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 2023-24

Shahada Road, Near Nimzari Naka, Shirpur, Maharashtra 425405
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Semester-III (w.e.f. 2023-24)													
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)	Best of TT1 / TT2			
							[A]			[B]	[C]	[A+B+C]	
1	BS	22BSEE3010T	Engineering Mathematics-III	3	1		20	15	15	15	65	100	4
2	PC	22PCEE3020T	Electrical Circuit Theory	3			20	15	15	15	65	100	3
3	PC	22PCEE3020L	Electrical Circuit Theory Laboratory			2	25				25	50	1
4	PC	22PCEE3030T	Analog Electronics	3			20	15	15	15	65	100	3
5	PC	22PCEE3030L	Analog Electronics Laboratory			2	25				25	50	1
6	PC	22PCEE3040T	Electrical Measurements and Instrumentation	3			20	15	15	15	65	100	3
7	PC	22PCEE3040L	Electrical Measurements and Instrumentation Laboratory			2	25				25	50	1
8	PC	22PCEE3050T	Electrical Energy Generation System	3			20	15	15	15	65	100	3
9	PC	22PCEE3060L	Electrical and Electronics Workshop			2	25				25	50	1
10	HM	22HMEE3070T	Universal Human Values	2			20	15	15	15	65	100	2
11	PJ	22PJEE3080L	Semester Project-I			2	25				25	50	1
			Total	**17**	**1**	**10**	**245**			**90**	**515**	**850**	**23**

Semester-IV(w.e.f. 2023-24)													
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)	Best of TT1 / TT2			
							[A]			[B]	[C]	[A+B+C]	
1	BS	22BSEE4010T	Engineering Mathematics-IV	3	1		20	15	15	15	65	100	4
2	PC	22PCEE4020T	Electrical Machine-I	3			20	15	15	15	65	100	3
3	PC	22PCEE4020L	Electrical Machine-I Laboratory			2	25				25	50	1
4	PC	22PCEE4030T	Digital Electronics	3			20	15	15	15	65	100	3
5	PC	22PCEE4030L	Digital Electronics Laboratory			2	25				25	50	1
6	PC	22PCEE4040T	Power System Transmission and Distribution	3			20	15	15	15	65	100	3
7	PC	22PCEE4040L	Power System Transmission and Distribution Laboratory			2	25				25	50	1
8	PC	22PCEE4050T	Microcontroller and Its Applications	3			20	15	15	15	65	100	3
9	PC	22PCEE4050L	Microcontroller and Its Applications Laboratory			2	25				25	50	1
10	MC	22MCEE4060T	Constitution of India	1									Audit Course
11	PJ	22PJEE4070L	Semester Project-II			2	25				25	50	1
12	HM	22HMEE4080L	Employability Skill Development Program-I			2	25				25	50	1
			Total	16	1	12	250			75	475	800	22

Prepared by

Checked by

BOS Chairman

Dean Academic/Dy. Director

C.O.E.

Director

Engineering Mathematics - III (22BSEE3010T)

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.

Course Outcome

COs	Course Outcomes	Blooms Level	Blooms Description
At the end of this course students will be able,			
CO1	To **demonstrate** basic knowledge of Laplace Transform, Fourier series, Vector Algebra and Complex Variable.	L3	Apply
CO2	To **demonstrate** an ability to identify and Model the problems in the field of Electrical Engineering and solve it.	L3	Apply
CO3	To apply the application of Mathematics in Electrical Engineering.	L3	Apply

Course Contents

Unit-I Laplace Transform 07 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 09 Hrs.

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

Applications of Laplace Transform: Solution of ordinary differential equations, Solving RLC circuit differential equation of first order and second order with boundary condition using Laplace transform (framing of differential equation is not included).

Unit-III Fourier Series 10 Hrs.

Introduction: Orthogonal and orthonormal set of functions, Introduction of Dirichlet's conditions, 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, Fourier Integral, Fourier Transform, Fourier sine and cosine Transform, Inverse Fourier Transform

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

Vector differentiation, Gradient of scalar point function, Divergence and Curl of vector point function, Properties: Solenoidal and irrotational vector fields, conservative vector field.

Vector Integral: Green 's theorem in a plane, Gauss 'divergence theorem and Stokes 'theorem

Unit-V Complex Variable 07 Hrs.

