



Shirpur Education Society's
R. C. Patel Institute of Technology,
Shirpur

An Autonomous Institute

Affiliated to DBATU, Lonere (M.S.),
Approved By AICTE, New Delhi and Govt. of Maharashtra
(DTE: EN - 5172)
Accredited by NAAC 'A' Grade, Bangalore.

Course Curriculum Structure
Electronics & Telecommunication Engineering
Second Year B. Tech
Batch: 2020-2024
With Effect from Academic Year 2021-22



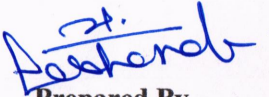
Shahada Road, Near Nimzari Naka, Shirpur, Maharashtra 425405

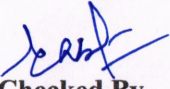
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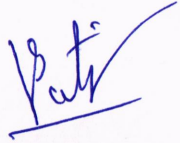
Semester-III (w.e.f. Academic Year 2021-2022)

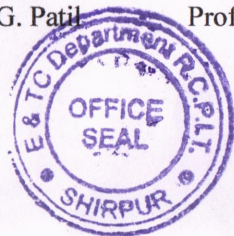
Sr. No	Course Category	Course Code	Course Title	Teaching Scheme			Evaluation Scheme					Total	Credit
				L	T	P	Continuous Assessment (CA)			ESE			
							TA	TT1	TT2		Average of TT1 & TT2		
A	B	C	A+B+C										
1	BS	BSET3010T	Engineering Mathematics-III	3	1	--	20	15	15	15	65	100	4
2	PC	PCET3020T	Analog Circuit Design	3	--	--	20	15	15	15	65	100	3
3	PC	PCET3020L	Analog Circuit Design Laboratory	--	--	2	25	--	--	--	25	50	1
4	PC	PCET3030T	Digital System Design	3	--	--	20	15	15	15	65	100	3
5	PC	PCET3030L	Digital System Design Laboratory	--	--	2	25	--	--	--	25	50	1
6	PC	PCET3040T	Electrical Network Analysis and Synthesis	3	--	--	20	15	15	15	65	100	3
7	PC	PCET3040L	Electrical Network Analysis and Synthesis Laboratory	--	--	2	25	--	--	--	25	50	1
8	PC	PCET3050T	Signals and Systems	3	--	--	20	15	15	15	65	100	3
9	PC	PCET3050L	Signals and Systems Laboratory	--	--	2	25	--	--	--	25	50	1
10	PC	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
Total				16	1	14	250	--	--	75	475	800	23

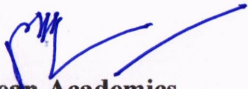
BS: Basic Science, **PC:** Program Core, **PCL:** Program Core Laboratory, **PJ:** Project, **MC:** Mandatory Course, **TA:** Teachers Assessment, **TT1:** Term Test-1, **TT2:** Term Test-2


Prepared By
Narendra L Lokhande

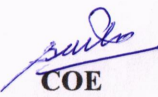

Checked By
Dr. Prashant G. Patil


BOS Chairman
Prof. Dr. Vijay S. Patil





Dean Academics
Prof. Dr. Pramod J. Deore

Dean, Academics
R. C. Patel Institute of Technology
Shirpur, Dist: Dhule (MS)


COE
Prof. S.P. Shukla

Controller of Examination
R. C. Patel Institute of Technology
Shirpur Dist: Dhule (MS)

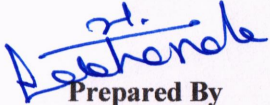

Director
Prof. Dr. J.B. Patil

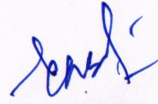
DIRECTOR
Patel Institute of Technology
Shirpur Dist Dhule (MS)


