SCHEME OF INSTRUCTION AND EXAMINATION

AICTE MODEL CURRICULUM

BACHELOR OF ENGINEERING
ELECTRICAL AND ELECTRONICS ENGINEERING

DEPARTMENT OF ELECTRICAL ENGINEERING

University College of Engineering (Autonomous)
Osmania University, Hyderabad
Telangana – 500 007

SCHEME OF INSTRUCTION AND EXAMINATION

AICTE MODEL CURRICULUM

B.E. (Electrical and Electronics Engineering)

SEMESTER – I

S.No	Course Code	Course Title	Scheme of Instruction			Contact Hrs/wk	Scheme of Examination		Credits
			L	T	P / Dg		CIE	SEE	
1.	MC100HS	Three Week Induction Program							-
2.	MT101BS	Engineering Mathematics-I	3	1	-	4	30	70	4
3.	PH101BS	Engineering Physics	3	1	-	4	30	70	4
Practicals									
4.	CE151ES	Engineering Graphics	-	-	6	6	50	50	3
5.	ME151ES	Workshop Practice	-	-	6	6	25	50	3
6.	PH151ES	Engineering Physics Laboratory	-	-	3	3	25	50	1.5
Total			**06**	**02**	**15**	**23**	**160**	**290**	**15.5**

Interdisciplinary Courses Offered to Other Departments in B.E. Semester – I

BME, CSE and ECE

S.No	Course Code	Course Title	Scheme of Instruction			Contact Hrs/wk	Scheme of Examination		Credits
			L	T	P / Dg		CIE	SEE	
1.	EE101ES	Basic Electrical Engineering	3	1	-	4	30	70	4

CSE

S.No	Course Code	Course Title	Scheme of Instruction			Contact Hrs/wk	Scheme of Examination		Credits
			L	T	P / Dg		CIE	SEE	
1.	EE151ES	Basic Electrical Engineering Lab	-	-	2	2	25	50	1

SCHEME OF INSTRUCTION AND EXAMINATION

AICTE MODEL CURRICULUM

B.E. (Electrical and Electronics Engineering)

SEMESTER – II

S.No	Course Code	Course Title	Scheme of Instruction			Contact Hrs/wk	Scheme of Examination		Credits
			L	T	P / Dg		CIE	SEE	
1.	MT201BS	Engineering Mathematics-II	3	1	-	4	30	70	4
2.	CH102BS	Engineering Chemistry	3	1	-	4	30	70	4
3.	EG101HS	English	2	-	-	2	30	70	2
4.	CS201ES	Programming and Problem Solving	3	-	-	3	30	70	3
5.	EE101ES	Basic Electrical Engineering	3	1	-	4	30	70	4
Practicals									
6.	CH152BS	Engineering Chemistry Laboratory	-	-	3	3	25	50	1.5
7.	EG151HS	English Laboratory	-	-	2	2	25	50	1
8.	CS251ES	Programming and Problem Solving Laboratory	-	-	3	3	25	50	1.5
Total			**14**	**03**	**08**	**25**	**225**	**500**	**21**

Interdisciplinary Courses Offered to Other Departments in B.E. Semester – II

Mechanical Engineering

S.No	Course Code	Course Title	Scheme of Instruction			Contact Hrs/wk	Scheme of Examination		Credits
			L	T	P / Dg		CIE	SEE	
1.	EE101ES	Basic Electrical Engineering	3	1	-	4	30	70	4

BME, ECE and ME

S.No	Course Code	Course Title	Scheme of Instruction			Contact Hrs/wk	Scheme of Examination		Credits
			L	T	P / Dg		CIE	SEE	
1.	EE151ES	Basic Electrical Engineering Lab	-	-	2	2	25	50	1

SCHEME OF INSTRUCTION AND EXAMINATION

AICTE MODEL CURRICULUM

B.E. (Electrical and Electronics Engineering)