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

Text Books

1. Dr. B. S. Grewal, "Higher Engineering Mathematics", Khanna Publication, 43rd Edition, 2020.
2. B. V. Ramana, "Higher Engineering Mathematics", Tata Mc-Graw Hill Publication, 6th Edition, 2018.
3. B.S. Grewal, "Higher Engineering Mathematics", Khanna Publication

Reference Books

1. Erwin Kreyszig, "Advanced Engineering Mathematics", Wiley Eastern Limited, 10th Edition, 2015.
2. Wylie and Barret, "Advanced Engineering Mathematics", Tata Mc-Graw Hill 6th Edition.
3. Dennis G. Zill & Warren S. Wright, "Advanced Engineering Mathematics", Jones and Bartlett Publishers, 1st Edition, 2009.

Evaluation Scheme:

Continuous Assessment (A):

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

Continuous Assessment (B):

1. Two term tests of 15 marks each will be conducted during the semester.
2. Total duration allotted for writing each of the paper is 1 hr.
3. 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 2 hrs.

Tutorial

Minimum eight tutorials shall be conducted.

Electrical Circuit Theory (22PCEE3020T)

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: Basic Electrical Engineering, Linear Algebra.

Course Objectives

1. To understand circuit analysis using network theorems.
2. To understand the network topology and duality of the network.
3. To understand the transient and steady state response of the circuits.
4. To understand the network parameter for circuit analysis and frequency selective networks.

Course Outcome

COs	Course Outcomes	Blooms Level	Blooms Description
At the end of this course students will be able,			
CO1	To **recall** basics of electrical circuits and **apply** network theorems for circuit analysis.	L1, L3	Remember, Apply
CO2	To **understand** and **apply** network topology in formulation and solution of electric circuit.	L2, L3	Understand, Apply
CO3	To **analyze** the transient response for any RC, RL and RLC circuits.	L4	Analyze
CO4	To **analyze** electrical network parameter for different application.	L4	Analyze
CO5	To **design** and **evaluate** frequency selective circuits.	L5, L6	Evaluate, Create

Course Contents

Unit-I Circuit Analysis using Theorems 08 Hrs.

Mesh and Supermesh analysis, Node and Supernode analysis,

Circuit Theorems for Independent and Dependent sources: Superposition, Thevenin's, Norton's Reciprocity, Maximum Power Transfer Theorem and Millman Theorem.

Unit-II Network Topology 08 Hrs.

Graph of network, oriented graph, definition of basic terminologies of graph theory, tree, cotree, link, twigs, incidence and reduced 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, Dual circuit and Duality.

Unit-III Transient Analysis 08 Hrs.

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

Laplace Transform (LT) of standard test signals, LT of R, L and C. Inverse LT using Partial fraction expansion method. Analysis of RL, RC and RLC circuits using LT, Initial condition .

Unit-IV Two Port Network 08 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: series and parallel connection.

Unit-V Frequency Selective Networks 08 Hrs.

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.

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 2 hrs.

Tutorial

Minimum eight tutorials shall be conducted.

Electrical Circuit Theory Laboratory (22PCEE3020L)

Teaching Scheme
Practical : 02 Hr/week
Credit : 01

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

Prerequisites: Basic Electrical Engineering Laboratory.

Course Objectives

1. Understand the circuit parameter measurement using Digital Multimeter.
2. Understand the circuit analysis using simulation tools.
3. Understand transient analysis .
4. Understand the measurement of two port network parameters.

Course Outcome

COs	Course Outcomes	Blooms Level	Blooms Description
At the end of this course students will be able,			
CO1	To **analyze** of the circuits using simulation techniques.	L4	Analyze
CO2	To **analyze** the transient response of the circuits.	L4	Analyze
CO3	To **evaluate** and **analyze** two-port network parameters.	L4, L5	Analyze, Evaluate
CO4	To **analyze** frequency selective networks.	L4	Analyze
CO5	To **verify** the electric circuit through collaborative analysis	L5	Evaluate

List of the Experiments

Perform any 10 experiments from the following list of experiments (two simulation and one Innovative)

1. Verification of Superposition Theorem.
2. Verifications of Thevenin's Theorem.
3. Verifications of Norton's Theorem using simulation tools.
4. Verification of Maximum Power Transfer Theorem.
5. Verification of Reciprocity Theorem.
6. Determination of transient response of current in RL & RC circuits with step voltage input using simulation tools.
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 RLC circuit with sinusoidal ac input.
11. Determine characteristics of Low pass and high pass filter.
12. Design and verification cut off frequency of Band Pass Filter.
13. Determination of transient response of current in underdamped, overdamped and critically damped RLC circuit with standard input signals (Innovative). **(Innovation)**
14. Determination of voltage and current using network equilibrium using node base equation.**(Innovation)**
15. Determination of voltage and current using network equilibrium using loop base equation.**(Innovation)**
16. Determination of transient response of current in RLC circuit with step voltage input for under damped, critically damped and over damped cases using simulation tools.**(Innovation)**