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


Sr. No	Course Category	Course Code	Course Title	Teaching Scheme			Evaluation Scheme					Total	Credit
				L	T	P	Continuous Assessment (CA)				ESE		
							TA	TT1	TT2	Average of TT1 & TT2			
1	BS	BSET4010T	Engineering Mathematics-IV	3	1	--	20	15	15	15	65	100	4
2	PC	PCET4020T	Analog Communication	3	--	--	20	15	15	15	65	100	3
3	PC	PCET4020L	Analog Communication Laboratory	--	--	2	25	--	--	--	25	50	1
4	PC	PCET4030T	Integrated Circuits	3	--	--	20	15	15	15	65	100	3
5	PC	PCET4030L	Integrated Circuits Laboratory	--	--	2	25	--	--	--	25	50	1
6	PC	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
Total				14	2	10	250	--	--	75	425	750	21

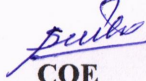
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DIRECTOR
Patel Institute of Technology
Shirpur, Dist: Dhule (MS)

Program: Electronics and Telecommunication Engineering	S.Y.B. Tech
	Sem-III
Engineering Mathematics - III (BSET3010T)	

Prerequisite:

- Mathematics-I
- Mathematics-II

Course Objectives:

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

COs	Course Outcomes	Blooms Level	Blooms Description
CO1	Apply basic knowledge of Laplace Transform. Fourier series, Vector Algebra and Complex Variable.	L3	Apply
CO2	Identify and Model the problems of the field of Electronics and Telecommunication Engineering and solve it.	L4	Analyze
CO3	Apply the application of Mathematics in Electronics and Telecommunication Engineering.	L3	Apply

Engineering Mathematics - III (BSET3010T)

COURSE CONTENTS

Unit-I	Laplace Transform	10 Hrs.
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Laplace Transform (LT) of Standard Functions: Definition of Laplace Transform, Condition of existence of Laplace Transform, Laplace Transform of e^{at} , $\sin(at)$, $\cos(at)$, $\sinh(at)$, $\cosh(at)$, tn . 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	8 Hrs.
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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	8 Hrs.
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Introduction: Orthogonal and orthonormal set of functions, Introduction of Dirichlet's 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	9 Hrs.
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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	7 Hrs.
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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, Cengage India Publication
3. B. S. Grewal, Higher Engineering Mathematics, Khanna Publication, 38th 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 6th Edition.
3. Erwin Kreysizg, Advanced Engineering Mathematics, John Wiley & Sons, Inc.
4. Murry R. Spieget, Vector Analysis, Schaums outline series, Mc-Graw Hill Publication.

Tutorial

- Minimum eight tutorials shall be conducted.

Program: Electronics and Telecommunication Engineering	S.Y.B. Tech
	Sem-III
Analog Circuit Design (PCET3020T)	
Analog Circuit Design Laboratory (PCET3020L)	

Pre-requisite:

- Basic Electrical Engineering & Digital Electronics
- Electrical Networks
- Physics

Course Objectives:

- To understand operation of semiconductor devices.
- To understand DC analysis and AC models of semiconductor devices.
- To apply concepts for the design of Amplifiers.
- To verify the theoretical concepts through laboratory and simulation experiments.
- To implement mini projects based on concept of electronics circuit concepts.

COs	Course Outcomes	Blooms Level	Blooms Description
CO1	Explain the current voltage characteristics of semiconductor devices.	L2	Understand
CO2	Analyze DC circuits and relate AC models of semiconductor devices with their physical operation.	L4	Analyze
CO3	Design and analysis of amplifier circuits.	L5	Synthesize
CO4	Evaluate frequency response to understand behaviour of Electronics circuits.	L6	Evaluate

Analog Circuit Design (PCET3020T)

COURSE CONTENTS

Unit-I	Bipolar Junction Transistor	6 Hrs.
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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.
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Introduction: Understanding of amplification concept with reference to input/output characteristics, AC load line analysis, Definition of amplifier parameters Z_i , Z_0 , A_v and A_i , 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	6 Hrs.
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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	7 Hrs.
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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	6 Hrs.
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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	7 Hrs.
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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.

Analog Circuit Design Laboratory (PCET3020L)

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.

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, 6th Edition.
3. David A. Bell, Electronic Devices and Circuits, Oxford University Higher Education, 5th edition 2008.
4. Boylestad and Nashelsky, Electronic Devices and Circuits Theory, Pearson Education, 11th Edition.

