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 2023-24

Shahada Road, Near Nimzari Naka, Shirpur, Maharashtra 425405
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Semester-III (w.e.f. 2023-2024)

S. N.	Course Category	Course Code	Course Title	Teaching Scheme			Evaluation Scheme						Credit
							Continuous Assessment (CA)				ESE	Total	
							TA	Term Test-1 (TT1)	Term Test-2 (TT2)	Best of (TT1 & TT2)			
				L	T	P	[A]			[B]	[C]	[A+B+C]	
1	BS	22BSET3010T	Engineering Mathematics-III	3	1		20	15	15	15	65	100	4
2	PC	22PCET3020T	Electronics Circuit Design	3			20	15	15	15	65	100	3
3	PCL	22PCET3020L	Electronics Circuit Design Laboratory			2	25				25	50	1
4	PC	22PCET3030T	Digital System Design	3			20	15	15	15	65	100	3
5	PCL	22PCET3030L	Digital System Design Laboratory			2	25				25	50	1
6	PC	22PCET3040T	Signals and Systems	3	1		20	15	15	15	65	100	4
7	PCL	22PCET3050L	Electrical Network Analysis and Synthesis Laboratory			2	25			-	25	50	1
8	ESL	22ESET3060L	Python Programming Laboratory			2	25				25	50	1
9	HM	22HMET3070T	Universal Human Values	2			20	15	15	15	65	100	2
10	PJ	22PJET3080L	Semester Project-I			2	25				25	50	1
			Total	14	2	10	225			75	450	750	21

Semester-IV

S. N.	Course Category	Course Code	Course Title	Teaching Scheme			Evaluation Scheme						Credit
							Continuous Assessment (CA)				ESE	Total	
							TA	Term Test-1 (TT1)	Term Test-2 (TT2)	Best of (TT1 & TT2)			
				L	T	P	[A]			[B]	[C]	[A+B+C]	
1	BS	22BSET4010T	Engineering Mathematics-IV	3	1		20	15	15	15	65	100	4
2	PC	22PCET4020T	Integrated Circuits	3			20	15	15	15	65	100	3
3	PCL	22PCET4020L	Integrated Circuits Laboratory			2	25				25	50	1
4	PC	22PCET4030T	Electromagnetic and Wave Propagation	3	1		20	15	15	15	65	100	4
5	PC	22PCET4040T	Microcontroller & Applications-I	3			20	15	15	15	65	100	3
6	PCL	22PCET4040L	Microcontroller & Applications-I Laboratory			2	25				25	50	1
7	ES	22ESET4050L	Data Analytics Laboratory			2	25				25	50	1
8	ES	22ESET4060L	Database Management System Laboratory			2	25				25	50	1
9	MC	22MCET4070T	Constitution of India	2									Audit
10	PJ	22PJET4080L	Semester Project-II			2	25				25	50	1
11	HM	22HMET4090L	Employability Skill Development Program -I			2	50					50	1
			Total	14	2	12	255			60	385	700	20

Prepared by

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Engineering Mathematics III (22BSET3010T)

Teaching Scheme	Examination
Lectures: 03 Hrs. / Week	Term Test: 15 Marks
Credit: 04	Teacher Assessment: 20 Marks
Tutorial: 01 Hrs. / Week	End Sem Exam: 65 Marks
	Total: 100 Marks

Course Objectives

1. To build the strong foundation in Mathematics of learner needed for the field of Electronics and Telecommunication Engineering.
2. To provide learner with mathematics fundamentals necessary to formulate, solve and analyses complex engineering problems.
3. To prepare student to apply reasoning informed by the contextual knowledge to engineering practice.
4. To prepare learner to work as part of teams on multi-disciplinary projects.

COs	Course Outcomes	Blooms Level	Blooms Description
CO1	Apply the knowledge of Laplace transform and its properties to evaluate specific kind of integrals.	L3	Apply
CO2	Apply knowledge of Inverse Laplace transform to solve ordinary, simultaneous differential equations	L3	Apply
CO3	Follow Fourier series expansion of functions which satisfy Dirichlet conditions and Fourier transform	L3	Apply
CO4	Demonstrate an ability to use vector algebra and vector calculus.	L5	Evaluate
CO5	Apply the knowledge of analytic functions to obtain functions, conformal mapping, bilinear transformations.	L3	Apply

Course Contents

Unit-I Laplace Transform 07 Hrs.

Laplace Transform (LT): 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 .Properties of Laplace Transform, Linearity, first shifting theorem, second shifting theorem, effect of multiplication by t^n, effect of 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 & it's Applications 09 Hrs.

Partial fraction method, Method of convolution, Laplace inverse by derivative, Heaviside unit step function, Dirac-delta function, Laplace transform of Periodic function 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 10 Hrs.

Introduction- Orthogonal and orthonormal set of functions, Introduction of Dirichlet's conditions, Eule's formulae. 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, Fourier Integral, Fourier Transform, Fourier sine and cosine Transform, Inverse Fourier Transform

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. Dr. B. S. Grewal, Higher Engineering Mathematics, Khanna Publication, 43rd Edition, 2020.

2. B. V. Ramana, Higher Engineering Mathematics, Tata Mc-Graw Hill Publication, 6th Edition, 2018.

Reference Books

1. Erwin Kreyszig, Advanced Engineering Mathematics, Wiley Eastern Limited, 10th Edition,2015.
2. Wylie and Barret, Advanced Engineering Mathematics, Tata Mc-Graw Hill, 6th Edition, 1995.
3. Dennis G. Zill & Warren S. Wright, Advanced Engineering Mathematics, Jones and Bartlett Publishers, 1st 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. Best 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 2 hrs.

