Shirpur Education Society's

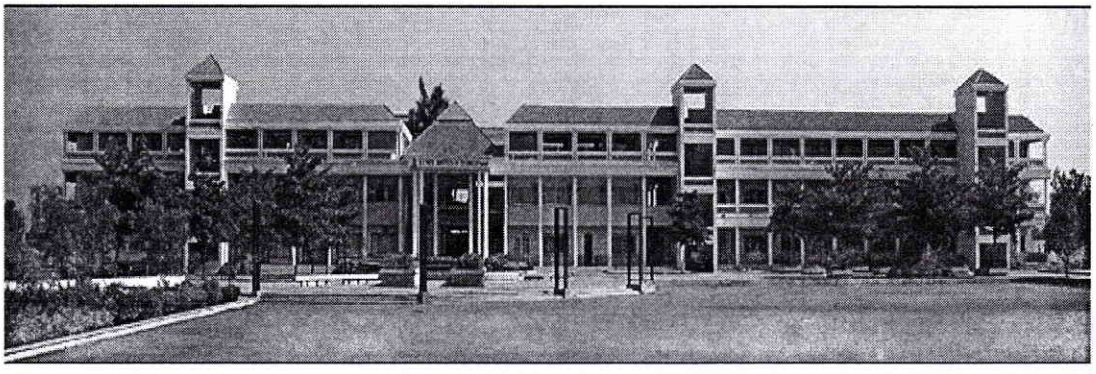
R. C. Patel Institute of Technology, Shirpur

(An Autonomous Institute)

Course Structure

Second Year B.Tech (Electrical Engineering)

with efffect from Year 2021-22



Shahada Road, Near Nimzari Naka, Shirpur, Maharashtra 425405
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Semester-III (w.e.f. 2021-22)												
SN	Course Category	Course Code	Course Title	Teaching Scheme			Evaluation Scheme (CA)				ESE	Total	Credit
				L	T	P	TA	Term Test 1 (TT1)	Term Test 2 (TT2)	Average (TT1 & TT2)			
							[A]			[B]	[C]	[A+B+C]	
1	BS	BSEE3010T	Engineering Mathematics-III	3	1		20	15	15	15	65	100	4
2	PC1	PCEE3020T	Electrical Circuit Theory	3	1		20	15	15	15	65	100	4
3	PC1L	PCEE3020L	Electrical Circuit Theory Laboratory			2	25				25	50	1
4	PC2	PCEE3030T	Analog and Digital Electronics	3			20	15	15	15	65	100	3
5	PC2L	PCEE3030L	Analog and Digital Electronics Laboratory			2	25				25	50	1
6	PC3	PCEE3040T	Electrical Measurements and Instrumentation	3			20	15	15	15	65	100	3
7	PC3L	PCEE3040L	Electrical Measurements and Instrumentation Laboratory			2	25				25	50	1
8	PC4	PCEE3050T	Electrical Energy Generation System	3			20	15	15	15	65	100	3
9	ES	ESEE3060L	Python Programming Language			2	25				25	50	1
10	PJ	PJEE3070L	Semester Project-I			2	25				25	50	1
11	MC	MCEE3080T	Constitution of India	1									Audit Course
12	INT	INTEE3090	@Field/Internship/Industry Training										Audit Course
Total				**16**	**2**	**10**	**225**			**75**	**450**	**750**	**22**
@ Minimum 6 weeks field/industry training/ internship should be done during winter/summer vacation of semester III to VI. Evaluation will be done in semester VII.													

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

Semester-IV(w.e.f. 2021-22)

SN	Course Category	Course Code	Course Title	Teaching Scheme			Evaluation Scheme (CA)				ESE	Total	Credit
				L	T	P	TA	Term Test 1 (TT1)	Term Test 2 (TT2)	Average (TT1 & TT2)			
							[A]			[B]	[C]	[A+B+C]	
1	BS	BSEE4010T	Engineering Mathematics-IV	3	1		20	15	15	15	65	100	4
2	PC1	PCEE4020T	Electrical Machine-I	3			20	15	15	15	65	100	3
3	PC1L	PCEE4020L	Electrical Machine-I Laboratory			2	25				25	50	1
4	PC2	PCEE4030T	Power System Transmission and Distribution	3			20	15	15	15	65	100	3
5	PC2L	PCEE4030L	Power System Transmission and Distribution Laboratory			2	25				25	50	1
6	PC3	PCEE4040T	Microcontroller and Its Applications	3			20	15	15	15	65	100	3
7	PC3L	PCEE4040L	Microcontroller and Its Applications Laboratory			2	25				25	50	1
8	PC4	PCEE4050T	Signals and Systems	3			20	15	15	15	65	100	3
9	ES	ESEE4060L	Numerical Methods and Computer Programming Laboratory			2	25				25	50	1
10	HM	HMEE4070T	Universal Human Values	2			20	15	15	15	65	100	2
11	PJ	PJEE4080L	Semester Project-II			2	25				25	50	1
12	HM	HMEE4090L	Employability Skill Development Program-I			2	25				25	50	1
13	INT	INTEE4100	@Field/Internship/Industry Training										Audit Course
			Total	**17**	**1**	**12**	**270**			**90**	**540**	**900**	**24**

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

Prepared by | Checked by | BOS Chairman | Dean Academic/Dy. Director | C.O.E. | Director

Engineering Mathematics - III (BSEE3010T)

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

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

Course Objectives

1. To build the 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	Learner will demonstrate basic knowledge of Laplace Transform. Fourier series, Vector Algebra and Complex Variable.	L2	Understand
CO2	Learner will demonstrate an ability to identify and Model the problems of the field of Electronics and Telecommunication Engineering and solve it.	L2, L5	Understand, Create
CO3	Learner will be able to apply the application of Mathematics in Electronics and Telecommunication Engineering.	L3	Apply

Course Contents

Unit-I Laplace Transform 10 Hrs.

Laplace Transform (LT) of Standard Functions: Definition of Laplace transform, Condition of Existence of Laplace transform, Laplace transform of e^{at} , *sinat* , *cosat* , *sinhat*, *coshat* , t^n. Heaviside unit step function, Dirac-delta function, Laplace transform of Periodic function Properties of Laplace Transform: Linearity, first shifting theorem, second shifting theorem, multiplication by t^n,Division by t, Laplace Transform of derivatives and integrals, change of scale, convolution theorem, Evaluation of integrals using Laplace transform.

Unit-II Inverse Laplace Transform and its Applications 8 Hrs.

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

Unit-III Fourier Series 8 Hrs.

Introduction: Orthogonal and orthonormal set of functions, Introduction of Dirichlet's conditions, Euler'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.

Unit-V Vector Algebra, Vector Differentiation & Vector Integral 9 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: Green's theorem in a plane, Gauss' divergence theorem and Stokes' theorem.

Unit-V Complex Variable 7 Hrs.

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

Text Books

1. H.K. Das, "Advanced Engineering Mathematics", S . Chand, 2008.
2. Kanti B. Datta, "Mathematical Methods in Science and Engineering", Cengage India; 1st edition (January 1, 2012).
3. B.S. Grewal, "Higher Engineering Mathematics", Khanna Publication

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", Schaum's outline series, Mc-Graw Hill Publication.

Evaluation Scheme:

Continuous Assessment (A):

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

Continuous Assessment (B):

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

End Semester Examination (C):

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

Tutorial

Minimum eight tutorials shall be conducted.

Electrical Circuit Theory (PCEE3020T)

Teaching Scheme
Lectures : 03 Hr/week
Tutorial : 01 Hr/week
Credit : 04

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

Prerequisites: Kirchhoff's Laws, Voltage and current division rule, Independent and dependent voltage and current sources, Source transformation and source shifting

Course Objectives

1. To make the students capable of analyzing any given electrical network.
2. To make the students learn how to synthesize an electrical network from a given impedance/admittance function.
3. To relate various two port parameters and transform them.

COs	Course Outcomes	Blooms Level	Blooms Description
CO1	Identify the network, solve electric circuits by applying various network laws and theorems	L1, L2, L3	Remember, Understand, Apply
CO2	Solve electric circuits by applying graph theory principles.	L3	Apply
CO3	Solve the first order and second order differential equation to determine the transient and steady state response of circuit	L3	Apply
CO4	Analyze waveform and circuit using Laplace transform.	L4	Analyze
CO5	Design and evaluate two port network, frequency selective circuits	L5, L6	Evaluate, Create

Course Contents

Unit-I Circuit Analysis using Theorems 7 Hrs.

Mesh and Supermesh analysis, Node and Supernode analysis,

Theorems: Superposition, Thevenin's, Norton's Reciprocity, Maximum power transfer theorem and Millman theorem.

Unit-II Network Topology 7 Hrs.

Graph of network, oriented graph, definition of basic terminologies of graph theory, tree, cotree, link, twigs, incidence and reduced incidence matrix, graph reconstruction from incidence matrix, loop and tieset matrix, cutset and fundamental cutset matrix, Network Equilibrium equations in matrix form: Mesh or Loop or KVL Equilibrium, Node or KCL Equilibrium equations, Duality.

Unit-III Transient Analysis of Circuit in Time Domain 7 Hrs.

Solution of differential equation, General and particular solutions, Particular integral and complimentary function, series and parallel R-L, R-C and R-L-C circuits, Mathematical analysis of circuit transients, Charging and discharging condition, time constant of the circuit, Analysis with initial conditions and without initial condition in network, steady state and transient state response, Over damped and Underdamped series RLC circuit.

Unit-IV Transient Analysis of Circuit in Frequency Domain 7 Hrs.

Laplace Transform (LT) its properties, Complex frequency. Solution of differential equation using Laplace transform, LT of standard mathematical functions, LT of standard test signals, LT of R, L and C. Inverse LT. Analysis of RL, RC and RLC circuits using LT, Initial condition.

Unit-V Two Port Network 7 Hrs.

Two Port Network: Introduction to Two port networks analysis, Reciprocity and Symmetry conditions, Open circuit Impedance parameters, Short circuit Admittance parameters, Transmission parameters, Inter conversion of parameters, Interconnection of Two port parameters: cascade connection, series connection, and parallel connection.