Reference Books

1. A. K. Maini, Electronic Devices and Circuits, Wiley.
2. T. L. Floyd, Electronic Devices, Prentice Hall, 9th Edition, 2012.
3. A. Rockett, Material Science of Semiconductors, Springer, 1st 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, 6th Edition, International Version, Oxford International Student Edition.

Program: Electronics and Telecommunication Engineering	S.Y.B. Tech
	Sem-III
Digital System Design (PCET3030T)	
Digital System Design Laboratory (PCET3030L)	

Pre-requisite

- Basic Electrical Engineering
- Digital Electronics

Course Objectives:

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

COs	Course Outcomes	Blooms Level	Blooms Description
CO1	Apply the concepts of digital codes and signed number systems to perform and verify signed binary arithmetic operations.	L3	Apply
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 circuit.	L5	Synthesize
CO5	Classify different programmable logic devices.	L4	Analyze

Digital System Design Laboratory (PCET3030L)

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.

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

Reference Books

1. Morris Mano, Michael D. Ciletti, Digital Design, Pearson Education, 4th Edition (2008).
2. Thomas L. Floyd, Digital Fundamentals, Pearson Hall, 11th Global Edition (2015).
3. Mandal, Digital Electronics Principles and Applications, McGraw Hill Education, 1st Edition (2010).
4. Ronald J. Tocci, Neal S. Widmer, Digital Systems Principles and Applications, 8th Edition, PHI (2003)
5. Donald P. Leach, Albert Paul Malvino, Gautam Saha, Digital Principles and Applications, The McGraw Hill, 7th Edition (2011).

Text Books

1. John F. Wakerly, Digital Design Principles and Practices, Pearson Education, 4th Edition (2008).
2. R. P. Jain, Modern Digital Electronics, Tata McGraw Hill Education, 3rd Edition (2003).

Program: Electronics and Telecommunication Engineering	S.Y.B. Tech
	Sem-III
Electrical Network Analysis and Synthesis (PCET3040T)	
Electrical Network Analysis and Synthesis Laboratory (PCET3040L)	

Pre-requisite

- Basic Electrical and Electronics Engineering

Course Objectives:

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

COs	Course Outcomes	Blooms Level	Blooms Description
CO1	Apply their knowledge in analysing Circuits by using network theorems.	L3	Apply
CO2	Apply the time and frequency method of analysis.	L3	Apply
CO3	Evaluate different two-port network parameter	L5	Evaluate
CO4	Apply network topology for analysing the circuit.	L3	Apply
CO5	Synthesize the network using passive elements.	L6	Create

Electrical Network Analysis and Synthesis (PCET3040T)

COURSE CONTENTS

Unit-I	Electrical Circuit Analysis	10 Hrs.
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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	8 Hrs.
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Objectives of graph theory, Linear oriented graphs, Graph terminologies, Matrix representation of a graph: Incidence matrix, Circuit matrix, Cut-set matrix, Reduced incident matrix, T set matrix, f cutset matrix. KVL & KCL using matrix, Solution of resistive networks and principle of duality.

Unit-III	Time and Frequency Domain Analysis	8 Hrs.
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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	8 Hrs.
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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	8 Hrs.
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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

Electrical Network Analysis and Synthesis Laboratory (PCET3040L)

List of Laboratory Experiments: (Minimum 8)

1. Verify the Thevenin's theorem for given two port Reactive/Resistive circuit.
2. Verify the Norton's theorem for given two port Reactive/Resistive circuit.
3. Verify the maximum Power Transfer theorem.
4. Determine transfer / driving point Impedance of given two port Reactive/Resistive N/w.
5. Determine voltage and current transfer function of a given two port Reactive/Resistive N/w.
6. Determine pole - zero plot of given one port Reactive/Resistive N/w.
7. Determine Z parameter of networks connected in series.
8. Determine Y parameter of networks connected in parallel.
9. Determine transmission parameter of networks connected in cascaded form.
10. Synthesize Cauer-I & Cauer-II form.
11. Synthesize Foster-I & Foster-II form.
12. Synthesis of LC circuit.
13. Synthesis of RC circuit.
14. Synthesis of RL circuit.

