROUP II: SEMESTER II

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24ET203P	Electronic Devices & Circuits Lab	-	-	2	1	-	25	25	50

Course Objectives	Course Outcomes
<ol style="list-style-type: none">Understand Semiconductor Device OperationsDevelop Circuit Design Skills:Explore Power Electronics Applications	<p>Students will be able to</p> <ol style="list-style-type: none">Analyze and interpret the characteristics of BJTs, FETs, and MOSFETs,To design and construct oscillator, multivibrator, and power amplifier circuits, applying theoretical concepts to practical applications.To gain proficiency in using power electronics devices (SCR, DIAC, TRIAC, and IGBT) for control and switching applications in industrial and domestic systems.

List of Practical's
Minimum 8 practical based on the following Topics
1. Bipolar Junction Transistor Biasing circuit
2. Oscillators, Multivibrators and Power Amplifiers
3. Field effect transistor- FET, MOSFET characteristics
4. Introduction to CMOS
5. Characteristics of SCR, DIAC, TRIAC, IGBT

Text Books

S.N	Title	Authors	Edition	Publisher
1	Electronic devices and circuits	J. Millman and Halkias	2	TMH Publications
2	Power Electronics	M.D. Singh, K.B. Khanchandani	2	TMH publications.
3	Electronic devices and circuits	Salivahanan, Suresh Kumar, Vallavaraj	3	TMH Publications

Reference Books

S.N	Title	Authors	Edition	Publisher
1	Integrated Electronics, Analog & Digital Circuits & Systems	J. Millman and Halkias	2	TMH Publications
2	Electronics Principles	Albert Malvino	3	TMH Publications.
3	Electronics Circuits Discrete and Integrated ckt	Schilling & Belouve	--	TMH Publications.

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GROUP II: SEMESTER II

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24ET204T	Basics of Electrical Engineering	2	-	0	2	10	10	30	50

Course Objectives	Course Outcomes
<ol style="list-style-type: none">To introduce students to basic electrical quantities, laws, and principlesTo enable students to apply mesh and nodal analysis techniquesTo familiarize students with essential network theorems and concepts of frequency-selective networks	<p>Student are able to,</p> <ol style="list-style-type: none">Demonstrate the ability to analyze and solve basic electric circuitsApply mesh and nodal analysis, including matrix methodsApply network theorems to simplify and analyze complex circuits and understand and evaluate the behavior of frequency-dependent circuits

Unit I: Electric Circuits	[08hrs]
EMF, Potential difference, Current, Power, Energy (Definition & Units SI), Ohms Law, Ideal and Practical Sources (Independent Sources only), Circuit elements, series & parallel combination of resistances, Kirchhoff's Laws (KVL, KCL) statement & Numerical	
Unit II: Mesh & Node Analysis	[09hrs]
Types of sources (Voltage & Current), Source transformation. Mesh analysis, Self-inductance, Basic equilibrium equations, Matrix approach for complicated networks, Independent sources to determine current, voltage, power, and energy., Nodal analysis, Basic equilibrium equations, Matrix approach for complicated networks, Principle of duality	
Unit III: Network Theorems & Frequency Selective Networks	[09hrs]
Thevenin's, Norton's and Maximum Power Transfer Theorems, Reciprocity Theorem, Significance of Quality factor. Impedance, Phase angle variations with frequency, Voltage and current variation with frequency, Bandwidth, Selectivity.	

Text Books

S.N	Title	Authors	Edition	Publisher
1	Network Analysis	M.E. Van Valkenburg	2	PHI Publications
2	Network and systems	D. Roy Choudhary	2	New Age Publication
3	Linear Network Theory	Kelkar and Pandit	3	Pratibha Publications.

Reference Books

S.N	Title	Authors	Edition	Publisher
1	Circuit Theory	Chakraborti	2	Dhanpat Rai
2	Engineering Circuit Analysis	Hayt W.H. & J.E. Kemmerly	1	TMH
3	Network analysis	G.K. Mittal	1	Khanna

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GROUP II: SEMESTER II

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24ET205P	Electronic Workshop Lab – I	-	-	4	2	-	25	25	50

Course Objectives	Course Outcomes
<ol style="list-style-type: none">1. Develop skills in identifying, testing, and handling electronic components2. Gain hands-on experience in assembling circuits using breadboards and PCBs3. Apply the acquired skills to design and implement a mini-project	<p>Students will be able to</p> <ol style="list-style-type: none">1. Identify and Test Components2. Use multimeters, oscilloscopes, and function generators to measure and analyze electrical parameters3. Apply knowledge of electronic measurement tools to debug and troubleshoot electronic circuits4. Design, construct, and present a working electronic circuit as a micro-project

List of Practical's

Practicals based on the following Topics

- Identification and testing of passive components (resistors, capacitors, inductors).
- Identification and testing active components (diodes, transistors).
- Identification and testing of relays, Sensors, Motors.
- Using breadboards for circuit assembly.
- Soldering techniques and circuits assembly using PCB
- Multimeter usage for measuring voltage, current, and resistance.
- Working with oscilloscopes: waveforms, frequency, and phase measurements.
- Function generator basics.
- Working with power supplies and electronic circuit debugging.
- Micro-project

Text Books

S.N	Title	Authors	Edition	Publisher
1	Electronic devices and circuits	J. Millman and Halkias	2	TMH Publications
2	Electronic devices and circuits	Salivahanan, Suresh Kumar, Vallavaraj	3	TMH Publications
3	Troubleshooting Electronic Equipment	R. S. Khandpur	2	TMH Publications

Reference Books

- Lab Manual

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GROUP II: SEMESTER II

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24ET206P	Business Communication Skills – II Lab	-	-	2	1	-	25	25	50

Course Objectives	Course Outcomes
To empower students to develop a career oriented mindset while harnessing the power of LSRW skills.	Students would be able to: 1. Participate in Group Discussions. 2. Improve their reading and formal writing skills. 3. Develop upon their listening skills to engage in meaningful conversations. 4. Develop oratory skills to engage and inform audiences. 5. Prepare themselves for participating in business meetings.

Expt. No.	Title of the experiment
1	Group Discussion
2	Reading for Competitive Exams II
3	Listening Skills II
4	Presenting a TED Talk
5	Media Interaction
6	Business Correspondence II
7	Report Writing
8	Mock Meeting

Reference Books

S. N	Title	Authors	Edition	Publisher
1.	Communication Skills for Engineers	C. Muralikrishna&SunitaMishra	2nd Edition, 2011	Pearson India Education Services
2.	Communication Skills	Dr. L. Bisen, Dr. B. Agrawal& Dr. N. T. Kalyani	1st Edition, 2021	Himalaya Publishing House
3.	Barron's IELTS Superpack	Lin Lougheed	2012	Barrons Educational Series

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GROUP II : SEMESTER II

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24ET207T	Indian Knowledge System	2	-	-	2	10	10	30	50

Course Objectives	Course Outcomes
<p>This course is intended</p> <ul style="list-style-type: none">To introduce the origin, evolution and approach of Indian knowledge systemsTo understand the Indian knowledge approaches to various domains such as time, language, environment, management, life and mindTo appreciate the principles of thought process, reasoning, inferencing and sustainability in Indian knowledge systemsTo navigate knowledge sources of different disciplines of studies from a Vedic perspective	<p>Students will be able to</p> <ul style="list-style-type: none">Explain the origin, evolution and approach of IKS and build various practices to conserve and protect rich Indian KnowledgeDescribe importance of Indian Literature and will know about Indian ScholarsUnderstand ancient Indian traditions, practices and knowledge for conservation of resources

Unit I	[10 Hrs.]
Introduction and Management of Indian Knowledge System	
1.1 Definition, Concept and Scope of IKS 1.2 IKS based approaches on Knowledge Paradigms 1.3 IKS in Ancient India and Modern India 1.4 Documentation and Preservation of IKS 1.5 Approaches for Conservation and Management of nature and Bio – Resources 1.6 Approaches and Strategies to protection and conservation of IKS	
Unit II	[12 Hrs.]
IKS and Indian Scholars, Indian Literature	
2.1 Philosophy and Literature (Maharshi Vyas, Kanad, Pingala, Parasara, Banabhatta, Nagarjuna and Panini) 2.2 Mathematics and Astronomy (Aryabhatta, Mahaviracharya, Bodhayan, Bhaskaracharya, Brahmagupta, Varahamihira) 2.3 Medicine and Yoga (Charak, Susruta, Maharshi Patanjali and Dhanwantari) 2.4 Sahitya (Vedas, Upvedas (Ayurveda, Dhanurveda, Ghandarveda), Puran and Upnishad and Shad Darshan (Vedanta, Nyaya, Vaisheshik, Sankhya, Mimamsa, Yoga, Adhyatma, Meditation) 2.5 Shashtra (Nyaya, Vyakarana, Krishi, Shilp, Vastu, Natya, Sangeet)	
Unit III	[08 Hrs.]
Unique Traditional Practices and Applied Traditional knowledge	
3.1 Myths, Rituals, Spirituals, Folk stories, Traditional Narratives 3.2 Agriculture, Land, Water and Soil Conservation and Management Practices 3.3 Vaidya (Traditional health Care system), Amchi Medicine system	

Text Books

S. N.	Title	Authors	Edition	Publisher
1	Indian Knowledge System: Introduction and Prospects	Acharya Shreyas Kurhekar	First	Sanskrit University, Ramtek
2	Indian Knowledge System Vol. I and II	Kapil Kapoor, Awadhesh Kumar Singh		D.K. Print World Ltd.
3	Traditional Knowledge System in India	Amit Jha		Atlantic Publisher

Reference Books / Resources

S. N.	Title	Authors	Edition	Publisher
1	Website of Indian Knowledge System Division, New Delhi	-	-	-

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GROUP 2: SEMESTER I

Sr No	Course Category	Course Code	Course Title	Hours perWeek			Credit s	Maximum Marks				No of hours for ESE
				L	T	P		Mid Sem Exam	Continuous Assessment	End Sem Examination	Total	
1	BSC	24II101T	Applied Physics	2	-	-	2	10	10	30	50	1.5
2	BSC	24II101P	Applied Physics Lab	-	-	2	1	-	25	25	50	-
3	BSC	24II102T	Linear Algebra and Calculus	3	1	-	4	20	20	60	100	03
4	ESC	24II103T	C Programming	3	-	-	3	20	20	60	100	03
5	ESC	24II103P	C Programming Lab	-	-	2	1	-	25	25	50	-
6	PCC	24II104T	Basic Electrical and Electronics Engineering	3	1	-	4	20	20	60	100	03
7	PCC	24II104P	Basic Electrical and Electronics Engineering Lab	-	-	2	1	-	25	25	50	-
8	AEC	24II105P	Business Communication Skills - I Lab	-	-	2	1	-	25	25	50	-
9	ESC	24II106T	Design Thinking	2	-	-	2	10	10	30	50	1.5
10	SEC	24II141P	Career Development - I	-	-	2	1	-	50	-	50	-
11	CC	24II107T	Co-curricular Courses - I	2	-	-	2	-	50	-	50	-
Total				15	2	10	22	80	280	340	700	12

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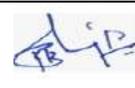
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INDUSTRIAL IoT

GROUP 2: SEMESTER II

Sr No	Course Category	Course Code	Course Title	Hours per Week			Credits	Maximum Marks				No. of hours for ESE
				L	T	P		Mid Sem Exam	Continual Assessment	End Sem Examination	Total	
1	BSC	24II201T	Applied Chemistry	2	-	-	2	10	10	30	50	1.5
2	BSC	24II201P	Applied Chemistry Lab	-	-	2	1	-	25	25	50	-
3	BSC	24II202T	Statistics and Transforms	3	1	-	4	20	20	60	100	3
4	PCC	24II203T	Digital Circuits	3	1	-	4	20	20	60	100	3
5	PCC	24II203P	Digital Circuits Lab	-	-	2	1	-	25	25	50	-
6	ESC	24II204T	Python Programming	3	-	-	3	20	20	60	100	3
7	ESC	24II204P	Python Programming Lab	-	-	2	1	-	25	25	50	--
8	AEC	24II205P	Business Communication Skills – II Lab	-	-	2	1	-	25	25	50	-
9	IKS	24II206T	Indian Knowledge System	2	-	-	2	10	10	30	50	1.5
10	SEC	24II241P	Career Development – II	-	-	2	1	-	50	-	50	-
11	CC	24II207T	Co-curricular Courses – II	2	-	-	2	-	50	-	50	-
Total				15	2	10	22	80	280	340	700	12

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**FIRST SEMESTER**

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
2411101T	Applied Physics	2	--	--	2	10	10	30	50

Course Objectives	Course Outcomes
This course is intended <ul style="list-style-type: none">To understand the basic laws of physics and their application in engineering and technology.To develop scientific temper and analytical capability.	Students will be able to <ul style="list-style-type: none">Explain the structure of Crystals.Understand the types and applications of Magnetic Materials.Distinguish the types of solids on the basis of conductivity and acquire a brief idea about semiconductors and its applications

Unit I CRYSTAL STRUCTURE	[10 Hrs]
Space lattice, Crystal structure, Unit cell, Types of unit cell, Characteristics of SC, BCC and FCC unit cell, Miller Indices, Interplanar distance and its derivation, Diffraction of X-rays - Braggs' Law and its applications.	
Unit II MAGNETIC MATERIALS	[08 Hrs]
Terms and definitions, Types of magnetic materials, characteristics of Diamagnetic, Paramagnetic and Ferromagnetic Materials, Applications of soft and hard magnetic materials.	
Unit III SEMICONDUCTORS	[08 Hrs]
Free electron Theory (qualitative idea) and its features; Idea of band formation in solids, Classification of solids: Metal, Insulator, Semiconductor; Fermi Energy, Types - Intrinsic and Extrinsic Semiconductors, Application of Extrinsic Semiconductors - p-n junction diode	

Text Books

S.N	Title	Authors	Edition	Publisher
1	Fundamentals of Physics	David Halliday, Robert Resnick and Jerle Walker	8 th extended	John-Wiley India
2	Electronic Engineering Materials and Devices	John Allision	10 th edition reprint	TMH
3	Engineering Physics	M. N. Avadhanulu	Latest edition	S. Chand & Co.

Reference Books

S.N	Title	Authors	Edition	Publisher
1	Solid State Physics	Charles Kittel	Eighth edition	John Wiley & Sons, Inc
2	Solid State Physics	R.L. Singhal	Eighth edition	Kedarnath Ramnath
3	Quantum Mechanics	Schiff	First Edition	McGraw-Hill Book Company, Inc.

Online Resources

1	https://www.britannica.com/science/semiconductor#ref233890
2	https://www.geeksforgeeks.org/semiconductors/
3	https://www.sciencedirect.com/topics/chemistry/magnetic-material
4	https://www.livescience.com/33816-quantum-mechanics-explanation.html

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**FIRST SEMESTER**

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24II101P	Applied Physics Lab	--	--	2	1	-	25	25	50

Course Objectives	Course Outcomes
This course is intended <ul style="list-style-type: none">To understand the basic laws of physics and their application in engineering and technology.To develop scientific temper and analytical capability.	Students will be able to <ul style="list-style-type: none">Verify principles/laws by selecting and using proper measuring instruments, interpret result and draw conclusions.Find various parameters using various properties of light.Apply the concepts of Semiconductors and Magnetic Materials.

Expt. No.	Title of the experiment
1	Study of semiconductor diodes
2	Study of Phenomenon of Diffraction
3	Study of Interference
4	Study of Birefringence
5	Guoy's Balance Method a) Determination of Magnetic Susceptibility of different magnetic materials. b) Identification of different types of Magnetic Materials
6	Study of Planck's Constant by means of LED
7	Determination of Curie Temperature of Ferromagnetic Material.
8	Study of Transistors.
9	Study of Hall Effect.
10	Experiment on 'Quantum Eraser'.
11	Demonstration of phenomena of Optics using Laser.

Text Books

S.N	Title	Authors	Edition	Publisher
1	Fundamentals of Physics	David Halliday, Robert Resnick and Jerle Walker	8e extended	John-Wiley India
2	A Textbook of Engineering Physics	Dr. M. N. Avadhanulu, Dr. P. G. Kshirsagar	Latest edition	S. Chand Publication.
3	Principles of Physics	David Halliday, Robert Resnick, Jearl Walker	10th Edition	John Wiley and Sons (2017)

Reference Books

S.N	Title	Authors	Edition	Publisher
1	Solid State Physics	Charles Kittel	Eighth edition	John Wiley & Sons, Inc
2	Solid State Physics	R.L. Singhal	Eighth edition	Kedarnath Ramnath
3	University Physics	Young and Freedman	Fifteenth edition	Pearson Education

Online Resources

1	https://www.britannica.com/science/semiconductor#ref233890
2	https://www.geeksforgeeks.org/semiconductors/
3	https://www.sciencedirect.com/topics/chemistry/magnetic-material

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FIRST SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24II102T	Linear Algebra & Calculus	3	1	-	4	20	20	60	100

Course Objectives	Course Outcomes
<p>The goal of this course is to introduce advanced concepts of</p> <ul style="list-style-type: none"> •Matrix Algebra •Multivariate Calculus •Differential Equations •Vector calculus 	<ul style="list-style-type: none"> • Solve the system of linear equations using matrices. • Identify engineering problems related to Matrices: Eigen value & Eigen vectors & Functions of Matrices. • Understand the concept of multivariate calculus & apply the knowledge of applications of differentiation. Solve first order and higher order differential equations by various methods and apply these techniques to solve problems in engineering. • Implement concept of vector calculus to solve engineering problems.
Unit I	[8Hrs]
Matrix Algebra: Introduction to matrices, Rank of a matrix, Consistency of system of linear equations, Linear and orthogonal transformations, Linear dependence of vectors.	
Unit II	[8Hrs]
Matrices: Characteristics equation, Cayley- Hamilton Theorem, Eigen values and Eigen vectors, Reduction to diagonal form, Reduction of quadratic form to canonical form by orthogonal transformation, Sylvester's theorem.	
Unit III	[8Hrs]
Multivariate Calculus: Functions of several variables and their partial derivatives, Chain rule and total differential coefficient, Jacobians and its properties, Maxima –Minima of functions of two variables, Lagrange's method of undetermined multipliers.	
Unit IV	[8Hrs]
Differential Equations: First order and first degree differential equations: Linear, Higher order differential equations with constant coefficients, Method of variation of parameters, Cauchy's homogeneous linear equation, Applications of differential equations.	
Unit V	[8Hrs]
Vector Calculus: Vector differentiation, Gradient, Directional derivatives, Divergence and Curl with their physical interpretation Solenoidal and irrotational motions, Scalar potential, Line integral & Work done.	