System and Network Functions: Driving point impedance and Admittance functions, transfer impedance and admittance, voltage and current transfer ratio.

Unit-VI Attenuators and Frequency Selective Networks 7 Hrs.

Attenuators: Attenuation, Types of attenuators, Symmetrical T type attenuator, Symmetrical π type attenuator, Symmetrical bridged T type attenuator, Symmetrical lattice type attenuator.

Introduction Filters Circuit: Introduction to Filters, Pass band, Attenuation band, Low Pass Filter, High Pass Filter, Band Pass Filter, Band Reject Filter, cutoff frequency.

Resonance Circuit: R-L-C series circuits, Series resonance Variation of Z with frequency, maximum value of VC and VL, Bandwidth, Q factor. Parallel Resonance: Resonance frequency, Locus diagram of

series R-L, R-C with variable R and X.

Text books

1. Ravish R. Singh, "Circuit Theory and Network: Analysis and Synthesis", Mc Graw Hill Education (India) Pvt Ltd, 2nd Edition, 2019.
2. S. K. Pandey, "Network Analysis and Synthesis", S. Chand and Company Ltd, 1st Edition, 2011.
3. A. Charaborthy, "Circuit Theory (Analysis and Synthesis)", Dhanpat Rai and Company, 1st Edition, 2008.
4. R. K. Mehta and A. K. Mal, "Problems and Solutions of Electrical Circuit Analysis", CBS Publishers, 1st Edition, 2015.

Reference Books

1. A. Anand Kumar, "Network Analysis and Synthesis", PHI Learning, 1st Edition, 2019.
2. S. P. Ghosh, A. K. Chakraborty, "Network Analysis and Synthesis", Tata McGraw Hill Education Pvt Ltd, New Delhi, 2010.
3. M.E. Valkenburg, "Network Analysis", Pearson Education, 3rd Edition, 2019.
4. Franklin Fa-Kun. Kuo, "Network Analysis and Synthesis", John Wiley & Sons, 2nd Edition, 2009.

Evaluation Scheme:

Continuous Assessment (A):

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

Continuous Assessment (B):

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

End Semester Examination (C):

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

Tutorial

Minimum eight tutorials shall be conducted.

Electrical Circuit Theory Laboratory (PCEE3020L)

Teaching Scheme
Practical : 02 Hr/week
Credit : 01

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

Course Objectives

1. Hands-on the on and get familiar with the practical aspects of various network theorems.
2. Hands-on the on and get familiar with the practical aspects of transient and steady state analysis.
3. Hands-on the on and get familiar with the practical aspects of various two port network.
4. Hands-on the on and get familiar with the practical aspects of various filter and attenuator circuits.

COs	Course Outcomes	Blooms Level	Blooms Description
CO1	Apply network theorems for the analysis of electrical circuits.	L2, L3	Understand, Apply
CO2	Obtain transient and steady-state response of electrical circuits.	L2	Understand
CO3	Analyze two port circuit behaviors.	L2	Understand
CO4	Design and Analyze filter circuits.	L3, L6	Apply, Create

List of the Experiments

Perform any 10 experiments from the following list of experiments **(Compulsory one innovative experiment)**

1. Verification of Superposition Theorem.
2. Verifications of Thevenin's Theorem.
3. Verification of Maximum Power Transfer Theorem.
4. Verification of Reciprocity Theorem.
5. Determination of transient response of current in RL & RC circuits with step voltage input.
6. Determination of transient response of current in RLC circuit with step voltage input for under damped, critically damped and over damped cases.
7. Measurement of Z parameter of two port network.
8. Measurement of Y parameter of two port network.
9. Measurement of parameters using Interconnection of two port network.
10. Determination of frequency response of current in series and parallel RLC circuit with sinusoidal ac input.
11. Determination of driving point and transfer functions of a two port ladder network and verify with theoretical values.
12. Determine characteristics of Low pass and high pass filter.
13. Design and verification cut off frequency of Band Pass Filter.
14. Determination of transient response of current in underdamped, overdamped and critically damped RLC circuit with standard input signals (Innovative). **(Innovation)**
15. Determination of voltage and current using network equilibrium using node base equation.**(Innovation)**
16. Determination of voltage and current using network equilibrium using loop base equation.**(Innovation)**
17. Measurement of ABCD parameter of transmission line.**(Innovation)**

Lab Tools: MATLAB, Python

Web Tools: www.falstad.com

Reference Books

1. Brian D. Hahn, Essential MATLAB for Scientists and Engineers, Elsevier Publication, 2002.
2. Brian D. Hahn, Essential MATLAB for Scientists and Engineers, Elsevier Publication, 2002.
3. www.mathworks.com.
4. https://www.w3schools.com/python/

Evaluation Scheme

Laboratory

Continuous Assessment (TA):

Laboratory work will be based on PCEE3060L and subject specific lab assignment/case study. The distribution of marks for term work shall be as follows:

- Performance in Experiments: 05 Marks

- Journal Submission: 05 Marks
- Viva-voce: 05 Marks
- Subject Specific Lab Assignment/Case Study: 10 Marks

The final certification and acceptance of term work will be subject to satisfactory performance of laboratory work and upon fulfilling minimum passing criteria in the term work.

End Semester Examination (ESE):

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

Analog and Digital Electronics (PCEE3030T)

Teaching Scheme
Lectures : 03 Hr/week
Credit : 03

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

Prerequisites: Basic Electrical and Electronics Engineering, Concepts of semiconductors and P-N junction, gate and number system

Course Objectives

1. This course aims to introduce students the basic features of transistor amplifier.
2. It intends to provide knowledge and experience for implementing simple electronic circuits to meet or exceed design specifications.
3. It is aimed to enable students for implementing combinational logic circuits for various applications.
4. It intends to provide knowledge for implementation of sequential circuits using flip-flops.

COs	Course Outcomes	Blooms Level	Blooms Description
CO1	Summarize various analog and digital circuits.	L2	Understand
CO2	Implement analog and digital circuits to meet stated applications.	L3	Apply
CO3	Construct basic analog filters, combinational and sequential circuits	L3	Apply
CO4	Solve the K-map of 2, 3 and 4 variable.	L3	Apply
CO5	Analyze the performance of electronic circuits	L4	Analyze

Course Contents

Unit-I Transistor Amplifiers and Voltage Regulators 7 Hrs.

Introduction, Types of Configuration: common base, common emitter and common collector configurations, operating point, DC load line analysis, stability and DC biasing circuits, Cascade amplifier, Voltage regulators, short circuit protection, fixed voltage regulators (± 5 V, ± 12 V).

Unit-II Fundamentals of Op-Amps and Timer IC 7 Hrs.

Block Diagram, Op-Amp parameters and ratings Characteristics, Op-Amp powering, feedback in Op-Amp circuits, inverting, non- inverting amplifiers, adder, subtractor, voltage comparator, difference amplifier, Multivibrator: IC 555Astable, Monostable and Bistable

Unit-III Applications of Opamps 7 Hrs

Instrumentation amplifier, Integrator, Differentiator, Schmitt trigger, Active filters-Low pass, high pass, band pass, all pass, band reject (notch) filters, Current to voltage convertor, voltage to current convertor.

Unit-IV Combinational and Sequential Circuits 7 Hrs

Review of postulates of Boolean algebra, Theorems of Boolean algebra, Boolean function and k- map minimization technique for multiple outputs, static & dynamic hazards, multiplexer, de-multiplexer, priority encoder, comparator, half & full adders, tri-state buffers. Latches – S-R latch, D latch, flip-flops-D F/F, J-K F/F, T F/F, master slave J-K F/F, conversion of one F/F to another F/F.

Unit-V Applications of Sequential Circuits 7 Hrs.

Counters: Modulus of Counter, Synchronous and Asynchronous counters, Ripple counters, drawbacks of ripple counters, Ring counters, Twisted Ring Counters, Shift registers, types of shift registers, design using Flip Flops- Bidirectional shift register, Universal shift register, Digital memories: SRAM, DRAM, ROM, EPROM.

Unit-VI Digital to Analog and Analog to Digital Converters 7 Hrs.

BiBinary weighted DAC, R-2R ladder DAC, Ramp ADC, dual slope ADC, successive approximation technique, flash ADC, Tracking type ADC, specific ADC, Voltage to frequency ADC.

Text Books

1. Sergio Franco, "Design with Op-Amps and analog Integrated Circuits", Tata McGraw-Hill Publication, 3rd Edition, 2001.
2. Allen Mottershead, "Electronic Devices and Circuits: An Introduction", Prentice Hall India, 2010.
3. A. Anand Kumar, Fundamentals of Digital Circuits, Prentice Hall India, 4th Edition, 2014.

Reference Books

1. R.A. Gayakwad, "Op-Amps & Linear Integrated Circuits", Prentice Hall India, 4th Edition, 2012.
2. R. L. Boylestad and Louis Nashelsky, "Electronic Devices and Circuit Theory", Pearson Publications, Tenth Edition, 2009.
3. M. Moris Mano and Michael Ciletti, "Digital Design", Pearson Publications, 5th Edition.

Evaluation Scheme:

Continuous Assessment (A):

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

Continuous Assessment (B):

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

End Semester Examination (C):

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

Analog and Digital Electronics Laboratory (PCEE3030L)

Teaching Scheme
Practical : 02 Hr/week
Credit : 01

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

Course Objectives

1. This lab course intends to provide basic practical knowledge of various ICs for developing linear integrated circuits.
2. It intends to impart skills to implement different electronic circuits using operational amplifier.
3. It aims to develop an ability to design and implement combinational and sequential circuits.