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

Reference Books

1. A Chakrabarti, Circuit Theory, Dhanpat Rai & Co., Delhi, 6th Edition.
2. Sudhakar, Shyammoan S. Palli Circuits and Networks, Tata McGraw-Hill Education.
3. Smarajit Ghosh, Network Theory Analysis & Synthesis, PHI Learning.
4. K. S. Suresh Kumar, Electric Circuit Analysis, Pearson (2013).
5. D. Roy Choudhury, Networks and Systems, New Age International, 1998.

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.

Program: Electronics and Telecommunication Engineering	S.Y.B. Tech
	Sem-III
Signals and Systems (PCET3050T)	
Signals and Systems Laboratory (PCET3050L)	

Pre-requisite

- Mathematics-II
- Mathematics of Telecommunication Engineering

Course Objectives:

- To introduce students, the concept and theory of signals and systems needed in electronics and telecommunication engineering fields.
- 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.	L3	Apply
CO2	Determine the impulse response and analyse LTI systems in time domain using convolution integral and convolution sum.	L4	Analyze
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

Signals and Systems (PCET3050T)

COURSE CONTENTS

Unit-I	Introduction to Signals	10 Hrs.
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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.
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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	8 Hrs.
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Trigonometric and exponential Fourier series representation of C T signals, Gibb's 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.
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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 stability of systems, Relation between Laplace Transform and Z Transform. Realization structures: Direct form I, Direct form II, Cascade and parallel forms.

Unit-V

Application of Various Signals

4 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.

Signals and Systems Laboratory (PCET3050L)

List of Laboratory Experiments: (Any Eight)

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 & perform 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).

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

Reference Books

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

Text Books

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

Program: Electronics and Telecommunication Engineering	S.Y.B. Tech
	Sem-III
Object Oriented Programming Laboratory (PCET3060L)	

Pre-requisite

- Basic knowledge of programming concepts (variables, data types, operators)
- Basic exposure to C programming / any procedural language

Course Objectives:

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

COs	Course Outcomes	Blooms Level	Blooms Description
CO1	Describe the basic principles of OOP.	L2	Understand
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

Object Oriented Programming Laboratory (PCET3060L)

COURSE CONTENTS

Unit-I	Fundamentals of C++ Programming	8 Hrs.
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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, and 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, size of operator. Function call: types of function calls, function pass by value, function pass by reference.

Unit-II	Classes and Constructors in C++	8 Hrs.
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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++	8 Hrs.
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Inheritance: Concept of subclass and superclass, Types of inheritance, Single level inheritance, Multilevel inheritance, Multiple Inheritance, Hierarchical Inheritance Function overloading, Function over-riding, 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 4 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 6 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 8 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, Pre- defined 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.

Reference Books

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

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.

Software Tools

1. Raptor-Flowchart Simulation: <http://raptor.martincarlisle.com/>
2. Eclipse: <https://eclipse.org/>
3. NetBeans: <https://netbeans.org/downloads/>
4. Code Block: <http://www.codeblocks.org/>
5. [J-Edit/J-Editor/Blue J](#)

Online Repository

1. Google Drive
2. GitHub
3. Code Guru

Program: Electronics and Telecommunication Engineering	S.Y.B. Tech
	Sem-III
Semester Project- I (PJET3070L)	

Course Objectives:

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

COs	Course Outcomes	Blooms Level	Blooms Description
CO1	Analyze a survey of several available literatures in the preferred field of study.	L4	Analyze
CO2	Describe various/alternate approaches to complete a project.	L2	Understand
CO3	Apply a collaborative project environment by interacting and dividing project work among team members.	L3	Apply
CO4	Use technical communication skills to present project work in the form of a technical report/paper.	L3	Apply
CO5	Apply teamwork and project management skills to plan, execute, and manage the research study.	L3	Apply

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 fulfilment 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 1).
- Report weekly to the project guide along with log book.