Text

Books

S.N	Title	Authors	Edition	Publisher
1	Higher Engineering Mathematics	B. S. Grewal		Khanna Publishers, New Delhi.
2	A Text Book of Applied Mathematics (Vol I & II)	P. N. Wartikar and J. N. Wartikar		Pune Vidyarthi Griha Prakashan, Pune
3	Higher Engineering Mathematics	H. K. Das and Er. Rajnish Verma		S. Chand & CO. Pvt. Ltd., New Delhi

Reference Books

S.N	Title	Authors	Edition	Publisher
1	Higher Engineering Mathematics	B.V. Ramana,	11th reprint, 2010.	Tata McGraw Hill New Delhi
2	A Text Book of Engineering Mathematics	Peter O' Neil		Thomson Asia Pvt. Ltd., Singapore.
3	Advanced Engineering Mathematics	Erwin Kreyszig		John Wiley & Sons, New York.

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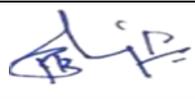
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Online Resources

1	https://archive.nptel.ac.in/courses/111/101/111101115/#
2	https://www.coursera.org/learn/matrix-algebra-engineers

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Industrial IoT

FIRST SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24III03T	C Programming	3	-	-	3	20	20	60	100

Course Objectives	Course Outcomes
<ol style="list-style-type: none">Understand the basic structure and syntax of the C programming language.Develop problem-solving skills using C programming constructs.Implement programs using arrays, functions, pointers, and structures.Understand file handling in C for input and output operations.	<ol style="list-style-type: none">Recall and explain the fundamental concepts of C programming.Apply control structures effectively to solve programming problems.Develop modular programs using functions, including recursive solutions.Implement operations on arrays and strings in C. Use pointers for dynamic memory management and manipulate data structures.Define and utilize structures and unions for efficient data handling. Perform file input/output operations proficiently.

Unit I Introduction to C Programming	[5 Hrs]
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History and Features of C, Structure of a C Program, Compilation and Execution Process, Basic Syntax and Semantics, Variables, Data Types, and Constants, Input and Output Operations

Unit II Control Structures	[8 Hrs]
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Decision Making: if, if-else, nested if-else, switch-case, Looping: for, while, do-while, Nested Loops, Break and Continue Statements, goto Statement

Unit III Functions	[9 Hrs]
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Function Definition and Declaration, Function Prototypes, Parameter Passing: Call by Value and Call by Reference, Recursion, Storage Classes: auto, extern, static, register

Unit IV Arrays, Strings and Pointers	[9 Hrs]
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One-dimensional Arrays, Multi-dimensional Arrays, Array Initialization, Searching and sorting, String Handling: String Functions and Operations, Array of Strings, Introduction to Pointers, Pointer Arithmetic, Dynamic Memory Allocation: malloc, calloc, realloc, free

Unit V	[9 Hrs]
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a. Structures and Unions

Defining and Declaring Structures, Accessing Structure Members, Unions and Difference between Structures and Unions

b. File Handling

Introduction to File Handling, File Operations: fopen, fclose, fprintf, fscanf, fputc, fgetc, fwrite, fread, File Modes, Reading and Writing Files, Command Line Arguments

Books and References

S.No.	Title	Authors	Edition	Publisher
1.	Programming In Ansi C	E. Balagurusamy	5th	Tata McGraw - Hill Education
2.	The C programming Language	Brian W. Kernighan and Dennis M. Ritchie	2 nd	Prentice-Hall
3.	Let Us C	Yashavant Kanetkar	5th	Bpb

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FIRST SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24II103P	C Programming Lab	-	-	2	1	-	25	25	50

Course Objectives	Course Outcomes
<p>To develop problem-solving skills by applying programming techniques.</p> <p>To impart knowledge on using arrays and strings for data manipulation.</p> <p>To understand the use of structures for organizing complex data.</p> <p>To learn how to handle files for data storage and manipulation.</p>	<ul style="list-style-type: none">• Write basic C programs to perform simple tasks such as printing output, performing arithmetic operations, and calculating simple interest.• Develop programs using loops (for, while, do-while) to handle repetitive tasks efficiently.• Create and utilize user-defined functions to promote code reusability and modularity.• Perform searching and sorting operations on arrays.• Develop programs to copy contents from one file to another, demonstrating proficiency in file handling.

Expt. No.	Title of the experiment
1	Basic Programs: Hello World, Arithmetic Operations, Simple Interest Calculation
2	Control Structures: Programs using if-else
3	Control Structures: switch-case
4	Control Structures: loops
5	Functions: Programs on user-defined functions, recursive functions
6	Arrays and Strings: Programs on searching, sorting, string manipulation
7	Pointers: Pointer arithmetic, arrays and pointers, dynamic memory allocation
8	Structures: Defining and using structures, array of structures, structures and functions
9	File Handling: File read/write operations, copying contents from one file to another

Books and References

S.No.	Title	Authors	Edition	Publisher
1.	Programming In Ansi C	E. Balagurusamy	5th	Tata McGraw - Hill Education
2.	The C programming Language	Brian W. Kernighan and Dennis M. Ritchie	2 nd	Prentice-Hall
3.	Let Us C	Yashavant Kanetkar	5th	Bpb

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Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24II104T	Basic Electrical and Electronics Engineering	3	1	-	4	20	20	60	100

Course Objectives	Course Outcomes
This course is intended to <ul style="list-style-type: none"> Impart basic knowledge of electrical quantities and provide working knowledge for the analysis of DC and AC circuits. Facilitate understanding of basic concepts of different Semiconductor Devices. Understand basic semiconductor applications. Facilitate understanding of basics of operational amplifier and microprocessor. 	Student will be able to <ul style="list-style-type: none"> Analyze the DC circuits using basic laws and theorems. Inculcate the understanding about fundamentals of AC circuits. Explain the principle and working of semiconductor devices. Relate the different semiconductor applications. Inculcate the understanding about operational amplifier and microprocessor.

Unit I DC CIRCUITS	[8 Hrs]
Electrical circuit elements (R, L and C), voltage and current sources, Kirchoff current and voltage laws, Mesh analysis, Node analysis, Star-delta transformation, Series parallel combination of circuits, Superposition theorem, Thevenin's theorem	
Unit II AC CIRCUITS	[8 Hrs]
Representation of sinusoidal waveforms, peak and rms values, phasor representation, real power, reactive power, apparent power, power factor. Analysis of single-phase ac circuits consisting of R, L, C, and RL, RC, RLC combinations (series only). Series and Resonance circuit.	
Unit III SEMICONDUCTOR DEVICES	[8 Hrs]
PN Junction diode operation- forward bias and reverse bias, Volt-Ampere characteristics of p-n diode, Temperature dependence of VI characteristics, Transition and Diffusion capacitances, Breakdown Mechanisms in Semi-Conductor diodes, Rectifiers: half wave and full wave, Bridge Rectifier, BJT - Operation, configuration and Characteristics, Introduction and characteristics of FET	
Unit IV SEMICONDUCTOR APPLICATIONS	[8 Hrs]
Zener diode characteristics and application, Tunnel Diode, LED, LDR, Varactor, Photo diode, PIN diode, Schottky diode, LASER, Transistor as a Switch.	
Unit V INTRODUCTION TO OP-AMP AND MICROPROCESSOR	[8 Hrs]
Operational Amplifiers – Inverting and Non-inverting amplifier, Instrumentation amplifiers, A/D and D/A conversion (Block diagram approach), Fundamentals of Microprocessor, Introduction to μ p 8085	

Text Books

S.N	Title	Authors	Edition	Publisher
1	Basic Electrical Engineering	D. C. Kulshreshtha	Revised First Edition	Tata Mc-Graw Hill
2	A Text Book of Electrical Technology : (Volume I, II & III)	B. L. Theraja and A. K. Theraja	Revised Edition	S. Chand and Company, Noida.
3.	Electronic Devices and Circuits	Salivahanan, N. Suresh Kumar	4 th Edition	Mc-Graw Hill
4	Op-Amps and Linear Integrated Circuits	Ramakant Gaikwad	4 th Edition	Pearson

Reference Books

S.N	Title	Authors	Edition	Publisher
1	Generation of Electrical Energy	B. R. Gupta	7 th Edition,	S. Chand Publication
2	Electric Circuits & Network	K. S. Suresh Kumar,	First Edition	Pearson Education
3	Microprocessor Architecture, Programming and Applications with the 8085	Ramesh Gaonkar	5 th Edition	Prentice Hall

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FIRST SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
24II104P	Basic Electrical and Electronics Engineering Lab	---	---	2	1	MSE	CA	ESE	Total
						-	25	25	50

Course Objectives	Course Outcomes
<p>This course is intended to</p> <ul style="list-style-type: none">● Provide working knowledge for the analysis of DC and AC circuits.● Facilitate practical knowledge of different Semiconductor Devices.● Understand the working of different types of Semiconductor applications.	<p>Students will be able to</p> <ul style="list-style-type: none">● Analyze DC & AC Electric Circuit using Basic Laws & Theorems.● Explain the basics of R, L & C Circuit elements● Describe & Identify different Semiconductor Devices.● Explain the working of basic electronic circuits applications.● Describe implementation of operational amplifier.

List of Experiments

- To verify the Kirchhoff's laws.
- To verify superposition theorem.
- To perform RLC series circuit.
- To perform RLC parallel circuit.
- To study basic electrical and electronic components
- To find V-I characteristics of semiconductor diodes.
- To perform half wave rectifier circuit.
- To find V-I characteristics of Zener diode.
- To perform light emitting diode circuit with LDR.
- To implement inverting amplifier on breadboard.
- To implement non-inverting amplifier on breadboard.

Text Books

S.N	Title	Authors	Edition	Publisher
1	Basic Electrical Engineering	D. C. Kulshreshtha	Revised First Edition	Tata Mc-Graw Hill
2	A Text Book of Electrical Technology : (Volume I, II & III)	B. L. Theraja and A. K. Theraja	Revised Edition	S. Chand and Company, Noida.
3.	Electronic Devices and Circuits	Salivahanan, N. Suresh Kumar	4 th Edition	Mc-Graw Hill
4	Op-Amps and Linear Integrated Circuits	Ramakant Gaikwad	4 th Edition	Pearson

Reference Books

S.N	Title	Authors	Edition	Publisher
1	Generation of Electrical Energy	B. R. Gupta	7 th Edition,	S. Chand Publication
2	Electric Circuits & Network	K. S. Suresh Kumar,	First Edition	Pearson Education
3	Microprocessor Architecture, Programming and Applications with the 8085	Ramesh Gaonkar	5 th Edition	Prentice Hall

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FIRST SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24II105P	Business Communication Skills I Lab	-	-	2	1	-	25	25	50

Course Objectives	Course Outcomes
<ul style="list-style-type: none">To empower students to develop a career-oriented mindset while harnessing the power of LSRW skills.	<p>Students will be able to:</p> <ul style="list-style-type: none">apply verbal and non-verbal skills to confidently and effectively deliver presentations.prepare themselves for overall language ability through listening and reading tasks.demonstrate formal writing skills.draft impactful Resumes and Cover Letters.prepare themselves for Personal Interviews.

Practical No.	Practical based on
1	Presentation Skills
2	Poster Making (Product/ Event)
3	Reading Comprehension for Competitive Exams.
4	Writing Skills for Academic Purposes.
5	Listening Skills I
6	Business Correspondence I
7	Resume Writing and Cover Letter
8	Mock Interviews

Reference Books:

S. N	Title	Authors	Edition	Publisher
1	Communication Skills for Engineers	C. Muralikrishna & Sunita Mishra	2nd Edition, 2011	Pearson India Education Services
2	Communication Skills	Dr. L. Bisen, Dr. B. Agrawal & Dr. N. T. Kalyani	1st Edition, 2021	Himalaya Publishing House
3	Barron's IELTS Superpack	Lin Lougheed	2012	Barrons Educational Series

Online Resources:

1	https://ieltsliz.com/
2	https://www.englishclub.com/business-english/
3	https://www.indiabix.com/verbal-ability/questions-and-answers/
4	https://prepinsta.com/interview-preparation/?utm_source=home+page&utm_medium=navigation
5	https://www.skillsyouneed.com/presentation-skills.html

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FIRST SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24II106T	Design Thinking	2	-	-	2	10	10	30	50

Course Objectives	Course Outcomes
<ol style="list-style-type: none">Learn design thinking concepts and principlesUse design thinking methods in every stage of the problemLearn the different phases of design thinkingApply various methods in design thinking to different problems	<ol style="list-style-type: none">Define key concepts of design thinkingPractice design thinking in all stages of problem solvingApply design thinking approach to real world problems

Unit I	[10 Hrs]
INTRODUCTION: Why Design? - Four Questions, Ten Tools - Principles of Design Thinking - The process of Design Thinking - How to plan a Design Thinking project. UNDERSTAND, OBSERVE AND DEFINE THE PROBLEM: Search field determination - Problem clarification - Understanding of the problem - Problem analysis- Reformulation of the problem - Observation Phase - Empathetic design - Tips for observing - Methods for Empathetic Design - Point-of-View Phase - Characterization of the target group - Description of customer needs.	
Unit II	[10 Hrs]
IDEATION AND PROTOTYPING: Ideate Phase - The creative process and creative principles - Creativity techniques - Evaluation of ideas - Prototype Phase - Lean Startup Method for Prototype Development - Visualization and presentation techniques.	
Unit III	[10 Hrs]
TESTING AND IMPLEMENTATION: Test Phase - Tips for interviews - Tips for surveys - Kano Model - Desirability Testing - How to conduct workshops - Requirements for the space - Material requirements - Agility for Design Thinking. FUTURE: Design Thinking meets the corporation - The New Social Contract - Design Activism - Designing tomorrow.	

Text Books

S.N	Title	Authors	Edition	Publisher
1.	Handbook of Design Thinking - Tips & Tools for how to design thinking	Christian Mueller-Roterberg	2021	Independently Published
2.	Change by Design: How Design Thinking Transforms Organizations and Inspires Innovation	Tim Brown	2019	HarperCollins

Reference Books

S.N	Title	Authors	Edition	Publisher
1.	Design Thinking for Strategic Innovation	Idris Mootee		Wiley

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**GROUP II: SEMESTER II**

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24II201T	Applied Chemistry	2	-	---	2	10	10	30	50

Course Objectives	Course Outcomes
This course is intended 1. To acquaint the students with the basic phenomenon, concepts, knowledge and understanding of the fundamental principles of chemistry. 2. To develop necessary skills and abilities to succeed in engineering education, research, Industry, environment and social context.	Students will be able to <ul style="list-style-type: none">Analyse and Compare parameter necessary for various treatment of water.Apply the Basic concepts of Electrochemistry in protection of engineering materialApply the principles of green Chemistry for sustainable development and analyse the impact of industrial pollution and its control.

Unit I Water Technology- [9 Hrs]

Hardness of water, Numericals on Hardness, Industrial water treatment- Boiler Troubles- Carry over, Caustic embrittlement, Boiler corrosion, Scale & Sludge formation External treatments - Softening of water by Zeolite process and De-mineralization process, Numericals on Zeolite process. Desalination of sea water- Electro dialysis and Reverse Osmosis process-Principle, methods and advantages

Unit II Electrochemical Phenomenon & Corrosion [9 Hrs]

Introduction- brief idea about electrochemical & galvanic series; Electrolytic & Electrochemical Cell; Construction, working & Advantages of Li Ion Battery, Fuel Cell, Photochemical Cell.
Corrosion- Introduction, Factors affecting corrosion, Types of corrosion, Corrosion prevention- Material & Design selection & Cathodic protection

Unit III Green Chemistry & Waste Management- [8 Hrs]

Green Chemistry- Introduction, Principles of Green Chemistry with example, Green Reagents- Super Critical Fluid (CO₂)- Properties and Applications, Green Crackers- Introduction, Advantages, Bio Catalysis- Definition and examples. Carbon Credit, Carbon Sequestration
Waste Management- Solid, Nuclear & e-waste: Sources, Impact & its control

Text Books

S.N	Title	Authors	Edition	Publisher
1	Text Book of Engineering Chemistry	S.S. Dara,	New	S. Chand and Company Ltd. New Delhi.
2	Textbook of Engineering Chemistry	P.C. Jain and Monica Jain	Sixth	Dhanpat Rai and Sons, New Delhi.
3	E-waste Recycling and Management	Anish Khan, Inamuddin, Abdullah M. Ansiri	1st	Springer

Reference Books

S.N	Title	Authors	Edition	Publisher
1	A Text book of Engineering Chemistry	Shashi Chawla	1st	Dhanpat Rai & Sons, New Delhi
2	Applied Chemistry	N. Krishnamurthy:P. Vallinavagam. And K. Jeysubramanian	1st	TMH
3	Environmental Chemistry	B. K. Sharma	1st	Krishna Prakashan Media (P) Ltd.

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GROUP II: SEMESTER II

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24II201P	Applied Chemistry Lab	-	-	2	1	-	25	25	50
Course Objectives		Course Outcomes							
<ul style="list-style-type: none"> To Make the students aware about various techniques available for Analysis of Material. To Impart the skill of handling chemicals and apparatus. 		<ul style="list-style-type: none"> List the proper procedures and regulations for safe handling and use of chemicals and can follow the proper procedures and regulations for safe handling when using different instruments. Demonstrate the use of modern instrumentation, classical techniques, and properly record the results of their experiment. Identify and solve chemical problems and explore new areas of research especially in fuel and lubricants. 							