Reference Books

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

Evaluation Scheme

Laboratory

Continuous Assessment (TA):

Laboratory work will be based on 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 Electronics (22PCEE3030T)

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: Basics of mathematics and semiconductor physics

Course Objectives

1. To understand operation of semiconductor devices viz. diodes, MOSFET, BJT and operational amplifier.
2. To analyze various diode circuits like rectifier, clipper and clamper.
3. To apply concepts for the design of regulators, amplifiers and oscillators.
4. To introduce basic concepts of Linear and Non-Linear Op-Amp.
5. To verify the theoretical concepts through laboratory and simulation experiments.

Course Outcome

COs	Course Outcomes	Blooms Level	Blooms Description
At the end of this course students will be able,			
CO1	To **understand** the current voltage characteristics of semiconductor devices.	L2	Understand
CO2	To develop the ability to **analyze** and **design** analog electronic circuits viz. rectifier, amplifier, oscillator, regulator circuits using discrete components.	L6	Create
CO3	To **apply** concept to design biasing circuit for transistors.	L3	Apply
CO4	To **evaluate** performance of positive and negative feedback viz. oscillator and amplifier .	L5	Evaluate
CO5	To **design** operational amplifier-based circuits.	L6	Create

Course Contents

Unit-I Diodes and Its Applications 08 Hrs.

P-N junction diode, V-I characteristics of a diode, half-wave, full wave rectifiers and bridge rectifiers, Filter circuit, clamper, clipper, voltage doublers, opto-couplers, Zener diode as a voltage regulator. **[Numerical on rectifier circuit, clipper and clamper]**

Unit-II Bipolar Junction Transistors and Coupling 08 Hrs.

Construction and operation of transistor, BJT configuration, I-V characteristics of a BJT, DC load line analysis: fixed bias, emitter bias and voltage divider bias configuration stability and DC biasing circuits-fixed-bias, Emitter-bias and voltage divider bias configuration **[DC analysis of BJT only]**, BJT as a switch, BJT as an amplifier, Cascade amplifiers: Types of coupling

Unit-III Metal-Oxide-Semiconductor Field Effect Transistor 08 Hrs

MOSFET structure and I-V characteristics. MOSFET as a switch. MOSFET as an amplifier: small-signal model and biasing circuits, common-source, common-gate and common-drain amplifiers; small signal equivalent circuits - gain, input and output impedances, Trans conductance, high frequency equivalent circuit.

Unit-IV Feedback Amplifier, Oscillators and Multivibrator 08 Hrs

Feedback concept. Barkhausen criterion, classification voltage/ current series/shunt feedback amplifier.
Oscillator: operation and analysis of R C phase shift, Wein bridge, Heartly, Colpitts and crystal oscillators **[using BJT only]**.
Multivibrator: IC 555 Timer, Astable, Bistable and monostable

Unit-V Op-Amp and Its Linear and Non-Linear Applications 08 Hrs.

Ideal op-amp, non-idealities in an op-amp (Output offset voltage, input bias current, input offset current, slew rate, gain bandwidth product). Linear Applications: Idealized analysis of op-amp circuits, virtual ground concept, inverting and non-inverting amplifier, differential amplifier, adder, subtractor, v to I converter, Integrator, Differentiator, instrumentation amplifier, Non-Linear Applications: Comparator, Zero Crossing Detector, Schmitt trigger with hysteresis, Square-wave generator, triangular-wave generators.

Reference Books

1. Robert L. Boylestad, Louis Nashelsky, "Electronic Devices and Circuit Theory", PHI Publishers, 8th Edition,2004.
2. J. Millman and C. C. Halkias, "Integrated Electronics: Analog and Digital Circuits and Systems", Tata McGraw-Hill Publishing Company, 1988.
3. R. A. Gayakwad, "Op-Amps and Linear Integrated Circuits", Prentice Hall India, 4th Edition, 2012.
4. A. S. Sedra and K. C. Smith, "Microelectronic Circuits", New York, Oxford University Press, 1998.
5. R. S. Sedha, "Applied Electronics", S. Chand and Company (P) LTD, Delhi, 1st Edition Reprint 2014.
6. J. V. Wait, L. P. Huelsman and G. A. Korn, "Introduction to Operational Amplifier Theory and Applications", McGraw Hill U. S., 1992.
7. P. Ramesh Babu, "Electronic Devices and Circuits", McGraw Hill Education, India, 3rd Edition, 2012

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 2 hrs.