Table 1: Log Book Format

Sr. No	Week (Start Date: End Date)	Work Done	Sign of Guide	Sign of Coordinator
1				
2				

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.

Table 2: Continuous Assessment Sheet

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

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 3: Evaluation Sheet

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

Program: Electronics and Telecommunication Engineering	S.Y.B. Tech
	Sem-III
Constitution of India (MCET3080T)	

Course Objectives:

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

COs	Course Outcomes	Blooms Level	Blooms Description
CO1	Explain the historical background, philosophy, and salient features of the Indian Constitution.	L2	Understand
CO2	Interpret the fundamental rights, duties, and directive principles enshrined in the Constitution for responsible citizenship.	L2	Understand
CO3	Describe the structure, roles, and functions of the legislative, executive, and judiciary branches of government.	L2	Understand
CO4	Analyze the federal structure, centre-state relations, and constitutional provisions for governance and emergency powers.	L4	Analyze

Evaluation Scheme:

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

Constitution of India (MCET3080T)

COURSE CONTENTS

Unit-I Introduction to the Constitution of India 2 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 3 Hrs.

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

Unit-III State Executives 3 Hrs.

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

Unit-IV Special Provisions 3 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 3 Hrs.

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

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 New Delhi, 2011.
4. Latest Publications of Indian Institute of Human Rights, New Delhi.

Text Books

1. Durga Das Basu: Introduction to the Constitution on India, (Students Edn.) Prentice Hall EEE, 19th / 20th Edition, 2001.
2. Charles E. Haries, Michael S Pritchard and Michael J. Robins, Engineering Ethics, Thompson Asia, 2003-08-05.

Website Resources

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

Program: Electronics and Telecommunication Engineering	S.Y.B. Tech
	Sem-IV
Engineering Mathematics - IV (BSET4010T)	

Prerequisite:

- Mathematics-I
- Mathematics-II
- Mathematics-III

Course Objectives:

- Random variables and random process.
- The design of the systems which involves randomness using mathematical analysis and computer simulations.
- 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.	L4	Analyze
CO3	Determine the response of Linear time invariant System to Random Process	L5	Evaluate
CO3	Explain the theory of linear algebra and its application to Telecommunication Engineering	L3	Apply

Engineering Mathematics - IV (BSET4010T)

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 5 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.

Eigen values and Eigen vectors, Properties of Eigen values and Eigen vectors. Cayley-Hamilton theorem, Examples based on verification of Cayley-Hamilton theorem. Similarity of matrices, Diagonalization of matrices. Function of square matrix. Quadratic forms over real field, Reduction of quadratic form to a diagonal canonical form, Rank, Index and signature of quadratic form, Sylvesters law of inertia, Value-class of quadratic form of definite, Semi-definite and indefinite.

Unit-V Linear Algebra 7 Hrs.

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

Text Books

1. T. Veerarajan, Probability, Statistics and Random Processes, McGraw Hill.
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, 4th Edition, Pearson Education.

4. B. S. Grewal, Higher Engineering Mathematics, Khanna Publication.

Reference Books

1. Miller, Probability and Random Processes-With Applications to Signal Processing and Communication, 1st 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.

Tutorial:

List of Tutorials: (Any Eight)

1. Probability: Sample Space, events, Venn Diagram, De Morgans 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 eigen vectors.
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.

Program: Electronics and Telecommunication Engineering	S.Y.B. Tech
	Sem-IV
Analog Communication (PCET4020T)	

Prerequisite:

- Basic Electrical Engineering

Course Objectives:

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

COs	Course Outcomes	Blooms Level	Blooms Description
CO1	Describe various types of noise and evaluate their impact on communication systems.	L2	Understand
CO2	Analyze the operation of AM, FM, and PM modulation and demodulation systems.	L4	Analyze
CO3	Illustrate and compare block diagrams of different analog communication receivers.	L5	Evaluate
CO4	Apply sampling concepts to different pulse modulation methods.	L3	Apply
CO5	Differentiate and summarize TDM and FDM techniques used in communication.	L4	Analyze

Analog Communication (PCET4020T)

COURSE CONTENTS

Unit-I	Basics of Communication System	4 Hrs.
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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.
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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.
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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	9 Hrs.
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Receiver parameters, TRF receiver, Problems in TRF receiver, Superheterodyne receiver, Choice of IF. Importance of RF amplifier, Tracking circuit, Mixer, IF amplifier, Simple AGC,

Analog Communication Laboratory (PCET4020L)

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.

