Shirpur Education Society's

R. C. Patel Institute of Technology, Shirpur

(An Autonomous Institute)

Course Structure and Syllabus
Second Year B. Tech

Electronics and Telecommunication Engineering

With efffect from Academic Year 2021-22

Shahada Road, Near Nimzari Naka, Shirpur, Maharashtra 425405
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Semester-III (w.e.f.2021-2022)

Sr	Course Category	Course Code	Course Title	Teaching Scheme			Evaluation Scheme					Total	Credit
							Continuous Assessment (CA)				ESE		
							TA	Term Test 1 (TT1)	Term Test 2 (TT2)	Average (TT1 & TT2)			
				L	T	P	[A]			[B]	[C]	[A+B+C]	
1	BS	BSET3010T	Engineering Mathematics-III	3	1		20	15	15	15	65	100	4
2	PC1	PCET3020T	Analog Circuit Design	3			20	15	15	15	65	100	3
3	PC1L	PCET3020L	Analog Circuit Design Laboratory			2	25				25	50	1
4	PC2	PCET3030T	Digital System Design	3			20	15	15	15	65	100	3
5	PC2L	PCET3030L	Digital System Design Laboratory			2	25				25	50	1
6	PC3	PCET3040T	Electrical Network Analysis and Synthesis	3			20	15	15	15	65	100	3
7	PC3L	PCET3040L	Electrical Network Analysis and Synthesis Laboratory			2	25				25	50	1
8	PC4	PCET3050T	Signals and Systems	3			20	15	15	15	65	100	3
9	PC4L	PCET3050L	Signals and Systems Laboratory			2	25				25	50	1
10	PC5L	PCET3060L	Object Oriented Programming Laboratory			4	25				25	50	2
11	PJ	PJET3070L	Semester Project-I			2	25				25	50	1
12	MC	MCET3080T	Constitution of India	1									Audit
13			@ Field/Internship/Industry Training										Audit
			Total	16	1	14	250			75	475	800	23

@ Minimum 6 weeks field/industry training/ internship should be done during winter/summer vacation of semester III to VI. Evaluation will be done in semester VII.

Semester-IV (w.e.f.2021-2022)

Sr	Course Category	Course Code	Course Title	Teaching Scheme			Evaluation Scheme					Total	Credit
							Continuous Assessment (CA)				ESE		
							TA	Term Test 1 (TT1)	Term Test 2 (TT2)	Average (TT1 & TT2)			
				L	T	P	[A]			[B]	[C]	[A+B+C]	
1	BS	BSET4010T	Engineering Mathematics-IV	3	1		20	15	15	15	65	100	4
2	PC1	PCET4020T	Analog Communication	3			20	15	15	15	65	100	3
3	PC1L	PCET4020L	Analog Communication Laboratory			2	25				25	50	1
4	PC2	PCET4030T	Integrated Circuits	3			20	15	15	15	65	100	3
5	PC2L	PCET4030L	Integrated Circuits Laboratory			2	25				25	50	1
6	PC3	PCET4040T	Electromagnetic and Wave Propagation	3	1		20	15	15	15	65	100	4
7	ES	ESET4050L	Python Programming Laboratory			2	25				25	50	1
8	HM	HMET4060T	Universal Human Values	2			20	15	15	15	65	100	2
9	PJ	PJET4070L	Semester Project-II			2	25				25	50	1
10	HM	HMET4080L	Employability Skill Development Program -I			2	50					50	1
11			@ Field/Internship/Industry Training										Audit
			Total	14	2	10	250			75	425	750	21

@ Minimum 6 weeks field/industry training/ internship should be done during winter/summer vacation of semester III to VI. Evaluation will be done in semester VII.

Prepared by

Checked by

BOS Chairman

Dean Academic/Dy. Director

C.O.E.

Director

R.C.Patel Institute of Technology * AN AUTONOMOUS INSTITUTE * Shirpur 425 405 (Dhule)

Engineering Mathematics - III (BSET3010T)

Teaching Scheme
Lectures: 03 Hrs./Week
Tutorial: 01 Hr/Week
Credit: 04

Examination Scheme
Term Test: 15 Marks
Teacher Assessment: 20 Marks
End Sem Exam: 65 Marks
Total: 100 Marks

Course Objectives

1. To build the foundation in Mathematics needed for the field of Electronics and Telecommunication Engineering.
2. Solve problems related to Fourier transform, Laplace transform and applications to Electronics and Telecommunication Engineering.
3. Perform vector differentiation and integration, analyze the vector fields and apply to Electromagnetic fields.

COs	Course Outcomes	Blooms Level	Blooms Description
CO1	Learner will demonstrate basic knowledge of Laplace Transform. Fourier series, Vector Algebra and Complex Variable.	L2	Understand
CO2	Learner will demonstrate an ability to identify and model the problems of the field of Electronics and Telecommunication Engineering and solve it.	L2, L5	Understand, Create
CO3	Learner will be able to apply the knowledge of vector algebra, vector differentiation & vector integral for problem solving.	L3	Apply

Course Contents

Unit-I Laplace Transform 10 Hrs.

Laplace Transform (LT) of Standard Functions: Definition of Laplace Transform, Condition of existence of Laplace Transform, Laplace Transform of e^{at}, $\sin(at)$, $\cos(at)$, $\sinh(at)$, $\cosh(at)$, t^n. Heaviside unit step function, Dirac-delta function, Laplace Transform of periodic function, Properties of Laplace Transform: Linearity, First shifting theorem, Second shifting theorem, Multiplication by t^n, Division by t. Laplace Transform of derivatives and integrals, Change of scale, Convolution theorem, Evaluation of integrals using Laplace Transform.

Unit-II Inverse Laplace Transform & its Applications 08 Hrs.

Partial fraction method, Method of convolution, Laplace inverse by derivative. Applications of Laplace Transform: Solution of ordinary differential equations, Solving RLC circuit differential equation of first order and second order with boundary condition using Laplace transform (framing of differential equation is not included).

Unit-III Fourier Series 08 Hrs.

Introduction: Orthogonal and orthonormal set of functions, Introduction of Dirichlets conditions, Eulers formula. Fourier Series of Functions: Exponential, Trigonometric functions of any period =2L, Even and odd functions, Half range sine and cosine series. Complex form of Fourier series.

Unit-IV Vector Algebra, Vector Differentiation & Vector Integral 09 Hrs.

Vector differentiation, Gradient of scalar point function, Divergence and Curl of vector point function Properties: Solenoidal and irrotational vector fields, Conservative vector field. Vector Integral: Greens theorem in a plane, Gauss divergence theorem and Stokes theorem.

Unit-V Complex Variable 07 Hrs.

Analytic Function: Necessary and sufficient conditions (No Proof), Cauchy Riemann equation Cartesian form (No Proof), Cauchy Riemann Equation in polar form (with Proof), Milne Thomson Method and its application, Harmonic function, orthogonal trajectories. Mapping: Conformal mapping, Bilinear transformations, Cross ratio, Fixed points.

Text Books

1. H. K. Das, Advanced Engineering Mathematics, S . Chand, 2008.
2. Kanti B. Datta, Mathematical Methods in Science and Engineering, Capital India, 1^{st} edition (January 1, 2012).
3. B. S. Grewal, Higher Engineering Mathematics, Khanna Publication, 38^{th} edition, 2005.

Reference Books

1. B. V. Ramana, Higher Engineering Mathematics, Tata Mc-Graw Hill Publication.
2. Wylie and Barret, Advanced Engineering Mathematics, Tata Mc-Graw Hill 6^{th} edition,2008.
3. Erwin Kreysizg, Advanced Engineering Mathematics, John Wiley & Sons, Inc 9^{th} edition.
4. Murry R. Spieget, Vector Analysis, Schaums outline series, Mc-Graw Hill Publication, 2^{nd} edition, 2009.

Evaluation Scheme:

Continuous Assessment (A):

Subject teacher will declare Teacher Assessment criteria at the start of semester.

Continuous Assessment (B):

1. Two term tests of 15 marks each will be conducted during the semester.
2. Total duration allotted for writing each of the paper is 1 hr.
3. Average of the marks scored in both the tests will be considered for final grading.

End Semester Examination (C):

1. Question paper will be based on the entire syllabus summing up to 65 marks.
2. Total duration allotted for writing the paper is 3 hrs.

Tutorial

Minimum eight tutorials shall be conducted.

Analog Circuit Design (PCET3020T)

Teaching Scheme
Lectures: 03 Hrs./Week
Credit: 03

Examination Scheme
Term Test: 15 Marks
Teacher Assessment: 20 Marks
End Sem Exam: 65 Marks
Total: 100 Marks

Course Objectives

1. To understand operation of semiconductor devices.
2. To understand DC analysis and ac models of semiconductor devices.
3. To apply concepts for the design of Amplifiers.
4. To verify the theoretical concepts through laboratory and simulation experiments.
5. To implement mini projects based on concept of electronics circuit concepts.

COs	Course Outcomes	Blooms Level	Blooms Description
CO1	Understand the VI characteristics of semiconductor devices.	L2	Comprehension
CO2	Analyze DC circuits and relate ac models of semiconductor devices with their physical operation.	L4	Analyze
CO3	Design and analysis of amplifier circuits.	L4, L5	Analyze, Synthesize
CO4	Evaluate frequency response to understand behavior of electronics circuits.	L6	Evaluate

Course Contents

Unit-I Bipolar Junction Transistor 06 Hrs.

BJT characteristics, DC load line and regions of operation, Transistor as a switch. DC analysis of common BJT circuits, Analysis and design of fixed bias, Collector to base bias and voltage divider bias, Stability factor analysis.

Unit-II BJT Amplifier 10 Hrs.

Introduction: Understanding of amplification concept with reference to input/output characteristics, AC load line analysis, Definition of amplifier parameters Zi, Z0, Av and Ai, Graphical analysis to evaluate parameters. Small Signal mid Frequency Models: Hybrid-pi model, early effect, h-parameter model. Small Signal amplifier Analysis: Small signal analysis of CE, CB, and CC configurations using hybrid-pi model. Low frequency and high frequency response amplifier.

Unit-III Introduction to MOSFET 06 Hrs.

Introduction to MOSFET: MOSFET Symbol, Types of MOSFET-Depletion and Enhancement type MOSFET (N channel and P channel), Construction, Operation, and V-I characteristics of MOSFET. MOSFET biasing, MOSFET as a switch, MOSFET as amplifier.

Unit-IV Multistage Amplifier 07 Hrs.

Introduction to multistage amplifier, Frequency response of coupled amplifiers. Cascaded amplifiers (CE-CE, CS-CS). Darlington emitter follower (CC-CC). Cascode amplifier (CE-CB). Design of single stage and multistage amplifier: Design of single stage CE, and CS amplifier. Design of two stage CE-CE, and CS-CS amplifier

Unit-V Power Amplifiers 06 Hrs.

Introduction to power amplifier, Need of power amplifier and harmonic distortion. Power efficiency of class A, B, AB and C amplifier.

Unit-VI Feedback Amplifiers and Oscillators 07 Hrs.

Concepts of feedback: Concept of negative feedback, voltage / current, series, shunt feedback. Positive feedback. Introduction to oscillator: Introduction, operation of oscillator. Types of transistor oscillators. RC oscillators: phase shift and Wein bridge. LC oscillators: Hartley, Colpitts and Clapp. Tuned oscillator: Twin-T oscillator and crystal oscillator.

Text Books

1. D. A. Neamen, Electronic Circuit Analysis and Design, Tata McGraw Hill, 2nd Edition

2. J. B. Gupta, Electronic Devices and Circuits, Katson Education Series, 6^{th} Edition.

3. David A. Bell, Electronic Devices and Circuits, Oxford University Higher Education, 5^{th} edition 2008.

4. Boylestad and Nashelesky, Electronic Devices and Circuits Theory, Pearson Education, 11^{th} Edition.

Reference Books

1. A. K. Maini, Electronic Devices and Circuits, Wiley.

2. T. L. Floyd, Electronic Devices, Prentice Hall, 9^{th} Edition, 2012.

3. A. Rockett, Material Science of Semiconductors, Springer, 1^{st} Edition, 2009.

4. A. Mottershead, Electronic Devices and Circuits: An Introduction, PHI Learning.

5. A. S. Sedra, K. C. Smith and A. N. Chandorkar, Microelectronic Circuits, Theory and Applications, 6^{th} Edition, International Version, Oxford International Student Edition.