Engineering Mathematics-III Tutorial

1. Laplace Transform.
2. Inverse Laplace Transform
3. Application of Laplace and Inverse Laplace Transform
4. Fourier Series
5. Complex form of Fourier series
6. Fourier Transform
7. Vector Algebra and Vector Differentiation
8. Vector Integral
9. Complex Variable analytic Function
10. Mapping of Complex variable

Electronics Circuit Design (22PCET3020T)

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 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 analyze of amplifier circuits.	L4	Analyze
CO4	Evaluate frequency response to understand behavior of Electronics circuits.	L5	Evaluate

Course Contents

Unit-I DC Analysis of Common BJT Circuits 06 Hrs.

Analysis and design of voltage divider bias, stability factor analysis. Small Signal Mid Frequency Models: Hybrid-pi model, early effect, h-parameter model.

Unit-II Small Signal Amplifier Analysis 10 Hrs.

Graphical analysis to evaluate parameters, small signal analysis of Common Emitter configurations using hybrid-pi model. Darlington emitter follower (CC-CC). Low frequency and high frequency response amplifier. Design of single stage CE amplifier, Power Devices: Construction, Operation, and V-I Characteristics of Silicon Controlled Rectifier (SCR), DIAC, and Triac

Unit-III Introduction to MOSFET 10 Hrs.

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 Power Amplifiers 08 Hrs.

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

Unit-V Feedback Amplifiers and Oscillators 08 Hrs.

Concept of negative Feedback, voltage / current, series, Shunt feedback. Positive feedback, Introduction to oscillator: Operation of oscillator, Types of Transistor oscillators. RC oscillators: Phase shift and Wein bridge. LC oscillators: Hartley, Colpitt's and Clapp. Tuned Oscillators: Twin-T oscillator and crystal oscillator.

Text Books

1. Jacob Millman, Christos Halkias and Chetan Parikh, Electronic Devices and Circuits (SIE), McGraw Hill Education, 4th Edition, 2015.
2. D. A. Neamen, Electronic Circuit Analysis and Design, Tata McGraw Hill, 3rd Edition, 2006.

Reference Books

1. Jacob Millman, Christos Halkias and Chetan Parikh, Integrated Electronics Analog and Digital Circuit and Systems, McGraw Hill Education, 2nd Edition, 2017.
2. A. Mottershead, Electronic Devices and Circuits: An Introduction, Prentice Hall India Learning Private Limited, 2022.
3. S. Sedra, K. C. Smith, and A. N. Chandorkar, Microelectronic Circuits Theory and Applications, International Version, Oxford International Students, 7th Edition, 2017
4. David A. Bell, Electronic devices and circuits, Oxford University higher education, 5th Edition, 2008
5. Boylestad and Nashelesky, Electronic Devices and Circuits Theory, Pearson Education, 11th Edition, 2013.
6. J B. Gupta, Electronic Devices and Circuits, Katson Education Series, 6th Edition, 2016.

Evaluation Scheme:

Continuous Assessment (A):

Course 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. Best 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 2 hrs.

Electronic Circuit Design - Laboratory (22PCET3020L)

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 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 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 analyze of amplifier circuits.	L4	Analyze
CO4	Evaluate frequency response to understand behavior of Electronics circuits.	L5	Evaluate

Course Contents

List of Laboratory Experiments: (Any Eight)

1. BJT Biasing.
2. Single stage Common Emitter Amplifier
3. Frequency Response of RC Coupled Common Emitter amplifier.
4. Single Stage Common Source (CS) Amplifier using MOSFET.
5. Darlington Emitter Follower
6. SCR Characteristics
7. Complementary symmetry Class B Push Pull Power amplifier
8. Negative Feedback Amplifier
9. RC Phase Shift Oscillator
10. LC Oscillator.

Minimum eight experiments from the above suggested list or any other experiment based on syllabus will be included, which would help the learner to apply the concept learnt.

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 (22PCET3030T)

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

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

Course Objectives

1. To introduce signed binary number representation
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 signed number representation and signed binary arithmetic.	L2	Comprehension
CO2	Minimize logic expressions using various reduction techniques.	L4	Analyze
CO3	Design combinational logic circuits using logic gates and implement the circuit by carrying out required investigations and debugging techniques.	L4, L5	Analyze, Synthesize
CO4	Design flip-flops using logic gates and use them to realize different sequential circuits and implement the circuit by carrying out required investigations and debugging techniques	L6	Evaluate
CO5	Classify different programmable logic devices (PLD) and design combinational circuits using PLD.	L6	Evaluate

Course Contents

Unit-I Signed Binary Numbers 04 Hrs.

Signed-Magnitude representation, One's complement representation and Two's complement representation, Binary Arithmetic: One's complement Addition and Subtraction, Two's complement Addition and Subtraction.

Unit-II Minimization Techniques 12 Hrs.

Implementations of Logic Functions using basic and universal gates. Boolean postulates and laws, De-Morgan's Theorem, Standard Representations of Logic Functions: Boolean expression Minterm, Maxterm, Sum of Products (SOP), Product of Sums (POS), Minimization of Boolean expressions: Karnaugh map Minimization (up to four variables), Minimizing Sum of Products, Simplifying Products of Sums,Quine-Mc Cluskey method of minimization, Don't care conditions

Unit-III Design of Combinational Logic 12 Hrs.