SEMESTER – III

S.No	Course Code	Course Title	Scheme of Instruction			Contact Hrs/wk	Scheme of Examination		Credits
			L	T	P / Dg		CIE	SEE	
1.	ES101CE	Engineering Mechanics	3	-	-	3	30	70	3
2.	PC301EE	Electrical Circuit – I	3	1	-	4	30	70	4
3.	PC302EE	Electrical Machines – I	3	1	-	4	30	70	4
4.	PC303EE	Power Systems - I	3	1	-	4	30	70	4
5.	PC304EE	Electromagnetic Fields	3	1	-	4	30	70	4
6.	PC305EE	Analog Electronics	3	-	-	3	30	70	3
Practicals									
7.	ES352EE	Computer Aided Electrical Drawing Laboratory	-	-	3	3	25	50	1.5
8.	PC351EE	Analog Electronics Laboratory	-	-	2	2	25	50	1
Total			**18**	**04**	**05**	**27**	**230**	**520**	**24.5**

Interdisciplinary Courses Offered to Other Departments in B.E. Semester – III

Civil Engineering

S.No	Course Code	Course Title	Scheme of Instruction			Contact Hrs/wk	Scheme of Examination		Credits
			L	T	P / Dg		CIE	SEE	
1.	EE101ES	Basic Electrical Engineering	3	1	-	4	30	70	4

SCHEME OF INSTRUCTION AND EXAMINATION

AICTE MODEL CURRICULUM

B.E. (Electrical and Electronics Engineering)

SEMESTER – IV

S.No	Course Code	Course Title	Scheme of Instruction			Contact Hrs/wk	Scheme of Examination		Credits
			L	T	P / Dg		CIE	SEE	
1.	MC101HS	Environmental Science	3	-	-	3	30	70	-
2.	PC401EE	Electrical Circuits - II	3	1	-	4	30	70	4
3.	PC402EE	Electrical Machines II	3	1	-	4	30	70	4
4.	PC403EE	Power System – II	3	1	-	4	30	70	4
5.	PC404EE	Power Electronics	3	1	-	4	30	70	4
6.	PC405EE	Digital Electronics and Logic Design	3	-	-	3	30	70	3
Practicals									
7.	PC451EE	Electrical Circuits Laboratory	-	-	2	2	25	50	1
8.	PC452EE	Electrical Machines Laboratory – I	-	-	2	2	25	50	1
9.	PC453EE	Digital Electronics and Logic Design Laboratory	-	-	2	2	25	50	1
Total			**18**	**04**	**06**	**28**	**255**	**570**	**22**

SCHEME OF INSTRUCTION AND EXAMINATION

AICTE MODEL CURRICULUM

B.E. (Electrical and Electronics Engineering)

SEMESTER – III

S.No	Course Code	Course Title	Scheme of Instruction			Contact Hrs/wk	Scheme of Examination		Credits
			L	T	P / Dg		CIE	SEE	
1.	ES101CE	Engineering Mechanics	3	-	-	3	30	70	3
2.	PC301EE	Electrical Circuit – I	3	1	-	4	30	70	4
3.	PC302EE	Electrical Machines – I	3	1	-	4	30	70	4
4.	PC303EE	Power Systems - I	3	1	-	4	30	70	4
5.	PC304EE	Electromagnetic Fields	3	1	-	4	30	70	4
6.	PC305EE	Analog Electronics	3	-	-	3	30	70	3
Practicals									
7.	ES352EE	Computer Aided Electrical Drawing Laboratory	-	-	3	3	25	50	1.5
8.	PC351EE	Analog Electronics Laboratory	-	-	2	2	25	50	1
Total			**18**	**04**	**05**	**27**	**230**	**520**	**24.5**

Interdisciplinary Courses Offered to Other Departments in B.E. Semester – III

Civil Engineering

S.No	Course Code	Course Title	Scheme of Instruction			Contact Hrs/wk	Scheme of Examination		Credits
			L	T	P / Dg		CIE	SEE	
1.	EE101ES	Basic Electrical Engineering	3	1	-	4	30	70	4

ES101CE

ENGINEERING MECHANICS

Instructions	:	4 hours per week
Duration of SEE	:	3 Hours
SEE	:	70 Marks
CIE	:	30 Marks
Credits	:	04

Course Objectives:

1. Understand the resolution of forces, equilibrium of force systems
2. Learn the analysis of forces in the structures
3. Understand the concept of centroid, moment of inertia and dynamics

Course Outcomes:

1. Determine the resultant and moment of a force system
2. Apply the equations of equilibrium for a generalized force system
3. Analyze the forces in trusses and frames
4. Determine the centroid and moment of inertia for 1D & 2D bodies
5. Apply the concepts of dynamics in solving the engineering problems

UNIT – I

Module 1*: Introduction to Engineering Mechanics covering,* Force Systems Basic concepts, Particle equilibrium in 2-D & 3-D; Rigid Body equilibrium; System of Forces, Coplanar Concurrent Forces, Components in Space – Resultant- Moment of Forces and its Application;

Couples and Resultant of Force System, Equilibrium of System of Forces, Free body diagrams, Equations of Equilibrium of Coplanar Systems and Spatial Systems; Static Indeterminacy

UNIT – II

Module 2*: Basic Structural Analysis covering,* Equilibrium in three dimensions; Method of Sections; Method of Joints; How to determine if a member is in tension or compression; Simple Trusses; Zero force members; Beams & types of beams; Frames & Machines.

UNIT – III

Module 3*: Centroid and Centre of Gravity covering,* Centroid of simple figures from first principle, centroid of composite sections; Centre of Gravity and its implications; Area moment of inertia- Definition, Moment of inertia of plane sections from first principles, Theorems of moment of inertia, Moment of inertia of standard sections and composite sections; Mass moment inertia of circular plate, Cylinder, Cone, Sphere, Hook.

UNIT – IV

Module 4*: Virtual Work and Energy Method*- Virtual displacements, principle of virtual work for particle and ideal system of rigid bodies, degrees of freedom. Active force diagram, systems with friction, mechanical efficiency. Conservative forces and potential energy (elastic and gravitational), energy equation for equilibrium. Applications of energy method for equilibrium. Stability of equilibrium.

UNIT – V

Module 5: *Mechanical Vibrations covering,* Basic terminology, free and forced vibrations, resonance and its effects; Degree of freedom; Derivation for frequency and amplitude of free vibrations without damping and single degree of freedom system, simple problems, types of pendulum, use of simple, compound and torsion pendulums

Suggested Reading:

1. F.L. Singer, *Engineering Mechanics*, Collins, Singapore, 1975.
2. S.P. Timoshenko and D.H. Young, *Engineering Mechanics*, McGraw-Hill International Edition, 1983.
3. S. Rajeshakharam and G. Sankarasubrahmanyam, *Mechanics*, Vikas Publications, 2002.
4. S.B. Junarkar and H.J. Shah, *Applied Mechanics*, 2001.
5. J.H. Shames, *Engineering Mechanics*, Prentice Hall, 1987.
6. B. Bhattacharyya, *Engineering Mechanics*, Oxford Higher Education, 2015.

e-Resources:

1. http://nptel.ac.in/
2. http://mhrd.gov.in/e-contents
3. http://spoken-tutorial.org/

PC301EE

ELECTRICAL CIRCUITS - I

Instructions	:	4 hours per week
Duration of SEE	:	3 Hours
SEE	:	70 Marks
CIE	:	30 Marks
Credits	:	04

Objectives:

1. To acquire knowledge in circuits and to understand the fundamentals of derived circuit laws.
2. To understand theorems, steady state and transient analysis of single phase and 3-phase circuits.

Course outcomes:

At the end of the course the students will be able to

1. understand network analysis, techniques using mesh and node analysis.
2. evaluate steady state and transient behavior of single port network for DC and AC excitations.
3. analyze electric circuits using network theorems.
4. understand the concept of coupled circuits and poly-phase circuits.

UNIT I

Network Elements & Laws: Active elements, Independent and dependent sources. Passive elements — R, L and C, Energy stored in inductance and capacitance, Kirchhoff's laws, Source transformations, Star-delta transformations, Node voltage method, Mesh current method including super node and super mesh analysis.