Evaluation Scheme:

Continuous Assessment (A):

Subject teacher will declare Teacher Assessment criteria at the start of semester.

Continuous Assessment (B):

1. Two term tests of 15 marks each will be conducted during the semester.

2. Total duration allotted for writing each of the paper is 1 hr.

3. Average of the marks scored in both the tests will be considered for final grading.

End Semester Examination (C):

1. Question paper will be based on the entire syllabus summing up to 65 marks.

2. Total duration allotted for writing the paper is 3 hrs.

Analog Circuit Design Laboratory (PCET3020L)

Teaching Scheme
Practical: 02 Hrs/Week
Credit: 01

Examination Scheme
Teacher Assessment: 25 Marks
End Sem Exam : 25 Marks
Total: 50 Marks

Course Objectives

1. To understand basic concepts of BJT & MOSFET biasing circuits.
2. Design and implementation of BJT & MOSFET amplifiers.
3. To study oscillator circuits & negative amplifier circuits.

COs	Course Outcomes	Blooms Level	Blooms Description
CO1	Analyze the biasing circuits of BJT and MOSFET.	L4, L6	Analyze, Evaluate
CO2	Design,implement various amplifiers and observe their frequency responses	L5	Synthesize
CO3	Understand the concepts of negative feedback amplifiers.	L2	Understand
CO4	Understand the concepts of Oscillators.	L2	Understand

Course Contents

List of Laboratory Experiments: (Any Eight)

1. BJT Biasing.
2. Single Stage Common Emitter Amplifier.
3. Single Stage CS Amplifier using MOSFET.
4. Two Stage CE-CE Amplifier.
5. Two Stage CS-CS Amplifier.
6. Darlington Emitter Follower.
7. Complementary Symmetry Class B Push Pull Power Amplifier.
8. Negative Feedback Amplifier.
9. RC Phase Shift Oscillator.
10. LC Oscillator.
11. Any other experiment based on syllabus may be included, which would help the learner to understand topic/concept.
12. One mini project / subject specific lab assignment/case study based on the theory learnt in Analog Circuit Design course.

Evaluation Scheme:

Continuous Assessment (A):

Laboratory work shall consist of minimum 8 experiments and subject specific lab assignment/case study/mini project.

The distribution of marks shall be as follows:

1. Performance in Experiments: 05 Marks
2. Journal Submission: 05 Marks
3. Viva-voce: 05 Marks
4. Subject Specific Lab Assignment/Case Study/mini project: 10 Marks

The final certification and acceptance of laboratory journal/manual/report will be subject to satisfactory performance of laboratory work and upon fulfilling minimum passing criteria in the teacher assessment.

End Semester Examination (C):

Oral / Practical examination will be based on the entire syllabus including, the practicals performed during laboratory sessions.

Digital System Design (PCET3030T)

Teaching Scheme
Lectures: 03 Hrs./Week
Credit: 03

Examination Scheme
Term Test: 15 Marks
Teacher Assessment: 20 Marks
End Sem Exam: 65 Marks
Total: 100 Marks

Course Objectives

1. To introduce different digital codes and their conversions.
2. To introduce methods for minimizing logical expressions.
3. To outline the formal procedure to design combinational logic circuits.
4. To introduce flip flops and outline the formal procedure to sequential circuits.
5. To illustrate concept of programmable devices.

COs	Course Outcomes	Blooms Level	Blooms Description
CO1	Explain different digital codes and their conversions.	L1	Knowledge
CO2	Minimize logic expressions using various reduction techniques.	L3	Apply
CO3	Analyze and design combinational logic circuits.	L4	Analyze
CO4	Design flip-flops using logic gates and use them to realize different sequential circuits.	L5	Synthesize
CO5	Classify different programmable logic devices.	L4	Analyze

Course Contents

Unit-I Digital Codes and Binary Arithmetic 04 Hrs.

Signed Binary number representation: Sign Magnitude, 1's complement, 2's complement representation and binary arithmetic. Codes: BCD, Excess-3, Gray Code, Binary Code and their conversions.

Unit-II Minimization Techniques and Logic Gates 12 Hrs.

Logic Gates: AND, OR, NOT, NAND, NOR, Exclusive-OR and Exclusive-NOR, Implementations of logic functions using universal gates. Boolean postulates and laws. De-Morgan's theorem, Boolean expression, Minterm, Maxterm, Sum of Products (SOP), Product of Sums (POS), Minimization of Boolean expressions, Karnaugh map Minimization Quine, Mc Cluskey method of minimization, Don't care conditions.

Unit-III Design of Combinational Logic 12 Hrs.

Introduction to combinational logic, Code converter: BCD, Excess-3, Gray code, Binary Code, Half-Adder, Full Adder, Half Subtractor, Full Subtractor, Binary Adder, BCD adder, Look ahead carry generator, Multiplexers, MUX tree, De-multiplexer and Decoders, Implementation of SOP and POS using Multiplexer & De-multiplexer/Decoder.

Unit-IV Sequential Logic Design 10 Hrs.

Introduction to sequential logic, Flip- Flop: SR, JK, D, T. Preset & Clear, Truth Tables and Excitation tables, Conversion from one type to another type of Flip Flop, Shift Registers: SISO, SIPO, PISO, PIPO, Bi-directional, Counters: Asynchronous counter, Synchronous counter, Ring counters, Johnson Counter, Modulus of the counter. State Machines: Basic design steps- State diagram, State table, State reduction, State assignment, Mealy and Moore machines representation, Sequence detector.

Unit-V Programmable Logic Devices 04 Hrs.

Programmable logic devices: Architecture of PROM, PAL, PLA, Designing combinational circuits using PLDs. General architecture of FPGA and CPLD..

Text Books

1. John F. Wakerly, Digital Design Principles and Practices, Pearson Education, 4^{th} Edition (2008).

2. R. P. Jain, Modern Digital Electronics, Tata McGraw Hill Education, 3^{rd} Edition (2003).

Reference Books

1. Morris Mano, Michael D. Ciletti, Digital Design, Pearson Education, 4^{th} Edition (2008).

2. Thomas L. Floyd, Digital Fundamentals, Pearson Hall, 11^{th} Global Edition (2015).

3. Mandal, Digital Electronics Principles and Applications, McGraw Hill Education, 1^{st} Edition (2010).

4. Ronald J. Tocci, Neal S. Widmer, Digital Systems Principles and Applications, 8^{th} Edition, PHI (2003)

5. Donald P. Leach, Albert Paul Malvino, Gautam Saha, Digital Principles and Applications, The McGraw Hill, 7^{th} Edition (2011).

Evaluation Scheme:

Continuous Assessment (A):

Subject teacher will declare Teacher Assessment criteria at the start of semester.

Continuous Assessment (B):

1. Two term tests of 15 marks each will be conducted during the semester.

2. Total duration allotted for writing each of the paper is 1 hr.

3. Average of the marks scored in both the tests will be considered for final grading.

End Semester Examination (C):

1. Question paper will be based on the entire syllabus summing up to 65 marks.

2. Total duration allotted for writing the paper is 3 hrs.

Digital System Design Laboratory(PCET3030L)

Teaching Scheme
Practical: 02 Hrs/Week
Credit: 01

Examination Scheme
Teacher Assessment: 25 Marks
End Sem Exam: 25 Marks
Total: 50 Marks

Course Objectives

1. To understand the Boolean algebra for logical circuits.
2. To analyze various logical gates.
3. To implement various logical and sequential circuits

COs	Course Outcomes	Blooms Level	Blooms Description
CO1	To verify various logical gates	L1	Knowledge
CO2	To analyze logical circuits	L4	Analyze
CO3	To analyze various sequential circuits	L4	Analyze

Course Contents

List of Laboratory Experiments: (First is Compulsory)

1. Verify different logic gates (introduce logic families CMOS and TTL and electrical and switching parameters).
2. Simplification of Boolean functions.
3. Verify Universal gates NAND and NOR and design EX-OR and EX-NOR gates using Universal gates.
4. Implement Half adder, Full adder, Half subtractor and Full subtractor circuits.
5. Implement BCD adder using four bit binary adder IC-7483.
6. Flip flops conversion JK to D, JK to T and D to TFF.
7. Implement logic equations using Multiplexer.
8. Design synchronous Mod-N counter using IC-7490.
9. Verify encoder and decoder operations.
10. Implement digital circuits to perform binary to gray and gray to binary operations.
11. Verify truth table of different types of flip flops.
12. Verify different counter operations.
13. One mini project / subject specific lab assignment/case study based on the theory learnt in the course.

Any other experiment based on syllabus may be included, which would help the learner to understand topic/concept.

Evaluation Scheme:

Continuous Assessment (A):

Laboratory work shall consist of minimum 8 experiments and subject specific lab assignment/case study.

The distribution of marks shall be as follows:

1. Performance in Experiments: 05 Marks
2. Journal Submission: 05 Marks
3. Viva-voce: 05 Marks

4. Subject Specific Lab Assignment/Case Study/mini project: 10 Marks

The final certification and acceptance of laboratory journal/manual/report will be subject to satisfactory performance of laboratory work and upon fulfilling minimum passing criteria in the teacher assessment.

End Semester Examination (C):

Oral / Practical examination will be based on the entire syllabus including, the practicals performed during laboratory sessions.

Electrical Network Analysis and Synthesis (PCET3040T)

Teaching Scheme
Lectures: 03 Hrs./Week
Credit: 03

Examination Scheme
Term Test: 15 Marks
Teacher Assessment: 20 Marks
End Sem Exam: 65 Marks
Total: 100 Marks

Course Objectives

1. To analyze the circuits in time and frequency domain.
2. To study network topology, network functions, two port network.
3. To synthesize passive network by various methods.

COs	Course Outcomes	Blooms Level	Blooms Description
CO1	Apply knowledge in analyzing circuits by using network theorems.	L3	Apply
CO2	Apply the time and frequency method of analysis.	L3	Apply
CO3	Find the various parameters of two port network.	L5	Evaluate
CO4	Apply network topology for analyzing the circuit.	L3	Apply
CO5	Synthesize the network using passive elements.	L6	Create

Course Contents

Unit-I Electrical Circuit Analysis 10 Hrs.

Analysis of DC & AC Circuits: Analysis of circuits with and without dependent sources using generalized loop and node matrix methods, Analysis: Mesh, Super mesh, Node and Super node. Circuit Theorems: Superposition, Thevenin's, Norton's, Maximum Power Transfer. Magnetic circuits: Concept of self and mutual inductance, Coefficient of coupling, Dot convention, Equivalent circuit, Coupled circuit, Solution using mesh analysis.

Unit-II Graph Theory 06 Hrs.

Objectives of graph theory, Linear oriented graphs, Graph terminologies, Matrix representation of a graph: Incidence matrix, Circuit matrix, Cut-set matrix, Reduced incident matrix, Tieset matrix, f-cutset matrix. KVL & KCL using matrix, Solution of resistive networks and principle of duality.

Unit-III Time and Frequency Domain Analysis 08 Hrs.

Time domain analysis of R-L and R-C Circuits: Forced and natural response, Initial and final values. Time domain analysis of R-L-C Circuits: Forced and natural response, Over damped and under damped series RLC circuit. Frequency domain analysis: Frequency-domain representation of R, L, C, Initial value theorem & final value theorem, Applications of Laplace Transform in analyzing electrical circuits.

Unit-IV Network Functions and Realization 08 Hrs.

Network functions for the one port and two port networks, Driving point and transfer functions, Poles and Zeros of Network functions, Necessary condition for driving point functions, Necessary condition for transfer functions, Hurwitz Criterion Concept of positive real function, Testing for necessary and sufficient conditions for Positive Real Functions, Synthesis of LC, RC & RL Circuits: properties of LC, RC & RL driving point functions, LC, RC & RL network Synthesis in Cauer-I & Cauer-II, Foster-I & Foster-II forms.