Introduction to combinational logic, Code converter: Binary Coded Decimal (BCD), Excess-3, Gray code, Binary Code, Arithmetic Circuits: Half- Adder, Full Adder, Half Subtractor, Full Subtractor, Binary Adder, Parallel Adder/Subtractor, BCD adder, Look ahead carry generator; Multiplexer, Multiplexer tree, De-multiplexer & Decoders, Implementation of SOP and POS using Multiplexer & Demultiplexer/Decoder

Unit-IV Sequential Logic Design 12 Hrs.

Introduction to sequential logic; Preset & Clear, Truth Tables and Excitation tables of Flip flops, Conversion from one type to another type of Flip Flop, Shift Registers: Serial Input Serial Output (SISO), Serial Input parallel Output (SIPO),Parallel Input Serial Output (PISO), Parallel Input Parallel Output (PIPO), Bi-directional shift registers, Universal shift registers, Counters: Asynchronous counter, Synchronous counter, Binary up-counter, down-counter and up-down counters, Modulus of the counter, Design of counter for a given sequence, Lock out condition, ring counters, Johnson 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 03 Hrs.

Architecture of Programmable Read Only Memory (PROM), Programmable Array Logic (PAL), Programmable Logic Array (PLA), designing combinational circuits using PLDs.

Text Books

1. John F. Wakerly, Digital Design Principles and Practices, 5th Edn, Pearson Education, 2021.
2. R. P. Jain, Modern Digital Electronics, 5th Edn, Tata McGraw Hill Education, 2022.

Reference Books

1. Morris Mano, Michael D. Ciletti, Digital Design, Pearson Education, 5th Edition, 2013
2. Thomas L. Floyd, Digital Fundamentals, Pearson Prentice 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, PHI, 10th Edition, 2009.
5. Donald P. Leach, Albert Paul Malvino, Gautam Saha, Digital Principles and Applications,Tata McGraw Hill, 11th Edition, 2011.

Evaluation Scheme:

Continuous Assessment (A):

Course 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. Best 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 2 hrs.

Digital System Design - Laboratory(22PCET3030L)

Teaching Scheme
Practical: 02 Hrs/Week
Credit: 01

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

Course Objectives

1. To introduce signed binary number representation
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 signed number representation and signed binary arithmetic.	L2	Comprehension
CO2	Minimize logic expressions using various reduction techniques.	L4	Analyze
CO3	Design combinational logic circuits using logic gates and implement the circuit by carrying out required investigations and debugging techniques.	L4, L5	Analyze, Synthesize
CO4	Design flip-flops using logic gates and use them to realize different sequential circuits and implement the circuit by carrying out required investigations and debugging techniques	L6	Evaluate
CO5	Classify different programmable logic devices (PLD) and design combinational circuits using PLD.	L6	Evaluate

Course Contents

List of Laboratory Experiments: (Any Eight)

1. Verify different logic gates
2. Simplification of Boolean functions.
3. Verify Universal gates and design EXOR and EXNOR 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.

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 & Systems (22PCET3040T)

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

Examination
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 signals and systems analysis with its characterization in time and frequency domain.

COs	Course Outcomes	Blooms Level	Blooms Description
CO1	Perform mathematical operations on signals to construct complex signals using basic elementary signals.	L4, L6	Analyze, Evaluate
CO2	Classify signals and systems on the basis of their properties and analyze the implications in the context of practical signals and systems	L2	Understand
CO3	Represent signals in the time and frequency domain using multiple representations and analyze LTI systems using convolution in the frequency domain.	L2	Understand
CO4	Compute Fourier series/different transforms for a set of well-defined signals from first principles and apply their appropriate properties for a broader class of signals.	L2	Understand

Course Contents

Unit-I Classification of Signals and Systems 10 Hrs.

Introduction to signals: 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, sinc, 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 Continuous Time and Discrete Time Linear Time Invariant(LTI) Systems 10 Hrs.

Response of Continuous TimeLTI System: 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, definition of power spectral density (PSD) and Energy spectral density (ESD), relation of ESD and PSD with auto-correlation.

Unit-III Analysis of Continuous Time Signals and Systems 12 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.

Laplace Transform (LT): 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 Analysis of Discrete Time Signals and Systems 10 Hrs.

Introduction to Z-Transform 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 Z-Transform, 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 formI, direct formII, cascade and parallel forms.

Text Books

1. Ramesh Babu P. and Anandanatarajan, Signals and Systems, 5th Revised Edition, 2022.
2. Simon Haykin, Barry Van Veen, Signals and Systems, John Wiley & Sons, 2nd Edition, 2021.

Reference Books

1. Hwei. P Hsu, Signals and Systems, Tata McGraw Hill, 3rd Edition, 2010.
2. V. Krishnaveni, A.Rajeshwari, Signals and Systems, Wiley-India, 1st Edition, 2012.
3. A. Nagoor Kani, Signals and Systems, McGraw Hill India, 1st Edition, 2018.

Evaluation Scheme:

Continuous Assessment (A):

Course 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. Best 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 2 hrs.

Signals & Systems Tutorial (Any Eight)

1. Perform classification of Signals and Systems.
2. Perform mathematical operations in Signals and Systems.
3. Plot various types of Continuous Time Signals.
4. Implement sampling and reconstruction of Continuous Signals.
5. Plot various types of Discrete Time Signals and perform various operations on Unit Step Signals.
6. Analysis of Continuous Time Signals.
7. Analyze Linear Time Invariant (LTI) Continuous Time Systems.
8. Analysis of Discrete Time Signals.
9. Analyze Linear Time Invariant (LTI) Discrete Time System.
10. Perform convolution of Discrete Time Signals.

Electric Networks Analysis & Synthesis Laboratory(22PCET3050L)

Teaching Scheme
Practical: 02 Hrs/Week
Credit: 01

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

Course Objectives

(a) To analyse the circuits in time and frequency domains.