Any other experiment based on syllabus may be included, which would help the learner to understand topic/concept. laboratory work shall consist of minimum 8 experiments and one mini project.

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.

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.

Program: Electronics and Telecommunication Engineering	S.Y.B. Tech
	Sem-IV
Integrated Circuits (PCET4030T)	

Prerequisite:

- Electronic Devices & Circuits
- Network Theory / Circuit Analysis
- Basic Electrical Engineering

Course Objectives:

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

COs	Course Outcomes	Blooms Level	Blooms Description
CO1	Analyze the characteristics of MOSFET devices and their utilization in designing constant current source circuits.	L4	Analyze
CO2	Analyze CMOS fabrication processes and design and implement active load differential amplifier	L6	Create
CO3	Explain the fundamentals and areas of operations of 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	L3	Apply

Integrated Circuits Laboratory (PCET4030L)

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 Op-amp.
8. Design of Astable Multivibrator using IC 555.
9. Design voltage regulator.

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

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 A amplifiers 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.

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.

Program: Electronics and Telecommunication Engineering	S.Y.B. Tech
	Sem-IV
Electromagnetic and Wave Propagation (PCET4040T)	

Prerequisite:

- Mathematics for Telecommunication Engineering
- Electrical Networks.

Course Objectives:

- To learn concept of static and time varying electromagnetic fields.
- To solve problems related to EM fields using Vectors and Partial differential equations.
- To learn Electromagnetic radiation and propagation in space and 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 electromagnetics.	L3	Apply
CO2	Analyze the coupling between electric and magnetic fields through Faraday's law, displacement current, and Maxwell's equations.	L4	Analyze
CO3	Characterize wave polarization and wave propagation in different media.	L4	Analyze
CO4	Determine transmission-line parameters at various operating frequencies.	L3	Apply

Electromagnetic and Wave Propagation (PCET4040T)

COURSE CONTENTS

Unit-I	Electrostatics	10 Hrs.
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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	8 Hrs.
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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	8 Hrs.
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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.
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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 im- perfect 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	4 Hrs.
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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, 6th Edition.
2. William H Hayt and John A Buck, Engineering Electromagnetics, Tata McGraw-Hill Publishing Company Limited, 7th Edition.
3. Edward C. Jordan, Keth G. Balmin, Electromagnetic Waves & Radiating Systems, Pearson Publications, 2nd Edition, 2006.

Reference Books

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

List of Tutorials (Any Seven)

1. Numerals on Electrostatics.
2. Numerals on Electric Boundary Conditions.
3. Numerals on Poisson's and Laplace's Equations.
4. Numeral's 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.

Program: Electronics and Telecommunication Engineering	S.Y.B. Tech
	Sem-IV
Python Programming Laboratory (ESET4050L)	

Prerequisite:

- Fundamentals of Programming
- Basic Mathematics

Course Objectives:

- Python programming basics, functions in Python and files handling.
- GUI Programming and databases operations in Python.
- Network programming in Python.

COs	Course Outcomes	Blooms Level	Blooms Description
CO1	Describe the various data types, dictionaries and regular expressions in Python.	L2	Understand
CO2	Describe different control statements, conditional statements and functions in Python.	L2	Understand
CO3	Realize and encapsulate different File handling and exception handling operations using Python.	L3	Apply
CO4	Design GUI, estimate different database operations and array handling in Python.	L4	Analyze
CO5	Design and Develop network applications using Python	L5	Evaluate

Python Programming Laboratory (ESET4050L)

COURSE CONTENTS

Unit-I	Introduction to Python	6 Hrs.
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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 Practical's: (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.