Expt. No.	Experiments based on Performance - Any FOUR
1	Determination of Hardness (Total, Permanent & Temporary) of Water Sample by Complexometric method
2	Determination of heavy metal from industrial effluent by colorimeter
3	Determination of Flash point by using Cleveland Open cup flash point apparatus / Abel's Close cup apparatus / Pensky Marten close cup apparatus
4	Determination of viscosity of lubricating oil at different temperature by Redwood Viscometer No.1 OR No. 2
5	Proximate analysis of coal -Determination of % of Moisture, Volatile Matter and Ash in coal sample
Demonstration - Any ONE	
1	Measurement of pH of sample from different sources by Digital pH Meter.
2	Determination of turbidity from industrial effluent.
Virtual Experiment - Any ONE	
1	Determination of Alkalinity of Water Sample.
5	Estimation of DO content of Water sample.
Activity - Any ONE	
1	Study of nearby industrial chemicals and safety measures.
2	Study of Air /Water Pollution Level at different Sites in Nagpur City.
3	Visit to Water Treatment Plant/Effluent Treatment Plant

Text Books

S.N	Title	Authors	Edition	Publisher
1	A Textbook on experiment and calculation in engineering chemistry	S.S. Dara	9th	S.Chand

Reference Books

S.N	Title	Authors	Edition	Publisher
1	Applied Chemistry theory and practical	O.P. Virmani and A.K. Narular	1st	New Age International
2	Laboratory Manual on Engineering Chemistry	Dr. Subdharani	1st	Dhanpat Rai Publishing

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GROUP II : SEMESTER II

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24II202T	Statistics and Transforms	3	1	0	4	20	20	60	100

Course Objectives	Course Outcomes
To inculcate and strengthen students with adequate knowledge of <ul style="list-style-type: none">StatisticsIntegral Transforms	Students will be able to: <ul style="list-style-type: none">Apply numerical integration methods and find analytical solutions to difference equations.Identify, analyse and solve statistical problems.Identify and solve practical problems by using Laplace Transforms.Solve and analyze practical problems with their physical and graphical interpretation by using Laplace Transforms.Apply Fourier Transform to analyse input-output relationships of signals.

Unit I	[8hrs]
Finite Differences: Operator E and delta, Factorial Polynomial, Numerical integration: Trapezoidal rule, Simpson's 1/3 rule, Simpson's 3/8 rule, Difference equations with constant coefficients.	
Unit II	[8hrs]
Statistics: Fitting of straight line, parabola and exponential curves by method of least squares, Coefficient of correlation and lines of regressions, Rank correlation, multiple regression.	
Unit III	[8hrs]
Laplace Transform –I : Definition, properties, Evaluation of Integrals by Laplace Transform.	
Unit IV	[8hrs]
Laplace Transform –II : Inverse Laplace Transform and its properties, Convolution theorem(Statement only), Unit Step Function, Periodic function, Applications of Laplace Transform.	
Unit V	[8hrs]
Fourier Series & Fourier Transform: Introduction to Fourier series , Concept of even and odd function , Definition, properties, Fourier Integral Theorem, Relation with Laplace Transform, Applications of Fourier Transform.	

Text Books

S.N	Title	Authors	Edition	Publisher
1	Higher Engineering Mathematics	B. S. Grewal	40 th	Khanna Publishers, New Delhi.
2	Higher Engineering Mathematics	H. K. Dass and Er. Rajnish Verma		S. Chand & Co. Pvt. Ltd., New Delhi.
3	Advanced Engineering Mathematics	Erwin Kreyszig		John Wiley & Sons, New York.

Reference Books

S.N	Title	Authors	Edition	Publisher
1	Higher Engineering Mathematics	B. V. Ramana		Tata McGraw-Hill Publications, New Delhi.
2	Advanced Engineering Mathematics	C. R. Wylie & L. C. Barrett		Tata McGraw-Hill Publications, New Delhi.
3	A Text Book of Engineering Mathematics	Peter O' Neil		Thomson Asia Pvt. Ltd., Singapore.
4	A Text Book of applied Mathematics- Volume -II	P.N. Wartikar & J.N. Wartikar		Poona Vidyarthi Griha Prakashan

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**GROUP II : SEMESTER II**

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24II203T	Digital Circuits	3	1	---	4	20	20	60	100

Course Objectives	Course Outcomes
<p>This course is intended</p> <ul style="list-style-type: none">To explain the importance of Electronics and number systemTo analyse and explain the importance of Boolean algebra and logic circuitsTo understand and explain the simplification of Boolean functionsTo describe, illustrate and analyse the use of combinational and sequential logic circuits	<p>Students will be able to</p> <ul style="list-style-type: none">Convert a number from one number system to another and perform arithmetic operations in various types of number system such as binary, octal and hexadecimal etcStudy different types of logic gates and properties of Boolean algebraReduce Boolean expression to the minimum terms using logic design minimization techniques and formulate Sum of Product and Product of Sum.Design combinational circuits such as half adder, full adder, half subtractor, full subtractor, BCD adder, multiplexers and de-multiplexers etc.Explain the concept of synchronous and asynchronous sequential circuits like flip flops, latches and apply the concepts of flip flops to design registers and counters.

UNIT I**Number System:****[06 hours]**

Binary Numbers, Decimal numbers, hexadecimal numbers, octal numbers and number conversion, 1's complement and 2's complement representation. Arithmetic operations: binary addition, binary subtraction using 1's complement and 2's complement, binary multiplication and division, 2's complement arithmetic, octal addition, hexadecimal addition.

UNIT II**Boolean Algebra and logic circuits****[08 hours]**

Basic logic variables and logic functions-NOT, AND, NOR, XOR, OR, XNOR, NAND, idealized logic gates and symbols, truth tables, basic theorems and properties of Boolean algebra, DeMorgan's rules.

UNIT III**Simplification of Boolean Functions****[08 hours]**

Logic minimization, representation of truth table, SOP form, POS form, simplification of logical functions, minimization of SOP and POS form, don't care conditions, reduction techniques: k-maps up to 4 variables.

UNIT IV**Combinational Logic****[08 Hours]**

Different types of Codes: BCD, EXCESS-3, Gray code, binary code and their conversion. Circuits: half -adder, full adder, half subtractor, full subtractor, BCD adder using IC7483. Multiplexers (MUX): working of MUX, implementation of expression using MUX, Demultiplexers (DEMUX): implementation of expression using DEMUX, decoder, encoder.

UNIT V**Sequential Logic Circuit Design****[10 Hours]**

Sequential circuit introduction, difference between combinational circuits and sequential circuits, flip-flop: SR, JK, D, T; preset & clear, master and slave flip-flop, their truth tables and excitation tables conversion from one type to another type of flip-flop. Counters: asynchronous counter, synchronous counter, ring counter, BCD counter, Johnson counter.

Text Books

- "Digital design", M.M. Mano, PHI, 4th edition
- "Modern Digital Electronics", R. P. Jain, Tata McGraw-Hill, 3rd Edition
- "Fundamentals of Digital Logic with VHDL Design", Stephen Brown, Zvonko Vranesic McGraw-Hill 2nd edition

Reference Books:

- Electronic Devices and Circuit Theory: Robert L. Boylestad, Louis Nashelsky, Pearson Education, Ninth Edition
- Electronic Devices and Circuits: S Salivahanan, N Suresh Kumar, Tata Mc Graw Hill Education Private Limited, Second Edition
- Integrated Electronics, J. Millman and Halkias, TMH Publications

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Industrial IoT

GROUP II :SEMESTER II

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24II203P	Digital Circuits Lab	-	-	2	1	-	25	25	50

Course Objectives	Course Outcomes
<p>1. To acquire the basic knowledge of digital logic levels and application of knowledge to understand digital electronics circuits.</p> <p>2. To prepare students to perform the analysis and design of various digital electronic circuits.</p>	<p>After studying this course, the students would gain enough knowledge</p> <ul style="list-style-type: none">● To explain the fundamental concepts and techniques used in digital electronics.● To understand and examine the structure of various number systems and its application in digital design.● The ability to understand, analyze and design various combinational and sequential circuits.● To develop skill to build, and troubleshoot digital circuits.

- All eight experiments to be performed from the list

Expt. No.	Title of the experiment
1	To study and verify truth table of basic logic gates
2	To study and demonstrate the working of combination logic circuit
3	To study and demonstrate the working of flip-flop circuits
4	To study and demonstrate the working of sequential logic circuits
5	To verify the operation of multiplexer and demultiplexer circuits
6	To study and demonstrate Half Adder
7	To study the memory unit and different types of memory
8	To study of basic properties of operation amplifier: Inverting & Non-inverting amplifier on virtual lab

Text Books

S. N	Title	Authors	Edition	Publisher
1.	Analog and Digital Electronics	Charles H. Roth, Larry L. Kinney, Raghunandan G.H., Cengage Publication	1st Edition	Cengage Learning
2.	Principles of Electronics	V.K. Mehta	7 th Edition	S.Chand Publications

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GROUP II : SEMESTER II

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24II204T	Python Programming	3	-	-	3	20	20	60	100
Course Objectives					Course Outcomes				
<p>This course is intended</p> <ul style="list-style-type: none"> Understand the basic structure and syntax of the Python programming language. Develop problem-solving skills using C programming constructs. Implement programs using control statement, use functions, and leverage modular programming. Apply built-in data structures like strings, lists, tuples, dictionaries, and sets to solve computational problems. 					<p>Students will be able to</p> <ul style="list-style-type: none"> Explain how Python's syntax and data types differ from other programming languages like C, and summarize their advantages.. Write Python programs using control structures and user-defined functions to solve basic computational problems. Analyze various Python data structures (lists, tuples, dictionaries, sets) and evaluate their suitability for specific problem-solving scenarios. Assess the efficiency of file handling and object-oriented programming techniques in managing data and optimizing program structure. Develop a Python-based IoT application integrating data visualization and numerical computations to address a real-world problem. 				

Unit I Introduction to Python	[10 Hrs]
History and features of Python, setting up the Python environment, Introduction to the Python interpreter and Python, Writing and executing the first Python program, Python syntax vs. C syntax, Variables, keywords, and identifiers, Indentation and comments, Data Types and Operations: Basic data types (int, float, str, bool), Type conversion and casting, Operators (arithmetic, comparison, logical, bitwise), Input/Output Operations: Taking input from the user, Output formatting	
Unit II Control Structures and Functions	[8 Hrs]
Control Structures: Conditional statements (if, elif, else), Loops (for, while), Loop control statements (break, continue, pass), Functions: Defining and calling functions, Function arguments and return values, Scope of variables, Recursive functions, Modules and Packages: Importing modules, Standard libraries overview, Creating and using custom modules	
Unit III Data Structure	[8 Hrs]
Strings: String operations and methods, String formatting, Lists: List operations and methods, List comprehensions, Tuples: Tuple operations and methods, Dictionaries: Dictionary operations and methods, Sets: Set operations and methods	
Unit IV Arrays, Strings and Pointers	[8 Hrs]
File Handling: Reading and writing files, Working with CSV files, Object-Oriented Programming: Classes and objects, Inheritance and polymorphism, Encapsulation and data hiding, Regular Expressions: Pattern matching and searching, Using re module	
Unit V Python for IoT	[6 Hrs]
Basic signal processing using Python, Plotting and visualizing data using matplotlib, Introduction to numpy for numerical computations, Real-world problem-solving using Python	

Books and References

S.No.	Title	Authors	Edition	Publisher
1.	Python for Data Analysis: Data Wrangling with Pandas, NumPy, and IPython	Wes McKinney	2 nd	O'Reilly Media
2.	Data Structures and Algorithms in Python	Michael T. Goodrich, Roberto Tamassia, Michael H. Goldwasser	1 st	Wiley
3.	Python Programming: An Introduction to Computer Science	John Zelle	3 rd	Franklin, Beedle & Associates Inc.
4.	Problem Solving and Python Programming	E. Balagurusamy	1 st	McGraw Hill Education

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GROUP II : SEMESTER II

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24II204P	Python Programming Lab	-	-	2	1	-	25	25	50

Course Objectives	Course Outcomes
<ul style="list-style-type: none"> Develop Practical Coding Skills: Enable students to gain hands-on experience in writing and executing Python programs Apply Problem-Solving Techniques: Encourage students to use Python to solve real-world problems by applying control structures, data structures, and functions. Introduce Advanced Python Concepts such as object-oriented programming, regular expressions, and data visualization, preparing them for practical applications in their field. 	<ul style="list-style-type: none"> To write and execute Python programs demonstrating correct usage of basic syntax, data types, and operators. To demonstrate the ability to implement control structures such as loops and conditional statements to solve problems efficiently. To adept at defining and calling functions, passing arguments, and returning values, as well as creating and using Python modules for modular programming. To create and manipulate fundamental data structures and applying them to solve practical problems. To demonstrate an understanding of file handling, exception management, object-oriented programming concepts, and data visualization, enabling them to handle more complex programming tasks and real-world applications.

Expt. No.	Title of the experiment
1	Writing simple programs to demonstrate basic syntax and data types.
2	Practice programs for input/output operations and type conversions.
3	Programs to demonstrate control structures and loops.
4	Writing functions for various mathematical and logical operations.
5	Creating and using modules in Python.
6	Programs to manipulate strings and use string methods.
7	Creating and manipulating lists, tuples, dictionaries, and sets.
8	Real-world applications of data structures in solving problems.
9	Writing programs for file handling and exception management.
10	Creating classes and objects, and implementing OOP concepts.
11	Using regular expressions to search and manipulate text.
12	Signal processing tasks such as filtering and analyzing signals.
13	Visualizing data using matplotlib.

Books and References

S.No	Title	Authors	Edition	Publisher
1.	Python for Data Analysis: Data Wrangling with Pandas, NumPy, and IPython	Wes McKinney	2 nd	O'Reilly Media
2.	Data Structures and Algorithms in Python	Michael T. Goodrich, Roberto Tamassia, Michael H. Goldwasser	1 st	Wiley
3.	Python Programming: An Introduction to Computer Science	John Zelle	3 rd	Franklin, Beedle & Associates Inc.
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GROUP II : SEMESTER II

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24II205P	Business Communication Skills - II Lab	-	-	2	1	-	25	25	50

Course Objectives	Course Outcomes
To empower students to develop a career-oriented mindset while harnessing the power of LSRW skills.	Students would be able to: 1. Participate in Group Discussions. 2. Improve their reading and formal writing skills. 3. Develop upon their listening skills to engage in meaningful conversations. 4. Develop oratory skills to engage and inform audiences. 5. Prepare themselves for participating in business meetings.

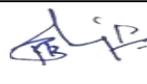
Expt. No.	Title of the experiment
1	Group Discussion
2	Reading for Competitive Exams II
3	Listening Skills II
4	Presenting a TED Talk
5	Media Interaction
6	Business Correspondence II
7	Report Writing
8	Mock Meeting

Reference Books

S. N	Title	Authors	Edition	Publisher
1.	Communication Skills for Engineers	C. Muralikrishna & Sunita Mishra	2nd Edition, 2011	Pearson India Education Services
2.	Communication Skills	Dr. L. Bisen, Dr. B. Agrawal & Dr. N. T. Kalyani	1st Edition, 2021	Himalaya Publishing House
3.	Barron's IELTS Superpack	Lin Lougheed	2012	Barrons Educational Series

Online Resources

1	https://ieltsliz.com/
2	https://www.englishclub.com/business-english/
3	https://www.indiabix.com/verbal-ability/questions-and-answers/
4	https://prepinsta.com/interview-preparation/?utm_source=home+page&utm_medium=navigation

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GROUP II : SEMESTER II

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24II206T	Indian Knowledge System	2	-	-	2	10	10	30	50
Course Objectives					Course Outcomes				
This course is intended <ul style="list-style-type: none"> To introduce the origin, evolution and approach of Indian knowledge systems. To understand the Indian knowledge approaches to various domains such as time, language, environment, management, life and mind. To appreciate the principles of thought process, reasoning, inferencing and sustainability in Indian knowledge systems. 					Students will be able to <ul style="list-style-type: none"> Explain the origin, evolution and approach of IKS and build various practices to conserve and protect rich Indian Knowledge Describe importance of Indian Literature and will know about Indian Scholars Understand ancient Indian traditions, practices and knowledge for conservation of resources 				

Unit I	[10 Hrs.]
Introduction and Management of Indian Knowledge System	
1.1 Definition, Concept and Scope of IKS	
1.2 IKS based approaches on Knowledge Paradigms	
1.3 IKS in Ancient India and Modern India	
1.4 Documentation and Preservation of IKS	
1.5 Approaches for Conservation and Management of nature and Bio – Resources	
1.6 Approaches and Strategies to protection and conservation of IKS	
Unit II	[12 Hrs.]
IKS and Indian Scholars, Indian Literature	
2.1 Philosophy and Literature (Maharshi Vyas, Kanad, Pingala, Parasar, Banabhatta, Nagarjuna and Panini)	
2.2 Mathematics and Astronomy (Aryabhatta, Mahaviracharya, Bodhayan, Bhaskaracharya, Brahmagupta, Varahamihira)	
2.3 Medicine and Yoga (Charak, Susruta, Maharshi Patanjali and Dhanwantari)	
2.4 Sahitya (Vedas, Upvedas (Ayurveda, Dhanurveda, Ghandarvaveda), Puran and Upnishad and Shad Darshan (Vedanta, Nyay, Vaisheshik, Sankhya, Mimamsa, Yoga, Adhyatma, Meditation)	
2.5 Shastra (Nyaya, Vyakarana, Krishi, Shilp, Vastu, Natya, Sangeet)	
Unit III	[08 Hrs.]
Unique Traditional Practices and Applied Traditional knowledge	
3.1 Myths, Rituals, Spirituals, Folk stories, Traditional Narratives	
3.2 Agriculture, Land, Water and Soil Conservation and Management Practices	
3.3 Vaidya (Traditional health Care system), Amchi Medicine system	

Text Books

S. N.	Title	Authors	Edition	Publisher
1	Indian Knowledge System: Introduction and Prospects	Acharya Shreyas Kurhekar	First	Sanskrit University, Ramtek
2	Indian Knowledge System Vol. I and II	Kapil Kapoor, Awadhesh Kumar Singh		D.K. Print World Ltd.
3	Traditional Knowledge System in India	Amit Jha		Atlantic Publisher