Unit-V Two Port Network 08 Hrs.

Parameters: Open Circuits, Short Circuit, Transmission and Hybrid parameters, Relationship among parameters, Conditions for reciprocity and symmetry, Interconnections of Two-Port networks (Series, Parallel, Cascaded, Series- Parallel), T & π representation.

Text Books

1. Franklin F Kuo, Network Analysis and Synthesis, Wiley, 2nd Edition. 1966.
2. M. E. Van Valkenburg, Network Analysis, Prentice-Hall of India Pvt Ltd, New Delhi, 26th

Indian Reprint, 2000.

3. Ravish Singh, Circuit Theory and Networks, Tata McGraw-Hill Education, 2nd Edition, 2016.

Reference Books

1. A Chakrabarti, Circuit Theory, Dhanpat Rai & Co., Delhi, 6^{th} Edition.

2. Sudhakar, Shyammohan S. Palli Circuits and Networks, Tata McGraw-Hill Education.

3. Smarajit Ghosh, Network Theory Analysis & Syntshesis, PHI Learning.

4. K. S. Suresh Kumar, Electric Circuit Analysis, Pearson (2013).

5. D. Roy Choudhury, Networks and Systems, New Age International, 1998.

Evaluation Scheme:

Continuous Assessment (A):

Subject teacher will declare Teacher Assessment criteria at the start of semester.

Continuous Assessment (B):

1. Two term tests of 15 marks each will be conducted during the semester.

2. Total duration allotted for writing each of the paper is 1 hr.

3. Average of the marks scored in both the tests will be considered for final grading.

End Semester Examination (C):

1. Question paper will be based on the entire syllabus summing up to 65 marks.

2. Total duration allotted for writing the paper is 3 hrs.

Electrical Network Analysis and Synthesis Laboratory (PCET3040L)

Teaching Scheme
Practical: 02 Hrs/Week
Credit: 01

Examination Scheme
Teacher Assessment: 25 Marks
End Sem Exam: 25 Marks
Total Marks: 50 Marks

Course Objectives

1. To verify network theorems.
2. To analyze various network theorems.
3. To analyze two port networks.
4. To synthesize networks.

COs	Course Outcomes	Blooms Level	Blooms Description
CO1	Verify the basic laws of electric circuits	L5	Evaluate
CO2	Determine the different network function for given two ports network	L3	Apply
CO3	Determine the different network Parameters for given two ports network	L3	Apply
CO4	Synthesize different Canonical forms of two port network	L6	Create
CO5	Synthesis of R-C, R-L, R-L-C network	L6	Create

Course Contents

List of Experiments (Any Eight)

1. Verify the Thevenins theorem for given two port resistive/reactive network.
2. Verify the Norton's theorem for given resistive/reactive network.
3. Verify the maximum Power Transfer theorem for resistive/reactive network.
4. Verify the Superposition theorem resistive/reactive network.
5. Determine transfer / driving point Impedance of given two port network.
6. Determine voltage and current transfer function of a given two port network.
7. Determine pole - zero plot of given one port network.
8. Determine Z parameter of two port networks connected in series.
9. Determine Y parameter of two port network connected in parallel.
10. Determine transmission parameter of the network .
11. Synthesize Cauer-I & Cauer-II form.
12. Synthesize Foster-I & Foster-II form.
13. Synthesis of LC circuit.
14. Synthesis of RC circuit.
15. Synthesis of RL circuit.
16. One mini project / subject specific lab assignment/case study based on the theory learnt in the course.

Evaluation Scheme:

Continuous Assessment (A):

Laboratory work shall consist of minimum 8 experiments and subject specific lab assignment/case study/mini project.

The distribution of marks shall be as follows:

1. Performance in Experiments: 05 Marks
2. Journal Submission: 05 Marks
3. Viva-voce: 05 Marks
4. Subject Specific Lab Assignment/Case Study/mini project: 10 Marks

The final certification and acceptance of laboratory journal/manual/report will be subject to satisfactory performance of laboratory work and upon fulfilling minimum passing criteria in the teacher assessment.

End Semester Examination (C):

Oral / Practical examination will be based on the entire syllabus including, the practicals performed during laboratory sessions.

Signals and Systems (PCET3050T)

Teaching Scheme
Lectures: 03 Hrs./Week
Credit: 03

Examination Scheme
Term Test: 15 Marks
Teacher Assessment: 20 Marks
End Sem Exam: 65 Marks
Total: 100 Marks

Course Objectives

1. To introduce students the concept and theory of signals and systems needed in electronics and telecommunication engineering fields.
2. To introduce students to the basic idea of signal and system analysis and its characterization in time and frequency domain.

COs	Course Outcomes	Blooms Level	Blooms Description
CO1	Classify, and perform mathematical operations on various types of signals and systems.	L4	Analyze
CO2	Determine the impulse response and analyse LTI systems in time domain using convolution integral and convolution sum.	L3	Apply
CO3	Analyze the effect of frequency transformation of signals and systems in continuous and discrete time domain.	L4	Analyze
CO4	Apply the concepts of signals and systems in different areas of telecommunication.	L3	Apply

Course Contents

Unit-I Introduction to Signals 10 Hrs.

Definition, Sampling theorem, Sampling of continuous time signals, Nyquist Criterion, Concept of aliasing, Concept of digital frequency. Continuous and discrete time representation of elementary signals: Exponential, Sine, Step, Impulse, Ramp, Rectangular, Triangular, Signum, Sinc, Operations on signals (shift, invert, scale) Classification of signals: Continuous and discrete time, Deterministic and non-deterministic, Periodic and aperiodic, Symmetric (even) and asymmetric (odd), Energy and power, Causal and anti-causal signal. Introduction to systems: Definition, Classification of systems: Static and dynamic, Time variant and time invariant, Linear and nonlinear, Causal and non-causal, Stable and unstable systems, Invertible and Non-Invertible Systems.

Unit-II Response of Continuous Time LTI System 10 Hrs.

Representation of systems using differential equation, Impulse response and convolution integral, Properties of convolution, Signal responses to CT-LTI system, System stability Impulse, Step and System stability Response of Discrete Time-LTI System: Representation of systems using difference equation, Impulse response characterization and convolution sum, Properties of convolution summation, Impulse response of DT-LTI system and its properties, Step response, System stability. Correlation and spectral Density: Auto-correlation, Cross correlation, Analogy between correlation and convolution, Energy spectral density, Power spectral density, Relation of ESD, PSD with auto-correlation.

Unit-III Fourier Series 08 Hrs.

Trigonometric and exponential Fourier series representation of C T signals, Gibbs phenomenon.

Fourier Transform (FT): Fourier Transform and Inverse Fourier Transform of a-periodic continuous and discrete time signals and systems, Limitations of CT/DT Fourier Transform and need for Laplace/Z Transform.

Overview of Laplace Transform: Need of Laplace Transform, Review of unilateral and bilateral Laplace Transform, properties, Inverse of Laplace Transform, Concept of Region of Convergence (ROC), Poles and zeros, Relation between continuous time Fourier Transform and Laplace Transform.

Unit-IV Z Transform 10 Hrs.

Need of Z Transform, Definition of unilateral and bilateral Z Transform, Z Transform of finite and infinite duration sequences, Properties, Inverse Z Transform, Relation between discrete time Fourier Transform and Z Transform, Z Transform of standard signals, ROC for ZT, Plotting poles and zeros of transfer function.

Analysis of discrete time LTI systems using Z-Transform: Transfer Function, Causality and stabil

of systems, Relation between Laplace Transform and Z Transform.

Realization structures: Direct formI, Direct formII, Cascade and parallel forms.

Unit-V Application of Various Signals 04 Hrs.

Types of signals used in bio-medical field, Speech, Audio Processing and Multimedia (image & video) field. Application of Communication and Filter System: Modulation (Analog and Digital) process, Low Pass and High pass filters as Systems.

Text Books

1. Tarun Kumar Rawat, Signals and Systems, Oxford, 2^{nd} Edition, 2010.
2. B. P. Lathi, Principles of Linear Systems and Signals, Oxford, 2^{nd} Edition, 2010.
3. S. L. Nalbalwar, A. M. Kulkarni and S. P. Sheth, Signals and Systems, Synergy Knowledgeware, 2016.
4. Simon Haykin and Barry Van Veen, Signals and Sytems, John Wiley and Sons, 2^{nd} Edition,2004.
5. Alan V. Oppenhiem, Alan S. Willsky and S. Hamid Nawab, Signals and Systems, Prentice-Hall of India, 2^{nd} Edition, 2002.
6. Nagoor Kani, Signals and Systems, Tata McGraw Hill, 3^{rd} Edition, 2011.

Reference Books

1. Hwei. P Hsu, Signals and Systems, Tata McGraw Hill, 3^{rd} Edition, 2010.
2. V. Krishnaveni and A. Rajeshwari, Signals and Systems, Wiley-India, 1^{st} Edition 2012.
3. Narayana Iyer, Signals and Systems, Cenage Learning, 1^{st} Edition, 2011.
4. Michael J Roberts, Fundamentals of Signals and Systems, Tata McGraw Hill, Special Indian Economy Edition, 2009.
5. Rodger E Ziemer, William H. Tranter and D. Ronald Fannin, Signals and Systems, Pearson Education, 4^{th} Edition, 2009.

Evaluation Scheme:

Continuous Assessment (A):

Subject teacher will declare Teacher Assessment criteria at the start of semester.

Continuous Assessment (B):

1. Two term tests of 15 marks each will be conducted during the semester.
2. Total duration allotted for writing each of the paper is 1 hr.

3. Average of the marks scored in both the tests will be considered for final grading.

End Semester Examination (C):

1. Question paper will be based on the entire syllabus summing up to 65 marks.

2. Total duration allotted for writing the paper is 3 hrs.

Signals and Systems Laboratory (PCET3050L)

Teaching Scheme
Practical: 02 Hrs/Week
Credit: 01

Examination Scheme
Teacher Assessment: 25 Marks
End Sem Exam: 25 Marks
Total Marks: 50 Marks

Course Objectives

1. To understand basics of MATLAB.
2. To design and analyze signals in time & frequency domain.
3. To implement various transforms.

COs	Course Outcomes	Blooms Level	Blooms Description
CO1	Understand the basics operation of MATLAB	L2	Understand
CO2	Analysis the time domain and frequency domain signals.	L2	Analyze
CO3	Implement the concept of Fourier series and Fourier transforms.	L3	Apply
CO4	Find impulse response and step response of a system	L1	Remember
CO5	Examining frequency response of the system	L3	Apply

Course Contents

List of Laboratory Experiments

Laboratory must include six experiments and four tutorials.

1. Introduction to Matlab.
2. To plot various types of Continuous time signals.
3. To implement Sampling and reconstruction of Continuous Signals.
4. To plot various types of discrete time signals and perform various operations on unit step signals.
5. To perform convolution of two discrete time signals.
6. To observe frequency response of various signals.
7. To find poles, zeros and ROC of any DT system using Z transform.
8. To analyze the spectrogram of a speech signal.
9. Tutorial 1(Operation on signals).
10. Tutorial 2(Convolution sum, Convolution Integral and Correlation).
11. Tutorial 3(Fourier, Laplace Transform).
12. Tutorial 4(Z transform and Realization structures).
13. One mini project / subject specific lab assignment/case study based on the theory learnt in the course.

Any other experiment based on syllabus may be included, which would help the learner to understand topic/concept.

Evaluation Scheme:

Continuous Assessment (A):

Laboratory must include six experiments, four tutorials and subject specific lab assignment/case study

The distribution of marks shall be as follows:

1. Performance in Experiments: 05 Marks
2. Journal Submission: 05 Marks
3. Viva-voce: 05 Marks
4. Subject Specific Lab Assignment/Case Study/mini project: 10 Marks

The final certification and acceptance of laboratory journal/manual/report will be subject to satisfactory performance of laboratory work and upon fulfilling minimum passing criteria in the teacher assessment.

End Semester Examination (C):

Oral / Practical examination will be based on the entire syllabus including, the practicals performed during laboratory sessions.