COs	Course Outcomes	Blooms Level	Blooms Description
CO1	Distinguish various analog and digital circuits.	L2	Understand
CO2	Illustrate linear integrated circuits using electronic components like Op-amps, transistors, etc.	L3	Apply
CO3	Implement applications of various analog and digital circuits.	L3	Apply

List of the Experiments

List of Laboratory Experiments **(minimum 10 to be covered)**

Part-A

Any 5 experiments from Part-A (3- Hardware base, 1- Simulation and 1- Innovative experiments)

1. To Plot I/P and O/P characteristics of BJT (CE Configuration).
2. To Plot DC Load Line for BJT (Voltage Divider biasing circuit).
3. Measurement of Op- Amp (IC741) parameters.
4. Design and implementation of integrator, differentiator.
5. Design and implementation of instrument amplifier.
6. Design and implement second order Butterworth LP / HP filter.
7. Setup ADC circuit Using IC LM 741 and study its performance.
8. Design of the astable multivibrator using IC 555.
9. Shadow Sensor Alarm using IC741 op-Amp . **(Innovation)**
10. Sequential Timer(IC-555) for DC Motor Control. **(Innovation)**

Part-B

Any 5 experiments from Part-B (3- Hardware base, 1- Simulation and 1- Innovative experiments)

1. Design and implementation of 4 bit Gray to Binary Code Converter.
2. Design and implementation of Half and Full Adder circuits.
3. Demonstration of the JK, D and T flip flops using ICs.
4. To realize and study of Shift Register.
5. Design and implementation of BCD to 7 Segment display decoder using IC 7447/7448
6. Design and implementation of multiplexer and de-multiplexer using ICs
7. Design and implementation of ripple counter using ICs.
8. Design and implementation of 3-bit Synchronous Up/Down counter
9. Construction of adder circuit using Shift Register and full Adder. **(Innovative)**
10. Code conversion circuits- BCD to Excess-3 and vice-versa. **(Innovative)**

Computer Usage / Lab Tool:

1. Use of software simulation tools like Proteus, PSpice etc.
2. Use of analog and digital circuit trainer kits.

Reference Books

1. R.A. Gayakwad, "Op-Amps & Linear Integrated Circuits", Prentice Hall India, Fourth Edition, 2012.
2. R. L. Boylestad and Louis Nashelsky, "Electronic Devices & Circuit Theory", Pearson Publications, Tenth Edition, 2009.
3. M. Moris Mano and Michael Ciletti, "Digital Design", Pearson Publications, Fifth Edition,

Evaluation Scheme

Laboratory

Continuous Assessment (TA):

Laboratory work will be based on PCEE3060L and subject specific lab assignment/case study. The distribution of marks for term work shall be as follows:

- Performance in Experiments: 05 Marks
- Journal Submission: 05 Marks
- Viva-voce: 05 Marks
- Subject Specific Lab Assignment/Case Study: 10 Marks

The final certification and acceptance of term work will be subject to satisfactory performance of laboratory work and upon fulfilling minimum passing criteria in the term work.

End Semester Examination (ESE):

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

Electrical Measurements and Instrumentation (PCEE3040T)

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

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

Prerequisites: Basic Electrical and Electronics Engineering

Course Objectives

1. This course intends to provide basic concepts of errors in measurements and basic fundamentals of measuring systems. formal representation, computational methods, notation, and vocabulary of linear models, philosophy of measurement..
2. It is aimed to impart skills to classify bridges, measuring instruments and equipment's and also demonstrate digital instruments, advance instruments.
3. Imparting basic knowledge of transducer.

COs	Course Outcomes	Blooms Level	Blooms Description
CO1	Grasp: Fundamental concepts of measurement and identify errors in measurements and its statistics.	L2	Understand
CO2	Explain: Working principle and mechanism of measuring instrument.	L2	Understand
CO3	Use: a proper measuring instrument for given application.	L3	Apply
CO4	Use: Proper measuring energy meters and transducer applications.	L4	Apply
CO5	Identify: Conventional and modern techniques for measurement of electrical parameters.	L5	Analyze

Course Contents

Unit-I Introduction to Measurement and Instrumentation 7 Hrs.

Philosophy of Measurement: Methods of Measurement, Measurement System, Classification of instrument system, Characteristics of instruments and measurement system, Errors in measurement and its analysis, Standards.

Unit-II Analog Measurement of Electrical Quantities 7 Hrs.

Electro dynamic, Thermocouple, Electrostatic & Rectifier type Ammeters and Voltmeters, Electro dynamic, Wattmeter, Three Phase Wattmeter, Power in three phase system, errors and remedies in wattmeter and smart energy meter. Instrument Transformer and their applications in the extension of instrument range, Introduction to measurement of speed, frequency and power factor

Unit-III Measurement of Parameters 7 Hrs.

Different methods of measuring low, medium and high resistances, measurement of inductance and capacitance with the help of AC Bridges, Q Meter

Unit-IV Digital Measurement of Electrical Quantities 7 Hrs.

Concept of digital measurement, block diagram Study of digital voltmeter, frequency meter Power Analyzer and Harmonics Analyzer; Electronic Multimeter

Unit-V Introduction to Transducers 7 Hrs.

Definition - different types of transducers – criteria for selection general characteristics dynamic characteristics – transducers for measurement of displacement (RVDT and LVDT), speed, angular rotation, altitude, force, torque, humidity and moisture, pressure, strain and temperature (Thermocouple and RTD method), Hall Effect transducer and applications.

Unit-VI Display Methods, Recorders 7 Hrs.

Display methods and devices-different types of recorders galvanometric recorders, magnetic recorders, digital recorders, Digital Storage Oscilloscope.

Text Books

1. E. W. Golding, "Electrical Measurements and Measuring Instruments", Reem Publication, 23rd Edition, 2011 .
2. C. T. Baldwin, "Fundamentals of Electrical Measurements", Kalyani Publication, 2nd Edition.
3. Cooper and Derfllick, "Electronic Instrumentation and Measurements Techniques" , Prentice-Hall of India, 3rd Edition, 1992.
4. J. B. Gupta, "Electrical and Electronic Measurement and Instrumentation", S. K. Kataria and Son, 14th Edition, 2013.
5. R. K. Rajput, "Electrical and Electronic Measurement and Instrumentation", S. Chand, 2000.

Reference Books

1. A. K. Sawhney. "Electrical and Electronic Measurement and Instrumentation" Dhanpant Rai and Co, 2015.

Evaluation Scheme:

Continuous Assessment (A):

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

Continuous Assessment (B):

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

End Semester Examination (C):

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

Electrical Measurements and Instrumentation Laboratory (PCEE3040L)

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

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

Course Objectives: The objective of the laboratory is to impart the fundamental knowledge of measuring instruments. Students develop their ability to select the specific instrument in reference of ranges and resolution of instruments for proper and correct analysis. The students will able to understand the characteristic of measuring instruments. In this lab course, students will be familiar with the use of different equipments, safety precautions on work place. This makes bridge on theoretical knowledge and practical practices.

COs	Course Outcomes	Blooms Level	Blooms Description
CO1	Conduct practical and able to analyze the practical data for various purposes.	L2	Understand
CO2	Apply various electrical and non electrical measurement methods to obtain electrical and non electrical quantities.	L3	Apply
CO3	Able to select the measuring instrument with proper range and type for practical uses.	L3	Apply
CO4	Calibrate various types of instruments as per IS.	L2	Understand
CO5	Do professional duties in technical field and able to use advance measuring instruments.	L3,L2	Apply, Understand

List of the Experiments

List of Laboratory Experiments **(minimum 10 to be covered)**

Part A

Any 5 experiments from Part-A (3- Hardware base, 1- Simulation and 1- Innovative experiments)

1. Study of Various analog and Digital measuring Instruments.
2. Measurement of active power by using two wattmeter method.
3. Measurement of reactive power by using two wattmeter method.
4. Calibration of single phase energy meter.
5. Study of different bridges.
6. Earth resistance measurement using earth tester.
7. Insulation measurement using megger.
8. Design and implementation of bridges.(Innovative)
9. Voltage Measurement. (Innovative)

Part B

Any 5 experiments from Part-B (3- Hardware base, 1- Simulation and 1- Innovative experiments)

1. Study of DSO, Power Analyzer.
2. Study of Instrument T/F and its types.
3. Study of Digital torque measurement.
4. Study of Linear Variable differential Transformer.
5. Study of digital frequency meter and digital Voltmeter.
6. Construction of ammeter and voltmeter.
7. Strain measurement using strain gauge.
8. Current Measurement using Falstad. (Innovative)
9. Power Measurement using Matlab (Innovative)

Computer Usage / Lab Tool:

1. Use of software simulation tools like Matlab, Proteus.
2. Use of Measuring and Instrument trainer kits.

Web Resources:

1. www.Falstad.com/circuit/(Circuit Simulator Applet)

Reference Books

1. E. W. Golding, "Electrical Measurements and Measuring instruments", Reem Publication, 23rd edition.
2. C. T. Baldwin, "Fundamentals of Electrical Measurements", Kalyani Publication, 2ndedition.
3. Cooper and Derfllick, "Electronic Instrumentation and Measurements Techniques", Prentice-Hall of India, 3rd edition.
4. J. B. Gupta, "Electrical & Electronic Measurement and Instrumentation", S. K. Kataria & Son, 14th edition.

Evaluation Scheme

Laboratory

Continuous Assessment (TA):

Laboratory work will be based on PCEE3060L and subject specific lab assignment/case study. The distribution of marks for term work shall be as follows:

- Performance in Experiments: 05 Marks
- Journal Submission: 05 Marks
- Viva-voce: 05 Marks
- Subject Specific Lab Assignment/Case Study: 10 Marks

The final certification and acceptance of term work will be subject to satisfactory performance of laboratory work and upon fulfilling minimum passing criteria in the term work.

End Semester Examination (ESE):

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

Electrical Energy Generation System (PCEE3050T)

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

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

Prerequisites: Knowledge of Basic Electrical Engineering

Course Objectives

1. This course aims to develop familiarity with power system.
2. An understanding of basic abstractions of electrical power generations from conventional and non-conventional sources of energy.
3. To Develop familiarity with the operation of various power plants.
4. To Develop an understanding of the environmental aspects of power generation.
5. To Understand the Challenges of using sources of energy efficiently and effectively.