Reference Books / Resources

S. N.	Title	Authors	Edition	Publisher
1	Website of Indian Knowledge System Division, New Delhi	-	-	-

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INFORMATION TECHNOLOGY

GROUP 1: SEMESTER I

Sr No	Course Category	Course Code	Course Title	Hours per Week			Credits	Maximum Marks				No. of hours for ESE
				L	T	P		Mid Sem Exam	Continual Assessment	End Sem Examination	Total	
1	BSC	24IT101T	Engineering Chemistry and Environmental Science	2	-	-	2	10	10	30	50	1.5
2	BSC	24IT101P	Engineering Chemistry and Environmental Science Lab	-	-	2	1		25	25	50	
3	BSC	24IT102T	Linear Algebra and Calculus	3	1	-	4	20	20	60	100	3
4	ESC	24IT103T	Fundamentals of IT	3	1	-	4	20	20	60	100	3
5	PCC	24IT104T	Logic building with C	3	-	-	3	20	20	60	100	3
6	PCC	24IT104P	Logic building with C Lab	-	-	2	1	-	25	25	50	-
7	ESC	24IT105P	Software Lab - I	-	-	2	1	-	25	25	50	-
8	AEC	24IT106P	Business Communication Skills I Lab	-	-	2	1	-	25	25	50	-
9	IKS	24IT107T	Indian Knowledge Systems	2	-	-	2	10	10	30	50	1.5
10	SEC	24IT141P	Career Development I	-	-	2	1	-	50	-	50	-
11	CC	24IT108T	Co-curricular Courses - I	2			2	-	50	-	50	-
Total				15	2	10	22	80	280	340	700	12

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INFORMATION TECHNOLOGY

GROUP 1: SEMESTER II

Sr No	Course Category	Course Code	Course Title	Hours per Week			Credits	Maximum Marks				No. of hours for ESE
				L	T	P		Mid Sem Exam	Continual Assessment	End Sem Examination	Total	
1	BSC	24IT201T	Engineering Physics and Materials Science	2	-	-	2	10	10	30	50	1.5
2	BSC	24IT201P	Engineering Physics and Materials Science Lab	-	-	2	1	-	25	25	50	-
3	BSC	24IT202T	Statistics and Probability	3	1	-	4	20	20	60	100	3
4	ESC	24IT203T	Basics of Python Programming	3	-	-	3	20	20	60	100	3
5	ESC	24IT203P	Basics of Python Programming Lab	-	-	2	1	-	25	25	50	-
6	ESC	24IT204T	Digital Logic Design	3	1	-	4	20	20	60	100	3
7	ESC	24IT205P	Software Lab – II	-	-	2	1	-	25	25	50	-
8	AEC	24IT206P	Business Communication Skills – II Lab		-	2	1	-	25	25	50	-
9	ESC	24IT207T	Design Thinking	2	-	-	2	10	10	30	50	1.5
10	SEC	24IT241P	Career Development – II	-	-	2	1	-	50	-	50	-
11	CC	24IT208T	Co-curricular Courses – II	2	-	-	2	-	50	-	50	-
Total				15	2	10	22	80	280	340	700	12

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INFORMATION TECHNOLOGY

FIRST SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24IT101T	Engineering Chemistry and Environmental Science	2	-	-	2	10	10	30	50

Course Objectives	Course Outcomes
<p>This course is intended</p> <ul style="list-style-type: none">To acquaint the students with the basic phenomenon, concepts, knowledge and understanding of the fundamental principles of chemistry.To develop necessary skills and abilities to succeed in engineering education, research, Industry, environment and social context.	<p>Students will be able to</p> <ul style="list-style-type: none">Develop innovative ideas for use of advanced materials in sustainable development.Apply the principles of green Chemistry for sustainable developmentUnderstand the environmental impacts of e-waste & apply concepts of e-waste management.

Unit I Advanced Materials	[8 Hrs]
Introduction-Need for Development Biodegradable polymers- PLA, PCL - Synthesis, Properties and Applications, Conducting Polymers- Polypyrrole, PANI Synthesis, Properties and Applications. Liquid Crystal Polymers- Types, Properties and Applications.	
Unit II Green Chemistry	[8 Hrs]
Green Chemistry- Introduction, Principles of Green Chemistry with example, Green Reagents- Super Critical Fluid (CO ₂)- Properties and Applications, Green Building-Introduction, Components, Green Crackers- Introduction, Types, Advantages, Bio Catalysis- Definition and examples. Carbon Credit, Carbon Sequestration, Carbon Trade exchange platform.	
Unit III E-waste Management	[8 Hrs]
Introduction. E- Waste; composition and generation. E-waste pollutants, E waste hazardous properties, Effects of pollutant (E-waste) on human health and surrounding environment, Basic principles of E waste management, Component of E waste management- Domestic e-waste disposal, E-waste Control measures - Reduction of waste at source	

Text Books

S.N	Title	Authors	Edition	Publisher
1	Text Book of Engineering Chemistry	S.S. Dara,	New	S. Chand and Company Ltd. New Delhi.
2	Textbook of Engineering Chemistry	P.C. Jain and Monica Jain	6 th	Dhanpat Rai and Sons, New Delhi.
3	Materials Chemistry	A.V. Bharati and Walekar,	1st	Tech Max Publications, Pune.
4	E-waste Recycling and Management	Anish Khan, Inamuddin, Abdullah M. Ansiri	1st	Springer

Reference Books

S.N	Title	Authors	Edition	Publisher
1	A Text book of Engineering Chemistry	Shashi Chawla	1st	Dhanpat Rai & Sons, New Delhi
2	Fuels and Combustion	Amir Circar	1st	Orient Longmans
3	Fundamentals of Engineering Chemistry (Theory and Practice)	S. K. Singh	1st	New Age Materials
4	Environmental Chemistry	B. K. Sharma	1st	Krishna Prakashan Media (P) Ltd.

Online Resources

1	suchitanimbalkar@gnomio.com
2	kkhandarka@gnomio.com
3	https://www.youtube.com/watch?v=WmQyPYm_g20
4	https://www.youtube.com/watch?v=6VWSiCCz-Sk

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FIRST SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24IT101P	Engineering Chemistry and Environmental Science Lab		-	2	1	-	25	25	50

Course Objectives	Course Outcomes
This course is intended <ul style="list-style-type: none">To make the students aware about various techniques available for Analysis of Material.To impart the skill of handling chemicals and apparatus.	Students will be able to <ul style="list-style-type: none">List the proper procedures and regulations for safe handling and use of chemicals and can follow the proper procedures and regulations for safe handling when using different instruments.Demonstrate the use of modern instrumentation, classical techniques, and properly record the results of their experiment.Identify and solve chemical problems and explore new areas of research especially in fuel and lubricants.

Expt. No.	Experiments based on Performance
1	Synthesis of Bakelite
2	Synthesis of Conducting polymer (Polyaniline)
3	Determination of heavy metal from industrial effluent.
	Virtual Experiment - Any THREE
4	Electro gravimetric estimation of metal
5	Estimation of e-waste (Cadmium)
6	Determination of Alkalinity of Water Sample.
7	Study of Lambert-Bears Law
	Demonstration - Any ONE
8	Determination of turbidity from industrial effluent.
9	Determination of pH by using different methods.
	Activity - Any One
1	Visit to e-waste recycling plant
2	Study of Air /Water Pollution Level at different Sites in Nagpur City.
3	Study of nearby industrial chemicals and safety measures

Text Books

S.N	Title	Authors	Edition	Publisher
1	A Textbook on experiment and calculation in engineering chemistry	S.S. Dara	9th	S.Chand

Reference Books

S.N	Title	Authors	Edition	Publisher
1	Applied Chemistry theory and practical	O.P. Virmani and A.K. Narular	1 st	New Age International
2	Laboratory Manual on Engineering Chemistry	Dr. Subdharani	1 st	Dhanpat Rai Publishing

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Online Resources

1	suchitanimbalkar@gnomio.com
2	kkhandarka@gnomio.com
3	https://www.youtube.com/watch?v=WmQyPYm_g20
4	https://www.youtube.com/watch?v=6VWSiCCz-Sk

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FIRST SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24IT102T	Linear Algebra and Calculus	3	1	-	4	20	20	60	100

Course Objectives	Course Outcomes
This course is intended <ul style="list-style-type: none">Matrix AlgebraMultivariate CalculusDifferential EquationsVector calculus	Students will be able to <ul style="list-style-type: none">Solve the system of linear equations using matrices.Identify engineering problems related to Matrices: Eigen value & Eigen vectors & Functions of Matrices.Understand the concept of multivariate calculus & apply the knowledge of applications of differentiation.Solve first order and higher order differential equations by various methods and apply these techniques to solve problems in engineering.Implement concept of vector calculus to solve engineering problems.
Unit I	[8Hrs]

Matrix Algebra : Introduction to matrices, Rank of a matrix, Consistency of system of linear equations, Linear and orthogonal transformations, Linear dependence of vectors.

Unit II **[8Hrs]**

Matrices: Characteristics equation, Cayley- Hamilton Theorem, Eigen values and Eigen vectors, Reduction to diagonal form, Reduction of quadratic form to canonical form by orthogonal transformation, Sylvester's theorem.

Unit III **[8Hrs]**

Multivariate Calculus: Functions of several variables and their partial derivatives, Chain rule and total differential coefficient, Jacobians and its properties, Maxima –Minima of functions of two variables, Lagrange's method of undetermined multipliers.

Unit IV **[8Hrs]**

Differential Equations: First order and first degree differential equations: Linear, Higher order differential equations with constant coefficients, Method of variation of parameters, Cauchy's homogeneous linear equation, Applications of differential equations.

Unit V **[8Hrs]**

Vector Calculus: Vector differentiation, Gradient, Directional derivatives, Divergence and Curl with their physical interpretation Solenoidal and irrotational motions, Scalar potential, Line integral & Work done.

Text Books

S.N	Title	Authors	Edition	Publisher
1	Higher Engineering Mathematics	B. S. Grewal		Khanna Publishers, New Delhi.
2	A Text Book of Applied Mathematics (Vol I & II)	P. N. Wartikar and J. N. Wartikar		Pune Vidyarthi Griha Prakashan, Pune
3	Higher Engineering Mathematics	H. K. Das and Er. Rajnish Verma		S. Chand & CO. Pvt. Ltd., New Delhi

Reference Books

S.N	Title	Authors	Edition	Publisher
1	Higher Engineering Mathematics	B.V. Ramana,	11th reprint, 2010.	Tata McGraw Hill New Delhi
2	A Text Book of Engineering Mathematics	Peter O' Neil		Thomson Asia Pvt. Ltd., Singapore.
3	Advanced Engineering Mathematics	Erwin Kreyszig		John Wiley & Sons, New York.

Online Resources

1	https://archive.nptel.ac.in/courses/111/101/111101115/#
2	https://www.coursera.org/learn/matrix-algebra-engineers

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FIRST SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24IT103T	Fundamentals of IT	3	1	-	4	20	20	60	100

Course Objectives	Course Outcomes
<p>This course is intended</p> <ul style="list-style-type: none">● Explain the fundamental concepts of computer systems, including hardware, software, and their interaction.● Analyze the evolution of computers and differentiate between various computer generations and classifications.● Describe the functionalities and types of different operating systems.● Understand the principles of data communication and networking fundamentals.● Apply basic IT skills for effective use of computers and the internet.	<p>Students will be able to</p> <ul style="list-style-type: none">● Analyze the historical development of computers.● Identify and explain the fundamental components of a computer system.● Demonstrate proficiency in installing, configuring, and using various types of operating systems.● Apply the principles of data communication and networking.● Utilize basic IT skills for effective use of computers and the internet

Unit I:	[8Hrs]
Introduction to Computers: What is a computer? Characteristics of computers, Evolution of Computers, Classification of Computers, Number System.	
Unit II:	[7Hrs]
Computer Hardware: Hardware Components, Input and Output Devices, Storage Devices, Processing Unit and Memory	
Unit III:	[7Hrs]
Introduction to Software: What is Software? Types of Software, System Software, Application Software	
Unit IV:	[7Hrs]
Operating Systems & Data Communication: Types of Operating Systems, Introduction to Networks	
Unit V:	[7Hrs]
The Internet and IT Applications: Introduction to the Internet, Internet Applications, IT Security and Privacy	

Text Books

Sr.No.	Title	Authors	Edition	Publisher
1	Introduction to Computers	Peter Norton	10 th	Tata McGraw Hill
2	Operating Systems: Three Easy Pieces	Remzi H. Arpaci- Dusseau , Andrea C. Arpaci - Dusseau	1 th	Arpaci- Dusseau Books
3	For Dummies: Networking	Ed Tittel	7 th	John Wiley & Sons

Reference Books

Sr. No.	Title	Authors	Edition	Publisher
1	A Guide to technical Support	Jeans Andrews	11 th	Cengage Learning
2	How the Internet Work	Richard Geldrench	6 th	Que Publishing
3	Computer Network: A top down Approach	James Kurose and keith W.Ross	7 th	Pearson Education

Online Resources

1	https://www.geeksforggeeks.org/
2	https://www.tutorialspoint.com

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FIRST SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24IT104T	Logic building with C	3	-		3	20	20	60	100

Course Objectives	Course Outcomes
<p>This course is intended</p> <ul style="list-style-type: none">To understand the basic concept of programming.To learn the basics of C.To Implement concept of array, functions and pointer and user defined data typeTo understand the concept of file handling & dynamic memory allocation.	<p>Students will be able to</p> <ul style="list-style-type: none">Understand the concept of algorithm & C programmingUse the basic C programming concepts to implement the programDevelop the program using 1D & 2D array and perform appropriate operationDemonstrate the use of function, pointer & user defined type like structure & union.Implement the program using file handling and dynamic memory allocation.

Unit I: Fundamentals of Programming	[7Hrs]
Introduction to C Programming, Translators- Compilers, Interpreters, Assemblers. Problem solving techniques: Top-down, Bottom-up. Structured Programming. Algorithms and Flowcharts: Characteristics of algorithms, flowcharts, flowchart symbols, Advantages disadvantages of flowcharts. Structure of C programming. Input Output statement of C (printf scanf), gets(), puts(). Preprocessor directives.	
Unit II: Basics of C Programming	[7Hrs]
Fundamentals of C: C Character Set, Identifiers, Keywords, Data Types, Constants, Variables, Declarations, Expressions, Statements, Symbolic Constants. Operators and Expressions: Arithmetic Operators, Unary Operators, Relational and Logical Operators, Assignment Operators the Conditional Operator, Hierarchy of operations. Control structure statement-Conditional, looping, and switch.	
Unit III: Array	[8Hrs]
Array: one dimensional array, Declaration of array, initialization of array. Operation on array like searching; sorting. 2-D array, Declaration of 2-D array, initialization of 2D- array. Operation on 2D-array like addition , multiplication ,subtraction , transpose of 2D matrix etc.	
Unit IV: Function, Pointers & User-defined data type in C	[7Hrs]
Function and Pointers: Introduction to functions, why use function, Scope rule of function, call by value, call by reference, recursion, Iterative versus recursive style. Pointers, Declaration; initialization of pointers. Advantages of pointers. Structure: Declarations, array of structures, unions, difference between structure and union.	
Unit V: File handling & dynamic memory allocation	[7Hrs]
Console and File I/O: file operation, file opening modes, file copy programming, Text file and binary file, file pointers, Command line argument. Dynamic memory allocation and Malloc(), Calloc(), free(), realloc(), Sizeof() operator.	

Text Books

Sr. No.	Title	Authors	Edition	Publisher
1	Programming in ANSI C	E. Balguruswamy	2 nd	Tata Mc-Graw Hill
2	Programming Techniques Through 'C'	M. G. Venkateshmurthy	2 nd	Pearson Education Publications
3	Let Us 'C'	Yashwant P. Kanetkar	1 st	BPB Publications

Reference Books

Sr. No.	Title	Authors	Edition	Publisher
1	The Complete Reference C	Herbert Schildt	4 th	Tata Mc-Graw Hill
2	The 'C' programming language	Kernighan and Ritchie	1 st	Prentice Hall
3	Programming and Problem Solving	M. Sprankle	2 nd	Pearson Education

Online Resources

1	https://cstutorialpoint.com/c-language-notes/#google_vignette
2	https://www.freecodecamp.org/news/the-c-programming-handbook-for-beginners
3	https://www.w3schools.com/c/index.php
4	https://www.programiz.com/c-programming

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FIRST SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24IT104P	Logic building with C Lab	-	-	2	1	-	25	25	50

Course Objectives	Course Outcomes
<p>This course is intended</p> <ul style="list-style-type: none">To understand the basic concept of programming.To learn the basics of C.To Implement concept of array, functions and pointer and user defined data typeTo understand the concept of file handling & dynamic memory allocation.	<p>Students will be able to</p> <ul style="list-style-type: none">Implement the concept of control structure statement in C programmingDevelop the program using 1D & 2D array and perform appropriate operationDemonstrate the use of function & pointerDesign the program for user defined data type like structure & unionImplement the program using file handling & dynamic memory

Sr. No.	Experiments based on
1	Conditional Control Statement & Looping Statement
2	Menu driven program (Switch Control Statement)
3	One Dimensional (1-D) array
4	Two Dimensional (2-D) array
5	Function, call by value; call by reference
6	Structure; Union
7	File Handling operations
8	Dynamic memory allocation

Text Books

Sr. No.	Title	Authors	Edition	Publisher
1	Programming in ANSI C	E. Balguruswamy	2 nd	Tata Mc-Graw Hill
2	Programming Techniques Through 'C'	M. G. Venkateshmurthy	2 nd	Pearson Education Publications
3	Let Us 'C'	Yashwant P. Kanetkar	1 st	BPB Publications

Reference Books

Sr. No.	Title	Authors	Edition	Publisher
1	The Complete Reference C	Herbert Schildt	4 th	Tata Mc-Graw Hill
2	The 'C' programming language	Kernighan and Ritchie	1 st	Prentice Hall
3	C Programming Language	Brian W. Kernighan , Dennis Ritchie	2 nd	Pearson Education

Online Resources

1	https://www.geeksforgeeks.org/c-programming-language/
2	https://cstutorialpoint.com/c-language-notes/#google_vignette
3	https://www.w3schools.com/c/index.php
4	https://www.programiz.com/c-programming

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FIRST SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24IT105P	Software Lab - I	-	-	2	1	-	25	25	50

Course Objectives	Course Outcomes
<p>This course is intended</p> <ul style="list-style-type: none">• Access a command line interface (CLI).• Use the all commands related with MS-DOS.	<p>Students will be able to</p> <ul style="list-style-type: none">• Access a command line interface (CLI).• Display the list of files/folders in a directory using DIR command• Create a new folder using MD command• Use the CD command and its various switches

Expt. No.	Experiments based on
1	Introduction to MS-DOS
2	Practical's based on Working directory, creating and navigating through directory.
3	Practical's based on create folder and operations on folder
4	Use the inbuilt help function to get information on the commands related to MS-DOS.
5	Using the command line, add the following extra folders (Photos and Letters)
6	Practical's based on Drive operations
7	Practical's based on Advanced Excel
8	Practical's based on Advanced office, Mail merge.