Object Oriented Programming Laboratory (PCET3060L)

Teaching Scheme
Practical: 04 Hrs/Week
Credit: 02

Examination Scheme
Teacher Assessment: 25
End Sem Exam: 25
Total: 50 Marks

Course Objectives

1. Describe the principles of object-oriented programming (OOP).
2. To understand object-oriented concepts such as data abstraction, encapsulation, inheritance and polymorphism.
3. To lay a foundation for advanced programming.
4. Develop programming insight using OOP constructs.

COs	Course Outcomes	Blooms Level	Blooms Description
CO1	Describe the basic principles of OOP.	L1	Knowledge
CO2	Design and apply OOP principles for effective programming.	L5	Synthesize
CO3	Develop programming applications using OOP language.	L5	Synthesize
CO4	Implement different programming applications using packaging.	L3	Apply

Course Contents

Unit-I Fundamentals of C++ Programming 10 Hrs.

Fundamentals of C++ Programming: Basics of C++: Introduction to OOP language and its basic features, Basic components of a C++, Program and program structure, Writing, Compiling and executing the First C++ Program. Tokens: Data types, Variables, Identifiers, constants. Scope of Variables: Introduction, Syntax of declaring a variable, initializing a variable, Scope of variables, Global variable, Local variable. Functions: What is a function, Function with arguments, Function without arguments. Conditional Statements: If and Else-If statements, Nested If and Switch statements, Continue statement, Break statement. Operators: Increment, Decrement operators, Typecasting, Arithmetic Operators, Relational Operators, Logical Operators, Loops: for, while, do, while loops. Array : Definition, Declaration and initialization of 1D and 2D array, Accepting values from the user, Strings: Definition, Syntax for declaring a string, Syntax for initializing a string, To read a string from keyboard, String Handling functions: strcpy, strncpy, Strcat, strncat, Strcmp, strncmp, strtok, Strlen, Structures: Introduction, Syntax, Declaration and initialization, Declaration of structure variables, Accessing structure variables. Pointers: Introduction, Syntax of Pointer, Declaration, Casting Between Numeric Address and Pointer, Constant Pointer and Pointer to Constant, Pass Pointer By Reference, Receive array with pointer, operations on pointers, Pointer Offset and Subscription, "sizeof" operator. Function call: types of function calls, function pass by value, function pass by reference.

Unit-II Classes and Constructors in C++ 08 Hrs.

Classes and Objects in C++: Defining Classes, Create a class, Defining Objects, Create an object of the class, Member Functions, to create a function, Encapsulation, Data Abstraction. Constructor and Destructor: To create a constructor, Parameterized constructors, Default constructor, Destructor. Static members in C++: Static Keyword, Static variable, Static member function.

Unit-III Inheritance, Polymorphism, Exception Handling in C++ 10 Hrs.

Inheritance: Concept of subclass and superclass, Types of inheritance, Single level inheritance, Multilevel inheritance, Multiple Inheritance, Hierarchical Inheritance Function overloading, Function overriding, Difference between both. Polymorphism in C++: Polymorphism, Virtual Members, Virtual Function. Abstract class in C++: Pure virtual function-abstract class, Abstract methods. Friend Function: friend function. Exception Handling: Exceptions, try, throw, catch.

Unit-IV Introduction to Java 02 Hrs.

Java History, Java Features, Java Virtual Machine, Programming Language JDK Environment and

Tools, Structure of Java Program, First Java Program. Data Types and Size (Signed vs. Unsigned, User Defined vs. Primitive Data Types, Explicit Pointer type).

Unit-V Inheritance, Polymorphism, Encapsulation using Java 10 Hrs.

Classes and Methods: Class fundamentals, Declaring objects, Assigning object reference variables, adding methods to a class, returning a value, constructors, this keyword, garbage collection, finalize() method, overloading methods, argument passing, object as parameter, returning objects, access control, static, final, nested and inner classes, command line arguments, variable-length Arguments. String: String Class and Methods in Java. Inheritances: Member access and inheritance, super class references, Using super, multilevel hierarchy, constructor call sequence, method overriding, dynamic method dispatch, abstract classes, Object class. Packages and Interfaces: defining a package, finding packages and CLASSPATH, access protection, importing packages, interfaces (defining, implementation, nesting, applying), variables in interfaces, extending interfaces, instance of operator.

Unit-VI Exception Handling, Applets and Swing in Java 14 Hrs.

Exception Handling: fundamentals, exception types, uncaught exceptions, try, catch, throw, throws, finally, multiple catch clauses, nested try statements, built-in exceptions, custom exceptions (creating your own exception sub classes). Managing I/O: Streams, Byte Streams and Character Streams, Predefined Streams, Reading console Input, Writing Console Output and Print Writer class. Threading: Introduction, thread life cycle, Thread States: new, runnable, Running, Blocked and terminated, Thread naming, thread join method, Daemon thread. Applet: Applet fundamental, Applet architecture, Applet life cycle, Applet skeleton, Requesting repainting, Status window, HTML Applet tag, Passing parameters to Applets, Applet and application program. Java Swing: Introduction to swing, Components and Containers, Swing packages and event handling, Simple swing, GUI application.

Text Books

1. Bjarne Stroustrup, The C++ Programming language, 3rd Edition, Pearson Education.
2. Yashwant Kanitkar, Let Us C++, 3rd Edition, BPB Publications.
3. Herbert Schidt, Java: The Complete Reference, Tata McGraw-Hill Publishing Company Limited, 9th Edition.
4. Yashwant Kanitkar, Let Us Java, 2nd Edition, BPB Publications.
5. Spoken Tutorials C++ of IITB.
6. Spoken Tutorials Java of IITB.

Reference Books

1. Deitel, C++ How to Program, 4^{th} Edition, Pearson Education.
2. D.T. Editorial Services, Java 8 Programming Black Book, Dreamtech Press, Edition: 2015.
3. Deitel, Java: How to Program, 8/e, Deitel, PHI.
4. Grady Booch, James Rumbaugh, Ivar Jacobson, The Unified Modeling Languageser Guide, Pearson Education.

Software Tools

1. Raptor-Flowchart Simulation: http://raptor.martincarlisle.com/
2. Eclipse: https://eclipse.org/
3. NetBeans: https://netbeans.org/downloads/
4. CodeBlock: http://www.codeblocks.org/
5. J-Edit/J-Editor/Blue J

Online Repository

1. Google Drive
2. GitHub
3. Code Guru

Evaluation Scheme:

Continuous Assessment (A):

Laboratory work shall consist of minimum 8 experiments of C++ and 8 experiments of Java and one Mini Project each of C++ and Java and subject specific lab assignment/case study. The distribution of marks shall be as follows:

1. Performance in Experiments: 05 Marks
2. Journal Submission: 05 Marks
3. Viva-voce: 05 Marks
4. Subject Specific Lab Assignment/Case Study/mini project: 10 Marks

The final certification and acceptance of laboratory journal/manual/report will be subject to satisfactory performance of laboratory work and upon fulfilling minimum passing criteria in the teacher assessment.

End Semester Examination (C):

Oral / Practical examination will be based on the entire syllabus including, the practicals performed during laboratory sessions.

Semester Project- I (PJET3070L)

Practical Scheme
Practical : 02 Hrs./week
Credit : 01

Examination Scheme
Teacher Assessment : 25 Marks
End Sem Exam : 25 Marks
Total : 50 Marks

Course Objectives:

Students are expected to design, simulate/implement a project based on the knowledge acquired from current semester subjects.

CO	Course Outcomes	Blooms Level	Blooms Description
CO1	Conduct a survey of several available literatures in the preferred field of study.	L4	Analyze
CO2	Demonstrate various/alternate approaches to complete a project.	L2	Understand
CO3	Ensure a collaborative project environment by interacting and dividing project work among team members.	L3	Apply
CO4	Present their project work in the form of a technical report / paper and thereby improve the technical communication skill.	L3	Apply
CO5	Demonstrate the ability to work in teams and manage the conduct of the research study.	L2	Understand

Semester Project:

The purpose of introducing semester project at second year level is to provide exposure to students with a variety of projects based on the knowledge acquired from the semester subjects. This activity is supposed to enrich their academic experience and bring enough maturity in student while selecting the project. Students should take this as an opportunity to develop skills in implementation, presentation and discussion of technical ideas/topics. Therefore, proper attention shall be paid to the content of semester project report which is being submitted in partial fulfillment of the requirements of the Second Year and it is imperative that a standard format be prescribed for the report.

Each student shall work on project approved by departmental committee approved by the Head of Department, a group of 03 to 05 students (max allowed: 5 students in extraordinary cases, subject to the approval of the department committee and the Head of the department) shall be allotted for each Semester Project. Each group shall submit at least 3 topics for the Semester Project. The departmental committee shall finalize one topic for every group. Semester Project Title or Theme should be based on knowledge acquired during semester. The project work shall involve sufficient work so that students get acquainted with different aspects of knowledge acquired from semester subjects.

Student is expected to:

- Select appropriate project title based on acquired knowledge from current semester subjects.
- Maintain Log Book of weekly work done (please see attached log book format).
- Report weekly to the project guide along with log book.

Assessment Criteria:

- At the end of the semester, after confirmation by the project guide, each project group will submit project completion report in prescribed format for assessment to the departmental committee (including project guide).
- Assessment of the project (at the end of the semester) will be done by the departmental committee (including project guide).

Prescribed project report guidelines:

Size of report shall be of minimum 25 pages. Project Report should include appropriate content for:

- Introduction
- Literature Survey
- Related Theory
- Implementation details

- Project Outcomes
- Conclusion
- References

Assessment criteria for the departmental committee (including project guide) for Continuous Assessment:

Guide will monitor weekly progress and marks allocation will be as per Table 2.

Assessment criteria for the departmental committee (including project guide) for End Semester Exam:

Departmental committee (including project guide) will evaluate project as per Table 3.

Each group shall present/publish a paper based on the semester project in reputed/peer reviewed Conference/Journal/TechFest/Magazine/ before the end of the semester.

Table 1: Log Book Format

Sr	Week (Start Date:End Date)	Work Done	Sign of Guide	Sign of Coordinator
1				
2				

Table 2: Continuous Assessment Sheet

Sr	Exam Seat No	Name of Student	Student Attendance	Log Book Maintain	Literature Review	Depth of Understanding	Report	Total
			5	5	5	5	5	25

Table 3: Evaluation Sheet

Sr	Exam Seat No	Name of Student	Project Selection	Design/ Simulation/ Logic	PCB/ hardware/ programming	Result Verification	Presentation	Total
			5	5	5	5	5	25

Constitution of India (MCET3080T)

Teaching Scheme
Lectures: 01 Hrs./Week

Audit Course

Course Objectives

1. To provide basic information about Indian constitution.
2. To identify individual role and ethical responsibility towards society.
3. To understand human rights and its implications.

COs	Course Outcomes	Blooms Level	Blooms Description
CO1	Have general knowledge and legal literacy and thereby to take up competitive examinations.	L1	Remember
CO2	Understand state and central policies, fundamental duties.	L1	Remember
CO3	Understand Electoral Process, special provisions.	L1	Remember
CO4	Understand powers and functions of Municipalities, Panchayats and Co- operative societies,	L1	Remember
CO5	Understand Engineering ethics and responsibilities of Engineers	L1	Remember
CO6	Understand Engineering Integrity & Reliability	L1	Remember

Course Contents

Unit-I Introduction to the Constitution of India 02 Hrs.

The making of the Constitution and salient features of the Constitution. Preamble to the Indian Constitution, Fundamental rights & its limitations.

Unit-II Directive Principles of State Policy 03 Hrs.

Relevance of Directive Principles, State Policy Fundamental Duties. Union Executives-President, Prime Minister, Parliament, Supreme Court of India.

Unit-III State Executives 03 Hrs.

Governor, Chief Minister, State Legislature High Court of State. Electoral Process in India, Amendment Procedures, 42^{nd}, 44^{th}, 74^{th}, 76^{th}, 86^{th} & 91^{st} Amendments.

Unit-IV Special Provisions 03 Hrs.

For SC & ST Special Provision for Women, Children & Backward Classes Emergency Provisions. Human Rights: Meaning and Definitions, Legislation Specific Themes in Human Rights, Working of National Human Rights Commission in India, Powers and functions of Municipalities, Panchyats and Co-Operative Societies.