(b) To synthesize passive network by various methods.

COs	Course Outcomes	Blooms Level	Blooms Description
CO1	Apply their knowledge in analyzing Circuits by using network theorems.	L4, L6	Analyze, Evaluate
CO2	Find the various parameters of two port networks.	L5	Synthesize
CO3	Synthesize the network using passive elements.	L2	Understand

Course Contents

List of Laboratory Experiments: (Any Eight)

(a) Verification of Thevenins Theorem.

(b) Verification of Superposition Theorem.

(c) Verification of Maximum Power Transfer Theorem Theorem.

(d) Determine driving point impedance of given two port network.

(e) Determine transfer impedance of given two port network.

(f) To study RLC series Resonance Circuit and determine the Resonance frequency and bandwidth, Q-factor.

(g) To study RLC Parallel resonance Circuit and determine the Resonance frequency and bandwidth, Q-factor.

(h) Determine Z-parameter of networks connected in series.

(i) Determine Y-parameter of networks connected in parallel.

(j) Determine transmission (ABCD-parameter) of networks connected in cascaded form.

(k) Design constant K-Low Pass filter, Also Plot the frequency response. Determine the cutoff frequency practically and compare with the design value.

(l) Design constant K-High Pass filter. Also Plot the frequency response. Determine the cutoff frequency practically and compare with the design value.

(m) Design m- derived low pass filter, Also Plot the frequency response. Determine the cut-off frequency practically and compare with the design value.

(n) Design a symmetrical T-attenuator to given attenuation of 40 dB to work into a use of 600 impedance.

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

Text Books

(a) Franklin F. Kuo, Network Analysis and Synthesis, Wiley, 2nd Edition, 1966.

(b) M. E. Van Valkenburg, Network Analysis, Prentice-Hall of India, 26th Indian Reprint, 2000.

(c) Ravish Singh, Circuit Theory and Networks, Tata McGraw-Hill education, 2nd Edition, 2016.

Reference Books

(a) A. Chakrabarti, Circuit Theory, Dhanpat Rai & Co., 6th Edition, 2019

(b) Smarajit Ghosh, Network Theory Analysis & Synthesis, PHI learning, 3rd Edition, 2019.

(c) D Roy Choudhury, Networks and Systems, New Age International, 4th edition, 2019

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:

(a) Performance in Experiments: 05 Marks

(b) Journal Submission: 05 Marks

(c) Viva-voce: 05 Marks

(d) 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.

Python Programming Laboratory (22PCET3060L)

Teaching Scheme
Practical: 02 Hrs/Week
Credit: 01

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

Course Objectives

(a) Python programming basics. Functions in Python and files handling.

(b) GUI Programming and Databases operations 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, L4	Apply,Analyze
CO4	Design GUI, estimate different database operations and array handling in Python.	L6	Create

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 Practical (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, else if, nested if and Switch Case Statements. Function arguments pass by value and reference. Recursive Functions.

List of Suggested Practical (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

Any one program to demonstrate the method of recursive function

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 Practical (Any three)

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 Practical (Any Two):-

1. Install MySQL db
2. Establish database connection
3. Creating Database Table.
4. Use of Insert/Read/Update Operations in database.

Unit-V 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 Practical (Any Two):-

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 Data Science Using Python 04 Hrs.

Data Frame, Creating Data Frame from .csv files, python dictionaries, Python List of Tuples, Operation on Data Frames. Data Visualization: Bar Graph, Histogram, Pie Chart creation and Creation of Line Graphs.

List of Suggested Practical (Any Two):-

1. Create and visualize a Data Frame
2. Generating outliers in the data
3. Calculation of statistical parameters: Mean, Median and Mode of data.
4. Creation and interpretation of box plots.
5. Interpret the features of a given data frame using histogram, pie charts and line graphs.

Text Books

(a) Reema Thareja, Python Programming: Using Problem Solving Approach, Oxford University Press India, 2nd Edition, 2023.

(b) R. Nageswara Rao, Core Python Programming, 3rd Edition Dreamtech Press, 2021.

Reference Books

(a) Johannes Ernesti, Peter Kaiser, Python 3: The Comprehensive Guide to Hands-On Python Programming, Rheinwerk Computing,1st Edition, 2022.

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:

(a) Performance in Experiments: 05 Marks

(b) Journal Submission: 05 Marks

(c) Viva-voce: 05 Marks

(d) 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.

Laboratory: (Suggested experiments)

(a) Installing python and setting up environment. Basic operations like printing the names, numbers, arithmetic calculations, etc.

(b) Performing string manipulation

(c) Perform operations on Lists, Tuples, Sets, arrays and dictionaries.

(d) Programs based on various loops, conditional constructs and functions.

(e) program to update in the file "friendsContact.txt" which has personal details and change the number of an old contact

(f) Demonstrate Amplitude-Shift-Keying (ASK) or On-Off Keying (OOK).

(g) Compute the spectrum of the above OOK signal using FFT and plot its magnitude.

(h) Program to demonstrate the BPSK signal of sequence [1 0 0 0 1 0 1 0 0 1]

(i) Compute the spectrum of the above BPSK signal.

(j) Given a data frame generate the box plot to determine the outliers

(k) Given a specific data set (iris, titanic etc.) create a data frame interpret the features using histogram, pie charts and line graphs.

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

Universal Human Values (22HMET3070T)

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-Explorationwhat 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 Coexistence

05 Hrs

Understanding the harmony in the Nature 19. 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 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:

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):

Course 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. Best 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 2 hrs.