Text Books

Sr. No.	Title	Authors	Edition	Publisher
1	The Quick Reference Guide to M. S.- DOS Commands	Van Wolverton	3 rd	Microsoft Press

Online Resources

1	https://corporatefinanceinstitute.com/resources/excel/advanced-excel-formulas-must-know/
2	https://www.geeksforgeeks.org/dos-commands/
3	https://www.lifewire.com/dos-commands-4070427
4	https://corporatefinanceinstitute.com/resources/excel/advanced-excel-formulas-must-know/

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Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24IT106P	Business Communication Skills I Lab	-	-	2	1	-	25	25	50

Course Objectives	Course Outcomes
<p>This course is intended</p> <ul style="list-style-type: none">To empower students to develop a career-oriented mindset while harnessing the power of LSRW skills.	<p>Students will be able to:</p> <ul style="list-style-type: none">apply verbal and non-verbal skills to confidently and effectively deliver presentations.prepare themselves for overall language ability through listening and reading tasks.demonstrate formal writing skills.draft impactful Resumes and Cover Letters.prepare themselves for Personal Interviews.

Expt. No.	Title of the experiment
1	Presentation Skills
2	Poster Making (Product/ Event)
3	Reading Comprehension for Competitive Exams.
4	Writing Skills for Academic Purposes.
5	Listening Skills I
6	Business Correspondence I
7	Resume Writing and Cover Letter
8	Mock Interviews

Reference Books:

S. N	Title	Authors	Edition	Publisher
1	Communication Skills for Engineers	C. Muralikrishna & Sunita Mishra	2nd Edition, 2011	Pearson India Education Services
2	Communication Skills	Dr. L. Bisen, Dr. B. Agrawal & Dr. N. T. Kalyani	1st Edition, 2021	Himalaya Publishing House
3	Barron's IELTS Superpack	Lin Lougheed	2012	Barrons Educational Series

Online Resources

1	https://ieltsliz.com/
2	https://www.englishclub.com/business-english/
3	https://www.indiabix.com/verbal-ability/questions-and-answers/
4	https://prepinsta.com/interview-preparation/?utm_source=home+page&utm_medium=navigation
5	https://www.skillsyouneed.com/presentation-skills.html

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FIRST SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24IT107T	Indian Knowledge Systems	2	-	-	2	10	10	30	50

Course Objectives	Course Outcomes
<p>This course is intended</p> <ul style="list-style-type: none">To introduce the origin, evolution and approach of Indian knowledge systemsTo understand the Indian knowledge approaches to various domains such as time, language, environment, management, life and mindTo appreciate the principles of thought process, reasoning, inferencing and sustainability in Indian knowledge systemsTo navigate knowledge sources of different disciplines of studies from a Vedic perspective	<p>Students will be able to</p> <ul style="list-style-type: none">Explain the origin, evolution and approach of IKS and build various practices to conserve and protect rich Indian KnowledgeDescribe importance of Indian Literature and will know about Indian ScholarsUnderstand ancient Indian traditions, practices and knowledge for conservation of resources.

Unit I	[10 Hrs.]
Introduction and Management of Indian Knowledge System 1.1 Definition, Concept and Scope of IKS 1.2 IKS based approaches on Knowledge Paradigms 1.3 IKS in Ancient India and Modern India 1.4 Documentation and Preservation of IKS 1.5 Approaches for Conservation and Management of nature and Bio – Resources 1.6 Approaches and Strategies to protection and conservation of IKS	
Unit II	[12 Hrs.]
IKS and Indian Scholars, Indian Literature 2.1 Philosophy and Literature (Maharshi Vyas, Kanad, Pingala, Parasar, Banabhatta, Nagarjuna and Panini) 2.2 Mathematics and Astronomy (Aryabhata, Mahaviracharya, Bodhayan, Bhaskaracharya, Bramhagupta, Varahamihira) 2.3 Medicine and Yoga (Charak, Susruta, Maharshi Patanjali and Dhanwantari) 2.4 Sahitya (Vedas, Upvedas (Ayurveda, Dhanurveda, Ghandarvaveda), Puran and Upanishad and Shad Darshan (Vedanta, Nyay, Vaisheshik, Sankhya, Mimamsa, Yoga, Adhyatma, Meditation) 2.5 Shastra (Nyaya, Vyakarana, Krishi, Shilp, Vastu, Natya, Sangeet)	
Unit III	[08 Hrs.]
Unique Traditional Practices and Applied Traditional knowledge 3.1 Myths, Rituals, Spirituals, Folk stories, Traditional Narratives 3.2 Agriculture, Land, Water and Soil Conservation and Management Practices 3.3 Vaidya (Traditional health Care system), Amchi Medicine system	

Text Books

S. N.	Title	Authors	Edition	Publisher
1	Indian Knowledge System: Introduction and Prospects	Acharya Shreyas Kurhekar	First	Sanskrit University, Ramtek
2	Indian Knowledge System Vol. I and II	Kapil Kapoor, Awadhesh Kumar Singh		D.K. Print World Ltd.
3	Traditional Knowledge System in India	Amit Jha		Atlantic Publisher

Reference Books

S. N.	Title	Authors	Edition	Publisher
1	Website of Indian Knowledge System Division, New Delhi			

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GROUP I : SEMESTER II

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24IT201T	Engineering Physics and Materials Science	2	-		2	10	10	30	50

Course Objectives	Course Outcomes
<p>This course is intended</p> <ul style="list-style-type: none"> To understand the basic laws of physics and their application in engineering and technology. To develop scientific temper and analytical capability. 	<p>Students will be able to</p> <ul style="list-style-type: none"> Distinguish the types of solids on the basis of conductivity and acquire a brief idea about semiconductors and Magnetic Materials. Understand the basics of Optical Fiber Communication. Interpret the concepts of Quantum Physics.

Unit I- BASICS OF SOLID-STATE PHYSICS	[11 Hrs]
<p>Semiconductors: Free electron Theory (qualitative idea) and its features; Idea of band formation in solids, Classification of solids: Metal, Insulator, Semiconductor; Fermi Energy, Types - Intrinsic and Extrinsic Semiconductors, Applications of solid state devices - p-n junction diode and transistor.</p> <p>Magnetic materials: Terms and definitions, Types of magnetic materials, characteristics of Diamagnetic, Paramagnetic and Ferromagnetic Materials, Applications of soft and hard magnetic materials with a special emphasis on storage devices such as hard disk, floppy disk and magnetic tapes, advantages & disadvantages.</p>	
Unit II- OPTICAL COMMUNICATION	[08 Hrs]
<p>Introduction, Optical Fiber, Total Internal Reflection, Propagation of light through an Optical Fiber, Fractional Refractive Index Change, Numerical Aperture, Modes of Propagation, Classification of Optical Fibers, The Three types of fibers, Comparative characteristics, V-Number, Losses in Optical Fiber, Fiber Optic Communication System, Merits of Optical Fibers, Fiber Optic Sensors (Temperature sensor and Liquid Level detector)</p>	
Unit III- QUANTUM PHYSICS	[07 Hrs]
<p>Dual nature, de-Broglie hypothesis, Wave packet, phase and group velocity, Uncertainty principle - physical significance and its application, Wave function - probability and normalization, Brief idea of application of quantum mechanics in quantum computing.</p>	

Text Books

S.N	Title	Authors	Edition	Publisher
1	Fundamentals of Physics	David Halliday, Robert Resnick and Jerle Walker	8th extended	John-Wiley India
2	Electronic Engineering Materials and Devices	John Allision	10 th edition reprint	TMH
3	Engineering Physics	M. N. Avadhanulu	Latest edition	S. Chand & Co.

Reference Books

S.N	Title	Authors	Edition	Publisher
1	Solid State Physics	Charles Kittel	Eighth edition	John Wiley & Sons, Inc
2	Optical Fiber Communication - Principles & Practice	John M. Senior	3 rd Edition	Prentice Hall
3	Quantum Mechanics	Schiff	First Edition	McGraw-Hill Book Company, Inc.

Online Resources

1	https://www.britannica.com/science/semiconductor#ref233890
2	https://www.geeksforgeeks.org/semiconductors/
3	https://www.sciencedirect.com/topics/chemistry/magnetic-material
4	https://www.livescience.com/33816-quantum-mechanics-explanation.html

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SECOND SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation		
						CA	ESE	Total
24IT201P	Engineering Physics & Materials Science Lab	--	--	2	1	25	25	50

Course Objectives	Course Outcomes
<p>This course is intended</p> <ul style="list-style-type: none">To understand the basic laws of physics and their application in engineering and technology.To develop scientific temper and analytical capability.	<p>Students will be able to</p> <ul style="list-style-type: none">Verify principles/laws by selecting and using proper measuring instruments, interpret result and draw conclusions.Find various parameters using various properties of light.Apply the concepts of Semiconductors and Quantum Mechanics.

Expt. No.	Title of the experiment
1	Study of semiconductor diodes
2	Study of Phenomenon of Diffraction
3	Study of Interference
4	Study of Birefringence
5	Determination of Numerical Aperture (NA) of given Optical Fiber
6	Determination of Planck's Constant using LED
7	Guoy's Balance Method a) Determination of Magnetic Susceptibility of different magnetic materials. b) Identification of different types of Magnetic Materials
8	Study of Planck's Constant by means of LED
9	Determination of Curie Temperature of Ferromagnetic Material.
10	Study of Transistors.
11	Study of Hall Effect.
12	Experiment on 'Quantum Eraser'.
13	Demonstration of phenomena of Optics using Laser.

Text Books

S.N	Title	Authors	Edition	Publisher
1	Fundamentals of Physics	David Halliday, Robert Resnick and Jerle Walker	8e extended	John-Wiley India
2	A Textbook of Engineering Physics	Dr. M. N. Avdhanulu, Dr. P. G. Kshirsagar	Latest edition	S. Chand Publication.
3	Principles of Physics	David Halliday, Robert Resnick, Jearl Walker	10th Edition	John Wiley and Sons (2017)

Reference Books

S.N	Title	Authors	Edition	Publisher
1	Solid State Physics	Charles Kittel	Eighth edition	John Wiley & Sons, Inc
2	Solid State Physics	R.L. Singhal	Eighth edition	Kedarnath Ramnath
3	University Physics	Young and Freedman	Fifteenth edition	Pearson Education

Online Resources

1	https://www.britannica.com/science/semiconductor#ref233890
2	https://www.geeksforgoeks.org/semiconductors/
3	https://www.sciencedirect.com/topics/chemistry/magnetic-material

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SECOND SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24IT202T	Statistics and Probability	3	1	-	4	20	20	60	100

Course Objectives	Course Outcomes
<p>This course is intended</p> <ul style="list-style-type: none"> To inculcate and strengthen students with adequate knowledge of Statistics and Probability distributions 	<p>Students will be able to-</p> <ul style="list-style-type: none"> Apply numerical integration methods and find analytical solutions to difference equations. Identify, analyse and solve statistical problems. Describe the importance of probability theory in the field of engineering and prepare student to use it for analysis of data. Apply various concepts of joint distributions. Apply concept of probability distributions to engineering problems.

Unit I	[8hrs]
Finite Differences: Operator E and delta, Factorial Polynomial, Numerical integration: Trapezoidal rule, Simpson's 1/3 rule, Simpson's 3/8 rule, Difference equations with constant coefficients.	
Unit II	[8hrs]
Statistics: Fitting of straight line, parabola and exponential curves by method of least squares, Coefficient of correlation and lines of regressions, Rank correlation, and multiple regression.	
Unit III	[8hrs]
Probability: Random Variable: Discrete & Continuous random Variable, Probability function, Distribution function, Baye's rule, Mathematical expectations, Variance and Standard deviation.	
Unit IV	[8hrs]
Joint probability: Joint probability function of discrete random variable, Marginal probability function and Conditional distribution of discrete random variable, Mathematical expectation of discrete random variable, Variance and Standard deviation, and Covariance of joint distribution.	
Unit V	[8hrs]
Probability Distributions: Binomial Distribution, Poison's Distribution, Normal Distribution.	

Text Books

S.N	Title	Authors	Edition	Publisher
1	Higher Engineering Mathematics	B. S. Grewal	40 th	Khanna Publishers, New Delhi.
2	Higher Engineering Mathematics	H. K. Dass and Er. Rajnish Verma		S. Chand & Co. Pvt. Ltd., New Delhi.
3	Advanced Engineering Mathematics	Erwin Kreyszig		John Wiley & Sons, New York.

Reference Books

S.N	Title	Authors	Edition	Publisher
1	Higher Engineering Mathematics	B. V. Ramana		Tata McGraw-Hill Publications, New Delhi.
2	Advanced Engineering Mathematics	C. R. Wylie & L. C. Barrett		Tata McGraw-Hill Publications, New Delhi.
3	A Text Book of Engineering Mathematics	Peter O' Neil		Thomson Asia Pvt. Ltd., Singapore.
4	Schaum's Outline of Probability and Statistics	John J. Schiller, R. Alu Srinivasan and Murray R. Spiegel	4 th	McGraw-Hill Education.

Online Resources

1	https://onlinecourses.nptel.ac.in/noc21_ma74/preview
2	https://www.coursera.org/learn/probability-statistics

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SECOND SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24IT203T	Basics of Python Programming	3	-		3	20	20	60	100

Course Objectives	Course Outcomes
<p>This course is intended</p> <ul style="list-style-type: none">To Introduce Python programming language and its features.To provide exercises and projects to practice writing and using functions and modules.To teach manipulation techniques for lists, tuples, dictionaries, and sets.To introduce the concepts of object-oriented programming (OOP).	<p>Students will be able to-</p> <ul style="list-style-type: none">Develop problem-solving skills through hands-on programming exercises.Understand the concept of functions and their role in modular programming.Gain proficiency in using list comprehensions and other Pythonic techniques.Learn how to read from and write to files using Python.Understand the principles of object-oriented programming (OOP).

Unit I : Introduction to Python	[8Hrs]
Overview of Python programming language, setting up Python environment (interpreter, IDEs), Basic syntax and data types (numbers, strings, lists, tuples, dictionaries), Writing and executing Python scripts, Introduction to control structures (if, else, loops)	
Unit II: Functions and Modules	[8Hrs]
Introduction to functions, defining functions with parameters and return values, Scope and lifetime of variables, Built-in functions and modules, Creating and using user-defined modules.	
Unit III: Data Structures	[8Hrs]
Overview of data structures (lists, tuples, sets, dictionaries), Manipulating lists and tuples (slicing, indexing, built-in functions), Working with dictionaries (key-value pairs, methods), Introduction to list comprehensions, Basic operations on sets (union, Intersection, difference).	
Unit IV: File Handling and I/O Operations	[8Hrs]
Reading from and writing to files, File modes (read, write, append), Handling exceptions in file operations, Working with text and binary files, File handling context managers.	
Unit V: Introduction to Object-Oriented Programming (OOP)	[8Hrs]
Understanding OOP concepts (classes, objects, inheritance, polymorphism), Defining classes and objects in Python, Encapsulation, and abstraction, Implementing inheritance and polymorphism, Introduction to special methods (dunder methods).	

Text Books

Sr.No.	Title	Authors	Edition	Publisher
1	Python Crash Course	Eric Matthes	2 nd	No Strech Press
2	Python Programming: An Introduction to Computer Science	John Zelle	2 nd	Franklin, Beedle & Associates Inc
3	Problem Solving with Algorithms and Data Structures using Python	Bradley N. Miller and David L. Ranum	2 nd	Franklin, Beedle & Associates Inc

Reference Books

Sr.No.	Title	Authors	Edition	Publisher
1	Python Data Structures and Algorithms	Benjamin Baka	1 st	Packt
2	Think Python: How to Think Like a Computer Scientist	Allen B. Downe	1 st	O'Reilly Media
3	Introduction to Computation and Programming Using Python"	John V. Guttag	3 rd	MIT Press

Online Resources

1	https://www.w3schools.com/python/python_intro.asp
2	https://www.programiz.com/python-programming
3	https://www.python.org/
4	https://www.geeksforgeeks.org/python-programming-language/

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**SECOND SEMESTER**

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24IT203P	Basics of Python Programming Lab		-	2	1	-	25	25	50

Course Objectives	Course Outcomes
This course is intended <ul style="list-style-type: none">To Introduce Python programming language and its features.To provide exercises and projects to practice writing and using functions and modules.To teach manipulation techniques for lists, tuples, dictionaries, and sets.To introduce the concepts of object-oriented programming (OOP).	Students will be able to- <ul style="list-style-type: none">Develop problem-solving skills through hands-on programming exercises.Understand the concept of functions and their role in modular programming.Gain proficiency in using list comprehensions and other Pythonic techniques.Learn how to read from and write to files using Python.Understand the principles of object-oriented programming (OOP).

Practical No.	Practical based on
1	A. Setting up Python environment (installation of Python, IDE setup). B. Running Python scripts and exploring the Python interpreter.
2	Implement basic Python programs to demonstrate variables, data types, and arithmetic operations.
3	Writing functions to perform specific tasks (e.g., calculating factorial, finding prime numbers)
4	Implementing lists, tuples, dictionaries, and sets to store and manipulate data.
5	Passing arguments to functions and returning values.
6	Defining classes and creating objects to represent real-world entities.
7	Implementing class attributes, methods, and constructors.
8	Reading from and writing to text files using Python's file handling mechanisms.

Text Books

Sr.No.	Title	Authors	Edition	Publisher
1	Python Crash Course	Eric Matthes	2 nd	No Strech Press
2	Python Programming: An Introduction to Computer Science"	John Zelle	2 nd	Franklin, Beedle & Associates Inc
3	Problem Solving with Algorithms and Data Structures using Python	Bradley N. Miller and David L. Ranum	2 nd	Franklin, Beedle & Associates Inc

Reference Books

Sr.No	Title	Authors	Edition	Publisher
1	Python Data Structures and Algorithms	Benjamin Baka	1 st	Packt
2	Think Python: How to Think Like a Computer Scientist"	Allen B. Downe	1 st	O'Reilly Media
3	Introduction to Computation and Programming Using Python"	John V. Guttag	3 rd	MIT Press

Online Resources

1	https://www.w3schools.com/python/python_intro.asp
2	https://www.programiz.com/python-programming
3	https://www.python.org/
4	https://www.geeksforgeeks.org/python-programming-language/

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INFORMATION TECHNOLOGY

SECOND SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24IT204T	Digital Logic Design	3	1	-	4	20	20	60	100

Course Objectives	Course Outcomes
<p>This course is intended</p> <ul style="list-style-type: none"> To teach various number systems, binary codes and their applications To familiarize the students the importance of error detection and error correction codes. To inculcate concepts of K-MAP to simplify a Boolean expression To facilitate students in designing a logic circuit. 	<p>Students will be able to-</p> <ul style="list-style-type: none"> To perform arithmetic operations on various types of number system. Study different types of logic gates and properties of Boolean algebra To formulate Sum of Product and Product of Sum. Design combinational circuits such as adder, subtractor, multiplexers and de-multiplexers etc. Explain the concept of synchronous and asynchronous sequential circuits and apply the concepts of flip flops to design registers and counters.