COs	Course Outcomes	Blooms Level	Blooms Description
CO1	Demonstrate the knowledge about the electric power generations and their impacts.	L2	Understand
CO2	Assess the theory and practices of conventional and non-conventional power generation method .	L3	Apply
CO3	Determine the operation, maintenance and working of power plants	L3	Apply
CO4	Understand the basic physics of wind and solar power generation.	L3	Understand
CO5	Analyze the issues related to the grid-integration of solar and wind energy systems.	L4	Analyze
CO6	To create awareness of the concept of micro-grid and distributed generation system	L3	Apply

Course Contents

Unit-I Introduction to Generation System 4 Hrs.

Importance of Electrical Energy, Conventional and Non conventional energy Sources, Generation of Electrical Energy, Energy demand growth and supply, Sustainable Development and Role of Renewable Energy Sources. Amount of generation of electric power from Conventional and non conventional sources of energy in India and world.

Unit-II Hydro Power Station 7 Hrs.

Schematic arrangement of Hydroelectric Power Station, Constituents of Hydroelectric power plant, Classification of HPS: based on head, Storage and pondage, Hydrology, stream flow, flow duration curve, power duration curve, mass curve, reservoir capacity, Water Power equation (Numerical), pumped storage plant and their utility. Micro hydro plants, Advantages and Limitations of Hydro- electric Plants, Potential of hydropower in India- its development and future prospect.

Unit-III Steam Power Station 7 Hrs.

Introduction, Line diagram of thermal power station (SPS), Site selection Criteria, size and number of units, general layout, Major equipment and auxiliaries of SPS, General study of steam Turbine. Condenser: Different types of condensers. Construction and Working principle of Condenser, Advantages and Limitations of Steam Power Station.

Unit-IV Nuclear Power Station 7 Hrs.

Environmental aspects for selecting the sites and locations of nuclear power stations, introduction to nuclear physics: Nuclear fusion and fission, Chain reaction, Components of a nuclear reactor, Various types of reactor, material for moderator and control rods, control of nuclear reactors, Special Precautions for NPS, Advantages and Disadvantages of Nuclear Power Station.

Unit-V Solar and Wind Energy Station 8 Hrs.

Introductions to Solar and Wind energy, Solar radiation and its Measurement: - Solar constant, Solar radiation at earth's surface, Solar radiation measurement, Solar Energy Collectors: - Physical principles of the conversion of solar radiation into heat, flat plate collectors. Applications of Solar energy, Present and new technological developments in photovoltaic, Principle of wind energy conversion, Site selection considerations, Basic components of wind energy conversion systems (WECS), Classification of WEC systems, Advantages and Limitations of WECS, Types of wind Machines: Horizontal Axis Wind Turbine (HAWT) and Vertical Axis Wind Turbine (VAWT), Potential of wind electricity generation in India and its current growth rate.

Unit-VI Economic aspects in power Generation 7 Hrs.

Economic aspects in power Generation: Terms commonly used in system operation, various factors affecting cost of generation: Load curves, load duration curves, Connected load, maximum load, Peak load, base load and peak load power plants, load factor, Plant capacity factor, Plant use factor, Demand factor, diversity factor, Concept of microgrid, operation of microgrid in grid-connected as well as

isolated mode, Requirements of hybrid/combined use of different renewable and distributed sources, Distributed energy systems and dispersed generation (DG). Control of frequency and voltage of distributed generation in Stand-alone and Grid-connected mode.

Text Books

1. Mehta, V. K. , "Electrical Power System", S. Chand and Company, 2011
2. Ashfaq Hussain, "Electrical Power Systems", CBS Publishers and Distributors, 5th Edition, 2007 .
3. J. B. Gupta, "Electrical Power", S. K. Kataria and Sons, 11th Edition, 2012.

Reference Books

1. Nag P. K., "Power Plant Engineering", Tata McGraw Hill, 2011
2. Uppal S. L., "Electrical Power", Khanna Publication, 2011
3. Solanki Chetan S., "Renewable Energy Technologies", PHI Learning, 2011
4. B. R. Gupta, "Generation of Electrical Energy", S. Chand and Company, 14th Edition , 2011.

Evaluation Scheme:

Continuous Assessment (A):

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

Continuous Assessment (B):

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

End Semester Examination (C):

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

Python Programming Language (ESEE3060L)

Teaching Scheme

Practical : 02 Hrs./week

Credit : 01

Examination Scheme

Teacher Assessment : 25 Marks

End Sem Exam : 25 Marks

Total Marks : 50 Marks

Course Objectives

1. Install and run Python Interpreter to create and execute programs..
2. Comprehend the concepts file I/O management.
3. Create visualization and plots using appropriate libraries.
4. Apply problem solving techniques and expose students to application development /prototyping.

COs	Course Outcomes	Blooms Level	Blooms Description
CO1	Learner will be able to understand the installation of python.	L2	Understand
CO2	Learner will be able to describe python syntax and implement different data structures.	L2	Understand
CO3	Learner will be able to write functions, use different modules and packages and also perform file handling operations in python.	L3	Apply
CO4	Learner will be able to interpret object-oriented programming concepts in Python	L2	Understand
CO5	Learner will be able to apply various advanced modules of Python for data analysis, develop applications in various fields like data science, machine learning, numerical techniques etc.	L3, L4	Applying, Analyze

Course Contents

Introduction

Informal introduction to programming, algorithms and data structures, Downloading and installing Python, run a simple program on Python interpreter.

Basics of Python

Numbers in Python, Basic & Built-in Math functions, Number Formats, Strings, Quotes, print () Function, Assigning Values to Names & Changing Data Through Names, Copying Data, Tuples-Unchanging Sequences of Data, Lists Changeable Sequences of Data; Dictionaries - Groupings of Data Indexed by Name, Special String Substitution Using Dictionaries, Arrays, Treating a String Like a List, Special Types, Ranges of Sequences, Working with Sets, Arrays.

Decision Making and Functions

If statement, if-elif-else, Repetition using while loop, for loop, break statement, Handling Errors- try: statement, except: statement, Functions-Grouping Code under a Name, defining a Function, function in the function, Checking & Setting Your Parameters, Calling Functions from within Other Functions, Functions Inside of Functions, Layers of Functions.

Object Oriented Programming using Python programming

Creating a Class, Self Variables, Constructors, Types of Methods, Inner Classes, Constructors in Inheritance, Polymorphism, Interfaces in Python. Exceptions Handling: Errors in a Python Program, Exceptions, Exception Handling, Types of Exceptions.

Advanced Python Libraries

Introduction to Objects and Functions of

1. Numpy - core library for scientific computing
2. Pandas - fast, powerful, flexible and easy to use open source data analysis and manipulation tool
3. MatplotLib - comprehensive library for creating static, animated, and interactive visualizations
4. SciPy - ecosystem of open-source software for mathematics, science, and engineering

List of the Experiments

Perform any 10 experiments from the following list of experiments **(Compulsory one innovative experiment)**

1. Installing python and setting up environment. Simple statements like printing the names, numbers, mathematical calculations, etc.
2. Write a program to demonstrate different number data types in Python.
3. Write a program to perform different Arithmetic Operations on numbers in Python.
4. Write a program to create, concatenate and print a string and accessing sub-string from a given string.
5. Write a program to create, append, and remove lists in python.
6. Write a program to demonstrate working with tuples in python.
7. Write a program to demonstrate working with dictionaries in python.
8. Write a python program to find largest of three numbers.
9. Write a python program to convert temperatures to and from Celsius, Fahrenheit.
10. Write a python script that prints prime numbers less than 20.
11. Write a python program using numpy to sort the elements in the given array.
12. Write a Pandas program to create and display a DataFrame from a specified dictionary data which has the index labels.
13. Write a Python program to draw line charts of the given data using Matplotlib.
14. Introduction of Python Electrical Machine Library (PYLEECAN).(Innovation)
15. Introduction of Python Linear Circuit Analysis (lcapy).(Innovation)
16. Introduction of Python Control System Library.(Innovation)
17. Data Analysis of Household Power Consumption.(Innovation)

Computer Usage / Lab Tool:

1. Use of software tools like Anaconda, Python, Pytorch etc.
2. Use of online tools like Colab, Programiz etc.

Web Resources:

1. www.python.org
2. https://www.w3schools.com/python/default.asp
3. https://www.learnpython.org/
4. http://spoken-tutorial.org
5. "The Python Tutorial", http://docs.python.org/release/3.0.1/tutorial/

Reference Books

1. Mark Lutz, "Learning Python", O Reily, 4th Edition, 2009.

2. Mark Lutz, "Programming Python", O Reily, 4th Edition, 2010.
3. Tim Hall and J-P Stacey, "Python 3 for Absolute Beginners", Apress, 1st Edition, 2009.
4. Magnus Lie Hetland, "Beginning Python: From Novice to Professional", Apress, 2nd Edition, 2009.
5. Wesley J. Chun, "Core Python Programming", Pearson, 2nd Edition, 2006.
6. J. Jose, "Introduction to Computing and Problem Solving with Python", Khanna Publications, 1st Edition, 2019.
7. Reema Thareja, "Python Programming: Using Problem Solving Approach", Oxford University Press, 2nd Edition, 2019.

Evaluation Scheme

Laboratory

Continuous Assessment (TA):

Laboratory work will be based on PCEE3060L and subject specific lab assignment/case study. The distribution of marks for term work shall be as follows:

- Performance in Experiments: 05 Marks
- Journal Submission: 05 Marks
- Viva-voce: 05 Marks
- Subject Specific Lab Assignment/Case Study: 10 Marks

The final certification and acceptance of term work will be subject to satisfactory performance of laboratory work and upon fulfilling minimum passing criteria in the term work.

End Semester Examination (ESE):

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

Semester Project- I (PJEE3070L)

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 A.

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

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

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: Table A

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: Table B

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

Constitution of India (MCEE3080T)

Teaching Scheme Lectures : 01 Hrs./week

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	L2	Understand
CO3	Understand Electoral Process, special provisions	L3	Apply
CO4	Understand powers and functions of Municipalities Panchayats and Co- operative Societies,	L1	Remember
CO5	Understand Engineering ethics and responsibilities of Engineers	L3	Apply
CO6	Understand Engineering Integrity & Reliability	L4	Analyze

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 and 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, 42nd, 44th, 74th, 76th, 86th & 91st 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 and Aims of Engineering Ethics** **03 Hrs.**

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

Text Books

1. Durga Das Basu, "Introduction to the Constitution of India", (Students Edn.) Prentice –Hall EEE, 19th / 20th Edn., 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.