UNIT II

Single-Phase Circuits: RMS and average values of periodic sinusoidal and non-sinusoidal waveforms, Phasor representation, Steady-state response of series, parallel and series-parallel circuits. Impedance, Admittance, Current locus diagrams of RL and RC series and parallel circuits with variation of various parameters. Resonance: Series and parallel circuits, Band-width and Q-factor.

UNIT III

Network theorems: Superposition theorem, Thevinin's theorem, Norton's theorems, Maximum power transfer theorem, Tellegen's theorem, Compensation theorem, Milliman's theorem and Reciprocity theorem. (AC & DC)

UNIT IV

Poly-phase Circuits: Analysis of balanced and unbalanced 3-phase circuits, Star and delta connections, Measurement of three-phase power for balanced and unbalanced loads.

Coupled circuits: Concept of self and mutual inductance, Dot convention, Coefficient of coupling, Analysis of circuits with mutual inductance.

UNIT V

Transient analysis: Transient response of RLC circuits, Formulation of integral differential equations, Initial conditions, Response of RL, RC and RLC networks subjected to internal energy, Response to impulse, step, ramp, exponential and sinusoidal excitations

Suggested Reading:

1. Van Valkenburg M.E., *Network Analysis*, Prentice Hall of India, 3rd Edition, 2000.
2. William Hayt H, Kimmerly Jack E, Steven Durbin M, *Engineering Circuit Analysis*, McGraw Hill, 6th Edition, 2002.
3. Jagan N.C, Lakshrninarayana C., *Network Analysis*, B.S. Publications, 3rd Edition, 2014.

PC302EE

ELECTRICAL MACHINES – I

Instructions	:	4 hours per week
Duration of SEE	:	3 Hours
SEE	:	70 Marks
CIE	:	30 Marks
Credits	:	04

Objectives:

1. To learn and understand electromechanical energy conversion devices.
2. To be able to understand in detail about DC machines. Construction, principle, performance characteristics and testing.

Outcomes:

At the end of the course the students will be able to

1. understand construction, operating principle and characteristics of different types of DC motors and generators
2. test and calculate performance parameters of DC motors and generators
3. select appropriate DC machines for a specific application

UNIT I

Electromechanical energy conversion: Principle of energy conversion, Flow of energy in electromechanical devices, Coupling-field reaction, Singly excited magnetic system – Electric energy input, Magnetic field energy stored, Mechanical work done – with slow, instantaneous and transient movement of armature, Calculation of mechanical force, Doubly excited magnetic systems, electromagnetic and reluctance torques.

UNIT II

DC Machines: Simple loop generator, Essential parts of DC machine, Details of Lap winding & Wave winding, EMF equation, Armature reaction — Remedies, Ampere turns, Commutation — reactance voltage, Methods of improving commutation — High resistance brushes, shifting of brushes, Interpoles, Compensating winding.

UNIT III

DC Generators; Classification & types of DC generators, Open circuit, Internal & External characteristics — Critical resistance & critical speed, Voltage regulation, Conditions for self excitation, Causes of failure of voltage buildup, Parallel operation Series, Shunt and Compound generators, Applications.

UNIT IV

DC Motors: Classification & Types of DC motors, Back emf, Speed regulation, Armature torque, Armature reaction, Operating characteristics, Performance curves, Basic speed control methods Shunt and Series motors, Three & four-point starters, Calculation of step resistances, Applications.

UNIT V

Testing, Losses and Efficiency: Power losses — Copper losses and Rotational losses, Power flow, Efficiency, Testing - Brake Test and Swinburne's test, Hopkinson's test, Field's test, Retardation test, Heat run test.

Suggested Reading:

1. D.P. Kothari, I.J. Nagrath , *Electric Machines*, Tata McGraw Hill, 4th Edition, 2010
2. Bhimbra P.S., *Electrical Machinery*, Khanna Publications, 2000
3. Gupta J.B., *Theory and Performance of Electrical Machines*, S.K.Kataria & Sons, Delhi, 2005.
4. AE Clayton and NN Hancock, *The Performance and Design of Direct Current Machines,* 3rd edition, 1959.