Unit I : Number System: [8Hrs]

Binary numbers, Decimal numbers, hexadecimal numbers, octal numbers and number conversion, representation: signed magnitude, 1's complement and 2's complement representation Arithmetic operations.

Unit II: Boolean Algebra for logic circuits: [8Hrs]

Basic Logic variables and logic functions -NOT, AND, NOR, XOR, OR, XNOR, NAND, idealized logic gates and symbols, Truth tables, Basic theorems and properties of Boolean algebra, DeMorgan's rules,

Unit III: Logic Design Minimization Techniques: [8Hrs]

Logic minimization, representation of truth-table, simplification of logical functions, minimization of SOP and POS forms, don't care conditions, reduction techniques: k-maps up to 4 variables

Unit IV: Combinational Logic: [8Hrs]

Different types of Codes:- BCD, excess-3, Gray code, binary code and their conversion, BCD addition and subtraction circuits: - half-adder, full adder, half subtractor, full subtractor, Binary adder, binary subtractor, Decoders, Encoders, Multiplexers, and Demultiplexers.

Unit V: Sequential Logic Circuit Design: [8Hrs]

Combinational circuits and sequential circuits, flip-flop: SR, JK, D, T; master and slave flip flops, their truth tables and excitation tables, conversion from one type to another type of flip flop, application of flip-flops, Counters: asynchronous counter, synchronous counter.

Text Books

Sr.No.	Title	Authors	Edition	Publisher
1	Digital design	M.M. Mano	4th	Pearson Education
2	Modern Digital Electronics	R. P. Jain	3rd	Tata McGraw-Hill
3	Fundamentals of Digital Logic with VHDL Design	Stephen Brown, Zvonko Vranesic	2nd	McGraw-Hill

Reference Books

Sr.No.	Title	Authors	Edition	Publisher
1	Fundamentals of Logic Design	Roth	5th	Thomson
2	Switching and Logic Design	C. V. S. Rao	3rd	Pearson Education
3	Digital Principles and Design	Donald D. Givone	3rd	Tata McGraw Hill

Online Resources

1	https://www.geeksforgeeks.org/binary-decoder-in-digital-logic/
2	https://www.tutorialspoint.com/digital_circuits/digital_circuits_useful_resources.htm
3	https://www.javatpoint.com/boolean-algebra-in-digital-electronics

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**SECOND SEMESTER**

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24IT205P	Software Lab II	-	-	2	1	-	25	25	50

Course Objectives	Course Outcomes
This course is intended <ul style="list-style-type: none">To understand various UNIX utilities and shell scripting.	Students will be able to <ul style="list-style-type: none">Understand the basic UNIX process structure and the UNIX file system.Understand the roles of unix developers / systems programmersGood knowledge of simple UNIX filters.Familiar with pipes and redirection, imagine the UNIX environment

Expt. No.	Experiments based on
1	Creating files with VI editor.
2	Practical's based on basic UNIX commands
3	Practical's based on File Operations
4	Practical's based on Text Processing
5	Practical's based on Shell Scripting
6	Practical's based on Shell Variables and Environment
7	Practical's based on Regular Expressions
8	Practical's based on Networking

Text Books

Sr.No.	Title	Authors	Edition	Publisher
1	Unix in a Nutshell, 4th Edition	Arnold Robbins	1st	O'Reilly Media, Inc.

Online Resources

1	https://www.digitalocean.com/community/tutorials/linux-commands
2	https://afni.nimh.nih.gov/pub/dist/edu/data/CD.expanded/AFNI_data6/unix_tutorial/misc/unix_commands.html
3	https://www.digitalocean.com/community/tutorials/linux-commands

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INFORMATION TECHNOLOGY

SECOND SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24IT206P	Business Communication Skills II Lab	-	-	2	1	-	25	25	50

Course Objectives	Course Outcomes
<ul style="list-style-type: none">To empower students to develop a career-oriented mindset while harnessing the power of LSRW skills.	Students would be able to: <ul style="list-style-type: none">Participate in Group Discussions.Improve their reading and formal writing skills.Develop upon their listening skills to engage in meaningful conversations.Develop oratory skills to engage and inform audiences.Prepare themselves for participating in business meetings.

Practical No.	Practical based on
1	Group Discussion
2	Reading for Competitive Exams II
3	Listening Skills II
4	Presenting a TED Talk
5	Media Interaction
6	Business Correspondence II
7	Report Writing
8	Mock Meeting

Reference Books:

S. N	Title	Authors	Edition	Publisher
1.	Communication Skills for Engineers	C. Muralikrishna & Sunita Mishra	2nd Edition, 2011	Pearson India Education Services
2.	Communication Skills	Dr. L. Bisen, Dr. B. Agrawal & Dr. N. T. Kalyani	1st Edition, 2021	Himalaya Publishing House
3.	Barron's IELTS Superpack	Lin Lougheed	2012	Barrons Educational Series

Online Resources:

1	https://ieltsliz.com/
2	https://www.englishclub.com/business-english/
3	https://www.indiabix.com/verbal-ability/questions-and-answers/
4	https://prepinsta.com/interview-preparation/?utm_source=home+page&utm_medium=navigation

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SECOND SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24IT207T	Design Thinking	2	-	-	2	10	10	30	50

Course Objectives	Course Outcomes
<ul style="list-style-type: none">Learn design thinking concepts and principlesUse design thinking methods in every stage of the problemLearn the different phases of design thinkingApply various methods in design thinking to different problems	<ul style="list-style-type: none">Define key concepts of design thinkingPractice design thinking in all stages of problem solvingApply design thinking approach to real world problems

Unit I	[10 Hrs]
INTRODUCTION: Why Design? - Four Questions, Ten Tools - Principles of Design Thinking - The process of Design Thinking - How to plan a Design Thinking project. UNDERSTAND, OBSERVE AND DEFINE THE PROBLEM: Search field determination - Problem clarification - Understanding of the problem – Problem analysis- Reformulation of the problem - Observation Phase - Empathetic design - Tips for observing - Methods for Empathetic Design - Point-of-View Phase - Characterization of the target group - Description of customer needs.	
Unit II	[10 Hrs]
IDEATION AND PROTOTYPING: Ideate Phase - The creative process and creative principles - Creativity techniques - Evaluation of ideas - Prototype Phase – Lean Startup Method for Prototype Development - Visualization and presentation techniques.	
Unit III	[10 Hrs]
TESTING AND IMPLEMENTATION :Test Phase - Tips for interviews - Tips for surveys - Kano Model - Desirability Testing - How to conduct workshops – Requirements for the space - Material requirements - Agility for Design Thinking. FUTURE: Design Thinking meets the corporation – The New Social Contract –Design Activism – Designing tomorrow.	

Text Books

S.N	Title	Authors	Edition	Publisher
1.	Handbook of Design Thinking - Tips &Tools for how to design thinking	Christian Mueller-Roterberg	2021	Independently Published
2.	Change by Design: How Design Thinking Transforms Organizations and Inspires Innovation	Tim Brown	2019	HarperCollins

Reference Books

S.N	Title	Authors	Edition	Publisher
1.	Design Thinking for Strategic Innovation	Idris Mootee		Wiley

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MECHANICAL ENGINEERING

GROUP 2: SEMESTER I

SrNo	Course Category	Course Code	Course Title	Hours per Week			Credits	Maximum Marks				No of Hours for ESE
				L	T	P		Mid-Sem Examination	Continual Assessment	End Sem Examination	Total	
1	BSC	24ME101T	Applied Physics	2	-	-	2	10	10	30	50	1.5
2	BSC	24ME101P	Applied Physics Lab	-	-	2	1	-	25	25	50	-
3	BSC	24ME102T	Linear Algebra and Calculus	3	1	-	4	20	20	60	100	3
4	ESE	24ME103T	Engineering Graphics	3	-	-	3	20	20	60	100	3
5	ESE	24ME103P	Engineering Graphics Lab	-	-	2	1	-	25	25	50	-
6	PCC	24ME104T	Manufacturing Processes	3	-	-	3	20	20	60	100	3
7	PCC	24ME104P	Manufacturing Processes Lab	-	-	2	1	-	25	25	50	-
8	ESE	24ME105P	Logic Building with C	-	-	2	1	-	25	25	50	-
9	AEC	24ME106P	Business Communication Skills I Lab	-	-	2	1	-	25	25	50	-
10	ESC	24ME107T	Design Thinking	2	-	-	2	10	10	30	50	1.5
11	SEC	24ME141P	Career Development I	-	-	2	1	-	50	-	50	-
12	CC	24ME108T	Co-curricular Courses - I	2			2	-	50		50	-
Total				15	1	12	22	80	305	365	750	12

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MECHANICAL ENGINEERING

GROUP 2(CV,EE,ET,ME,II): SEMESTER II

Sr No	Course Category	Course Code	Course Title	Hours per Week			Credits	Maximum Marks				No of Hours for ESE
				L	T	P		Mid-Sem Examination	Continual Assessment	End Sem Examination	Total	
1	BSC	24ME201T	Applied Chemistry	2	0	-	2	10	10	30	50	1.5
2	BSC	24ME201P	Applied Chemistry Lab	-	-	2	1	-	25	25	50	-
3	BSC	24ME202T	Statistics & Transform	3	1	-	4	20	20	60	100	3
4	ESE	24ME203T	Engineering Mechanics	3	-	-	3	20	20	60	100	3
5	ESE	24ME203P	Engineering Mechanics Lab	-	-	2	1	-	25	25	50	-
6	ESE	24ME204T	Basics of Electrical & Electronics Engineering	3	-	-	3	20	20	60	100	3
7	ESE	24ME204P	Basics of Electrical & Electronics Engineering Lab	-	-	2	1	-	25	25	50	-
8	ESE	24ME205P	Problem Solving with Python Lab	-	-	2	1	-	25	25	50	-
9	AEC	24ME206P	Business Communication Skills – II Lab	-	-	2	1	-	25	25	50	-
10	IKS	24ME207T	Indian Knowledge System	2	-	-	2	10	10	30	50	-
11	SEC	24ME241P	Career Development – II	-	-	2	1	-	50	-	50	-
12	CC	24ME208T	Co-Curricular Courses – II	2			2	-	50	-	50	-
Total				15	1	12	22	80	305	365	750	10.5

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ARISE & SHINE

FIRST SEMESTER (ME)

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24ME101T	Applied Physics	2	--	--	2	10	10	30	50

Course Objectives	Course Outcomes
This course is intended <ul style="list-style-type: none"> To understand the basic laws of physics and their application in engineering and technology. To develop scientific temper and analytical capability. 	Students will be able to <ul style="list-style-type: none"> Explain the structure of Crystals. Understand the types and applications of Magnetic Materials. Distinguish the types of solids on the basis of conductivity and acquire a brief idea about semiconductors and its applications

Unit I CRYSTAL STRUCTURE	[10 Hrs]
Space lattice, Crystal structure, Unit cell, Types of unit cell, Characteristics of SC, BCC and FCC unit cell, Miller Indices, Interplanar distance and its derivation, Diffraction of X-rays - Braggs' Law and its applications.	
Unit II MAGNETIC MATERIALS	[08 Hrs]
Terms and definitions, Types of magnetic materials, characteristics of Diamagnetic, Paramagnetic and Ferromagnetic Materials, Applications of soft and hard magnetic materials.	
Unit III SEMICONDUCTORS	[08 Hrs]
Free electron Theory (qualitative idea) and its features; Idea of band formation in solids, Classification of solids: Metal, Insulator, Semiconductor; Fermi Energy, Types - Intrinsic and Extrinsic Semiconductors, Application of Extrinsic Semiconductors - p-n junction diode	

Text Books

S.N	Title	Authors	Edition	Publisher
1	Fundamentals of Physics	David Halliday, Robert Resnick and Jerle Walker	8 th extended	John-Wiley India
2	Electronic Engineering Materials and Devices	John Allision	10 th edition reprint	TMH
3	Engineering Physics	M. N. Avadhanulu	Latest edition	S. Chand & Co.

Reference Books

S.N	Title	Authors	Edition	Publisher
1	Solid State Physics	Charles Kittel	Eighth edition	John Wiley & Sons, Inc
2	Solid State Physics	R.L. Singhal	Eighth edition	Kedarnath Ramnath
3	Quantum Mechanics	Schiff	First Edition	McGraw-Hill Book Company, Inc.

Online Resources

1	https://www.britannica.com/science/semiconductor#ref233890
2	https://www.geeksforgoeks.org/semiconductors/
3	https://www.sciencedirect.com/topics/chemistry/magnetic-material
4	https://www.livescience.com/33816-quantum-mechanics-explanation.html

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ARISE & SHINE

FIRST SEMESTER (ME)

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24ME101P	Applied Physics Lab	--	--	2	1	-	25	25	50

Course Objectives	Course Outcomes
This course is intended <ul style="list-style-type: none"> To understand the basic laws of physics and their application in engineering and technology. To develop scientific temper and analytical capability. 	Students will be able to <ul style="list-style-type: none"> Verify principles/laws by selecting and using proper measuring instruments, interpret result and draw conclusions. Find various parameters using various properties of light. Apply the concepts of Semiconductors and Magnetic Materials.

Expt. No.	Title of the experiment
1	Study of semiconductor diodes
2	Study of Phenomenon of Diffraction
3	Study of Interference
4	Study of Birefringence
5	Guoy's Balance Method a) Determination of Magnetic Susceptibility of different magnetic materials. b) Identification of different types of Magnetic Materials
6	Study of Planck's Constant by means of LED
7	Determination of Curie Temperature of Ferromagnetic Material.
8	Study of Transistors.
9	Study of Hall Effect.
10	Experiment on 'Quantum Eraser'.
11	Demonstration of phenomena of Optics using Laser.

Text Books

S.N	Title	Authors	Edition	Publisher
1	Fundamentals of Physics	David Halliday, Robert Resnick and Jerle Walker	8e extended	John-Wiley India
2	A Textbook of Engineering Physics	Dr. M. N. Avadhanulu, Dr. P. G. Kshirsagar	Latest edition	S. Chand Publication.
3	Principles of Physics	David Halliday, Robert Resnick, Jearl Walker	10th Edition	John Wiley and Sons (2017)

Reference Books

S.N	Title	Authors	Edition	Publisher
1	Solid State Physics	Charles Kittel	Eighth edition	John Wiley & Sons, Inc
2	Solid State Physics	R.L. Singhal	Eighth edition	Kedarnath Ramnath
3	University Physics	Young and Freedman	Fifteenth edition	Pearson Education

Online Resources

1	https://www.britannica.com/science/semiconductor#ref233890
2	https://www.geeksforgeeks.org/semiconductors/
3	https://www.sciencedirect.com/topics/chemistry/magnetic-material

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FIRST SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24ME102T	Linear Algebra and Calculus	3	1	-	4	20	20	60	100

Course Objectives	Course Outcomes
<ul style="list-style-type: none"> The goal of this paper is to introduce advanced concepts of <ol style="list-style-type: none"> Matrix Algebra Multivariate Calculus Differential Equations Vector calculus 	<ul style="list-style-type: none"> Solve the system of linear equations using matrices. Identify engineering problems related to Matrices: Eigen value & Eigen vectors & Functions of Matrices. Understand the concept of multivariate calculus & apply the knowledge of applications of differentiation. Solve first order and higher order differential equations by various methods and apply these techniques to solve problems in engineering. Implement concept of vector calculus to solve engineering problems.
Unit I	[8Hrs]
Matrix Algebra: Introduction to matrices, Rank of a matrix, Consistency of system of linear equations, Linear and orthogonal transformations, Linear dependence of vectors.	
Unit II	[8Hrs]
Matrices: Characteristics equation, Cayley- Hamilton Theorem, Eigen values and Eigen vectors, Reduction to diagonal form, Reduction of quadratic form to canonical form by orthogonal transformation, Sylvester's theorem.	
Unit III	[8Hrs]
Multivariate Calculus: Functions of several variables and their partial derivatives, Chain rule and total differential coefficient, Jacobians and its properties, Maxima –Minima of functions of two variables, Lagrange's method of undetermined multipliers.	
Unit IV	[8Hrs]
Differential Equations: First order and first degree differential equations: Linear, Higher order differential equations with constant coefficients, Method of variation of parameters, Cauchy's homogeneous linear equation, Applications of differential equations.	
Unit V	[8Hrs]
Vector Calculus: Vector differentiation, Gradient, Directional derivatives, Divergence and Curl with their physical interpretation Solenoidal and irrotational motions, Scalar potential, Line integral & Work done.	

Text Books

S.N	Title	Authors	Edition	Publisher
1	Higher Engineering Mathematics	B. S. Grewal		Khanna Publishers, New Delhi.
2	A Text Book of Applied Mathematics (Vol I & II)	P. N. Wartikar and J. N. Wartikar		Pune Vidyarthi Griha Prakashan, Pune
3	Higher Engineering Mathematics	H. K. Das and Er. Rajnish Verma		S. Chand & CO. Pvt. Ltd., New Delhi

Reference Books

S.N	Title	Authors	Edition	Publisher
1	Higher Engineering Mathematics	B.V. Ramana,	11th reprint, 2010.	Tata McGraw Hill New Delhi
2	A Text Book of Engineering Mathematics	Peter O' Neil		Thomson Asia Pvt. Ltd., Singapore.
3	Advanced Engineering Mathematics	Erwin Kreyszig		John Wiley & Sons, New York.