Web Resources:

1. https://www.nptel.ac.in

2. http://www.nspe.org

3. http://www.hnlu.ac.in

4. http://www.preservearticles.com

Evaluation Scheme:

1. Student should submit a report on the case study declared by teacher.

2. Audit point shall be awarded subject to submission of report of the case study declared by teacher.

Field/Internship/Industry Training (INTEE3090)

Course Objectives

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

COs	Course Outcomes	Blooms Level	Blooms Description
CO1	To apply fundamental principles of engineering	l3	Apply
CO2	To become master in specialized/emerging technology	l6	Evaluate
CO3	Self-improvement through continuous professional development and life-long learning	l6	Evaluate
CO4	To get awareness of the ethics, social, cultural, global and environmental responsibility as an engineer.	l2	Comprehension

Guideline

Minimum of six weeks in an Industry in the area of Electrical Engineering. The summer internship should give exposure to the practical aspects of the discipline. In addition, the student may also work on a specified task or project which may be assigned to him/her. The outcome of the internship should be presented in the form of a report.

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

Engineering Mathematics - IV (BSEE4010T)

Teaching Scheme
Lectures: 03 Hrs./Week

Tutorial: 01 Hr/Week
Credit: 04

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

Course Objectives

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

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

Course Contents

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

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

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

Functions of a random variable and their distribution and density functions, Expectation, Variance and Moments of random Variable. Pairs of random variables, Joint CDF, Joint PDF, Independence, Conditional CDF and PDF, Conditional Expectation One function of two random variables, two functions of two random variables; joint moments, joint characteristic function, covariance and correlation-independent, uncorrelated and orthogonal random variables. Central limit theorem and its significance.

Unit-III Random Process 05 Hrs.

Random process: Definition, realizations, sample paths, discrete and continuous time processes. Probabilistic structure of a Random process: mean, correlation and covariance, functions, stationarity of random process. Ergodicity and WSS.

Unit-IV Matrix Theory 10 Hrs

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

Unit-V Linear Algebra 07 Hrs.

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

Reference Books

1. Miller, "Probability And Random Processes With Applications to Signal Processing and Communication", first 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, McGraw Hill Publication.

Text Books

1. T. Veerarajan, "Probability, Statistics and Random Processes", McGraw Hill.
2. Papoulis and S. Unnikrishnan Pillai, "Probability, Random Variables and Stochastic Processes," Fourth Edition, McGraw Hill.
3. Alberto Leon Garcia, "Probability And Random Processes For Electrical Engineering", second edition Low price edition Pearson education.
4. B.S. Grewal, "Higher Engineering Mathematics", Khanna Publication.

Evaluation Scheme

Continuous Assessment (CA)

1. Two term tests of 15 marks each will be conducted during the semester.
2. Total duration allotted for writing each of the paper is 1 hr.
3. Average of the marks scored in both the two tests will be considered for final grading.
4. Teacher's assessment (TA) will carry weightage of 20 marks.Components of TA are Individual Presentation (Mandatory), Group Discussion (Mandatory), Quizzes, Class Tests/ Surprise Tests/ Open Book Tests, research Paper Presentation, Viva, Any other component recommended by BoS and approved by Dean Academics.

End Semester Examination (ESE)

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

Tutorial

List of Tutorials: (Any Eight)

1. Probability: Sample Space, events, Venn Diagram, De Morgan's law, Properties of Probability, Conditional Probability.
2. Bayes' Rule, Application of probability in communication
3. Random Variables: Functions of a random variable, distribution and density functions
4. Binomial, Poisson, Geometric discrete Random variable and their distributions.
5. Transformation of random variable, characteristic function, moment generating function of Bernoulli, Poisson, exponential random variable
6. Pairs of random variable, Joint CDF, Joint PDF, conditional CDF and PDF.

7. One function of Two random variables, Two functions of Two random variables
8. Mean and variance of a Random Process.
9. Eigenvalues and eigenvectors.
10. Quadratic forms.
11. Implementation of Gram Schmidt orthogonalization process.
12. Implementation of the singular vector decomposition algorithm.

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

Electrical Machine-I (PCEE4020T)

Teaching Scheme
Lectures : 03 Hr/week
Practical : 02 Hr/week
Credit : 03

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

Prerequisites: Magnetic circuit, mutually induced EMF, Dynamically induced EMF, Direction of magnetic field in current carrying conductor, Flemings LHR & RHR, Electromechanical energy conversion and Single phase transformer.

Course Objectives

1. To understand energy conversion process.
2. To understand basic principles operation,performance and control of dc machine and transformer.
3. To understand selection of machines for specific applications.
4. To understand test & analysis the performance of machine.

COs	Course Outcomes	Blooms Level	Blooms Description
CO1	Understand energy conversion process.	L2	Understand
CO2	Apply engineering concepts in working and characteristics of DC machines.	L3	Apply
CO3	Analyse the performance of DC machines.	L4	Analyzing
CO4	Apply engineering concepts in construction & working of Transformers.	L3	Apply
CO5	Make selection of appropriate machine for different applications.	L4	Analyzing

Course Contents

Unit-I Electromechanical Energy Conversion Principle 7 Hrs.

Energy in a magnetic systems, field energy and mechanical force, energy in single and multiple excited magnetic systems, Physical concept of torque production, electromagnetic torque and reluctance torque, concept of general terms pertaining to rotating machines, electrical and mechanical degree, Pole pitch, Coil. Dynamic equations of electromechanical systems and analytical techniques.

Unit-II DC Generator 7 Hrs.

Constructional feature of DC machines, type of DC Generator, emf equation of DC generator ,voltage built up in DC shunt generator, critical filed resistance, losses and efficiency of DC generator, armature reaction ,characteristic of DC generator,demagnetizing and cross magnetizing,compensating winding, commutation process and methods to improve commutation.

Unit-III DC Motor 7 Hrs

Type of DC motors, concept of back emf, general armature torque equation, power stages, losses and efficiency, characteristic of DC motors, speed control of DC motors, necessity and types of starters, solid state starters. Applications of various DC machines, troubleshooting of various DC machines, selection procedure, study of relevant Indian Standard Specifications.

Unit-IV Single Phase Transformers 7 Hrs

Principle, construction and operation of single-phase transformers, corrugated core transformer,toroidal core Transformer , Cargo core and amorphous core transformers, comparison of the identical rating transformer with Cargo core and amorphous core transformer, energy efficiency in line with cargo and amorphous transformers, mineral oil and Ester oil difference in transformers. Phasor diagram, equivalent circuit, voltage regulation, losses and efficiency, maximum efficiency,testing of transformer - open circuit and short circuit tests, polarity test.

Unit-V Three Phase Transformers 7 Hrs.

Three-phase transformer construction, three phase unit transformer and bank of single phase transformer, vector groups, Open Delta connection or V-V connections, Scott connection, parallel operation and load sharing. Applications of various transformers, Pulse transformer, Audio frequency transformer, Grounding transformer, Losses in a distribution transformer. Distribution Transformer requirements as per Indian Standard.

Unit-VI Special Machines and Applications 7 Hrs.

Brushless DC Motor (BLDC): Constructional details, working principle, comparison of BLDC motor with conventional DC motor, characteristics and applications, advantages and disadvantages. Permanent Magnet DC Motor (PMDC): Constructional details, working principle,characteristics and applications, advantages and disadvantages. Stepper Motor: Constructional details, working principle, types, characteristics and applications, advantages and disadvantages. Universal Motor,Switched Reluctance Motor.

Text Books

1. Edward Hughes "Electrical Technology", ELBS, Pearson Education.
2. Ashfaq Husain, "Electrical Machines", Dhanpat Rai and Sons.
3. S. K. Bhattacharya, "Electrical Machine", Tata McGraw Hill publishing Co. Ltd, 2nd Edition.
4. Nagrath and Kothari, "Electrical Machines", Tata McGraw Hill.
5. Bhag S Guru, Husein R. Hiziroglu, "Electrical Machines", Oxford University Press.
6. K Krishna Reddy, "Electrical Machines- I and II", SCITECH Publications (India) Pvt. Ltd.

Reference Books

1. A.E. Clayton and N. N. Hancock, "Performance and Design of Direct Current Machines", CBS Publishers, 3rd Edition.
2. A.E. Fitzgerald, Charles Kingsley, Stephen D. Umans, "Electrical Machines", Tata McGraw Hill Publication Ltd, 5th Edition.
3. A.S. Langsdorf, "Theory and Performance of DC Machines", Tata McGraw Hill.
4. M.G. Say, "Performance and Design of AC Machines", CBS Publishers and Distributors.
5. Smarajit Ghosh, "Electrical Machines", Pearson Education, New Delhi.
6. Charles I Hubert, "Electrical Machines Theory, Application, and Control", Pearson Education,

Evaluation Scheme:

Continuous Assessment (A):

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

Continuous Assessment (B):

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

End Semester Examination (C):

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

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

Electrical Machine-I Laboratory (PCEE4020L)

Teaching Scheme
Practical : 02 Hr/week
Credit : 01

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

Course Objectives

1. To inculcate in students basic ideas and principle of electrical engineering.
2. To impart the fundamental knowledge of Machines and transformers.
3. To understand the characteristic of DC machines and application.
4. To enhance knowledge of application of transformer in power system.