Semester Project- I (22PJET3080L)

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

Engineering Mathematics - IV (22BSET4010T)

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

To build the strong foundation in Mathematics of learner needed for the field of Electronics and Telecommunication Engineering learner would be able:

1. To understand the concept of Random Variables.
2. To test the hypothesis of samples.
3. To apply the 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	Understand major types of probability sampling method and indicate when each is preferred.	L2	Understand
CO4	Understand the theory of linear algebra.	L2	Understand
CO5	Apply theory of Eigen systems to principal component analysis.	L3	Apply

Course Contents

Unit-I Introduction to Probability and Random Variable 08Hrs.

Conditional probability, Joint probability, Baye's theorem, Independence of events, Definition of Random Variable. Discrete and Continuous random variables, probability mass function, probability density function, probability distribution function, Expectation, Variance and Moments of random Variable, Binomial, Poisson and Normal (Gaussian) distributions.

Unit-II Operations on One and Multiple Random Variable 07Hrs.

Functions of a random variable and their distribution and density functions. 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, covariance, and correlation-independent, uncorrelated and orthogonal random variables.

Unit-III Sampling Theory and Distribution 04 Hrs.

Central limit theorem and its significance, Sampling distribution: Population distribution, parameter and statistics, Z distribution, Student's t-distribution, Chi-square distribution.

Unit-IV Test of Hypothesis 06 Hrs.

Hypothesis testing: Test of significance, null and alternative hypothesis, type I and type II error, factors affecting Type II error, probability of Type II error, power of test, p Value, critical region, level of significance. One tailed and Two tailed Test, Large sample (Z-Test)-Test of significance of Mean of the sample and test of significance difference of means of two samples, Small sample(t-Test)-Test of significance of Mean of the sample and test of significance difference of means of two samples(dependent and independent), Chi-square test: Test of goodness of fit and independence of attributes, contingency table.

Unit-V Basics of Linear Algebra 06Hrs.

Vector Spaces, Subspaces, Span, Basis, Dimension, Rank, Linear transformations, Rank nullity theorem, Inner Product Space, Gram Schmidt Orthogonalization Process.

Unit-VI Matrix Theory 08Hrs.

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, Quadratic forms over real field, Reduction of quadratic form to a diagonal, canonical form, Rank, index and signature of quadratic form, class value of quadratic

forms, definite, Semi-definite and indefinite.

Text Books

1. T. Veerarajan. Probability, Statistics and Random Processes, McGraw Hill, 3rd Edition 2017.
2. Gareth Williams, Linear Algebra with Application, Jones and Bartlett, 9th Edition, 2017.

Reference Books

1. Papoulis and S. Unnikrishnan Pillai, Probability, Random Variables and Stochastic Processes, 4th Edition 2017, McGraw Hill.
2. Seymour Lipschitz and Marc Lipson, Schaum's Outline of Linear Algebra, Mc-Graw Hill Publication, 3th Edition, 2017.
3. S. C. Gupta and V. K. Kapoor, Fundamental of Mathematical Statistics, Sultan Chand and Sons, 12th Edition 2020.

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. Best 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 2 hrs.

Tutorial

List of Tutorials: (Any Eight)

1. Conditional probability and Bayes theorem.
2. Random variable
3. Binomial, Poisson, and Normal distribution
4. Function of one random variable.
5. One function of two random variable and two function of two random variables.
6. Central Limit Theorem and Sampling distribution.
7. Test of hypothesis (parametric)
8. Test of hypothesis (non-parametric).
9. Linear algebra.

10. Eigen system.

11. Quadratic forms.

Minimum 08 tutorials from the above suggested list or any other experiment based on syllabus will be included, which would help the learner to apply the concept learnt.

Integrated Circuits (22PCET4020T)

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 the concepts, and working principle of integrated circuits.
2. To design and analyze different circuits as well as systems for various applications using integrated circuits.

COs	Course Outcomes	Blooms Level	Blooms Description
CO1	Describe the physical operation of integrated circuits using Op-Amps.	L2	Understand
CO2	Analyze linear and non-linear Op-Amp applications.	L4	Analysis
CO3	Design various applications using Op-Amps, Timers, and special ICs.	L6	Create
CO4	Implement different types of applications using various Analog ICs with proper justifications.	L3	Apply

Course Contents

Unit-I Introduction to Operational Amplifiers 10Hrs.

Block diagram of Op-Amp, analysis of basic differential amplifier circuit configurations using MOSFETs, MOSFET differential amplifier with active load, effect of swamping resistor, current mirror circuit, current sources using MOSFETs (Widlar current source, and Wilson current source), voltage sources and references, DC level shifters, Op-Amp symbol and terminals, ideal Op-Amp and practical Op-Amp characteristics, Op-Amp parameters, open loop and closed loop configurations.

Unit-II Applications of Operational Amplifier 10Hrs.

Amplifiers: Inverting, non-inverting, buffer, summing, difference, integrator, differentiator, current, instrumentation, log and antilog, Active Filters: First and second order active LPF and HPF, switched capacitor filters; Converters: Current to voltage, voltage to current, Comparators: Inverting comparator, non-inverting comparator, zero crossing detector, window detector, peak detector, sample and hold circuit, Schmitt trigger, Waveform generator: Square wave generator, triangular wave generator; Precision rectifier: Half wave and full wave.

Unit-III Analog to Digital and Digital to Analog Converters 8Hrs.

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.

Unit-IV Special Purpose Integrated Circuits 6 Hrs.