PC303EE

POWER SYSTEMS – I

Instructions	:	4 hours per week
Duration of SEE	:	3 Hours
SEE	:	70 Marks
CIE	:	30 Marks
Credits	:	04

Objectives:

1. To be able to learn and understand the conventional and renewable generating power stations and economics of generation.
2. To be able to understand design concepts of transmission lines and cables.

Outcomes:

1. The students will acquire knowledge in conventional renewable generating power stations and economics of generation
2. The students will acquire knowledge regarding the design concepts of transmission lines and cables.

UNIT I

Economics of Power Generation: Load Curve, Load Demand and Diversified factors, Base Load and Peak load operation, Types of costs and depreciation fund calculations, Methods of power factor improvement, Economics of power factor improvement, Tariffs, Distribution: 2 wire and 3 wire distributors, Ring mains, AC distribution calculations.

UNIT II

Steam Power Stations: Choice of site, Layout & various parts of station, Boilers, Turbines, Super Heaters, Economizers, Air pre-heaters etc. and their Pulverized fuel, Coal handling.

Hydro-Electric Power plants: Estimation Hydrograph, Flow duration curve, Mass curve, Storage and pondage, Types electric plants and layouts, Prime movers for hydro-electric plants.

UNIT III

Nuclear Power Plants: Fissile materials, Working principle of nuclear plants and reactor control, Shielding, Types of reactors.

Non-Conventional Energy Sources – Basic principles of Wind, solar and gas turbines.

UNIT IV

Over-Head Lines: Supports sag and tension calculations, Effect of wind and ice, Erection conditions, Insulators: Types of insulators, Potential distribution over a string of suspension insulators, Methods of equalizing the potential, Testing of insulators. Insulated Cables: Conductors for cables, Insulating materials, Mechanical protection, Low voltage cables, Grading of cables, Three phase high voltage cables and Super voltage cables, Capacitance of three-core cables.

UNIT V

Inductance and Capacitance of Transmission Lines: Inductance and capacitance of overhead line conductors, Single phase and three phase with symmetrical composite conductors, GMR and GMD Spacing, Transposition, Bundled conductors, Effect of earth capacitance.

Suggested Reading:

1. Wadhwa C.L., *Electrical Power Systems*, New Age International (P) Ltd., 4th Edition, 2007.
2. Wadhwa C.L., *Generation, Distribution and Utilization of Electrical Energy*, New Age International (P) Ltd., 4th Edition, 2006.
3. Singh S.N., *Electrical Power Generation*, Transmission and Distribution, Prentice Hall of India, Pvt. Ltd., New Delhi, 2003.
4. V.K.Mehta, *Principles of Power Systems*, S. Chand and Co., 2007.

PC304EE

ELECTRO MAGNETIC FIELDS

Instructions	:	3 hours per week
Duration of SEE	:	3 Hours
SEE	:	70 Marks
CIE	:	30 Marks
Credits	:	03

Objectives:

1. To be able to understand the concepts of electrostatic fields, magneto static fields, electromagnetic waves and Maxwell's equation.
2. To understand the concepts of electromagnetic wave propagation in different media.

Outcomes:

At the end of the course students will be able to

1. Formulate problems within electrostatics, magnetostatics and stationary current distributions in linear, isotropic media.
2. Derive expressions for the energy for electrostatic and magnetostatic fields, and derive Poynting's theorem.
3. Calculate the boundary conditions for electric and magnetic fields between different media.
4. Calculate the reflection and refraction coefficients of electromagnetic waves for different conditions.

UNIT I

Review of Vector Analysis: Coulomb's Law, Electric field intensity, Electric field due to different charge distributions. Electric field due to line charge, Sheet charge, Volume charge distribution, Electric flux density, Gauss's law, Divergence theorem. Potential, Potential gradient, Potential field of different charge distributions, Applications of above laws.

UNIT II

Energy in electrostatic field, Poisson's and Laplace equations, Uniqueness theorem, Solution of Laplace's equation, Conductors, Dielectric capacitance, Conductor properties and Boundary conditions, Calculation of capacitance, Boundary conditions for conductors and perfect dielectric materials.