COs	Course Outcomes	Blooms Level	Blooms Description
CO1	Understand basic knowledge of measuring instruments to conduct experiments on machine with safety precautions.	L2	Understand
CO2	Apply the characteristic of DC machines as generator and its applications.	L3	Apply
CO3	Analyze the data for determination of parameter by conducting different test on DC machines.	L4	Analyzing
CO4	Explain and Apply the different methods of testing on transformer in manufacturing , utility and service industry.	L3	Apply
CO5	Demonstrate the application of special purpose machines in power system, utility and different industry.	L2	Understand

List of the Experiments

Perform 10 experiments from the following list of experiments. (7 – Hardware, 2 – Simulation and 1 – Innovative)

1. Familiarization of the electrical machine laboratory apparatus.
2. Speed Control of DC motor by field resistance control.
3. Speed Control of DC motor by Armature Resistance Control.
4. To study Magnetization Characteristics of D C generator.
5. To study External, Internal Characteristics of D C Generator.
6. Determination of performance characteristic of DC series motor by direct load.
7. Determination of Transformer equivalent circuit from Open Circuit and Short Circuit Test.
8. Determination of performance of single phase transformer by direct load test.
9. Polarity and Ratio test on single phase transformer.
10. Parallel operation of two single phase transformer.
11. Study of phasor and vector group of three phase transformer.
12. Scott connection of two single phase transformer.
13. To study DC Machine characteristics using MATLAB.
14. Load test on single phase transformer using MATLAB.
15. Speed control of BLDC motor using Ardiuno (Innovation).
16. Direction control of stepper motor using Ardiuno (Innovation).
17. PMDC motor control using PWM technique (Innovation).

Lab Tools: MATLAB

Web Tools: www.falstad.com , motoranalysis.com

Reference Books

1. Brian D. Hahn, Essential MATLAB for Scientists and Engineers, Elsevier Publication, 2002.
2. www.mathworks.com.

Evaluation Scheme

Laboratory

Continuous Assessment (TA):

Laboratory work will be based on PCEE3060L and subject specific lab assignment/case study. The distribution of marks for term work shall be as follows:

- Performance in Experiments: 05 Marks
- Journal Submission: 05 Marks
- Viva-voce: 05 Marks
- Subject Specific Lab Assignment/Case Study: 10 Marks

The final certification and acceptance of term work will be subject to satisfactory performance of laboratory work and upon fulfilling minimum passing criteria in the term work.

End Semester Examination (ESE):

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

Power System Transmission and Distribution (PCEE4030T)

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

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

Prerequisites:

1. Knowledge of Basic Electrical Energy.
2. Knowledge of Electrical Energy Generation System.
3. Present scenario of power system.

Course Objectives

1. To introduce students to the basic structure and requirements of any electric power supply system.
2. To develop knowledge about nature of power systems engineering and the profession.
3. To develop an understanding of components in a power system and to understand the basic principles involved in these components.
4. To explore analysis and design principles for the complete power system.
5. To Able to erect Transmission Line.
6. To Understand the Challenges of using sources of energy efficiently and effectively.

COs	Course Outcomes	Blooms Level	Blooms Description
CO1	Ability to model and represent power system components .	L3	Apply
CO2	Ability to use software development tools to simulate and analyze the system .	L3	Apply
CO3	Ability to implement corrective measure for immediate as well as long term solution to the system problems.	L4	Analyze
CO4	Get the knowledge of Generation, Transmission and Distribution of power.	L2	Understand
CO5	Able to design transmission line model .	L6	Create
CO6	Ability to recognize the need to continuously follow the advancements in technology and incorporating them in the present system to improve efficiency.	L3	Apply

Course Contents

Unit-I Fundamentals of Power Systems 4 Hrs.

Introduction to modern power system: Generation, Transmission and sub-transmission, Distribution, Loads. Growth of power system in India, Present Scenario Indian power industry, GRID formation, concept of National GRID, complex power, power factor correction methods.

Unit-II Transmission System 7 Hrs.

Electric supply system, A.C power supply scheme, D.C transmission scheme, Comparison of AC and DC transmission system, advantages of A.C. transmission system, Comparison of various transmission system (Two wire dc system, Single phase two wire A.C system, Single phase three wire system, three phase three wire system, Three phase four wire system), Economic choice of transmission voltage, requirements of satisfactory electric supply.

Unit-III Mechanical Design of Overhead Transmission Line 7 Hrs.

Main components of overhead line, conductor materials, line supports, Type of insulators, potential distribution over suspension insulator string, string efficiency, methods of improving string efficiency. Phenomenon of corona, factors affecting corona, advantages and disadvantages of corona, methods of reducing corona, Sag in overhead line, calculation of sag, Effects of wind and ice coating on transmission line.

Unit-IV Transmission Line Parameters 7 Hrs.

Resistance, Inductance: Definition, Inductance due to internal flux of two wire single phase line of composite conductor line, GMD and GMR, Inductance of three phase line with equal and unequal spacing, vertical spacing. Computation of capacitance of single phase, three phase transmission lines with and without symmetrical spacing for conductors. Skin effect, Proximity Effect, Ferranti effect.

Unit-V Transmission Line Modeling and Performance 8 Hrs.

Single line diagram and impedance or reactance diagram, per unit system, per unit methods of representation of system and its components such as transformers (1 phase/3 phase) Two winding / Three winding) Synchronous machines (motors and generators) load. Performance of Transmission Lines, Determination of generalized ABCD constants, Power Circle Diagrams, series and shunt compensation, surge impedance loading.

Unit-VI Distribution System and Underground Cables 7 Hrs.

Distribution System Classification of distribution system, Types of distribution AC and DC, Requirements of distribution system, Design consideration of distribution system, AC distribution types, and Voltage drop calculations in different distribution system, Tariff, desirable characteristics of tariff, types of tariff. Introductions to Underground cables and its Classification, Types of Cable and its Constructions.

Text Books

1. Mehta, V. K. , "Electrical Power System", S. Chand and Company, 2011
2. Ashfaq Hussain, "Electrical Power Systems", CBS Publishers and Distributors, 5th Edition, 2007 .
3. J. B. Gupta, "Electrical Power", S. K. Kataria and Sons, 11th Edition, 2012.

Reference Books

1. Nag P. K., "Power Plant Engineering", Tata McGraw Hill, 2011
2. Uppal S. L., "Electrical Power", Khanna Publication, 2011
3. Solanki Chetan S., "Renewable Energy Technologies", PHI Learning, 2011
4. B. R. Gupta, "Generation of Electrical Energy", S. Chand and Company, 14th Edition , 2011.

Evaluation Scheme:

Continuous Assessment (A):

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

Continuous Assessment (B):

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

End Semester Examination (C):

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

Power System Transmission and Distribution Laboratory (PCEE4030L)

Teaching Scheme

Practical : 02 Hrs./week

Credit : 01

Examination Scheme

Teacher Assessment : 25 Marks

End Sem Exam : 25 Marks

Total Marks : 50 Marks

Course Objectives

1. This course aims to develop familiarity with power system.
2. To understand and estimation of transmission line parameters.
3. To obtain the equivalent circuits of the transmission lines for determining voltage regulation and efficiency.
4. To gain knowledge on design of insulators and their performance.
5. To Develop an understanding of the environmental aspects of power generation.

COs	Course Outcomes	Blooms Level	Blooms Description
CO1	Ability to create awareness of general structure of power system.	L2	Understand
CO2	Ability to apply the real time electrical transmission system with respect to various electrical parameters.	L3	Apply
CO3	Ability to analyze the experimental results and correlating them with the practical power system.	L4	Analyze
CO4	Ability to Identify and select appropriate sub–station location.	L2	Understand
CO5	Able to apply distribution system.	L3	Apply

List of the Experiments

Any **10** experiments to be performed from Group A- minimum **Five** practicals and Group B- minimum **Five** practicals

Group-A: (3- Hardware base, 2- Simulation)

1. To Determine the Inductance for symmetrical and unsymmetrical configuration of 3 phase transmission line by using Software.
2. To Determine the Capacitance for symmetrical and unsymmetrical configuration of 3 phase transmission line by using Software.
3. To verify the effect of VAR Compensation on receiving end profile of transmission line using capacitor bank.
4. Study of line conductors and insulators of OHT system.
5. Analysis of surge impedance loading of transmission line.
6. To Determine regulation and transmission efficiency for short and medium transmission line.
7. To Determine ABCD parameters of short, medium and long transmission lines.
8. Calculation of different parameters by power circle diagram.

Group-B: (3- Hardware base, 2- Simulation)

1. To Study Various Types of Distribution systems
2. To Design substation models.
3. Case study on different types of Tariff.
4. To Determine Voltage regulation, efficiency and Power factor of long transmission line by using MATLAB Software.
5. To Determine sag of transmission line by using MATLAB Software.
6. Measurement of insulation resistance of power cables.
7. Transmission line fault analysis (Line to ground) by using MATLAB software.
8. To study control panel and metering equipment of Industries

Reference Books

1. Nag P. K., "Power Plant Engineering", Tata McGraw Hill, 2011
2. Uppal S. L., "Electrical Power", Khanna Publication, 2011
3. Solanki Chetan S., "Renewable Energy Technologies", PHI Learning, 2011
4. B. R. Gupta, "Generation of Electrical Energy", S. Chand and Company, 14th Edition , 2011.
5. Mehta, V. K. , "Electrical Power System", S. Chand and Company, 2011
6. Ashfaq Hussain, "Electrical Power Systems", CBS Publishers and Distributors, 5th Edition, 2007 .
7. J. B. Gupta, "Electrical Power", S. K. Kataria and Sons, 11th Edition, 2012.

Evaluation Scheme

Laboratory

Continuous Assessment (TA):

Laboratory work will be based on PCEE4030L and subject specific lab assignment/case study The distribution of marks for term work shall be as follows:

- Performance in Experiments: 05 Marks
- Journal Submission: 05 Marks
- Viva-voce: 05 Marks
- Subject Specific Lab Assignment/Case Study: 10 Marks

The final certification and acceptance of term work will be subject to satisfactory performance of laboratory work and upon fulfilling minimum passing criteria in the term work.

End Semester Examination (ESE):

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

Microcontroller and Its Applications (PCEE4040T)

Teaching Scheme
Lectures : 03 Hr/week
Credit : 03

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

Prerequisites: Concepts of number systems. Concepts of combinational and sequential logic circuits.

Course Objectives

1. To study the Architecture of 8051 micro-controller.
2. To study the addressing modes and instruction set of 8051.
3. To introduce the need and use of Interrupt structure of 8051.
4. To develop skill in simple applications development with programming 8051.
5. To introduce Arduino with commonly used peripheral and interfacing.