IC 555(timer): Functional block diagram, working, design of astable and monostable multivibrator using Timer 555, application of IC 555 as pulse position modulator; IC 566 (VCO): Functional block diagram, working and application as frequency modulator; IC 565 (PLL): Functional block diagram, working and application as FSK demodulator.

Unit-V Voltage Regulators 08 Hrs.

Three terminal regulators: Functional block diagram, working and design of three terminal fixed (78XX, 79XX series) and three terminal adjustable (LM 317, LM 337) voltage regulators; General purpose voltage regulator: Functional block diagram, working and design of general purpose 723 (LVLC, LVHC, HVLC and HVHC) with current limit and current fold-back protection.

Text Books

1. Ramakant A. Gayakwad. Op-Amps and Linear Integrated Circuits. Pearson Prentice Hall. 4th Edition.
2. D. Roy Choudhury and S. B. Jain. Linear Integrated Circuits. New Age International Publishers. 4nd Edition 2018.

Reference Books

1. Sergio Franco. Design with Operational Aamplifiers and Analog Integrated Circuits. Tata McGraw Hill. 4rd Edition 2015.
2. R. F. Coughlin and F. F. Driscoll. Operation Amplifiers and Linear Integrated Circuits. Prentice Hall. 6rd Edition 2000.
3. David A. Bell. Operation Amplifiers and Linear Integrated Circuits . Oxford University Press. 3th Edition 2011.
4. Millman Halkias. Integrated Electronics. McGraw-Hill Electrical and Electronic Engineering. 1th Edition 2001. Series

Evaluation Scheme:

Continuous Assessment (A):

Course 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. Best 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 2 hrs.

Integrated Circuits Laboratory
(22PCET4020L)

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 concepts, and working principle of integrated circuits.
2. To design and analyze different circuits as well as systems for various applications using integrated circuits.

COs	Course Outcomes	Blooms Level	Blooms Description
CO1	Describe the physical operation of integrated circuits using Op-Amps.	L2	Understand
CO2	Analyze linear and non-linear Op-Amp applications.	L4	Analysis
CO3	Design various applications using Op-Amps, Timers, and special ICs.	L6	Create
CO4	Implement different types of applications using various Analog ICs with proper justifications.	L3	Apply

Course Contents

List of Laboratory Experiments: (Any Eight)

1. Design Inverting and Non-inverting amplifier using Op-Amp (IC 741).
2. Design Integrator and Differentiator using Op-Amp (IC 741).
3. Design Summing /Difference amplifier using Op-Amp (IC 741).
4. Second Order Low Pass filter using Op-Amp (IC 741).
5. Design Square wave and Triangular wave generator using Op-Amp (IC 741).
6. Design Schmitt trigger using Op-amp (IC 741).
7. Design Half wave and Full wave Precision Rectifier using Op-Amp (IC 741).
8. Design R-2R Ladder DAC using Op-Amp (IC 741).
9. Design Astable Multivibrator using IC 555.
10. Design Voltage Regulator using IC 723.
11. To perform AC and DC analysis of MOSFET based differential amplifier using Spice Tool.
12. Instrumentation Amplifier using Spice Tool.

Minimum 08 experiments from the above suggested list or any other experiment based on syllabus will be included, which would help the learner to apply the concept learnt.

Evaluation Scheme:

Continuous Assessment (A):

Laboratory work shall consist of minimum 8 experiments.

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 Wave Propagation (22PCET4030T)

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

Examination
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 electromagnetics.	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.	L3	Apply

Course Contents

Unit-I Coordinate system transformation and vector calculus 06 Hrs.

Cartesian, cylindrical and spherical coordinate. Differential length, area and volume, line surface and volume integrals. Del Operator, Gradient of scalar, Divergence of a vector and Divergence Theorem, Curl of a Vector and Stokes Theorem, Laplacian of a scalar.

Unit-II Electrostatics 08 Hrs.

Coulomb's Law, Gauss's Law and its applications, Electric Potential, Relationship between E and V, Electric Dipole and flux lines, Convection and Conduction Currents, Electric Boundary Conditions, Poisson's and Laplace's Equations, Uniqueness Theorem, General Procedure for solving Poisson's or Laplace's Equations.

Unit-III Magnetostatics 08 Hrs.

Biot-Savart's Law, Ampere's Circuital Law and it's applications, Magnetic Flux density, Maxwell's equations for Static Fields, Magnetic Scalar and Vector potentials, Magnetic boundary conditions.

Unit-IV 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 fields.

Unit-V Transmission Lines 06 Hrs.

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

Unit-VI Electromagnetic Wave Propagation 08 Hrs.

Derivation of Wave equation and it's solution, Wave Propagation in lossy dielectrics, Plane waves in loss less dielectrics, free space and good conductors, Power and Poynting Vector, Reflection of a Plane wave at normal incidence and oblique incidence. Modes of Wave Propagation- Ground Wave Propagation, Sky Wave Propagation, Space Wave Propagation. .

Text Books

1. William H. Hayt and John A Buck, Engineering Electromagnetics, Tata McGraw-Hill Publishing Company Limited, 9th Edition 2020.
2. Matthew N. O. Sadiku, S. V. Kulkarni, Principles of electromagnetics, Oxford University Press, 6th Edition 2015.

Reference Books

1. Edward C. Jordan, Keth G. Balmin, Electromagnetic Waves & Radiating Systems, Pearson Publications,2nd Edition, 2015.
2. Reinhold Ludwig, Pavel Bretchko, RF Circuit Design Theory and Applications, Pearson, Publications, 2nd Edition, 2011.
3. R. K. Shevgaonkar, Electromagnetic Waves, Tata McGraw Hill, 1st Edition, 2018.

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. Best 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 2 hrs.