Unit-V Scope & Aims of Engineering Ethics 03 Hrs.

Responsibility of Engineers, Impediments to Responsibility. Risks, Safety and liability of Engineers, Honesty, Integrity & Reliability in Engineering.

Text Books

1. Durga Das Basu, Introduction to the Constitution on India, (Students Edn.) Prentice Hall EEE, 19^{th} / 20^{th} Edition, 2001.

2. Charles E. Haries, Michael S Pritchard and Michael J. Robins, Engineering Ethics, Thompson Asia, 2003-08-05.

Reference Books

1. M. V. Pylee, An Introduction to Constitution of India, Vikas Publishing, 2002.

2. M. Govindarajan, S. Natarajan, V. S. Senthilkumar, Engineering Ethics, Prentice Hall of India Pvt. Ltd. New Delhi, 2004.

3. Brij Kishore Sharma, Introduction to the Constitution of India, PHI Learning Pvt. Ltd., New Delhi, 2011.

4. Latest Publications of Indian Institute of Human Rights, New Delhi.

Website Resources

1. www.nptel.ac.in
2. www.hnlu.ac.in
3. www.nspe.org
4. www.preservearticles.com

Evaluation Scheme:

1. Student should submit a report on the case study declared by teacher.
2. Audit point shall be awarded subject to submission of report of the case study declared by teacher.

Field/Internship/Industry Training (INTET3090)

Course Objectives

1. To get exposure of industrial ecosystem.
2. To enhance student's knowledge in the particular technology.
3. To nurture student's leadership ability and responsibility to perform or execute the given task individually or in team.

COs	Course Outcomes	Blooms Level	Blooms Description
CO1	To apply fundamental principles of engineering.	L3	Aplly
CO2	To become master in specialized/emerging technology	L6	Evaluate
CO3	Self-improvement through continuous professional development and life-long learning	L6	Evaluate
CO4	To get awareness of the ethics, social, cultural, global and environmental responsibility as an engineer.	L2	Comprehension

Guidelines

Internship/industry training of minimum of six weeks in an industry in the area of Electronics & Telecommunication Engineering shall be done. The summer/winter internship should give exposure to the practical aspects of the discipline. In addition, the student may also work on a specified task or project which may be assigned to him/her. The outcome of the internship should be presented in the form of a report.

1. Student shall undergo industrial training /internship for a minimum period of **SIX** weeks in total during summer/winter vacations of third to sixth semester.
2. The industry in which industrial training/internship is taken should be a medium or large scale industry.
3. The paper bound report on training must be submitted by the student in the beginning of **Seventh** semester along with a certificate from the company where the student took training.
4. Every student should write the report separately.
5. Institute / Department / T& P Cell have to assist the students for finding Industries for the training/internship.
6. Students must take prior permission from department before joining for industrial training/internship.
7. Note that, the degree certificate will not be awarded if the certificate of field/industry/internship is not submitted to the department.
8. The field/industry/internship training will be reflected on the final mark sheet/degree certificate in the section of audit points completed.

Engineering Mathematics - IV (BSET4010T)

Teaching Scheme
Lectures: 03 Hrs./Week
Tutorial: 01 Hr/Week
Credit: 04

Examination Scheme
Term Test: 15 Marks
Teacher Assessment: 20 Marks
End Sem Exam: 65 Marks
Total: 100 Marks

Course Objectives

1. Random variables and random process.
2. The design of the systems which involves randomness using mathematical analysis and computer simulations.
3. Concepts of linear algebra.

COs	Course Outcomes	Blooms Level	Blooms Description
CO1	Apply theory of probability in identifying and solving relevant problems.	L3	Apply
CO2	Differentiate random variables through the use of cumulative distribution function (CDF),Probability density function (PDF), Probability mass function (PMF) as well as joint, marginal and conditional CDF, PDF and PMF.	L2	Understand
CO3	Determine the response of a linear time invariant system to random processes.	L3	Apply
CO4	Understand the theory of linear algebra and its applications to telecommunication engineering.	L2	Understand

Course Contents

Unit-I Introduction to Probability and Random Variable 10 Hrs.

Sample space, events, Set operations, The notion and axioms of probability, Conditional probability, Joint probability, Bayes' rule, Independence of events. Definition of Random Variable. Continuous random variables, Probability density function, Probability distribution function, Uniform, Exponential and Gaussian continuous random variables and distributions.

Unit-II Operations on One and Multiple Random Variable 10 Hrs.

Functions of a random variable and their distribution and density functions, Expectation, Variance and moments of random variable. Pairs of random variables, Joint CDF, Joint PDF, Independence, Conditional CDF and PDF, Conditional expectation, One function of two random variables, Two functions of two random variables, Joint moments, Joint characteristic function, Co-variance and correlation-independent, Uncorrelated and orthogonal random variables. Central limit theorem and its significance.

Unit-III Random Process 05 Hrs.

Random process: Definition, Realizations, Sample paths, Discrete and continuous time processes. Probabilistic structure of a Random process: Mean, Correlation and co-variance functions, Stationarity of random process. Ergodicity and WSS.

Unit-IV Matrix Theory 10 Hrs

Eigenvalues and Eigenvectors, Properties of Eigenvalues and Eigenvectors. Cayley-Hamilton theorem, Examples based on verification of Cayley-Hamilton theorem. Similarity of matrices, Diagonalization of matrices. Function of square matrix. Quadratric forms over real field, Reduction of quadratic form to a diagonal canonical form, Rank, Index and signature of quadratic form, Sylvester's law of inertia, Value-class of quadratic form of definite, Semi-definite and indefinite.

Unit-V Linear Algebra 07 Hrs.

Vector Spaces, Subspaces, Span, Basis, Dimension, Rank. Linear transformations, Givens and Householder transformations, Application of SVD to principal component analysis

Text Books

1. T. Veerarajan, Probability, Statistics and Random Processes, McGraw Hill, 3rd Edition.
2. Papoulis and S. Unnikrishnan Pillai, Probability, Random Variables and Stochastic Processes, 4th Edition, McGraw Hill.

3. Alberto Leon Garcia, Probability And Random Processes For Electrical Engineering, 4^{th} Edition, Pearson Education.

4. B. S. Grewal, Higher Engineering Mathematics, Khanna Publication, 44^{th} Edition.

Reference Books

1. Miller, Probability and Random Processes-With Applications to Signal Processing and Communication, 1^{st} Edition 2007, Elsevier.

2. Dimitris G. Manolakis, Vinay Ingale and Stephen M. Kogon, Statistical and Adaptive Signal Processing, Artech House, Inc., 2005.

3. Todd K. Moon and Wynn C. Stirling, Mathematical Methods and Algorithms for Signal Processing, Pearson Education, Inc., 2000.

4. Seymour Lipschutz and Marc Lipson, Linear Algebra Schaum's outline series, Mc-Graw Hill Publication, 3^{rd} Edition.

Evaluation Scheme:

Continuous Assessment (A):

Subject teacher will declare Teacher Assessment criteria at the start of semester.

Continuous Assessment (B):

1. Two term tests of 15 marks each will be conducted during the semester.

2. Total duration allotted for writing each of the paper is 1 hr.

3. Average of the marks scored in both the tests will be considered for final grading.

End Semester Examination (C):

1. Question paper will be based on the entire syllabus summing up to 65 marks.

2. Total duration allotted for writing the paper is 3 hrs.

Tutorial

List of Tutorials: (Any Eight)

1. Probability: Sample Space, events, Venn Diagram, De Morgan's law, Properties of Probability, Conditional Probability.

2. Bayes Rule, Application of probability in communication

3. Random Variables: Functions of a random variable, distribution and density functions

4. Binomial, Poisson, Geometric discrete Random variable and their distributions.

5. Transformation of random variable, characteristic function, moment generating function of Bernoulli, Poisson, exponential random variable

6. Pairs of random variable, Joint CDF, Joint PDF, conditional CDF and PDF.

7. One function of Two random variables, Two functions of Two random variables

8. Mean and variance of a Random Process.

9. Eigenvalues and eigenvectors.

10. Quadratic forms.

11. Implementation of Gram Schmidt orthogonalization process.

12. Implementation of the singular vector decomposition algorithm.

Any other experiment based on syllabus may be included, which would help the learner to understand topic/concept.

Analog Communication (PCET4020T)

Teaching Scheme
Lectures: 03 Hrs./Week
Credit: 03

Examination Scheme
Term Test: 15 Marks
Teacher Assessment: 20 Marks
End Sem Exam: 65 Marks
Total: 100 Marks

Course Objectives

1. To understand basics of communication systems and effect of noise on communication.
2. To understand various Continuous and pulse modulation, demodulation techniques.
3. Get acquainted with various types of multiplexing techniques and their use in communication.

COs	Course Outcomes	Blooms Level	Blooms Description
CO1	Describe different types of noise and its effect on communication system.	L1	Knowledge
CO2	Analyze AM, FM, PM modulation and demodulation systems.	L4	Analyze
CO3	Explain the block diagram of various types of receiver for analog communication.	L2	Understand
CO4	Apply Sampling Technique in various pulse modulation systems.	L3	Apply
CO5	Explain and differentiate TDM and FDM techniques used in communication.	L2	Understand

Course Contents

Unit-I Basics of Communication System 04 Hrs.

Block diagram, Electromagnetic spectrum, Signal bandwidth and power, Types of communication channels, Introduction to time and frequency domain. Types of noise, Signal to noise ratio, Noise figure and noise temperature.

Unit-II Amplitude Modulation and Demodulation 10 Hrs.

Basic concepts, Signal representation, Need for modulation. DSBFC: Mathematical analysis, Time domain waveforms, Frequency spectrum, Modulation index, Concept of under modulation, Over modulation and critical modulation, Bandwidth, Voltage distribution and power calculations. Low level and high level modulation, Simple diode detector, Practical diode detector, Square law detector. DSBSC: Mathematical analysis, Time domain waveforms, Frequency spectrum, Modulation index, Bandwidth, Voltage distribution and power calculations. Multiplier modulator, Balanced Modulator. SSBSC: Mathematical analysis, Time domain waveforms, Frequency spectrum, Modulation index, Bandwidth, Voltage distribution and power calculations. SSB generation, Filter method, Phase shift method, Third method. ISB: Basic concepts, Transmitter and receiver block diagram, Applications. VSB: Basic concepts, Application in television. Comparison of different AM techniques

Unit-III Angle Modulation and Demodulation 10 Hrs.

Frequency modulation (FM): Basic concept, Mathematical analysis, Time domain waveform, Spectrum of FM wave, Maximum deviation, Modulation index, Bandwidth requirement, Narrowband FM and wideband FM, Effect of noise, Noise triangle, Pre-emphasis and de-emphasis, FET reactance modulator, Varactor diode modulator, Frequency stabilized reactance modulator, Indirect method of FM generation. Phase modulation (PM): Basic concept, Mathematical analysis, Time domain waveform, Maximum deviation, Modulation index, Principle and working of transistor direct PM modulator, FM demodulation: Balance slope detector, Foster-Seely discriminator, Ratio detector, Amplitude limiting and thresholding. Comparison between FM and PM, Applications of FM and PM.

Unit-IV Radio Receivers 06 Hrs.

Receiver parameters, TRF receiver, Problems in TRF receiver, Superheterodyne receiver, Choice of IF. Importance of RF amplifier, Tracking circuit, Mixer, IF amplifier, Simple AGC, AFC in superheterodyne receiver. Comparison of FM receiver with AM receiver, Communication receiver

Unit-V Pulse Modulation & Demodulation 08 Hrs.

Sampling theorem, Nyquist criteria, Sampling techniques, Aliasing error and aperture effect, PAM, PWM, PPM generation and detection, Pulse Code Modulation, Delta modulation, Adaptive delta

modulation, Principle of generation and detection, Applications of pulse communication

Unit-VI Multiplexing & De-multiplexing 04 Hrs.