COs	Course Outcomes	Blooms Level	Blooms Description
CO1	Describe the architecture of various micro controller.	L1	Understand
CO2	Write program for 8051in assembly language and embedded C.	L6	Create
CO3	Understand the Timers ,Interrupts with microcontroller.	L2	Understand
CO4	Discuss architecture of advanced microprocessor.	L2	Understand
CO5	Apply to interface the IO devices to microcontroller and Arduino.	L3	Apply

Course Contents

Unit-I **8051 Microcontroller Architecture** **7 Hrs.**

Microprocessor vs Microcontroller, Overview of the microcontroller Family, Intel 8051 Functional block diagram, Functions of pins of 8051, Memory organization of 8051, Stack and operation of stack, Stack pointer, Overview of special function registers, Subroutines.

Unit-II **Instruction set and Programming** **7 Hrs.**

Instruction set of 8051 microcontroller, Assembly Language Programs based on instructions, Addressing modes of 8051

Unit-III **8051 Timers, and Programming** **7 Hrs.**

Data types in C ,8051 Programming in embedded C, 8051 ports and programming in embedded C. Time delay programming in embedded C. 8051 Timers and counters and its programming in embedded C

Unit-IV **8051 Interrupts and Advanced Microprocessors** **7 Hrs.**

8051 interrupts, Interrupts Programming in embedded C, 8051 Serial port Structure and its programming in embedded C, Introduction to Architecture of PIC Microcontroller, ARM Processor, ATMEGA Processor.

Unit-V **8051 Interfacing** **7 Hrs.**

Interfacing of Switch, LED, with 8051 and its programming in embedded C, Interfacing and programming of LCD, ADC, DAC, Stepper motor and Relay with 8051 in embedded C.

Unit-VI **Arduino and its Programming** **7 Hrs.**

Introduction to the Arduino, Arduino IDE, Arduino Shields, Arduino Programs, Interfacing Arduino with Analog devices, Interrupts, Communication Device: Serial port, Applications: Interfacing of motor, LCD.

Text Books

1. Muhammad Ali Mazidi, Janice Gillispie Mazidi, Rolin McKinlay, "The 8051 Microcontroller and Embedded Systems", Pearsons, 2nd Edition, 2014.
2. V Udayashankara and M S Mallikarjuna Swamy, "8051 Microcontroller, Hardware, Software and Applications", TATA McGraw Hill, 1st Edition, 2017.
3. R. Theagrajan,"Microprocessor and Microcontroller", BS Publication, 1st Edition, 2010.

4. K. J. Ayala, "The 8051 Microcontrollers- Architecture, Programming and Applications", Peram International Publications, 2nd Edition, 1998.

5. Subrata Ghoshal, "8051 Microcontroller", Pearsons Publishers, 2nd Edition, 2014.

6. Han-Way Huang,"Embedded System Design with C8051", Cengage Learning, 1st Edition, 2009.

7. A.K Ray and K.M. Burchandi, "Advanced Microprocessor and Peripherals Architectures,Programming and Interfacing",second edition,Tata McGraw-Hill, 3rd Edition, 2017.

8. James A. Langbridge "Arduino Sketches: Tools and Techniques for Programming Wizardry", Wiley Publication, 1st Edition, 2015.

Reference Books

1. Scott Mackenzie, "8051 Microcontroller", Pearson Education, 4th Edition, 2006.

2. Intel Microcontroller Data Book.

3. Intel Corporation 1990- 8 bit Embedded Controller Handbook

Web Resources:

1. https://www.arduino.cc/en/Tutorial/Homepage

2. http://www.control.aau.dk/ jdn/edu/doc/arduino/litt/ArduinoTutorials.pdf

Evaluation Scheme:

Continuous Assessment (A):

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

Continuous Assessment (B):

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

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

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

End Semester Examination (C):

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

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

Microcontroller and Its Applications Laboratory (PCEE4040L)

Practical 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 simulate microcontroller using KEIL or Equivalent simulator.
2. To prepare the students to be able to solve different problems by developing different programs
3. Practical hands on experience of programming the 8051 microcontroller
4. To gain knowledge on interfacing of different peripherals to microcontroller
5. To provide training on programming of microcontrollers and Arduino and understand the interface requirements.

COs	Course Outcomes	Blooms Level	Blooms Description
CO1	Analyze architecture of microcontroller IC	L1,L2	Analyze Understand
CO2	Interpret the program for 8051 in assembly language and in embedded C for the given operations	L3	Apply
CO3	Ability to understand basics of software simulators	L2	Understand
CO4	Understand the interfacing of microcontrollers with various peripherals	L3,L2	Understand

List of Laboratory Experiments

Part-A:

Any 5 experiments from Part-A (3- Hardware base, 1- Simulation and 1- Innovative experiments)

1. Write an Assembly language program to perform 8 bit arithmetic operations Addition and Subtraction
2. Write an Assembly language program to find larger number from given data bytes stored in memory locations
3. Write an Assembly language program to find square of number using Look up table concept
4. Write an Assembly language program to perform 8 bit logical AND, OR operations
5. Write an Assembly language program to arrange an data in ascending or descending order
6. Write an Assembly language program to transfer data from source to destination locations of memory
7. Write a program blinking of LED using Proteus VSM simulation software
8. Design of temperature meter using Arduino (Innovative)
9. Design of DC voltmeter using Arduino (Innovative)

Part-B:

Any 5 experiments from Part-A (3- Hardware base, 1- Simulation and 1- Innovative experiments)

1. Implementation of Serial Communication by using 8051 serial ports
2. Write an embedded C program for interfacing of 8 bit ADC 0809 with 8051 Microcontroller
3. Write an embedded C program for interfacing of 8 bit DAC 0808 with 8051 to generate various waveforms
4. Write an embedded C program for stepper motor control by 8051 Microcontroller
5. Write an embedded C program for interfacing of the relay with 8051
6. Write an embedded C program for LCD interfacing with 8051 microcontroller
7. Write a program for switch and LED interfacing using Proteus VSM simulation software
8. Design of ultrasonic distance meter using Arduino (Innovative)
9. Design of digital ohmmeter using Arduino (Innovative)

Computer Usage / Lab Tool:

1. Keil, Flash Magic, Proteus VSM
2. Arduino IDE 1.8.15

Reference Books

1. Muhammad Ali Mazidi, Janice Gillispie Mazidi, Rolin McKinlay, "The 8051 Microcontroller and Embedded Systems", Pearsons, 2nd Edition, 2014.
2. V Udayashankara and M S Mallikarjuna Swamy, "8051 Microcontroller, Hardware, Software and Applications", TATA McGraw Hill, 1st Edition, 2017.
3. Ajay V. Deshmukh, "Microcontrollers : Theory and Applications", TATA McGraw Hill, 2nd Edition, 2017.
4. R. Theagrajan,"Microprocessor and Microcontroller", BS Publication, 1st Edition, 2010.
5. K. J. Ayala, "The 8051 Microcontrollers- Architecture, Programming and Applications", Peram International Publications, 2nd Edition, 1998.
6. Subrata Ghoshal, "8051 Microcontroller", Pearsons Publishers, 2nd Edition, 2014.
7. Han-Way Huang,"Embedded System Design with C8051", Cengage Learning, 1st Edition, 2009.
8. James A. Langbridge "Arduino Sketches: Tools and Techniques for Programming Wizardry", Wiley Publication, 1st Edition, 2015.

Evaluation Scheme:

Laboratory:

Continuous Assessment (B):

Laboratory work will be based on PCEE4040T and subject specific lab assignment/case study.

The distribution of marks for term work 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: 10 Marks.

The final certification and acceptance of term work will be subject to satisfactory performance of laboratory work and upon fulfilling minimum passing criteria in the term work.

End Semester Examination (ESE):

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

Signals and Systems (PCEE4050T)

Teaching Scheme
Lectures : 03 Hr/week
Credit : 03

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

Prerequisites: Frist Year. Physics, Engineering Mathematics-III

Course Objectives

1. This course aims to introduce students the basic features of transistor amplifier.
2. This course intends to provide basic knowledge of theoretical structure, formal representation, computational methods, notation, and vocabulary of linear models.
3. It is aimed to impart skills to perform signal analysis with reference to spectrum analysis of deterministic signals.
4. Imparting basic knowledge of signals and systems analysis.

COs	Course Outcomes	Blooms Level	Blooms Description
CO1	Describe the mathematical principles of continuous time, discrete-time systems and applications of signal processing techniques.	L2	Understand
CO2	Calculate the response of linear systems in time domain using various tools such as convolution, Laplace transform, Z transform.	L3	Apply
CO3	Analyze frequency domain behavior of linear systems using Fourier transform techniques.	L3	Apply

Course Contents

Unit-I Introduction to Signals and Systems 7 Hrs.

Continuous and discrete time representation of elementary signals, 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) 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 Analysis of Continuous and Discrete Time Systems 7 Hrs.

Representation of systems using differential equation, Impulse response and convolution integral, properties of convolution, signal responses to CT-LTI system, system stability Impulse, step and, system stability

Response of Discrete Time-LTI System: Representation of systems using difference equation, Impulse response characterization and convolution sum, Properties of convolution summation, Impulse response of DT-LTI system and its properties, step response, system stability.

Unit-III Fourier Analysis of Continuous Time Signal 7 Hrs

Trigonometric Fourier series, Compact Trigonometric Fourier series, Exponential form, Dirichlet Conditions, Frequency domain representation of periodic signals, Fourier Transform representation of aperiodic signals, Properties of CFT duality, time reversal, Convolution – time and frequency domain, etc.

Unit-IV LT Analysis of Signals and System 7 Hrs

Definition, Properties, Solution of differential equation. Transfer function, Poles and Zeroes, System analysis using Laplace Transform.

Unit-V Fourier Domain Analysis of Discrete Time Signal 7 Hrs.

Sampling theorem, sampling of continuous time signals, Nyquist Criterion, concept of aliasing, Discrete time Fourier Transform, Properties of DTFT: time reversal, Linear Convolution time and frequency domain, conjugate symmetry.

Unit-VI Z Transform Analysis of Discrete Signals and System 7 Hrs.