Unit-II	Control statements and Functions in Python	5 Hrs.
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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 Practical's: (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	5 Hrs.
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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 Practical's: (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** **4 Hrs.**

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

List of suggested Practical's: (Any three) 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** **4 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 Practical's: (Any three) 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 tool kits to extend python matplotlib functionality.

Unit-VI **Python for Networking** **4 Hrs.**

Socket, Socket Module Clients and Server, Internet Modules.

List of suggested Practical's: (Any three) 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.

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.

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.

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. PYTHON 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).

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

Program: Electronics and Telecommunication Engineering	S.Y.B. Tech
	Sem-IV
Universal Human Values (HMET4060T)	

Course Objectives:

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

COs	Course Outcomes	Blooms Level	Blooms Description
CO1	Identify the need, relevance, and role of universal human values in personal, academic, and professional life.	L2	Understand
CO2	Demonstrate understanding of self-exploration, harmony in human relationships, and ethical	L3	Apply
CO3	Apply principles of trust, respect, and responsibility to foster sustainable and compassionate social environments.	L3	Apply
CO4	Analyze the interdependence between individual values, societal well-being, and ecological balance.	L4	Analyze
CO5	Use human values into decision-making processes for holistic development and responsible engineering practice.	L3	Apply

Universal Human Values (HMET4060T)

COURSE CONTENTS

Unit-I Introduction: Need, Basic Guidelines, Content and Process for 5 Hrs.

Value Education Introduction to the Constitution of India

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 fulfilment of aspirations of every human being with their correct priority. Understanding Happiness and Prosperity correctly- A critical appraisal of the current scenario. Method to fulfil the above human aspirations: understanding and living in harmony at various levels.

Unit-II Understanding Harmony in the Human Being - Harmony in 6 Hrs.

Myself!

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 6 Hrs.

Human-Human Relationship.

Understanding values in human-human relationship; meaning of Justice (nine universal values in relationships) and program for its fulfilment 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 5 Hrs.

existence as Coexistence

Understanding the harmony in the Nature 19. Interconnectedness and mutual fulfilment 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 6 Hrs.
Professional Ethics

Natural acceptance of human values 23. 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:

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

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).

Text Books

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

Program: Electronics and Telecommunication Engineering	S.Y.B. Tech
	Sem-IV
Semester Project- II (PJET4070L)	

Course Objectives:

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

COs	Course Outcomes	Blooms Level	Blooms Description
CO1	Analyze a survey of several available literatures in the preferred field of study.	L4	Analyze
CO2	Describe various/alternate approaches to complete a project.	L2	Understand
CO3	Apply a collaborative project environment by interacting and dividing project work among team members.	L3	Apply
CO4	Use technical communication skills to present project work in the form of a technical report/paper.	L3	Apply
CO5	Apply teamwork and project management skills to plan, execute, and manage the research study.	L3	Apply

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 fulfilment 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 1).
- Report weekly to the project guide along with log book.

Table 1: Log Book Format

Sr. No	Week (Start Date: End Date)	Work Done	Sign of Guide	Sign of Coordinator
1				
2				

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.

Table 2: Continuous Assessment Sheet

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

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 3: Evaluation Sheet

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

Program: Electronics and Telecommunication Engineering	S.Y.B. Tech
	Sem-IV
Employability Skill Development Program - I (HMET4080L)	

Pre-requisite:

- Basic Mathematics
- Basic knowledge of C programming

Course Objectives:

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

COs	Course Outcomes	Blooms Level	Blooms Description
CO1	Explain the basic concepts of Quantitative Ability, including profit, loss, time, work, and geometry.	L2	Understand
CO2	Demonstrate the concepts of Quantitative Ability for problem solving.	L3	Apply
CO3	Demonstrate the concept of Variables and Functions through examples	L3	Apply
CO4	Demonstrate the concept of Multithreading and String Handling.	L3	Apply
CO5	Explain the fundamentals of Object-Oriented	L2	Understand
CO6	Describe the concepts of Distributed Database.	L2	Understand

Employability Skill Development Program - I (HMET4080L)

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, Multitasking 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. Venkatesh Murthy, 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.