Frequency Division Multiplexing transmitter & receiver block diagram, Time Division Multiplexing transmitter & receiver block, Examples and applications of FDM and TDM

Text Books

1. Kennedy & Devis, Electronic Communication System, McGraw Hill Education Pvt. Ltd.
2. Wayne Tomasi, Electronic Communication System, Pearson.
3. B. P. Lathi, Zhi Ding, Modern Digital and Analog Communication System, Oxford University Press.

Reference Books

1. Toub Schilling and Shaha, Principles of Communication Systems, Tata McGraw Hill
2. Symon Haykin, Michal Moher, Introduction to Analog and Digital Communication, Wiley.

Evaluation Scheme:

Continuous Assessment (A):

Subject teacher will declare Teacher Assessment criteria at the start of semester.

Continuous Assessment (B):

1. Two term tests of 15 marks each will be conducted during the semester.
2. Total duration allotted for writing each of the paper is 1 hr.
3. Average of the marks scored in both the tests will be considered for final grading.

End Semester Examination (C):

1. Question paper will be based on the entire syllabus summing up to 65 marks.
2. Total duration allotted for writing the paper is 3 hrs.

Analog Communication Laboratory (PCET4020L)

Teaching Scheme
Practical: 02 Hrs/Week
Credit: 01

Examination Scheme
Teacher Assessment: 25 Marks
End Sem Exam: 25 Marks
Total: 50 Marks

Course Objectives

1. To analyze modulation and demodulation circuit responses.
2. To understand pulse modulation and demodulation techniques.
3. To understand sampling and reconstruction technique.

COs	Course Outcomes	Blooms Level	Blooms Description
CO1	To analyze various AM, FM modulation & demodulation	L4	Analyze
CO2	To analyze pre-emphsis & de-emphasis	L4	Analyze
CO3	To analyze pulse modulation	L4	Analyze

Course Contents

List of Laboratory Experiments: (Any Eight)

1. Study of Amplitude Modulation.
2. Study of Double Side Band Suppressed Carrier and Single Side Band Amplitude Modulation.
3. Simulate of AM System and Generate Time and Frequency Domain Output.
4. To Study Different Types of Frequency Modulators and Demodulators.
5. Simulate Frequency Modulation System Generate Time and Frequency Domain Output.
6. Implement Pre-emphasis and De-emphasis Circuit Required for FM and Analyze the Output.
7. Study of Natural Sampling and its Reconstruction.
8. Study of Flat Top Sampling and It's Reconstruction.
9. Study of Pulse Amplitude Modulation.
10. Study of Pulse width Modulation.
11. Study of Pulse Position Modulation.
12. Study of PAM-TDM System.
13. Study of FDM.
14. One mini project / subject specific lab assignment/case study based on the theory learnt in the course.

Any other experiment based on syllabus may be included, which would help the learner to understand topic/concept.

Evaluation Scheme:

Continuous Assessment (A):

laboratory work shall consist of minimum 8 experiments and subject specific lab assignment/case study/mini project.

The distribution of marks shall be as follows:

1. Performance in Experiments: 05 Marks
2. Journal Submission: 05 Marks
3. Viva-voce: 05 Marks

4. Subject Specific Lab Assignment/Case Study/mini project: 10 Marks

The final certification and acceptance of laboratory journal/manual/report will be subject to satisfactory performance of laboratory work and upon fulfilling minimum passing criteria in the teacher assessment.

End Semester Examination (C):

Oral / Practical examination will be based on the entire syllabus including, the practicals performed during laboratory sessions.

Integrated Circuits (PCET4030T)

Teaching Scheme
Lectures: 03 Hrs./Week
Credit: 03

Examination Scheme
Term Test (Th): 15 Marks
Teacher Assessment: 20 Marks
End Sem Exam: 65 Marks
Total: 100 Marks

Course Objectives

1. To understand fabrication of integrated circuit.
2. To analyze active load differential amplifier
3. To understand the concepts, working principles and key applications of linear integrated circuits.
4. To perform analysis of circuits based on linear integrated circuits.
5. To design circuits and systems for particular applications using linear integrated circuits.

COs	Course Outcomes	Blooms Level	Blooms Description
CO1	Analyze various constant current source circuit using MOS.	L4	Analysis
CO2	Design and implement active load differential amplifier.	L6	Create
CO3	Understand the fundamentals and areas of applications for the integrated circuits.	L2	Understand
CO4	Demonstrate the ability to design practical circuits that perform the desired operations.	L3	Apply
CO5	Select the appropriate integrated circuit modules to build a given application.	L5	Evaluate

Course Contents

Unit-I Physics of MOSFET 05 Hrs.

NMOS, PMOS enhancement and depletion mode MOSFET transistor, Threshold voltage, Linear and saturated operation, FET capacitance.

Unit-II Silicon Semiconductor Technology 07 Hrs.

Fabrication of passive elements, NMOS and PMOS processes, CMOS using n-well, CMOS using p-well, CMOS using twin tub process, CMOS Latch up, Comparison between MOS and Bipolar technology, Bipolar processes.

Unit-III Current Sources & Operational Amplifier Overview 12 Hrs.

Current Mirror, Current sources using FETs, Widlar current source, Wilson current source. Block diagram of Op-Amp, Basic MOS differential Amplifier, MOS differential amplifier with active load, Op-Amp symbol and Terminals, Ideal Op-Amp and Practical Op-Amp characteristics, Op-Amp Parameters, Open loop and Closed loop configurations, Inverting, Non-inverting and differential amplifier.

Unit-IV Applications of OP-Amp & Special Purpose Integrated Circuits 12 Hrs.

Summing and difference amplifier, Integrator and Differentiator, Schmitt trigger: Inverting and Non-inverting Schmitt trigger, 3 op-amp Instrumentation amplifier. Overview of Special purpose ICs, Functional block diagram, Working, design of IC 555. Design of astable and monostable multivibrator using Timer 555 Functional block diagram, Working and applications of VCO 566, Functional block diagram, Working and applications of PLL 565 Voltage regulators-functional block diagram, Working of three terminal voltage regulators.

Unit-V Data Converters 06 Hrs.

Performance parameters of ADC, Single ramp ADC, ADC using DAC, Dual slope ADC, Successive approximation ADC, Flash ADC, Performance parameters of DAC, Binary weighted register DAC, R/2R ladder DAC, Inverted R/2R ladder DAC.

Text Books

1. D. A. Neamen, Electronic Circuit Analysis and Design, Tata McGraw Hill, 2nd Edition.
2. Ramakant A. Gayakwad, Op-Amps and Linear Integrated Circuits, Pearson Prentice Hall, 4th Edition.

3. Sung-Mo Kang & Yusuf Leblebici, CMOS Digital Integrated Circuits-Analysis & Design, 2nd Edition, MGH.

Reference Books

1. S. Sedra, K. C. Smith and A. N. Chandorkar, Microelectronic Circuits Theory and Applications, International Version, Oxford International Students, 6th Edition.
2. Sergio Franco, Design with Operational Aamplifiers and Analog Integrated Circuits, Tata Mc-Graw Hill, 3rd Edition.
3. K. R. Botkar, Integrated Circuits, Khanna Publishers (2004).
4. D. Roy Choudhury and S. B. Jain, Linear Integrated Circuits, New Age International Publishers, 4th Edition.

Evaluation Scheme:

Continuous Assessment (A):

Subject teacher will declare Teacher Assessment criteria at the start of semester.

Continuous Assessment (B):

1. Two term tests of 15 marks each will be conducted during the semester.
2. Total duration allotted for writing each of the paper is 1 hr.
3. Average of the marks scored in both the tests will be considered for final grading.

End Semester Examination (C):

1. Question paper will be based on the entire syllabus summing up to 65 marks.
2. Total duration allotted for writing the paper is 3 hrs.

Integrated Circuits Laboratory (PCET4030L)

Teaching Scheme
Practical: 02 Hrs/Week
Credit: 01

Examination Scheme
Teacher Assessment: 25 Marks
End Sem Exam: 25 Marks
Total: 50 Marks

Course Objectives

1. To analyze VI characteristics of MOSFET.
2. To design and implement amplifiers circuits using MOSFET and Op-Amp.
3. To design and analyze voltage regulator.

COs	Course Outcomes	Blooms Level	Blooms Description
CO1	Study VI characteristic of MOSFET using SPICE tool	L1	Remember
CO3	Design Integrator & Differentiator Circuit using IC 741	L6	Create
CO4	Implementation of Astable multivibrator using IC555	L3	Apply
CO5	Explain working of DAC circuit using OPAmp	L2	Understand
CO6	Analyse IC based Voltage regulator circuit	L4	Analyze

Course Contents

List of Laboratory Experiments: (Any Eight)

1. To study VI characteristics of MOSFET using SPICE tool.
2. To design single stage MOS amplifier.
3. To design Differential amplifier using MOSFET.
4. Design Inverting and Non-inverting amplifier using Op-Amp (IC 741).
5. Design Integrator and Differentiator using Op-Amp (IC 741).
6. Design R-2R Ladder DAC using Op-Amp.
7. Design Schmitt trigger using Opamp.
8. Design of Astable Multivibrator using IC 555.
9. Design voltage regulator.
10. One mini project / subject specific lab assignment/case study based on the theory learnt in the course.

Any other experiment based on syllabus may be included, which would help the learner to understand topic/concept.

Evaluation Scheme:

Continuous Assessment (A):

Laboratory work shall consist of minimum 8 experiments and subject specific lab assignment/case study/mini project. The distribution of marks shall be as follows:

1. Performance in Experiments: 05 Marks
2. Journal Submission: 05 Marks
3. Viva-voce: 05 Marks
4. Subject Specific Lab Assignment/Case Study/mini project: 10 Marks

The final certification and acceptance of laboratory journal/manual/report will be subject to satisfactory performance of laboratory work and upon fulfilling minimum passing criteria in the teacher assessment.

End Semester Examination (C):

Oral / Practical examination will be based on the entire syllabus including, the practicals performed during laboratory sessions.

Electromagnetic and Wave Propagation (PCET4040T)

Teaching Scheme
Lectures: 03 Hrs./Week
Tutorial: 01 Hr/Week
Credit: 04

Examination Scheme
Term Test: 15 Marks
Teacher Assessment: 20 Marks
End Sem Exam: 65 Marks
Total: 100 Marks

Course Objectives

1. To learn concept of static and time varying electromagnetic fields.
2. To solve problems related to EM fields using Vectors and Partial differential equations.
3. To learn Electromagnetic radiation and propagation in space and within transmission lines.

COs	Course Outcomes	Blooms Level	Blooms Description
CO1	Compute electric and magnetic fields for symmetrical charge and current configurations using basic principles of electromagnetic	L2	Understand
CO2	Explain coupling between electric and magnetic fields through Faraday's law, displacement current and Maxwell's equations.	L2	Understand
CO3	Explain Wave Polarization and propagation in different media.	L2	Understand
CO4	Determine the parameters of transmission lines for various frequencies.	L5	Evaluate

Course Contents

Unit-I Electrostatics 10 Hrs.

Coulomb's Law, Gauss's Law and its applications, Electric potential, Electric dipole Properties of materials, Convection and conduction Currents, Conductors, Dielectric Polarization, Electric boundary conditions, Poisson's and Laplace's equations, Resistance and capacitance.

Unit-II Magnetostatics 08 Hrs.

Biot-Savart's Law, Ampere's Circuital Law and its applications, Magnetic flux density, Magnetic scalar and vector potentials, Forces due to magnetic fields, Torque and moment, Magnetic dipole, Classification of magnetic materials, Magnetic boundary conditions.

Unit-III Time Varying Fields 08 Hrs.

Faraday's Law, Transformer and motional Electromotive Forces, Displacement current, Maxwell's equations in point form and integral form, Boundary conditions for time varying field, Magnetic vector potential, Time harmonic field.

Unit-IV Electromagnetic Wave Propagation 12 Hrs

Derivation of wave equation and its solution, Wave propagation in lossy dielectrics, Plane waves in loss less dielectrics, Free space and good conductors, Wave polarization, Power and Poynting Vector and skin depth, Reflection of a Plane wave at normal incidence and oblique incidence, Ground wave Propagation: Ground waves, effect of earth's curvature on ground wave propagation, Impact of imperfect earth, Sky Wave propagation Ionosphere and earth magnetic field effect, Critical frequency, Angle of incidence, Maximum usable frequency, Skip distance, Virtual height, Variations in ionosphere and Attenuation and fading of waves in ionosphere Space Wave Propagation

Unit-V Transmission Lines 04 Hrs.

