



ST. VINCENT PALLOTTI COLLEGE OF ENGINEERING & TECHNOLOGY, NAGPUR

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

B. Tech. Scheme of Examination & Syllabus 2025-26 ELECTRONICS AND TELECOMMUNICATION ENGINEERING

Annexure – I

CREDIT FRAMEWORK STRUCTURE

Semester		I	II	III	IV	V	VI	VII	VIII	Total Credits
Basic Science Course	BSC/ESC	7	7							14
Engineering Science Course		6	6							12
Program Core Course (PCC)	Program Courses	2	2	13	10	7	4	6		44
Program Elective Course (PEC)						4	6	6	4	20
Multidisciplinary Minor (MDM)	Multidisciplinary Courses			2	3	3	3	3		14
Open Elective (OE) Other than a particular program						2	3	3		08
Vocational and Skill Enhancement Course (VSEC)	Skill Courses	2		1	1	2	2			08
Ability Enhancement Course (AEC -01, AEC-02)	Humanities Social Science and Management (HSSM)	1	1			2				04
Entrepreneurship/Economics/Management Courses				2	2					04
Indian Knowledge System (IKS)				2						02
Value Education Course (VEC)				2	2					04
Research Methodology		Experiential Learning Courses								4
Comm. Engg. Project (CEP)/ Field Project (FP)					2					02
Project							2	2		04
Internship/OJT									12	12
Co-curricular Courses (CC)	Liberal Learning Courses	2	2							04
Total Credits (Major)		20	20	20	20	20	20	20	20	160

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GROUP II : SEMESTER I

Sr. No.	Course Category	CourseCode	Course Title	Hours per Week			Credits	Mid-Sem Examination	Maximum Marks			Minimum Passing Marks	No. of hours ESE
				L	T	P			Continual Assessment	End Sem Examination	Total		
1	BSC	25ET101T	Applied Physics	2	-	-	2	10	10	30	50	22	1.5
2.	BSC	25ET101P	Applied Physics Lab	-	-	2	1	-	25	25	50	25	-
3.	BSC	25ET102T	Linear Algebra & Calculus	3		-	3	20	20	60	100	45	3
4.	BSC	25ET102P	Linear Algebra & Calculus Lab	-	-	2	1	-	25	25	50	25	-
5.	ESC	25ET103T	Digital Electronics	3	-	-	3	20	20	60	100	45	3
6.	ESC	25ET103P	Digital Electronics Lab	-	-	2	1	-	25	25	50	25	-
7.	ESC	25ET104P	C Programming Lab	-	-	4	2	-	25	25	50	25	-
8.	PCC	25ET105T	Fundamentals of Electronic Engineering	2	-	-	2	10	10	30	50	22	1.5
9.	AEC	25ET106P	Business Communication Skills I Lab	-	-	2	1	-	25	25	50	25	-
10.	SEC	25ET207T	Design Thinking	2	-	-	2	10	10	30	50	22	1.5
11.	CC	25ET108T	Co-curricular Courses – I	2	-	-	2	-	50	-	50	25	-
Total				14	-	12	20	70	220	310	600	281	--

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Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
25ET101T	Applied Physics	2	--	--	2	10	10	30	50

Course Objectives	Course Outcomes
<p>This course is intended</p> <ol style="list-style-type: none"> To understand the basic laws of physics and types of materials and their application in engineering and technology. To develop scientific temper and analytical capability. 	<p>Students will be able to</p> <ol style="list-style-type: none"> Explain the fundamental concepts of crystal structure, unit cells, Miller indices, and apply Bragg's law to analyze X-ray diffraction in crystalline solids. Classify different types of magnetic materials and analyze their properties (diamagnetic, paramagnetic, ferromagnetic) along with their practical applications. Illustrate the band theory of solids, differentiate between conductors, insulators, and semiconductors, and calculate Fermi energy for given systems. Distinguish between intrinsic and extrinsic semiconductors and evaluate the working principle and applications of p-n junction diodes in electronic devices.

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 - Bragg's Law and its applications.	
Unit II MAGNETIC MATERIALS	[10 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	[10 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	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

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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Course	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
25ET101P	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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FIRST SEMESTER

Course	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
25ET102T	Linear Algebra & Calculus	3	-	0	3	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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SEMESTER-I

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation		
						CA	ESE	Total
25ET102P	Linear Algebra & Calculus Lab	--	--	2	1	25	25	50

Course Objectives	Course Outcomes
<p>This Course is intended to:</p> <ol style="list-style-type: none">To develop students' computational proficiency in solving problems related to linear algebra, calculus, and differential equations using SageMath with an emphasis on symbolic computation and numerical methods.To enable students to apply SageMath for solving and visualizing problems in vector calculus through effective use of graphical and analytical tools.	<p>Students will be able to:</p> <ol style="list-style-type: none">Apply fundamental matrix operations and solve systems of linear equations using SageMath.Apply concepts of linear algebra to compute eigenvalues and eigenvectors of matrices using SageMath.Evaluate partial derivatives of multivariable functions and solve first and higher-order ordinary differential equations using SageMath.Analyze and visualize vector calculus operations including gradient, divergence, curl, and evaluate line and surface integrals using SageMath.

List of Experiments:-

Experiment No.	List of Experiment
1	To Implement basic matrix operations using SageMath's symbolic computation tools.
2	To check the consistency of a system of linear equations using augmented matrices and SageMath.
3	To solve systems of linear equations using various within the SageMath environment.
4	To determine eigenvalues and eigenvectors of matrices using built-in SageMath functions.
5	To implement and validate the Cayley-Hamilton Theorem with the aid of SageMath.
6	To compute partial derivatives of various orders for multivariable functions using SageMath.
7	To solve first-order and higher-order differential using SageMath's differential equation solvers.
8	To find maxima and minima of functions of two variables using partial derivatives and the second derivative test implemented in SageMath.
9	To compute and visualize vector differential operations using SageMath.
10	To compute vector integrals in SageMath.

Text Books

S.N	Title	Authors	Edition	Publisher
1	Computational Mathematics with SageMath	Paul Zimmermann	1st	SIAM Publications Library.
2	Basics of SageMath : Mathematics(Practicals)	Varun Kumar	1st	Amazon KDP

Reference Books

S.N	Title	Authors	Edition	Publisher
1	Mathematics-SageMath Software System	Indrajeet Varhadpande & Dr. Kirti Sahu	1 st	Himalaya Publication
2	Applied Mathematics Using SageMath	Dr. Kirti Sahu & Dr. Sajid Anwar	1 st	Himalaya Publication

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Course	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
25ET103T	Digital Electronics	3	-	0	3	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 & PO S 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
25ET103P	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 operation2. Analyze, design, illustrate and implement combinational logic circuits3. Design and implement sequential circuits like flip flops, registers, counters4. 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
25ET105T	Fundamentals 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

Referen e 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
25ET104P	C Programming 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
25ES106P	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 mind set 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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