Online Resources

1	https://archive.nptel.ac.in/courses/111/101/111101115/#
2	https://www.coursera.org/learn/matrix-algebra-engineers

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MECHANICAL ENGINEERING

ARISE & SHINE

FIRST SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24ME103T	Engineering Graphics	3	-	-	3	20	20	60	100

Course Objectives	Course Outcomes
<ul style="list-style-type: none"> To expose the students to the area of Engineering Graphics. To enable the student to communicate effectively through technical drawings. 	<p>Students will be able to</p> <ul style="list-style-type: none"> Recognize the application of drawing standards, construct engineering curves and orthographic projections of lines. Construct orthographic projections of Planes and solids. Apply concepts of orthographic projections to construct the Development of Lateral surfaces of sections of solids. Apply concepts of projections and convert pictorial views to orthographic views. Apply concepts of projections and construct isometric views.

Unit I	[8Hrs]
Introduction to Engineering Graphics: Types of lines, standard layout, Lettering, Standard representation of dimensions.	
Types of Curves - Ellipse, Parabola, Hyperbola, Cycloid, involute and Spiral. Construction of Ellipse (Arcs of circles method), Parabola (Rectangle Method) and Hyperbola (Rectangle Method)	
Introduction to Orthographic projections- Projection of Points and Lines in the first quadrant. [Problem-solving on lines inclined to one reference plane].	
Unit II	[8Hrs]
Projection of Planes- Projection of planes in the first quadrant. Problem-solving on planes inclined to one reference plane.	
Projection of Solids- Projection of solids in the first quadrant. Problem-solving for the solids with an axis inclined to one reference plane.	
Unit III	[8Hrs]
Development of lateral Surfaces for Section of solids: Introduction to Sectional Planes, Section of solids, Method of development, Development of lateral surfaces of right solids including Prisms, Cylinders, Pyramids & Cone cut by different section planes.	
Unit IV	[8Hrs]
Introduction to Orthographic drawings: Conversion of Pictorial / Isometric drawings of machine components to Orthographic drawings.	
Unit V	[8Hrs]
Introduction to Isometric drawings: Isometric concepts of Isometric axes, Isolines, Isometric scale, Isometric projection and Isometric view. Construction of Isometric drawings and views from a given orthographic view.	

Text Books

S.N	Title	Authors	Edition	Publisher
1.	Engineering Drawing	N. D. Bhatt	-	Charotar Publishing House
2.	Engineering Drawing	D. N. Johle	-	Tata McGraw-Hill Publishing

Reference Books

S.N	Title	Authors	Edition	Publisher
1.	Fundamentals of Engineering Drawing	Luzadder Warren J, Duff John		PHI publications

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ARISE & SHINE

FIRST SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24ME103P	Engineering Graphics Lab	-	-	2	1	-	25	25	50

Course Objectives	Course Outcomes
<ul style="list-style-type: none"> To expose the students to the area of Engineering Graphics. To enable the student to communicate effectively through technical drawings. 	Students will be able to <ul style="list-style-type: none"> Apply engineering drawing standards and construct engineering curves and orthographic projections of lines. Construct orthographic projections of Planes and solids. Apply orthographic projection concepts to construct the Development of Lateral surfaces of sections of solids. Apply concepts of projections and convert pictorial views to orthographic views through pencil drawings and CAD. Apply concepts of projections and construct isometric views through pencil drawings and CAD.

A minimum of eight experiments to be performed

Expt. No.	Title of the experiment
1	Pencil drawings on Engineering Curves
2	Pencil drawings on Projection of Lines
3	Pencil drawings on Projection of Planes
4	Pencil drawings on Projection of Solids
5	Pencil drawings on the Development of Lateral surfaces
6	Pencil drawings on Orthographic Views
7	Pencil drawings on Isometric Views / Projection
8	Computer-Aided Drawing on Orthographic Views
9	Computer-Aided Drawing on Isometric Views

Text Books

S.N	Title	Authors	Edition	Publisher
1.	Engineering Drawing	N. D. Bhatt	-	Charotar Publishing House
2.	Engineering Drawing	D. N. Johle	-	Tata McGraw-Hill Publishing

Reference Books

S.N	Title	Authors	Edition	Publisher
1.	Fundamentals of Engineering Drawing	Luzadder Warren J, Duff John		PHI publications

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MECHANICAL ENGINEERING

FIRST SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24ME104T	Manufacturing Processes	3	-	-	3	20	20	60	100

Course Objectives	Course Outcomes
<p>1. This course is designed to provide students with an overview of a wide variety of manufacturing processes for processing of engineering materials.</p> <p>2. Students will learn principles, operations and capabilities of various moulding, metal casting, metal joining processes</p> <p>3. In this course, students shall understand the importance of manufacturing processes and be able to select and apply suitable processes for an engineering product.</p>	<p>1. Describe principles, operations and capabilities of various moulding, metal casting processes.</p> <p>2. Select appropriate welding or allied process & set correct welding parameters for the given components. Identify welding defect & correct the required parameter.</p> <p>3. Identify various rolling & forging processes as per applications.</p> <p>4. Describe principles, operations and capabilities of various presses and dies.</p> <p>5. Illustrate appropriate process for the manufacture of the given plastic components.</p>

Unit I	[8Hrs]
Pattern Making & Moulding: - Pattern making: Types, materials used, Pattern making allowances, color codes. Core making: - Types, core material & its properties. Moulding: Types of sand moulds, moulding sand composition. moulding sand properties, moulding machines. Shell moulding, Gating System & Casting Processes: - Elements of gating systems, Melting furnaces -Types, Electric furnace, Cupola construction & operation. Special casting processes such as investment Casting, Centrifugal Casting, Die Casting	
Unit II	[8Hrs]
Joining Processes: - Introduction to metal Joining- Types of Welding. Arc Welding & Gas Welding Processes, Defects & Inspection of Welding Joints, Electrodes, weldability of Metals, Welding equipments. Fixtures, TIG Welding, MIG Welding, Spot Welding Soldering and brazing, Thermit welding.	
Unit III	[8Hrs]
Forming Process for metals:- Rolling, Forging, Extrusion, Drawing, Mechanics of forming process, Types of rolling mills, Forging equipment, Extrusion processes and various drawing operations.	
Unit IV	[8Hrs]
Sheet Metal Working: Introduction, Punches and dies, sheet metal working operations: piercing and punching, blanking, notching, beading, perforating, slitting, lancing, mechanism of blanking, drawing, coining, embossing, wire drawing, metal spinning operations, bending, forming and drawing.	
Unit V	[8Hrs]
Processing of Plastic: Introduction, general properties and applications, types of plastic, thermosetting plastic, thermo-plastic plastics. Methods of processing plastics: compression molding, injection molding, extrusion, Calendaring, wire drawing.	

Text Books

S.N	Title	Authors	Edition	Publisher
1.	Manufacturing technology (Vol. I)	P. N. Rao,		Tata Mc-Graw Hill
2.	Manufacturing Engineering & Technology	Kalpakjian		Pearson
3.	Modern Materials and Manufacturing Process,	R. Gregg Bruce, John E. Neely		Pearson Education
4	Workshop Technology Volume I	S.K.Hajra Chaudhary, A.K.Hajra Chaudhary		Media Promoters & Publishers Pvt Ltd,.
5	Workshop Technology Volume I	B.S.Raghuwanshi		Dhanpat Rai & Co.
6	Workshop Practice	H.S.Bawa		Mc Graw Hill

Reference Books

S.N	Title	Authors	Edition	Publisher
1.	Manufacturing Science,	Ghosh & Malik,		East West Press.
2.	Processes & Materials of Manufacturing,	R. Lindberg, Allyn & Bacon.		

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ARISE & SHINE

FIRST SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24ME104P	Manufacturing Processes Lab	-	-	2	1	-	25	25	50

Course Objectives	Course Outcomes
1. To understand and demonstrate the basic principle of manufacturing processes 2. To understand and describe casting ,joining and forming processes 3.To demonstrate the skills for pattern making,casting and welding.	1. Performing various tests on the moulding sand sample such as compressive strength testing, permeability test,moisture testing etc. 2. To know the properties of the moulding sand. 3.Pattern making from the given component drawing Or component. 4. Making complete mould from various types of patterns like single piece, split,etc. 5. Preparing edges for joining thick plates by M.I.G welding,setting welding parameters such as current, inert gas pressure & job setting. 6. Demonstrate how to melt metal in the furnace & pour the molten metal in the mould.

Minimum 8 experiments to be performed

Expt. No.	Title of the experiment
1	Performance of Moulding techniques (Sand Testing)
2	Study of Casting process and Preparation of green sand Moulds (Min two jobs)
3	Study of cupola furnace
4	Preparation of Single piece Pattern (one job)
5	Demonstration and preparation of welding joint with GMAW (one job)
6	Demonstration of Casting process

Text Books

S.N	Title	Authors	Edition	Publisher
1.	Manufacturing technology (Vol. I)	P. N. Rao,		Tata Mc-Graw Hill
2.	Manufacturing Engineering & Technology	Kalpakjian		Pearson
3	Modern Materials and Manufacturing Process,	S. Gregg Bruce, John E. Neely		Pearson Education

Reference Books

S.N	Title	Authors	Edition	Publisher
	Manufacturing Science,	Ghosh & Malik,		East West Press.
	Processes & Materials of Manufacturing,	R. Lindberg, Allyn & Bacon.		

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Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24ME105P	Logic Building With C Lab	-	-	2	1	-	25	25	50

Course Objectives	Course Outcomes
This course is intended <ul style="list-style-type: none"> To make the students learn a programming language. To learn problem solving techniques. To teach the student to write C programs and to solve the problems. 	Student will able to <ul style="list-style-type: none"> Understand the fundamentals of C Programs. Implement branching control structures. Implement loop control structures. Analyse and develop problem solving logic. Analyse and design problems.

Expt. No.	Title
1	To implement operators and variables.
2	To implementsimple If and If-else statement.
3	To implement If-else if ladder and nested If control structures.
4	To implement Switch-case statement.
5	To implement While loop structure.
6	To implement Do-while loop structure.
7	To implement for loop structure.
8	To implement Nested loops, break and continue statement.

Text Books

S. N	Title	Authors	Edition	Publisher
1	Programming in ANSI C	E. Balguruswamy	2 nd	Tata Mc-Graw Hill
2	Programming Techniques Through 'C'	M. G. Venkateshmurthy	2 nd	Pearson
3	Let Us 'C'	Yashwant P. Kanetkar	1 st	BPB
4	Programming With C	Byron S. Gottfried	2 nd	Schaum Series
5	How to solve it by Computer	R. G. Dromey	1 st	Pearson Education

Reference Books

S. N	Title	Authors	Edition	Publisher
1	The Complete Reference C	Herbert Schildt	4 th	Tata Mc-Graw Hill
2	The 'C' programming language	Kernighan and Ritchie	1 st	Prentice Hall
3	Programming and Problem Solving	M. Sprankle	2 nd	Pearson Education

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FIRST SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24ME106P	Business Communication Skills I Lab	-	-	2	1	-	25	25	50

Course Objectives	Course Outcomes
To empower students to develop a career oriented mindset while harnessing the power of LSRW skills.	Students will be able to: <ol style="list-style-type: none"> 1. apply verbal and non-verbal skills to confidently and effectively deliver presentations. 2. prepare themselves for overall language ability through listening and reading tasks. 3. demonstrate formal writing skills. 4. draft impactful Resumes and Cover Letters. 5. prepare themselves for Personal Interviews.

Expt. No.	Title of the experiment
1	Presentation Skills
2	Poster Making (Product/ Event)
3	Reading Comprehension for Competitive Exams.
4	Writing Skills for Academic Purposes.
5	Listening Skills I
6	Business Correspondence I
7	Resume Writing and Cover Letter
8	Mock Interviews

Reference Books

S. N	Title	Authors	Edition	Publisher
1	Communication Skills for Engineers	C. Muralikrishna & Sunita Mishra	2nd Edition, 2011	Pearson India Education Services
2	Communication Skills	Dr. L. Bisen, Dr. B. Agrawal & Dr. N. T. Kalyani	1st Edition, 2021	Himalaya Publishing House
3	Barron's IELTS Superpack	Lin Lougheed	2012	Barrons Educational Series

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FIRST SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24ME107T	Design Thinking	2	-	-	2	10	10	30	50

Course Objectives	Course Outcomes
<ol style="list-style-type: none"> Learn design thinking concepts and principles Use design thinking methods in every stage of the problem Learn the different phases of design thinking Apply various methods in design thinking to different problems 	<ol style="list-style-type: none"> Define key concepts of design thinking Practice design thinking in all stages of problem solving Apply design thinking approach to real world problems

Unit I	[10 Hrs]
<p>INTRODUCTION: Why Design? - Four Questions, Ten Tools - Principles of Design Thinking - The process of Design Thinking - How to plan a Design Thinking project.</p> <p>UNDERSTAND, OBSERVE AND DEFINE THE PROBLEM: Search field determination - Problem clarification - Understanding of the problem – Problem analysis- Reformulation of the problem - Observation Phase - Empathetic design - Tips for observing - Methods for Empathetic Design - Point-of-View Phase - Characterization of the target group - Description of customer needs.</p>	
Unit II	[10 Hrs]
<p>IDEATION AND PROTOTYPING: Ideate Phase - The creative process and creative principles - Creativity techniques - Evaluation of ideas - Prototype Phase - Lean Startup Method for Prototype Development - Visualization and presentation techniques.</p>	
Unit III	[10 Hrs]
<p>TESTING AND IMPLEMENTATION : Test Phase - Tips for interviews - Tips for surveys - Kano Model - Desirability Testing - How to conduct workshops - Requirements for the space - Material requirements - Agility for Design Thinking.</p> <p>FUTURE: Design Thinking meets the corporation – The New Social Contract – Design Activism – Designing tomorrow.</p>	

Text Books

S.N	Title	Authors	Edition	Publisher
1.	Handbook of Design Thinking - Tips & Tools for how to design thinking	Christian Mueller-Roterberg	2021	Independently Published
2.	Change by Design: How Design Thinking Transforms Organizations and Inspires Innovation	Tim Brown	2019	HarperCollins

Reference Books

S.N	Title	Authors	Edition	Publisher
1.	Design Thinking for Strategic Innovation	Idris Mootee		Wiley

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ARISE & SHINE

Group II : SEMESTER II

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24ME201T	Applied Chemistry	2	-	-	2				
						10	10	30	50

Course Objectives	Course Outcomes
<p>This course is intended</p> <ol style="list-style-type: none"> To acquaint the students with the basic phenomenon, concepts, knowledge and understanding of the fundamental principles of chemistry. To develop necessary skills and abilities to succeed in engineering education, research, Industry, environment and social context. 	<p>Students will be able to</p> <ul style="list-style-type: none"> Analyse and Compare parameter necessary for various treatment of water. Apply the Basic concepts of Electrochemistry in protection of engineering material Apply the principles of green Chemistry for sustainable development and analyse the impact of industrial pollution and its control.

Unit I Water Technology- [9 Hrs]
Hardness of water, Numericals on Hardness, Industrial water treatment- Boiler Troubles- Carry over, Caustic embrittlement, Boiler corrosion, Scale & Sludge formation External treatments - Softening of water by Zeolite process and De-mineralization process, Numericals on Zeolite process. Desalination of sea water- Electro dialysis and Reverse Osmosis process-Principle, methods and advantages
Unit II Electrochemical Phenomenon & Corrosion [9 Hrs]
Introduction- brief idea about electrochemical & galvanic series; Electrolytic & Electrochemical Cell; Construction, working & Advantages of Li Ion Battery, Fuel Cell, Photochemical Cell. Corrosion- Introduction, Factors affecting corrosion, Types of corrosion, Corrosion prevention- Material & Design selection & Cathodic protection
Unit III Green Chemistry & Waste Management- [8 Hrs]
Green Chemistry- Introduction, Principles of Green Chemistry with example, Green Reagents- Super Critical Fluid (CO ₂)- Properties and Applications, Green Crackers- Introduction, Advantages, Bio Catalysis- Definition and examples. Carbon Credit, Carbon Sequestration Waste Management- Solid, Nuclear & e-waste: Sources, Impact & its control

Text Books

S.N	Title	Authors	Edition	Publisher
1	Text Book of Engineering Chemistry	S.S. Dara,	New	S. Chand and Company Ltd. New Delhi.
2	Textbook of Engineering Chemistry	P.C. Jain and Monica Jain	Sixth	Dhanpat Rai and Sons, New Delhi.
3	E-waste Recycling and Management	Anish Khan, Inamuddin, Abdullah M. Ansiri	Ist	Springer

Reference Books

S.N	Title	Authors	Edition	Publisher
1	A Text book of Engineering Chemistry	Shashi Chawla	Ist	DhanpatRai& Sons, New Delhi
2	Applied Chemistry	N. Krishnamurthy:P. Vallinavagam. And K. Jeysubramanian	Ist	TMH
3	Environmental Chemistry	B. K. Sharma	Ist	Krishna Prakashan Media (P) Ltd.

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GROUP II : SEMESTER II

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24ME201P	Applied Chemistry Lab	-	-	2	1	-	25	25	50

Course Objectives	Course Outcomes
1. To Make the students aware about various techniques available for Analysis of Material. 2. To Impart the skill of handling chemicals and apparatus.	<ul style="list-style-type: none"> List the proper procedures and regulations for safe handling and use of chemicals and can follow the proper procedures and regulations for safe handling when using different instruments. Demonstrate the use of modern instrumentation, classical techniques, and properly record the results of their experiment. Identify and solve chemical problems and explore new areas of research especially in fuel and lubricants.

Expt. No.	Experiments based on Performance - Any FOUR
1	Determination of Hardness (Total, Permanent & Temporary) of Water Sample by Complexometric method
2	Determination of heavy metal from industrial effluent by colorimeter
3	Determination of Flash point by using Cleveland Open cup flash point apparatus / Abel's Close cup apparatus / Pensky Marten close cup apparatus
4	Determination of viscosity of lubricating oil at different temperature by Redwood Viscometer No.1 OR No. 2
5	Proximate analysis of coal -Determination of % of Moisture, Volatile Matter and Ash in coal sample
Demonstration - Any ONE	
1	Measurement of pH of sample from different sources by Digital pH Meter.
2	Determination of turbidity from industrial effluent.
Virtual Experiment - Any ONE	
1	Determination of Alkalinity of Water Sample.
5	Estimation of DO content of Water sample.
Activity - Any ONE	
1	Study of nearby industrial chemicals and safety measures.
2	Study of Air /Water Pollution Level at different Sites in Nagpur City.
3	Visit to Water Treatment Plant/Effluent Treatment Plant

Text Books

S.N	Title	Authors	Edition	Publisher
1	A Textbook on experiment and calculation in engineering chemistry	S.S. Dara	9th	S.Chand

Reference Books

S.N	Title	Authors	Edition	Publisher
1	Applied Chemistry theory and practical	O.P. Virmani and A.K. Narular	1st	New Age International
2	Laboratory Manual on Engineering Chemistry	Dr. Subdharani	1st	Dhanpat Rai Publishing

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GROUP II: SEMESTER II

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24ME202T	Statistics & Transform	3	1	-	4	20	20	60	100

Course Objectives	Course Outcomes
<p>To inculcate and strengthen students with adequate knowledge of</p> <ol style="list-style-type: none"> Statistics Integral Transforms 	<p>Students will be able to:</p> <ul style="list-style-type: none"> Apply numerical integration methods and find analytical solutions to difference equations. Identify, analyse and solve statistical problems. Identify and solve practical problems by using Laplace Transforms. Solve and analyze practical problems with their physical and graphical interpretation by using Laplace Transforms. Apply Fourier Transform to analyse input-output relationships of signals.