Parameters, Transmission line equations, Input impedance, Reflection coefficient, Standing wave ratio.

Text Books

1. Matthew N. O. Sadiku , S. V. Kulkarni, Principles of Electromagnetics, Oxford university press, 6^{th} Edition.
2. William H. Hayt and John A. Buck, Engineering Electromagnetics, Tata McGraw-Hill Publishing Company Limited, 7^{th} Edition.
3. Edward C. Jordan, Keth G. Balmin, Electromagnetic Waves & Radiating Systems, Pearson Publications, 2^{nd} Edition, 2006.

4. R. K. Shevgaonkar, Electromagnetic Waves, Tata McGraw Hill.

Reference Books

1. J. D. Krauss and Daniel Fleisch, Electromagnetics with applications, 5^{th} Edition.
2. Bhag Singh Guru, Hseyin R. Hiziroglu, Electromagnetic Field Theory Fundamentals, Cambridge University Press, 2^{nd} Edition.
3. Joseph Edminister, Mahmood Nahvi, Electromagnetics, Schaum Outline Series, 4^{th} Edition.
4. D. K. Cheng, Fundamentals of Electromagnetics, Addison Wesley, MA 1993.
5. David M. Pozar, Microwave Engineering, Wiley, 4^{th} edition.

List of Tutorials (Any Seven)

1. Numericals on Electrostatics.
2. Numericals on Electric boundary conditions.
3. Numericals on Poissons and Laplaces equations.
4. Numericals on magnetostatics.
5. Vector potentials.
6. Maxwell equations.
7. Transmission line impedance calculations.
8. Transmission line reflection coefficient calculations.
9. Wave propagation in different material.
10. Normal and oblique incidence.
11. Sky and space Wave propagation.

Any other experiment based on syllabus may be included, which would help the learner to understand topic/concept.

Evaluation Scheme:

Continuous Assessment (A):

Subject teacher will declare Teacher Assessment criteria at the start of semester.

Continuous Assessment (B):

1. Two term tests of 15 marks each will be conducted during the semester.
2. Total duration allotted for writing each of the paper is 1 hr.

3. Average of the marks scored in both the tests will be considered for final grading.

End Semester Examination (C):

1. Question paper will be based on the entire syllabus summing up to 65 marks.

2. Total duration allotted for writing the paper is 3 hrs.

Python Programming Laboratory (ESET4050L)

Teaching Scheme
Practical: 02 Hrs/Week
Credit: 01

Examination Scheme
Teacher Assessment: 25
End Sem Exam: 25
Total: 50

Course Objectives

1. Python programming basics, functions in Python and files handling.
2. GUI Programming and databases operations in Python.
3. Network programming in Python.

COs	Course Outcomes	Blooms Level	Blooms Description
CO1	Describe the various data types, dictionaries and regular expressions in Python.	L1, L2	Knowledge, Comprehension
CO2	Describe different control statements, conditional statements and functions in Python.	L2, L3	Comprehension, Apply
CO3	Realize and encapsulate different file handling and exception handling operations using Python.	L2, L3	Comprehension, Apply
CO4	Design GUI, estimate different database operations and array handling in Python.	L1, L5	Knowledge, Synthesis
CO5	Design and develop network applications using Python.	L2, L3	Comprehension, Apply

Course Contents

Unit-I Introduction to Python 06 Hrs.

History of python, data types & regular expression, Basic data types identifiers, Basic data types, Integer data Type, Float and complex data type, Mathematical functions, string data types, String manipulation functions, String slices, Basic data types collections Lists: Working with lists, Basic operations, Sorting, Count & append, List comprehension Dictionary: Definition, Update dictionary, Dictionary comprehension sets, Tuples and frozen sets, Conversion of list to dictionary, Regular expressions: Match function, Search function, Modifiers, Patterns.

List of suggested practicals: (Any three)

1. To read a number n and print patterns
2. Program to map a list into a dictionary and vice versa.
3. Program to study list and dictionary comprehension.
4. To implement different string manipulation functions.
5. To count the number of letters/ vowels/ consonants in a string or a list or a dictionary.

(Multiple variations of the above suggested programs can be performed)

Unit-II Control Statements and Functions in Python 06 Hrs.

While, for, Nested loops. Use of continue, Pass and break statement. Range function, Conditional statements: if, else, elif, nested if and switch case statements, Function arguments pass by value and reference, Recursive functions.

List of suggested practicals: (Any three) Use of the control statements to implement :-

1. Factorial of a number.
2. Palindrome of number or a string.
3. Fibonacci series.
4. Sine and Cosine series.
5. Pythagoras triplets.
6. Any one program to demonstrate the method of recursive functions.

Unit-III Files Directories & Flow control 06 Hrs.

Making and list directories, Changing directory, list files in directories. File & directory manipulation, File functions, File object attributes, close() method, Opening a binary file, File Attributes, read (read_fixed_size) readline () tell (). Read data from keyboard. File handling: Opening and closing file, Reading and writing files. Exception handling, Except clause, User defined Exceptions.

List of suggested practicals: (Any three) Use of the control statements to implement :-

1. Open a file and read the contents of a file and print.
2. Open a file and write to a file (overwrite and append).
3. Open a file and count the characters present in the file.
4. Program to demonstrate Exception Handling.
5. Splitting of lines by file handling.

Unit-IV Python Database 04 Hrs.

Introduction, Connections and executing queries, Transactions and handling errors, Introduction to GUI programming.

List of suggested practicals: (Any two) Use of the control statements to implement :-

1. Install MySQLdb.
2. Establish database connection.
3. Creating database table.
4. Use of Insert/Read/Update operations in database.

Unit-V Python Libraries 04 Hrs.

Working with numpy, constructing numpy arrays, Printing arrays, Arithmetic operations on matrix, Slicing Arrays, Random number generation. Working with Matplotlib, and pandas: Installation and implementation

List of suggested practicals: (Any two) Use of the control statements to implement :-

1. Data visualization with matplotlib.
2. Array manipulation/strings/indexing/slicing and other numpy library functions.
3. Histogram using matplotlib.
4. Statistical functions in numpy.

5. Any one toolkits to extend python matplotlib functionality.

Unit-VI Python for Networking 04 Hrs.

Socket, Socket Module Clients and Server, Internet Modules.

List of suggested practicals: (Any two) Use of the control statements to implement :-

1. The socket module.
2. Client socket methods.
3. A simple client.
4. A simple server.
5. Sending email using SMTP.

Text Books

1. James Payne, Beginning Python: Using Python 2.6 and Python 3.1, Wrox Publication.
2. Dr. R. Nageswara Rao, Core Python Programming, Dreamtech Press, Wiley Publication.
3. Magnus Lie Hetland, Beginning Python from Novice to Professional, 2nd Edition, Apress Publication.
4. Charles Dierbach, Introduction to Computer Science using Python, Wiley, 2013.

Reference Books

1. Wesley J. Chun, Core Python Applications Programming, 3rd Edition, Pearson Publication.
2. E. Balaguruswamy, Introduction to Computing and Problem Solving using Python, McGraw Hill Education.

List of Laboratory Experiments: (Any Eight)

1. Installing python and setting up environment. Simple statements like printing the names, numbers, mathematical calculations, etc.
2. Programs related to string manipulation.
3. Programs Lists, Tuples, Sets, arrays and dictionaries.
4. Programs based on various loops, conditional constructs and functions.
5. Program to update in the file "friendsContact.txt" which has name and contact and change the number of an old contact.
6. Demonstrate Amplitude-Shift-Keying (ASK) or On-Off Keying (OOK).

7. Compute the spectrum of the above OOK signal using FFT and plot its magnitude.
8. Write a program to demonstrate the BPSK signal of sequence [1 0 0 0 1 0 1 0 0 1].
9. Compute the spectrum of the above BPSK signal.
10. Write python programs to understand TCP and UDP Sockets in Python.
11. Examples illustrating broadcasting in Python (one for each rule of broadcasting).
12. One mini project / subject specific lab assignment/case study based on the theory learnt in the course.

Any other experiment based on syllabus may be included, which would help the learner to understand topic/concept.

Evaluation Scheme:

Continuous Assessment (A):

laboratory work shall consist of minimum 8 experiments and subject specific lab assignment/case study/mini project. The distribution of marks shall be as follows:

1. Performance in Experiments: 05 Marks
2. Journal Submission: 05 Marks
3. Viva-voce: 05 Marks
4. Subject Specific Lab Assignment/Case Study/mini project: 10 Marks

The final certification and acceptance of laboratory journal/manual/report will be subject to satisfactory performance of laboratory work and upon fulfilling minimum passing criteria in the teacher assessment.

End Semester Examination (C):

Oral / Practical examination will be based on the entire syllabus including, the practicals performed during laboratory sessions.

Universal Human Values (HMET4060T)

Teaching Scheme
Lectures: 02 Hrs./Week
Credit: 02

Examination Scheme
Term Test: 15 Marks
Teacher Assessment: 20 Marks
End Sem Exam: 65 Marks
Total: 100 Marks

Course Objectives

1. Development of a holistic perspective based on self-exploration about themselves (human being), family, Society and nature/existence.
2. Understanding (or developing clarity) of the harmony in the human being, Family, society and nature/existence.
3. Strengthening of self-reflection.
4. Development of commitment and courage to act.

COs	Course Outcomes	Blooms Level	Blooms Description
CO1	Become more aware of themselves, and their surroundings (family, society, nature); they would become more responsible in life, and in handling problems with sustainable solutions, while keeping human relationships and human nature in mind. They would have better critical ability.	L6	Evaluate
CO2	Become sensitive to their commitment towards what they have understood (human values, human relationship, and human society).	L4	Analyze
CO3	Apply what they have learnt to their own self in different day-to-day settings in real life, at least a beginning would be made in this direction.	L3	Apply

Course Contents

Unit-I Introduction: Need, Basic Guidelines, Content and Process for Value Education 05 Hrs.

Purpose and motivation for the course. Self-Exploration what is it? - Its content and process; Natural Acceptance and Experiential Validation- as the process for self-exploration. Continuous Happiness and Prosperity- A look at basic Human Aspirations. Right understanding, Relationship and Physical Facility- the basic requirements for fulfillment of aspirations of every human being with their correct priority. Understanding Happiness and Prosperity correctly- A critical appraisal of the current scenario. Method to fulfill the above human aspirations: understanding and living in harmony at various levels.

Unit-II Understanding Harmony in the Human Being - Harmony in Myself! 06 Hrs.

Understanding human being as a co-existence of the sentient 'I' and the material 'Body'. Understanding the needs of Self ('I') and 'Body' - happiness and physical facility. Understanding the Body as an instrument of 'I' (I am being the doer, seer and enjoyer). Understanding the characteristics and activities of 'I' and harmony in 'I'. Understanding the harmony of 'I' with the Body: Sanyam and Health; correct appraisal of Physical needs, meaning of Prosperity in detail. Programs to ensure Sanyam and Health.

Unit-III Understanding Harmony in the Family and Society: Harmony in Human-Human Relationship. 06 Hrs.

Understanding values in human-human relationship; meaning of Justice (nine universal values in relationships) and program for its fulfillment to ensure mutual happiness; Trust and Respect as the foundational values of relationship. Understanding the meaning of Trust; Difference between intention and competence. Understanding the meaning of Respect, Difference between respect and differentiation; the other salient values in relationship. Understanding the harmony in the society (society being an extension of family): Resolution, Prosperity, fearlessness (trust) and co-existence as comprehensive Human Goals. Visualizing a universal harmonious order in society- Undivided Society, Universal Order-from family to world family.

Unit-IV Understanding Harmony in the Nature and Existence: Whole existence as Co-existence

05 Hrs.

Understanding the harmony in the Nature. Interconnectedness and mutual fulfillment among the four orders of nature recyclability and self-regulation in nature. Understanding Existence as Co-existence

of mutually interacting units in all pervasive space. Holistic perception of harmony at all levels of existence.