Analog Electronics Laboratory (22PCEE3030L)

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 expose the students to a variety of practical circuits using various analog circuits.
2. Build diode circuits like rectifier, clipper, and clamper.
3. To acquire skills of designing and testing integrated circuits.

Course Outcome

COs	Course Outcomes	Blooms Level	Blooms Description
At the end of this course students will be able,			
CO1	To **analyze** and **evaluate** a wide variety of analog circuits.	L4	Analyze
CO2	To Build and **understand** a circuit and take measurements of circuit variables using tools such as oscilloscopes, mustimeters and signal generators.	L2	Understand
CO3	To **apply** the knowledge for **design** and construction of circuits for projects.	L3, L6	Apply, Create
CO4	To **analyze** different Op-Amp and timer circuits .	L5	Evaluate
CO5	To **implement** application of various analog circuits.	L3	Apply

List of the Experiments

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

Perform any 10 experiments from the following list of experiments (7-Hardware-based, 2- Simulation and 1- Innovative)

1. To plot V-I characteristics of P-N junction diode.
2. To Design and Test Half wave rectifier circuit with and without LC filter and determines the ripple factor and efficiency.
3. Find performance parameter of the full wave- center tap and bridge type rectifier circuits with and without LC filter.
4. To plot forward and reverse characteristics of PN junction diode.
5. To design, assemble and test the wave shaping circuit using diode - clipping and clamping circuits.
6. To Plot I/P and O/P characteristics of BJT (CE Configuration).
7. To Plot DC Load Line for BJT (Voltage Divider biasing circuit).
8. To Plot the Drain characteristics of the N-channel Enhancement type MOSFET.
9. To design and implement different types of oscillators-Build and test Phase Shift Oscillator Circuit.
10. To Design inverting and non-inverting configurations of Op-Amp.
11. To Design and implementation of integrator, differentiator using Op-Amp.
12. To Design of the astable multivibrator using IC 555.
13. Shadow Sensor Alarm using IC741 op-Amp. **(Innovation)**
14. Sequential Timer (IC-555) for DC Motor Control **(Innovation)**

Computer Usage / Lab Tool:

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

Reference Books

1. Robert L. Boylestad, Louis Nashelsky, "Electronic Devices and Circuit Theory", PHI Publishers, 8th Edition,2004.
2. J. Millman and C. C. Halkias, "Integrated Electronics: Analog and Digital Circuits and Systems", Tata McGraw-Hill Publishing Company, 1988.
3. R. A. Gayakwad, "Op-Amps and Linear Integrated Circuits", Prentice Hall India, 4th Edition, 2012.
4. A. S. Sedra and K. C. Smith, "Microelectronic Circuits", New York, Oxford University Press, 1998.
5. R. S. Sedha, "Applied Electronics", S. Chand and Company (P) LTD, Delhi, 1st Edition Reprint 2014.
6. J. V. Wait, L. P. Huelsman and G. A. Korn, "Introduction to Operational Amplifier Theory and Applications", McGraw Hill U. S., 1992.
7. P. Ramesh Babu, "Electronic Devices and Circuits", McGraw Hill Education, India, 3rd Edition, 2012

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 (22PCEE3040T)

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. To provide basic concepts of errors in measurements and basic fundamentals of measuring systems, philosophy of measurement and standards.
2. To impart skills to classify bridges, measuring instruments and equipment's and also demonstrate digital instruments, advance instruments.
3. To impart basic knowledge of transducer and recorders.

Course Outcome

COs	Course Outcomes	Blooms Level	Blooms Description
At the end of this course students will be able,			
CO1	To **understand** the philosophy of measurement systems, types of errors, standards	L2	Understand
CO2	To **understand** the construction, working principle of analog and digital instruments, bridges, transducers and recorders.	L2	Understand
CO3	To **analyze** the different parameters of electrical quantity in analog and digital instruments,	L4	Analyze
CO4	To **analyze** the various parameters of DC and AC bridges.	L4	Analyze
CO5	To **analyze** the various errors produced in analog and digital instruments.	L4	Analyze

Course Contents

Unit-I Introduction to Measurement and Instrumentation 08 Hrs.