Need of Z-Transform, definition of unilateral and bilateral Z Transform, Z- Transform of finite and infinite duration sequences, properties, Inverse Z-Transform, relation between discrete time Fourier Transform and Z-Transform, Z Transform of standard signals, ROC for ZT, plotting poles and zeros of transfer function, Analysis of discrete time LTI systems using Z-Transform: Transfer Function,

causality and stability of systems, relation between Laplace Transform and Z–Transform.

Text books

1. A.V. Oppenheim, A.S. Willsky, S.H. Nawab, "Signals and Systems", Prentice Hall, 2nd Edition, 1998.
2. B. P. Lathi, "Principles of Linear systems and signals", Oxford University press, 2nd Edition, 2005

Reference Books

1. M. J. Roberts, "Signals and systems", Tata Macgraw Hill, 3rd Edition, 2011.
2. Simon Haykin, Barry Van Veen, "Signals and systems", Wiley, 2nd Edition, 2007.

Evaluation Scheme:

Continuous Assessment (A):

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

Continuous Assessment (B):

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

End Semester Examination (C):

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

Numerical Methods and Computer Programming Laboratory (ESEE4060L)

Teaching Scheme

Practical : 02 Hrs./week

Credit : 01

Examination Scheme

Teacher Assessment : 25 Marks

End Sem Exam : 25 Marks

Total Marks : 50 Marks

Prerequisites:

1. Basic Knowledge of types of matrices and its properties, mathematical operations.
2. Basic knowledge of Maxima and Minima of single variable function, Partial derivatives, solutions of systems of solutions
3. Basic knowledge of derivation, integration, solution of differential equation.

Course Objectives

1. Describe basic functions and advantages of different Numerical Methods
2. Explain basic concepts of Numerical Methods
3. Solve introductory engineering problems using Numerical Methods
4. Correlate numerical results and approximations with field problems

COs	Course Outcomes	Blooms Level	Blooms Description
CO1	To describe functions and advantages of different numerical methods	L2	Understand
CO2	To explain basic concepts of numerical approximations	L2	Understand
CO3	To solve introductory engineering problems	L3	Apply
CO4	To correlate numerical results and approximations with actual field results	L2	Understand

Course Contents

Linear Algebra and Systems of Linear Equations

Basics of Linear Algebra, Linear Transformations, Systems of Linear Equation, Solve Systems of Linear Equations in Python, Matrix Inversion.

Least Squares Regression

Least Squares Regression Problem Statement, Least Squares Regression Derivation (Linear Algebra), Least Squares Regression in Python

Interpolation

Interpolation Problem Statement, Linear Interpolation, Cubic Spline Interpolation, Lagrange Polynomial Interpolation, Newtons Polynomial Interpolation

Series

Expressing Functions with Taylor Series, Approximations with Taylor Series

Root Finding

Root Finding Problem Statement, Tolerance, Bisection Method, Newton-Raphson Method, Root Finding in Python

Numerical Differentiation

Numerical Differentiation Problem Statement, Finite Difference Approximating Derivatives, Approximating of Higher Order Derivatives, Numerical Differentiation with Noise

Numerical Integration

Numerical Integration Problem Statement, Trapezoid Rule, Simpsons Rule, Computing Integrals in Python

Ordinary Differential Equations (ODEs)

Initial-Value Problems, The Euler Method, Predictor-Corrector Methods, Runge Kutta Method, Python ODE Solvers (IVP)

List of the Experiments

Any **10** experiments to be performed from Group A- minimum **Five** practicals and Group B- minimum **Five** practicals

Group A (Python Programs)

1. Write a program for finding roots of f(x) by Gauss Elimination Method using Python
2. Write a program for finding roots of f(x) by Bisection Method using Python
3. Write a program for finding roots of f(x) by False Position Method using Python
4. Write a program for finding roots of f(x) by Secant Method using Python
5. To generate forward difference table using Python
6. To generate reverse difference table using Python
7. To implement Linear Regression Method using Least Square Method to find curve of best fit of type y=a+bx using Python
8. To implements least square method to fit curve of type y = abx using Python

Group (MATLAB Programs)

1. Write a program for finding roots of f(x) by Crouts Method using MATLAB
2. Write a program for finding roots of f(x) by Gauss Siedel Method using MATLAB
3. Write a program for solving numerical integration by trapezoidal rule using MATLAB
4. Write a program for solving numerical integration by Simpsons One-Third Rule using MATLAB
5. Write a program for solving numerical integration by Simpsons Three-Eighth Rule using MATLAB
6. Write a program for solving ordinary differential equation by Runge Kutta Method using MATLAB
7. Design and Implementation of MATLAB/SIMULINK model of Linear equations in Electrical Circuit Analysis
8. Design and Implementation of MATLAB/SIMULINK model of Load Flow analysis using Newton Raphson method

Reference Books

1. Fausett L.V. "Applied Numerical Analysis Using MATLAB", Pearson Education, 2nd Edition, 2007.
2. Chapra S.C. and Canale R.P. "Numerical Methods for Engineers", McGraw Hill, 5th Edition, 2006.
3. R. L. Burden and J. D. Faires, "Numerical Analysis Theory and Applications", Cengage Learning India Pvt. Ltd., 1st Edition, 2016.
4. W. Y. Yang, W. Cao and J. Morris, "Applied Numerical Methods Using MATLAB", Wiley India Pvt. Ltd., 1st Edition, 2005.

5. R. V. Dukkipati , "Applied Numerical Methods using MATLAB", New age International Ltd, 1st Edition, 2011.

6. Qingkai Kong, Timmy Siauw, Alecxandre Bayen, "Python Programming and Numerical Methods: A Guide for Engineers and Scientists", Elsevier, 1st Edition, 2020

Text Books

1. Dr. B. S.Grewal, "Numerical Methods", Khanna Publishers, New Delhi, 7th Edition,2005.

2. E. Balguruswamy, "Numerical Methods", Tata McGraw Hill Publication Company Ltd., 8th Edition, 2002.

Web Links

1. Prof. P. B. Sunil Kumar, "Numerical Methods and Programming", Department of Physics, IIT Madras, https://nptel.ac.in. (URL: http://www.nptelvideos.in/2012/11/numerical-methods-and-programing.html)

2. Prof. Ameeya Kumay Nayak, Prof Sanjeev Kumar, "Numerical Methods", Department of Mathematics, IIT Roorkee (URL: https://nptel.ac.in/courses/111/107/111107105)

Evaluation Scheme

Laboratory

Continuous Assessment (TA):

Laboratory work will be based on PCEE3060L and subject specific lab assignment/case study. The distribution of marks for term work shall be as follows:

- Performance in Experiments: 05 Marks
- Journal Submission: 05 Marks
- Viva-voce: 05 Marks
- Subject Specific Lab Assignment/Case Study: 10 Marks

The final certification and acceptance of term work will be subject to satisfactory performance of laboratory work and upon fulfilling minimum passing criteria in the term work.

End Semester Examination (ESE):

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

Universal Human Values (HMEE4070T)

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

Examination Scheme
Term Test : 15 Marks
Teacher Assessment : 20 Marks
End Sem Exam : 65 Marks
Total Marks : 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).	L2	Understand
CO3	Apply what they have learnt to their own self in different day-to-day settings in real life, at least a beginning would be made in this direction	L3	Apply

Course Contents

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

Purpose and motivation for the course. Self-Exploration–what is it? - Its content and process; 'Natural Acceptance' and Experiential Validation- as the process for self-exploration.

Continuous Happiness and Prosperity- A look at basic Human Aspirations. Right understanding, Relationship and Physical Facility- the basic requirements for 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 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 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 existence as Coexistence 05 Hrs.

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 Professional Ethics 06 Hrs.

Natural acceptance of human values. Definitiveness of Ethical Human Conduct.

Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order.

Competence in professional ethics:

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

Case studies of typical holistic technologies, management models and production systems.

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

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

Text Books

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

Reference Books

1. Jeevan Vidya: Ek Parichaya, A Nagaraj, Jeevan Vidya Prakashan, Amarkantak, 1999.
2. Human Values, A.N. Tripathi, New Age Intl. Publishers, New Delhi, 2004.
3. The Story of Stuff (Book).
4. The Story of My Experiments with Truth - by Mohandas Karamchand Gandhi.
5. Small is Beautiful - E. F Schumacher.
6. Slow is Beautiful - Cecile Andrews.
7. Economy of Permanence - J C Kumarappa.
8. Bharat Mein Angreji Raj - PanditSunderlal.
9. Rediscovering India - by Dharampal.
10. Hind Swaraj or Indian Home Rule - by Mohandas K. Gandhi.
11. India Wins Freedom - Maulana Abdul Kalam Azad.

12. Vivekananda - Romain Rolland (English).
13. Gandhi - Romain Rolland (English).

Evaluation Scheme:

Continuous Assessment (A):

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

Continuous Assessment (B):

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

End Semester Examination (C):

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

Semester Project- II (PJEE4080L)

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 A.

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

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

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: Table A

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: Table B

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 (HMEE4090L)

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

Examination Scheme
Teacher Assessment : 50 Marks
Total Marks : 50 Marks

Prerequisites: 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, L3	Understand, Apply
CO2	Understand and apply the concepts of Quantitative Ability for the problem solving.	L2, L3	Understand, Apply
CO3	Illustrate the concept of Variables and Functions	L2, L3	Understand, Apply
CO4	Understand and illustrate the concept of Multithreading and string handling	L2, L3	Understand, Apply
CO5	Understand and describe the fundamental of object- oriented programming	L2	Understand

Course Contents

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

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,

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

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

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

Evaluation Scheme

Continuous Assessment (TA):

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

- MCQ Test based on Aptitude: 20 Marks
- MCQ Test based on Programming skills: 20 Marks.
- Mock Interview: 10 Marks

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

Field/Internship/Industry Training (INTEE4100)

Course Objectives

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

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

Guideline

Minimum of six weeks in an Industry in the area of Electrical Engineering. The summer internship should give exposure to the practical aspects of the discipline. In addition, the student may also work on a specified task or project which may be assigned to him/her. The outcome of the internship should be presented in the form of a report.

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