Unit-V Implications of the above Holistic Understanding of Harmony on Professional Ethics 06 Hrs.

Natural acceptance of human values. Definitiveness of Ethical Human Conduct. Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order. Competence in professional ethics:

1. Ability to utilize the professional competence for augmenting universal human order,
2. Ability to identify the scope and characteristics of people friendly and eco-friendly production systems.
3. Ability to identify and develop appropriate technologies and management patterns for above production systems. Case studies of typical holistic technologies, management models and production systems.

Strategy for transition from the present state to Universal Human Order:

1. At the level of individual: as socially and ecologically responsible engineers, technologists, and managers,
2. At the level of society: as mutually enriching institutions and organizations.

Text Books

1. R. R. Gaur, R. Sangal, G. P. Bagaria, Human Values and Professional Ethics by Excel Books, New Delhi, 2010.

Reference Books

1. A Nagaraj, Jeevan Vidya: Ek Parichaya, Jeevan Vidya Prakashan, Amarkantak, 1999.
2. A. N. Tripathi, Human Values, New Age International Publishers, New Delhi, 2004.
3. The Story of Stuff (Book).
4. Mohandas Karamchand Gandhi, The Story of My Experiments with Truth.
5. E. F. Schumacher, Small is Beautiful.
6. Cecile Andrews, Slow is Beautiful.
7. J. C. Kumarappa, Economy of Permanence.
8. Pandit Sunderlal, Bharat Mein Angreji Raj.

9. Dharampal, Rediscovering India.

10. Mohandas K. Gandhi, Hind Swaraj or Indian Home Rule.

11. Maulana Abdul Kalam Azad, India Wins Freedom.

12. Romain Rolland, Vivekananda(English).

13. Romain Rolland, Gandhi(English).

Evaluation Scheme:

Continuous Assessment (A):

Subject teacher will declare Teacher Assessment criteria at the start of semester.

Continuous Assessment (B):

1. Two term tests of 15 marks each will be conducted during the semester.

2. Total duration allotted for writing each of the paper is 1 hr.

3. Average of the marks scored in both the tests will be considered for final grading.

End Semester Examination (C):

1. Question paper will be based on the entire syllabus summing up to 65 marks.

2. Total duration allotted for writing the paper is 3 hrs.

Semester Project- II (PJET4070L)

Practical Scheme
Practical : 02 Hrs./week
Credit : 01

Examination Scheme
Teacher Assessment : 25 Marks
End Sem Exam : 25 Marks
Total : 50 Marks

Course Objectives:

Students are expected to design, simulate/implement a project based on the knowledge acquired from current semester subjects.

CO	Course Outcomes	Blooms Level	Blooms Description
CO1	Conduct a survey of several available literatures in the preferred field of study.	L4	Analyze
CO2	Demonstrate various/alternate approaches to complete a project.	L2	Understand
CO3	Ensure a collaborative project environment by interacting and dividing project work among team members.	L3	Apply
CO4	Present their project work in the form of a technical report / paper and thereby improve the technical communication skill.	L3	Apply
CO5	Demonstrate the ability to work in teams and manage the conduct of the research study.	L2	Understand

Semester Project:

The purpose of introducing semester project at second year level is to provide exposure to students with a variety of projects based on the knowledge acquired from the semester subjects. This activity is supposed to enrich their academic experience and bring enough maturity in student while selecting the project. Students should take this as an opportunity to develop skills in implementation, presentation and discussion of technical ideas/topics. Therefore, proper attention shall be paid to the content of semester project report which is being submitted in partial fulfillment of the requirements of the Second Year and it is imperative that a standard format be prescribed for the report.

Each student shall work on project approved by departmental committee approved by the Head of Department, a group of 03 to 05 students (max allowed: 5 students in extraordinary cases, subject to the approval of the department committee and the Head of the department) shall be allotted for each Semester Project. Each group shall submit at least 3 topics for the Semester Project. The departmental committee shall finalize one topic for every group. Semester Project Title or Theme should be based on knowledge acquired during semester. The project work shall involve sufficient work so that students get acquainted with different aspects of knowledge acquired from semester subjects.

Student is expected to:

- Select appropriate project title based on acquired knowledge from current semester subjects.
- Maintain Log Book of weekly work done(please see attached log book format) Table 4.
- Report weekly to the project guide along with log book.

Assessment Criteria:

- At the end of the semester, after confirmation by the project guide, each project group will submit project completion report in prescribed format for assessment to the departmental committee (including project guide).
- Assessment of the project (at the end of the semester) will be done by the departmental committee (including project guide).

Prescribed project report guidelines:

Size of report shall be of minimum 25 pages. Project Report should include appropriate content for:

- Introduction
- Literature Survey
- Related Theory
- Implementation details

- Project Outcomes
- Conclusion
- References

Assessment criteria for the departmental committee (including project guide) for Continuous Assessment:

Guide will monitor weekly progress and marks allocation will be as per Table 5.

Assessment criteria for the departmental committee (including project guide) for End Semester Exam:

Departmental committee (including project guide) will evaluate project as per Table 6.

Each group shall present/publish a paper based on the semester project in reputed/peer reviewed Conference/Journal/TechFest/Magazine/ before the end of the semester.

Table 4: Log Book Format

Sr	Week (Start Date:End Date)	Work Done	Sign of Guide	Sign of Coordinator
1				
2				

Table 5: Continuous Assessment Sheet

Sr	Exam Seat No	Name of Student	Student Attendance	Log Book Maintain	Literature Review	Depth of Understanding	Report	Total
			5	5	5	5	5	25

Table 6: Evaluation Sheet

Sr	Exam Seat No	Name of Student	Project Selection	Design/ Simulation/ Logic	PCB/ hardware/ programming	Result Verification	Presentation	Total
			5	5	5	5	5	25

Employability Skill Development Program - I (HMET4080L)

Teaching Scheme	Examination Scheme
Practical: 02 Hrs/Week	Teacher Assessment: 50 Marks
Credit: 01	Teacher Total: 50 Marks

Pre-requisite: Basic Mathematics, Basic knowledge of C programming

Course Objectives

1. To enhance the problem solving skills.
2. To improve the basic mathematical skills for solving real life examples.
3. Able to implement the algorithms and draw flowcharts for solving Mathematical and Engineering problems.
4. Demonstrate an understanding of computer programming language concepts.

COs	Course Outcomes	Blooms Level	Blooms Description
CO1	Understand and apply the basic concepts of Quantitative Ability i.e. profit, loss, time, work and geometry.	L2 and L3	Understand, Apply
CO2	Understand and apply the concepts of Quantitative Ability for the problem solving.	L2 and L3	Understand, Apply
CO3	Illustrate the concept of Variables and Functions	L2 and L3	Understand, Apply
CO4	Understand and illustrate the concept of Multithreading and string handling	L2 and L3	Understand, Apply
CO5	Understand and describe the fundamental of object-oriented programming	L2	Understand

Course Contents

Unit-I Aptitude

Quantitative Aptitude : Algebra, Profit and Loss, Average & Allegation / Mixture, Time and Work, Geometry Mensuration, Numbers , Percentage, Permutation and Combination, Probability, Ratios & Proportion, Time and Distance.

Reasoning : Analytical, Puzzles, Blood relationship, Data Interpretation, Data sufficiency

Unit-II Fundamental of Programming

Variables: Local variables, Global variables, global keyword, Rules of Identities

Functions : Introduction, Prototype, Classification of functions, No arguments and No return values, With arguments and With return values

No arguments and With return values : With arguments and No return values, Recursion, Argument type functions, Default arguments functions, Required arguments functions, Keyword arguments functions, Variable arguments function

Operators : Arithmetic Operators, Relational operators, Logical operators, Bitwise operators, Shift operators.

Unit-III Statements

Control Statements : Conditional Control Statements, if, if-else, if-elif-else, nested-if, Loop Control Statements, While, For

Branching Statements: Break, Continue, pass, return, exit

Exception Handling: Introduction, The need of exception handling, Getting exceptions, Default exception handler, Handling exception, Try, Except

Try with multiple except blocks: Handling exceptions using Exception class, Finally, block, Releasing resources using Finally block, Raise, Creating a user exception class, Raise exception manually, Exceptions based application

Unit-IV Multithreading

Multithreading : Introduction, Multitasking, Multi tasking v/s Multithreading, threading module, Thread class introduction, Creating thread, The life cycle of a thread, Single-threaded application, Multi-threaded application, Sleep() method. Sleep() v/s run(), Join() v/s Sleep(), Multiple custom threads creation, The execution time of single-threaded application, The execution time of multi-threaded application, Synchronization of threads.

Inner classes: Basic syntax of inner class, Advantages of Inner classes, Access class level members of inner classes, Access object level members of inner classes, Local inner classes, Complex inner classes, Accessing data of inner classes.

Regular expressions: re module, Match(), Search(), find() etc, and actual projects web scrapping

Mail extraction: Date extraction, Mobile number extraction, Vehicle number extraction, zoom chat analysis

Expressions using operators and symbols: Split string into characters, Split string into words, Lambda expressions

String handling using regex: Introduction to Strings, Indexing and Slicing, Special operators in String handling, Old style String formatting, String library methods, Quotes and Escape characters in a String representation, String Immutability, Logical programs using Strings.

Unit-V Object Oriented Programming

Object Oriented Programming : Introduction to OOPs, Classes, Objects, Structure to OOP application, Contexts of OOP application, Class level members, Object level members, self variable, Constructor and Initialization of object.

Access modifiers : Private, Protected, Public, Program codes. Encapsulation Rules, Implementation, Abstraction, Polymorphism Inheritance Introduction, Types of Inheritance, Single inheritance, Multi-Level inheritance, Method overriding, Object initialization using constructor, Multiple inheritances, Hierarchical inheritance, Method overriding in Multi level inheritance

Reference Books

1. Dr. R. S. Aggarwal, Quantitative Aptitude for Competitive Examinations, S. Chand Publication.
2. M. G. Venkateshmurthy, Programming Techniques through C, Pearson Publication.
3. Behrouz Forouzan, A Computer Science Structure Programming Approaches using C, Cengage Learning.
4. Yashwant Kanetkar, Let Us C, BPB Publication.

Evaluation Scheme:

Continuous Assessment (A)

Teacher's assessment (TA) will carry weightage of 50 marks. Components of TA are:

1. MCQ Test based on Aptitude: 20 Marks
2. MCQ Test based on Programming skills: 20 Marks.
3. Mock Interview: 10 Marks

Any other component recommended by BOS and approved by Dean Academics.

Field/Internship/Industry Training (INTET4090)

Course Objectives

1. To get exposure of industrial ecosystem.
2. To enhance student's knowledge in the particular technology.
3. To nurture student's leadership ability and responsibility to perform or execute the given task individually or in team.

COs	Course Outcomes	Blooms Level	Blooms Description
CO1	To apply fundamental principles of engineering.	L3	Aplly
CO2	To become master in specialized/emerging technology	L6	Evaluate
CO3	Self-improvement through continuous professional development and life-long learning	L6	Evaluate
CO4	To get awareness of the ethics, social, cultural, global and environmental responsibility as an engineer.	L2	Comprehension

Guidelines

Internship/industry training of minimum of six weeks in an industry in the area of Electronics & Telecommunication Engineering shall be done. The summer/winter internship should give exposure to the practical aspects of the discipline. In addition, the student may also work on a specified task or project which may be assigned to him/her. The outcome of the internship should be presented in the form of a report.

1. Student shall undergo industrial training /internship for a minimum period of **SIX** weeks in total during summer/winter vacations of third to sixth semester.
2. The industry in which industrial training/internship is taken should be a medium or large scale industry.
3. The paper bound report on training must be submitted by the student in the beginning of **Seventh** semester along with a certificate from the company where the student took training.
4. Every student should write the report separately.
5. Institute / Department / T & P Cell have to assist the students for finding Industries for the training/internship.
6. Students must take prior permission from department before joining for industrial training/internship.
7. Note that, the degree certificate will not be awarded if the certificate of field/industry/internship is not submitted to the department.
8. The field/industry/internship training will be reflected on the final mark sheet/degree certificate in the section of audit points completed.