List of Tutorial: (Any Eight)

1. Numericals on Electrostatics.
2. Numericals on Electric Boundary conditions.
3. Numericals on Poisson's and Laplace's Equations.
4. Numericals on Magnetostatics.
5. Numericals on Vector Potentials.
6. Numericals on Time varying fields.
7. Numericals on Maxwell Equations.
8. Transmission line impedance calculations.
9. Transmission line impedance calculations.
10. Numericals on Wave Propagation in different material.
11. Numericals on Normal and Oblique incidence.
12. Sky and Space wave propagation.

Minimum 08 Tutorials from the above suggested list or any other experiment based on syllabus will be included, which would help the learner to apply the concept learnt.

Microcontroller & Applications-I
(22PCET4040T)

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 develop background knowledge and core expertise in microcontrollers.
2. To understand peripheral devices and their interfacing to microcontrollers.
3. To write programs for microcontrollers and their applications in Assembly language.

COs	Course Outcomes	Blooms Level	Blooms Description
CO1	Identify different functionalities and architecture of 8051 microcontrollers.	L1	Remember
CO2	Identify different hardware components and use relevant software for programming of microcontroller-based development system.	L1	Remember
CO3	Write assembly language programs for microcontroller-based systems using instruction set.	L3	Apply
CO4	Interface different input/output devices with microcontroller for various applications.	L3	Apply

Course Contents

Unit-I Introduction to Microcomputer System 07 Hrs.

Block diagram of microprocessor based system: CPU, I/O Devices, Clock, Memory, Concept of Address, Data and Control Bus and Tristate logic, Need of Assembly Language and its Comparison with higher level languages, Need of Assembler and Compiler and their comparison.

Unit-II 8051 Microcontroller 10 Hrs.

Features, architecture and pin configurations, CPU timing, Input / Output ports, Memory organization, Counters and timers, Interrupts, Serial Communication.

Unit-III 8051 Programming 10 Hrs.

Instruction set, Addressing mode, Assembler Directives Programs related to: arithmetic, logical, delay, input, output, timer, counters, port, serial communication, and interrupts.

Unit-IV Memory Interfacing with 8051 06 Hrs.

RAM, ROM, EPROM and Memory mapping.

Unit-V Interfacing and Applications 07 Hrs.

Interfacing of Display: LED, Seven Segment display, and LCD, DC Motor, Stepper motor, Relay and UART.

Text Books

1. M. A. Mazidi, J. G. Mazidi and R. D. Mckinlay, The 8051 Microcontroller & Embedded systems, Pearson Education India, 1st Edition, 2007.
2. Lyla Das, Embedded Systems: An Integrated Approach, Pearson Publication, 1st Edition, 2012.

Reference Books

1. C. Kenneth J. Ayala and D. V. Gadre, The 8051 Microcontroller & Embedded system Using assembly & C, Cengage Learning Publication, 1st Edition, 2010.
2. I. Scott Mackenzie, Raphael C. W. Phan, The 8051 Microcontroller, Pearson International Publication, 4th Edition 2007.
3. Ajay Deshmukh, Microcontrollers, Tata McGraw Hill Publication, 2nd Edition 2006.

Evaluation Scheme:

Continuous Assessment (A):

Course 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. Best 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 2 hrs.

Microcontroller & Applications-I Laboratory (22PCET4040L)

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 develop background knowledge and core expertise in microcontrollers.
2. To understand peripheral devices and their interfacing to microcontrollers.
3. To write programs for microcontrollers and their applications in Assembly language.

COs	Course Outcomes	Blooms Level	Blooms Description
CO1	Identify different functionalities and architecture of 8051 microcontrollers.	L1	Remember
CO2	Identify different hardware components and use relevant software for programming of microcontroller-based development system.	L1	Remember
CO3	Write assembly language programs for microcontroller-based systems using instruction set.	L2	Understand
CO4	Interface different input/output devices with microcontroller for various applications.	L2	Understand

Course Contents

List of Laboratory Experiments: (Any Eight)

1. To find smallest and largest number from given data string using 8051.
2. To perform addition, subtraction, multiplication & division of 8-bit numbers.
3. To exchange data blocks using 8051.
4. To arrange data series in ascending & descending order.
5. To find even and odd numbers from data string.
6. To blink LED and generate various pattern using 8051.
7. To interface 7-segment display with 8051.
8. To display the message on LCD using 8051.
9. To transfer and receive data serially using 8051.
10. To generate waveform using 8051.
11. To measure pulse width using 8051.
12. To interface temperature sensor and display room temperature on display.
13. To interface DC motor using 8051.
14. To interface relay and turn ON/OFF the bulb using 8051.

Text Books

1. M. A. Mazidi, J. G. Mazidi and R. D. Mckinlay, The 8051 Microcontroller & Embedded systems, Pearson Education India, 1st Edition, 2007.
2. Lyla Das, Embedded Systems: An Integrated Approach, Pearson Publication, 1st Edition, 2012.

Reference Books

1. C. Kenneth J. Ayala and D. V. Gadre, The 8051 Microcontroller & Embedded system Using assembly & C, Cengage Learning Publication, 1st Edition, 2010.
2. I. Scott Mackenzie, Raphael C. W. Phan, The 8051 Microcontroller, Pearson International Publication, 4th Edition 2007.
3. Ajay Deshmukh, Microcontrollers, Tata McGraw Hill Publication, 2nd Edition 2006.

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:

(a) Performance in Experiments: 05 Marks

(b) Journal Submission: 05 Marks

(c) Viva-voce: 05 Marks

(d) 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.