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

Unit-II Analog and Digital Measurement of Electrical Quantities 08 Hrs.

Construction and Working operation of all types of ammeters and voltmers, construction and working operation of all types of wattmeters, measurement of power in dc and ac circuit, errors & remedies in wattmeter and smart energy meter. Instrument Transformers, extension range of voltmeters and ammeters, Introduction to measurement of speed, frequency and power factor

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

Unit-III Measurement of Parameters 08 Hrs.

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

Unit-IV Introduction to Transducers 08 Hrs.

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

Unit-V Display Methods, recorders 08 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.
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.
4. J. B. Gupta, "Electrical & Electronic Measurement and Instrumentation", S. K. Kataria & Son, 14th edition.
5. R. K. Rajput, "Electrical & Electronic Measurement and Instrumentation", S. Chand.

Reference Books

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

Evaluation Scheme:

Theory :

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

End Semester Examination (C):

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

Electrical Measurements and Instrumentation Laboratory (22PCEE3040L)

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.

Course Outcome

COs	Course Outcomes	Blooms Level	Blooms Description
At the end of this course students will be able,			
CO1	To **conduct** practical and able to analyze the practical data for various purposes.	L2	Understand
CO2	To **apply** various electrical and non electrical measurement methods to obtain electrical and non electrical quantities.	L3	Apply
CO3	To **select** the measuring instrument with proper range and type for practical uses.	L3	Apply
CO4	To **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, 2nd edition.
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 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 (22PCEE3050T)

Teaching Scheme
Lectures : 02 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.

Course Outcome

COs	Course Outcomes	Blooms Level	Blooms Description
At the end of this course students will be able,			
CO1	Understand the knowledge about the electric power generations and their impacts.	L2	Understand
CO2	To **apply** theoretical concepts of conventional and non-conventional power generation method.	L3	Apply
CO3	To **apply** the operation, maintenance and working of power plants	L3	Apply
CO4	To **analyze** the issues related to the grid-integration of solar and wind energy systems.	L4	Analyze
CO5	To **create** awareness of the concept of micro-grid and distributed generation system	L6	Create

Course Contents

Unit-I Introduction to Generation System 08 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 08 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 08 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, Ad- vantages and Limitations of Steam Power Station.

Unit-IV Nuclear Power Station 08 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, Wind Energy Station & Power plant Economics 08 Hrs.

Introductions to Solar and Wind energy, solar radiation measurement, Types of Solar Energy Collectors, Developments in photovoltaic, Wind Energy Conversion systems, Types of wind Turbine.

Micro grid: Cost of electrical energy, Terms commonly used in system operation, Operation of micro grid in grid-connected as well as isolated mode, Distributed energy systems and dispersed generation (DG).Application, Merit & Demerit of Solar and wind Stations, Numericals on power plant economics.

Text Books

1. Mehta, V. K., "Electrical Power System", S. Chand and Company, New Delhi, 2011.
2. Ashfaq Hussain, "Electrical Power System", CBS Publishers and Distributors, 2015
3. J. B. Gupta, "Electrical Power", S. K. Kataria and Sons 2012.

Reference Books

1. Nag, P. K., "Power plant Engineering", Tata McGraw Hill, New Delhi, 2011.
2. Uppal S. L., "Electrical Power", Khanna Publication, New Delhi, 2011.
3. Solanki Chetan S., "Renewable Energy Technologies", PHI Learning, New Delhi, 2011
4. B. R. Gupta, "Generation of Electrical Energy", S. Chand and Company, 7th Edition, New Delhi, 2017.
5. C. L. Wadhwa, "Generation Distribution and Utilization of Electrical Energy", 7th Edition, New Age International, 2016.

Evaluation Scheme:

Theory :

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

End Semester Examination (C):

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

Electrical and Electronics Workshop (22PCEE3060L)

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 Electrical Engineering and Digital Electronics.

Course Objectives

1. Demonstrate safety measures against electric shocks.
2. Identify the tools used for electrical wiring, electrical accessories, wires, cables, batteries and standard symbols.
3. Develop the connection diagram, identify the suitable accessories and materials necessary for wiring simple lighting circuits for domestic buildings.
4. Identify and test various electronic components.
5. Assemble and test electronic circuits on boards.
6. Work in a team with good interpersonal skills.