Unit I	[8hrs]
Finite Differences: Operator E and delta, Factorial Polynomial, Numerical integration: Trapezoidal rule, Simpson's 1/3 rule, Simpson's 3/8 rule, Difference equations with constant coefficients.	
Unit II	[8hrs]
Statistics: Fitting of straight line, parabola and exponential curves by method of least squares, Coefficient of correlation and lines of regressions, Rank correlation, multiple regression.	
Unit III	[8hrs]
Laplace Transform –I : Definition, properties, Evaluation of Integrals by Laplace Transform.	
Unit IV	[8hrs]
Laplace Transform –II : Inverse Laplace Transform and its properties, Convolution theorem(Statement only), Unit Step Function, Periodic function, Applications of Laplace Transform.	
Unit V	[8hrs]
Fourier Transform and Fourier Transform: Introduction to Fourier series , Concept of even and odd function , Definition, properties, Fourier Integral Theorem, Relation with Laplace Transform, Applications of Fourier Transform.	

Text Books

S.N	Title	Authors	Edition	Publisher
1	Higher Engineering Mathematics	B. S. Grewal	40 th	Khanna Publishers, New Delhi.
2	Higher Engineering Mathematics	H. K. Dass and Er. Rajnish Verma		S. Chand & Co. Pvt. Ltd., New Delhi.
3	Advanced Engineering Mathematics	Erwin Kreyszig		John Wiley & Sons, New York.

Reference Books

S.N	Title	Authors	Edition	Publisher
1	Higher Engineering Mathematics	B. V. Ramana		Tata McGraw-Hill Publications, New Delhi.
2	Advanced Engineering Mathematics	C. R. Wylie & L. C. Barrett		Tata McGraw-Hill Publications, New Delhi.
3	A Text Book of Engineering Mathematics	Peter O' Neil		Thomson Asia Pvt. Ltd., Singapore.
4	A Text Book of applied Mathematics- Volume -II	P.N. Wartikar & J.N. Wartikar		Poona Vidyarthi Griha Prakashan

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Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24ME203T	Engineering Mechanics	3	-	-	3	20	20	60	100

Course Objectives	Course Outcomes
To develop the capacity to predict the effects of force while carrying out the creative design functions of engineering. Familiarize the concept of equilibrium and friction. Study and analyze motion of moving particles/bodies	<ul style="list-style-type: none"> Categorize and solve various force systems. Analyze for equilibrium and equivalent force system Illustrate Center of Gravity and Moment of Inertia for various lamina. Correlate to specific type of friction and estimate required force to overcome friction Establish relation between velocity and acceleration of a particle and analyze the motion by plotting the relation Illustrate different types of motions and establish Kinematic relations for a rigid body and explain the concept of virtual work

Unit I	[8Hrs]
Fundamentals of Engineering Mechanics: Fundamental laws of mechanics, Principle of transmissibility, System of forces, Resultant force, Resolution of force, Moment and Couples, Varignon's theorem, Resolution of a force into a force and a couple, Free body diagram, Equilibrium, Conditions for equilibrium, Lami's theorem.	
Unit II	[8Hrs]
Centroid and Centre of Gravity: Centroid of simple figures from first principle, centroid of composite sections, Centre of Gravity and its implications. Moment of Inertia: Moment of Inertia of plane sections from first principles, Moment of inertia of standard sections and composite sections	
Unit III	[8Hrs]
Friction: Types of Friction, Laws of friction, Angle of friction, Angle of repose, Ladder, Wedge, Belt Friction. Lifting machines: Mechanical advantage, Velocity Ratio, Efficiency of machine, Ideal machine, Ideal effort and ideal load, Reversibility of machine, Law of machine, Lifting machines	
Unit IV	[8Hrs]
Kinematics and Kinetics of Particles: Equations of motion – Rectilinear motion, curvilinear motion, relative motion, D'Alembert's principle, work-Energy equation – conservative forces and principle of conservation of energy, Impulse – momentum	
Unit V	[8Hrs]
Kinetics of Rigid Bodies: Introduction to Kinetics of Rigid Bodies, Basic terms, general principles in dynamics; D'Alembert's principle and its applications in plane motion and connected bodies; Work energy principle and its application in plane motion of connected bodies; Virtual Work and Energy Method: Virtual displacements, principle of virtual work for particle and ideal system of rigid bodies, Applications of energy method for equilibrium, Stability of equilibrium.	

Text Books

S.N	Title	Authors	Edition	Publisher
1.	Engineering Mechanics (In SI Units)	S. Timoshenko, D.H. Young, J.V. Rao and Sukumar Pati	2017, 5 th edition	McGraw Hill Publishers
2	Engineering Mechanics	K.L Kumar		Tata McGrawHill

Reference Books

S.N	Title	Authors	Edition	Publisher
1.	Engineering Mechanics	F.L. Singer		Harper & Raw Publication
2.	Engineering Mechanics	A K Tayal		Umesh Publication

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Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24ME203P	Engineering Mechanics Lab	-	-	2	1	-	25	25	50

Course Objectives	Course Outcomes
To understand and apply the concepts of planar force system, structures and simple lifting machines	1. Apply the basic concepts of applied mechanics for solution of problems on planar force system. 2. Analyze pin jointed truss frame structure and beam structure analytically and graphically. 3. Evaluate the dynamic variables of kinetics of particles and simple lifting machine

Minimum 8 experiments to be performed

Expt. No.	Title of the experiment
1	Experimental determination of support reactions of a Simply Supported Beam experimentally and analytically.
2	Determination of forces in the members of a Jib Crane Apparatus experimentally and graphically.
3	Determination of coefficient of friction between two surfaces of different material on Plane Friction Apparatus.
4	Determination of coefficient of friction of Coil Friction Apparatus.
5	Determination of forces in members of a Shear Leg Apparatus experimentally and manually.
6	Determination of mass moment of inertia of a fly wheel using Fly Wheel Apparatus
7	Determination of efficiency and law of machine of Differential Axle & Wheel machine.
8	Determination of efficiency and Law of machine of Single Purchase Crab machine.
9	Determination of efficiency and Law of machine of Double Purchase Crab machine.
10	Determination of support reactions of a simply supported beam using graphical method and hand calculation.

Text Books

S.N	Title	Authors	Edition	Publisher
01	Engineering Mechanics Practical	A K Sharma	2009	Laxmi Publications
02	Engineering Mechanics	F.L. Singer		Harper & Raw Publication

Reference Books

S.N	Title	Authors	Edition	Publisher
01	Engineering Mechanics (In SI Units)	S. Timoshenko, D.H.Young, J.V. Rao and Sukumar Pati	2017, 5th edition	McGraw Hill Publishers

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MECHANICAL ENGINEERING

ARISE & SHINE

SECOND SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24ME204T	Basic of Electrical and Electronics	3	-	-	3	20	20	60	100

Course Objectives	Course Outcomes
<ol style="list-style-type: none"> To understand the basic concepts of DC and magnetic Circuits To understand the basic concepts of single phase and three phase ac circuit To understand the basic concepts of different Electrical Machines To understand the basic concepts of different semiconductor devices. To understand the basic concepts of Sensors, Transducers and Communication Signals. 	<p>Students will be able to</p> <ul style="list-style-type: none"> Analyze the DC & magnetic circuits using basic laws and theorems. Inculcate the understanding about 1-phase & 3-Phase AC fundamentals Understand the knowledge of basic concept, construction, working of the single- phase transformer and rotating electrical machines and their applications in industry Explain the principles of semiconductor devices and their applications. Understand Binary Number System, Boolean Algebra and Logic Gates. Inculcate the understanding about Sensors and Transducer. Understand different types of Communication Signals and their applications

Unit I:DC circuit and magnetic circuit	[08 Hrs]
Concept of energy, power, voltage, current. Ohms Law, Series and Parallel connections, Kirchhoff's Laws (KCL, KVL), Types of Sources (Current & Voltage), Ideal and Practical Sources (Independent Sources only). Magnetic Circuit, flux, mmf, flux density, amperes law, similarities between electric and magnetic circuit B-H curve, magnetic hysteresis. Numericals on series magnetic circuit.	
Unit II : AC circuit (single phase and three phase)	[08 Hrs]
Generation of Single Phase Voltage, Average and RMS value for Sinusoidal Waveform, Steady state behavior of R-L-C circuit with excitation, Resonance in Series R-L-C circuit. Principal of Generation of Three Phase Voltage and Phase Sequence. Star and delta connection. Relation between line and phase values	
Unit III : AC/DC Machines	[08 Hrs]
Basic Principle of operation, Construction, Types and application of Transformer. Basic Principle of operation, Construction and applications of DC Motors, Stepper Motor, BLDC Motor and Servo Motor.	
Unit IV : Basic of Electronics	[08 Hrs]
Introduction to LED, Photo diode, Zener diode, Varactor diode, Solar cell and applications, Bipolar Junction Transistor and its application as a switch and an amplifier, Logic Gates (AND, OR, NOT, NAND, NOR, EX-OR, EX NOR), Introduction to microcontroller (Block Schematic Representation)	
Unit V : Introduction To Transducers and Sensors	[08 Hrs]
Introduction to transducers - Classification of Transducers: Resistive, Inductive, Capacitive, Thermoelectric, piezoelectric, photoelectric, Hall effect, LVDT. Introduction to Motion sensor, Optical Sensors, Gyro sensors and Mechanical Sensors	

Text Books

S. N.	Title	Authors	Edition	Publisher
1	Basic Electrical Engineering	D. C. Kulshreshtha,	Revised 1st edition	Tata Mc-Graw Hill Education Pvt. Ltd. New Delhi
2	A Text Book of Electrical	B. L. Thareja and A. K. Thareja,		Technology S. Chand Publication (Volume I, II & III)
3	Electronic Devices and Circuits	Millman and Halkias		McGraw Hill

Reference Books

T. N.	Title	Authors	Edition	Publisher
1	Electric Circuits & Network	K. Suresh Kumar		Pearson Publication
2	Fundamentals of Digital Circuits	A. Kumar	2016	Prentice Hall India,

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B.Tech. Scheme of Examination & Syllabus 2024-25 MECHANICAL ENGINEERING

GROUP II : SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24ME204P	Basics of Electrical & Electronics Engineering Lab	-	-	2	1	-	25	25	50

Course Objectives	Course Outcomes
This course is intended <ul style="list-style-type: none">To understand the basic fundamentals of Electrical & Electronics engineering.To summarize and apply the basic concepts of Electrical & Electronics engineering.	Student will able to <ul style="list-style-type: none">Develop circuits using bread board.Verify truth tables of gates.Study RLC circuit and transformer

Expt. No.	Title
1	To study basic electrical and electronic components.
2	To visit and study solar power plant generation unit at rooftop.
3	To study LDR and LED circuit.
4	To verify truth tables of basic gates.
5	To verify NAND gate as universal gate.
6	To study KCL and KVL equations.
7	To study series RLC circuit.
8	To study and demonstrate single phase transformer/dimmerstat.

Text Books

S. N	Title	Authors	Edition	Publisher
1	A Text Book of Electrical Technology	B. L. Theraja and A. K. Theraja,	(Volume I, II & III)	S. Chand and Company
2	Electronic Devices and Circuits,	N. Suresh Kumar, S. Salivahanan,	4 th Edition	Mc-Graw Hill Education Pvt. Ltd. New Delhi
3	Modern Digital Electronics,	R. P. Jain	4 th Edition,	Mc-Graw Hill Education,

Reference Books

S. N	Title	Authors	Edition	Publisher
1	Integrated Electronics, ,	J. Millman, C. Halkias,	4 th Edition,	Mc-Graw Hill Education
2	Fundamentals of Digital Circuits	A. Anand Kumar,		PHI Learning Pvt. Ltd.

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GROUP II : SEMESTER II

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24ME205P	Problem Solving with Python Lab	-	-	2	1	-	25	25	50

Course Objectives	Course Outcomes
<p>This course is intended</p> <ul style="list-style-type: none">• To focus on paradigms of programming language.• To enhance programming environment.• To study various programming language.• To study the python as one of the important Programming language	<p>Student will able to</p> <ul style="list-style-type: none">• Develop a program using python operators• Develop a python code using sequential concept.• Develop a python code using non- sequential concept.• Implement the program using conditional and looping

Expt. No.	Title
1	(A). Installation of Latest Python version from Genuine Website, its installation process, path setting & its testing. (B) Implementation of some python program on interaction mode
2	Introduction to inbuilt IDE. Implementation of python programming in batch mode.
3	Implementation of Python programming on various arithmetic and conditional operators.
4	Implementation of Python programming on functions.
5	Implementation of Python programming on list.
6	Implementation of Python programming on tuples and sets.
7	Implementation of Python programming on Dictionary
8	Implementation of Python programming on various Loops.

Text Books

S. N	Title	Authors	Edition	Publisher
1	Python Programming using problem solving Approach	Reema Theraja	First Edition, 2017.	Oxford University Press
2	A Byte of Python	C. H. Swaroop	Edition 2.1	Swaroop C H

Reference Books

S. N	Title	Authors	Edition	Publisher
1	Python: The Complete Reference	Martin C. Brown	First Edition, 2017.	Oxford University Press

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ARISE & SHINE

GROUP II : SEMESTER II

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24ME206P	Business Communication Skills II Lab	-	-	2	1	-	25	25	50

Course Objectives	Course Outcomes
To empower students to develop a career oriented mindset while harnessing the power of LSRW skills.	Students would be able to: 1. Participate in Group Discussions. 2. Improve their reading and formal writing skills. 3. Develop upon their listening skills to engage in meaningful conversations. 4. Develop oratory skills to engage and inform audiences. 5. Prepare themselves for participating in business meetings.

Expt. No.	Title of the experiment
1	Group Discussion
2	Reading for Competitive Exams II
3	Listening Skills II
4	Presenting a TED Talk
5	Media Interaction
6	Business Correspondence II
7	Report Writing
8	Mock Meeting

Reference Books

S. N	Title	Authors	Edition	Publisher
1.	Communication Skills for Engineers	C. Muralikrishna&SunitaMishra	2nd Edition, 2011	Pearson India Education Services
2.	Communication Skills	Dr. L .Bisen, Dr. B. Agrawal& Dr. N. T. Kalyani	1st Edition, 2021	Himalaya Publishing House
3.	Barron's IELTS Superpack	Lin Lougheed	2012	Barrons Educational Series

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MECHANICAL ENGINEERING

GROUP II : SEMESTER II

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24ME207T	Indian Knowledge System	2	-	-	2	10	10	30	50
Course Objectives					Course Outcomes				
This course is intended <ul style="list-style-type: none"> To introduce the origin, evolution and approach of Indian knowledge systems To understand the Indian knowledge approaches to various domains such as time, language, environment, management, life and mind To appreciate the principles of thought process, reasoning, inferencing and sustainability in Indian knowledge systems 					Students will be able to <ul style="list-style-type: none"> Explain the origin, evolution and approach of IKS and build various practices to conserve and protect rich Indian Knowledge Describe importance of Indian Literature and will know about Indian Scholars Understand ancient Indian traditions, practices and knowledge for conservation of resources 				

Unit I	[10 Hrs.]
Introduction and Management of Indian Knowledge System <ol style="list-style-type: none"> 1.1 Definition, Concept and Scope of IKS 1.2 IKS based approaches on Knowledge Paradigms 1.3 IKS in Ancient India and Modern India 1.4 Documentation and Preservation of IKS 1.5 Approaches for Conservation and Management of nature and Bio – Resources 1.6 Approaches and Strategies to protection and conservation of IKS 	
Unit II	[12 Hrs.]
IKS and Indian Scholars, Indian Literature <ol style="list-style-type: none"> 2.1 Philosophy and Literature (Maharshi Vyas, Kanad, Pingala, Parasara, Banabhatta, Nagarjuna and Panini) 2.2 Mathematics and Astronomy (Aryabhatta, Mahaviracharya, Bodhayan, Bhaskaracharya, Brahmagupta, Varahamihira) 2.3 Medicine and Yoga (Charak, Susruta, Maharshi Patanjali and Dhanwantari) 2.4 Sahitya (Vedas, Upvedas (Ayurveda, Dhanurveda, Ghandarvaveda), Puran and Upnishad and Shad Darshan (Vedanta, Nyaya, Vaisheshik, Sankhya, Mimamsa, Yoga, Adhyatma, Meditation) 2.5 Shastra (Nyaya, Vyakarana, Krishi, Shilp, Vastu, Natya, Sangeet) 	
Unit III	[08 Hrs.]
Unique Traditional Practices and Applied Traditional knowledge <ol style="list-style-type: none"> 3.1 Myths, Rituals, Spirituals, Folk stories, Traditional Narratives 3.2 Agriculture, Land, Water and Soil Conservation and Management Practices 3.3 Vaidya (Traditional health Care system), Amchi Medicine system 	

Text Books

S. N.	Title	Authors	Edition	Publisher
1	Indian Knowledge System: Introduction and Prospects	Acharya Shreyas Kurhekar	First	Sanskrit University, Ramtek
2	Indian Knowledge System Vol. I and II	Kapil Kapoor, Awadhesh Kumar Singh		D.K. Print World Ltd.
3	Traditional Knowledge System in India	Amit Jha		Atlantic Publisher

Reference Books / Resources

S. N.	Title	Authors	Edition	Publisher
1	Website of Indian Knowledge System Division, New Delhi	-	-	-

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