Data Analytics Laboratory (22ESET4050L)

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. Basics of data modeling.
2. Data processing techniques.
3. Supervised learning methods.
4. Unsupervised learning methods.
5. Dimensionality Reduction.
6. Ensemble methods.

COs	Course Outcomes	Blooms Level	Blooms Description
CO1	Perform data cleaning and transformations on a given dataset.	L3	Apply
CO2	Perform data modeling using regression and classification methods.	L3	Apply
CO3	Apply dimensionality reduction on high dimensional datasets.	L3	Apply
CO4	Apply the concepts of Neural Network on non-linear datasets.	L3	Apply
CO5	Apply ensemble techniques for imbalance datasets.	L3	Apply
CO6	Apply clustering techniques for unsupervised datasets.	L3	Apply

Course Contents

List of Laboratory Experiments: (Minimum Eight)

1. Analysis of different types of datasets.
2. Plotting of probability distribution using different dataset.
3. Plotting and visualization of dataset using different types of graphs.
4. Different types data cleaning methods.
5. Implementation of logistic regression model for predictive analysis.
6. Implementation of linear regression model for predictive analysis.
7. Implement PCA on dataset with high dimensionality and perform prediction using KNN.
8. Implement clustering methods on unsupervised dataset.
9. Hypothesis testing for given dataset.
10. ANOVA technique using dataset.

Text Books

1. Max Kuhn & Kjell Johnson, Applied Predictive Modelling, Springer Publication,1st Edition.
2. Olson, David L., Wu, Desheng, Predictive Data Mining Models, Springer,1st Edition 2020.

Reference Books

1. Alvaro Fuentes, Hands-On Predictive Analytics with Python: Master the Complete Predictive Analytics Process, from Problem Definition to Model Deployment, Packt Publishing,, 2nd Edition 2019.
2. Ai Publishing, Data Pre-processing with Python for Absolute Beginners: Step-by-Step Guide with Hands-on Projects and Exercises, Apex Persuasion 2020.

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.

Database Management System Laboratory (22ESET4060L)

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. Learn and practice data modeling using the entity-relationship and developing database designs.
2. Understand the use of Structured Query Language (SQL) and learn SQL syntax.

COs	Course Outcomes	Blooms Level	Blooms Description
CO1	Analyze a case study and create ER diagram of the scenario and able to create Database schema from this using given software and SQL.	L4, L6	Analyze, Evaluate
CO2	Write basic SQL queries to apply constraints, insert rows, do basic operations like alter, update and delete, to use basic aggregate functions and retrieve information from databases.	L5	Synthesize
CO3	Perform normalization on tables by analyzing functional dependencies.	L2	Understand
CO4	Write SQL queries to make joins and views on table.	L2	Understand
CO5	Perform nested queries and triggers..	L2	Understand

Course Contents

Unit-I Introduction to databases 02 Hrs.

Characteristics of databases, Users of Database system, Database architecture, Data abstraction, Different data models.

Unit-II The Entity-Relationship (ER) Model 04 Hrs.

Types of entities and Attributes, Keys, Relationship constraints: Cardinality and Participation.

Unit-III Relational Database 06 Hrs.

Relational schema and concept of keys, Mapping ER model to Relational Model, Constraints, types of constrains, Integrity constraints, Normalization 1NF,2NF,3NF, BCNF.

Unit-IV SQL 08 Hrs.

DDL & DML commands, Specifying Constraints in SQL, Basic Retrieval Queries in SQL, Views in SQL, aggregate functions, nested sub queries, JOINTS, Triggers.

List of Laboratory Experiments (Minimum 08 Experiments)

Experiments are be based on theory topics given below:-

1. Design an Entity-Relationship (ER) model according to the requirement of organization.
2. Convert the designed ER model to a Relational Database. Create this database in MySQL/SQL Server (any other suitable software) with required tables. Apply the constraints like Primary Key, Foreign key, NOT NULL to the tables.
3. Write SQL statements for inserting rows (INSERT) and perform ALTER, UPDATE and DELETE.
4. Perform aggregate functions.
5. Identify dependencies in a table and accordingly convert it to 1NF, 2NF, 3NF and BCNF.
6. Perform SELECT statement for retrieval of data from Database.
7. Perform various JOIN operations on Tables.
8. Create views and access data from it using SQL statements.
9. Perform queries for triggers.
10. Perform Nested queries.
11. Mini Project.

Text Books

1. A Silberschatz, H Korth, S Sudarshan, Database System and Concepts, McGraw Hill, 7th Edition, 2019.

2. Ramez Elmasri, Shamkant B. Navathe, Fundamentals of Database System,Person Publication, 7th Edition, 2017.

Reference Books

1. Peter Rob, Carlos Coronel, Database Systems Design, Implementation and Management, 8th Edition Cengage Learning, 2007.
2. P.S. Deshpande, SQL and PL/SQL for Oracle 11g Black Book, Dreamtech Press, 2011.
3. Mark L. Gillenson, Paulraj Ponniah, Introduction to Database Management, Wiley, 2008.

Evaluation Scheme:

Continuous Assessment (A):

Minimum 08 experiments from the above suggested list or any other experiment based on syllabus will be included, which would help the learner to apply the concept learnt.

The distribution of marks shall be as follows:

1. Laboratory work (Performance in Experiments): 15 Marks
2. 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.

Constitution of India (22MCET4070T)

Teaching Scheme
Lectures: 02 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.lnlu.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.

Semester Project- II (22PJET4080L)

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 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 (22HMET4090L)

Teaching Scheme
Practical: 02 Hrs/Week
Credit: 01

Examination Scheme
Teacher Assessment: 50 Marks
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.