Course Outcome

COs	Course Outcomes	Blooms Level	Blooms Description
At the end of this course students will be able,			
CO1	To **demonstrate** safety measures against electric shocks.	L2	Understand
CO2	To **identify** the tools used for electrical wiring, electrical accessories, wires, cables, batteries and standard symbols.	L2	Understand
CO3	To **develop** the connection diagram, identify the suitable accessories and materials necessary for wiring simple lighting circuits for domestic buildings.	L6	Create
CO4	To **identify** and **test** various electronic components..	L2, L4	Understand, Analyze
CO5	To **assemble** and **test** electronic circuits on boards.	L6, L4	Create, Analyze
CO6	To **collaborate** in a team with good interpersonal skills.	L6	Create

List of the Experiments

Minimum 5 practical from each group

Group A - Electrical

1. a) Demonstrate the precautionary steps adopted in case of Electrical shocks.
   b) Identify different types of cables, wires, switches, fuses, fuse carriers, MCB, ELCB, MCCB and RCCB with ratings.
2. Wiring of simple light circuit for controlling light/ fan point (PVC conduit wiring)
3. Wiring of light/fan circuit using Two way switches. (Staircase wiring)
4. Wiring of Fluorescent lamps and light sockets (6A) with a power circuit for controlling power device. (16A socket)
5. Wiring of power distribution arrangement using single phase MCB distribution board with ELCB, main switch and Energy meter.
6. a) Identify different types of batteries with their specifications.
   b) Demonstrate the Pipe and Plate Earthing Schemes using Charts/Site Visit.

Group B - Electrical

1. Identification of Active and Passive Components
2. Testing of Active and Passive Components.
3. Familiarization/Application of testing instruments and commonly used tools. [Multimeter, Function generator, Power supply, DSO etc., Soldering iron, De-soldering pump, Pliers, Cutters, Wire strippers, Screw drivers, Tweezers, Crimping tool, Hot air soldering and desoldering station etc.]
4. Inter-connection methods and soldering practice. [Bread board, Wrapping, Crimping, Soldering - types - selection of materials and safety precautions, soldering practice in connectors and general purpose PCB, Crimping.]
5. Printed circuit boards (PCB) [Types, Single sided, Double sided, PTH, Processing methods, Design and fabrication of a single sided PCB for a simple circuit with manual etching (Ferric chloride) and drilling].
6. Simulation of electronic circuit PCB using software.
7. Assembling an electronic circuit/system on general purpose PCB, test and show the functioning.
   Note:
   1) Name of the circuit will be provided by the subject teacher at the time of practical.

Reference Books

1. D. P. Kothari and I. J. Nagrath, "Basic Electrical Engineering", Tata McGraw Hill, 3rd Edition, 2010.
2. D. C. Kulshreshtha, "Basic Electrical Engineering", Tata McGraw Hill, 2nd Edition, 2019.
3. M.S.Sukhija and T.K.Nagsarkar, "Basic Electrical and Electronics Engineering", Oxford University Press, 1st Edition, 2012.
4. Mitchel Schultz, "Grob's Basic Electronics", McGraw Hill Education, 12th Edition, 2015.
5. V. N. Mittle and Arvind Mittal, "Basic Electrical Engineering", McGraw Hill, 2nd Edition, 2006.
6. Charles A. Harper, "Handbook of Components for Electronics", Laxmi Enterprise, 2020.
7. K. B. Raina, Dr. S. K. Bhattacharya, "Electrical Engineering Materials and Electronic Components", S. K. Kataria and Sons, 10th Edition, 2021.

Evaluation Scheme

Laboratory

Continuous Assessment (TA):

Laboratory work will be based on 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 (HMEE3070T)

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.

Course Outcome

COs	Course Outcomes	Blooms Level	Blooms Description
At the end of this course students will be able,			
CO1	To **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	To **become** sensitive to their commitment towards what they have understood (human values, human relationship, and human society).	L2	Understand
CO3	To **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 Process for Value Education 5 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 Human Being, in Myself! 6 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 6 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 5 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 Holistic Understanding of Harmony on Professional Ethics 6 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- I (PJEE3080L)

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.

Course Outcome

COs	Course Outcomes	Blooms Level	Blooms Description
At the end of this course students will be able,			
CO1	To **conduct** a survey of several available literatures in the preferred field of study.	L4	Analyze
CO2	To **demonstrate** various/alternate approaches to complete a project.	L2	Understand
CO3	To **ensure** a collaborative project environment by interacting and dividing project work among team members.	L3	Apply
CO4	To **present** their project work in the form of a technical report / paper and thereby improve the technical communication skill.	L3	Apply
CO5	To **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