UNIT III

Steady magnetic field, Biot-Savart's law, Ampere's law, Stoke's theorem, Magnetic scalar vector potential Faraday's law, Magnetic boundary conditions, Self and Mutual inductances, Force on moving charge, Force on differential elements, Magnetic circuits, Analogy with electrical circuits, Applications of above laws.

UNIT IV

Maxwell's equations in Integral form, Line and surface integrals, Application to static fields, Boundary conditions, Maxwell's equations in differential forms, Continuity equation, Potential function for static fields, Field equations in vector forms, energy storage in electric and magnetic fields.

UNIT V

EM waves in homogeneous medium solutions for free space conditions, Uniform plane wave propagation, Poisson's and Laplace's equations, Sinusoidally time varying uniform plane waves in free space, Uniform plane waves in dielectrics and conductors, Poynting

vector, Power dissipation, Reflection of uniform plane waves, Introduction to method of moments, Method of images.

Suggested Reading:

1. Matthew Sadiku N.O., *Elements of Electromagnetics*, Oxford University Press, 4th Edition, 2006.
2. William. Hayt H, Buck John A., *Engineering Electromagnetics*, Tata McGraw Hill, 7th Edition, 2003.
3. Nannapaneni Narayana Rao, *Elements of Engineering Electromagnetics*, PHI, New Delhi, 5th Edition, 2002.

PC305EE

ANALOG ELECTRONICS

Instructions	:	3 hours per week
Duration of SEE	:	3 Hours
SEE	:	70 Marks
CIE	:	30 Marks
Credits	:	03

Course Objectives:

1. To understand the diode characteristics.
2. To study the input and out characteristics of different Transistor configurations.
3. To understand the design concepts MOSFET and amplifier.
4. To understand the design concepts of OP-Amp.
5. To understand the Applications of OP-Amp.

Course Outcomes:

At the end of this course, students will demonstrate the ability to

1. Understand the characteristics of transistors.
2. Design and analyze various rectifier and amplifier circuits.
3. Design sinusoidal and non-sinusoidal oscillators.
4. Understand the functioning of OP-AMP and design OP-AMP based circuits.

Unit 1: **Diode circuits** (4 Hours)

P-N junction diode, I-V characteristics of a diode, review of half-wave and full-wave rectifiers, Zener diodes, clamping and clipping circuits.

Unit-II: BJT circuits (8 Hours)

Structure and I-V characteristics of a BJT; BJT as a switch. BJT as an amplifier: small-signal model, biasing circuits, current mirror; common-emitter, common-base and common collector amplifiers; Small signal equivalent circuits, high-frequency equivalent circuits

Unit-III: MOSFET circuits (8 Hours)

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, transconductance, high frequency equivalent circuit.

Unit-IV: Differential, multi-stage and operational amplifiers (8 Hours)

Differential amplifier; power amplifier; direct coupled multi-stage amplifier; internal structure of an operational amplifier, ideal op-amp, non-idealities in an op-amp (Output off set voltage, input bias current, input offset current, slew rate, gain bandwidth product)

Unit-V: Linear applications of op-amp (8 Hours)

Idealized analysis of op-amp circuits. Inverting and non-inverting amplifier, differential amplifier, instrumentation amplifier, integrator, active filter, voltage regulator, oscillators (Wein bridge and phase shift).Analog to Digital Conversion: (Flash, Successive Approximation, Dual slope).

Suggested Reading:

1. A. S. Sedra and K. C. Smith, “Microelectronic Circuits”, New York, Oxford University Press, 1998.
2. J. V. Wait, L. P. Huelsman and G. A. Korn, “Introduction to Operational Amplifier theory and applications”, McGraw Hill U. S., 1992.
3. J. Millman and A. Grabel, “Microelectronics”, McGraw Hill Education, 1988.
4. D.Roy Chowdary and Shail B Jain, “*Linear Integrated Circuits*”, 3rd Edition, New Age
5. International (P) Limited, New Delhi, 2008.

ES352EE

COMPUTER AIDED ELECTRICAL DRAWING LABORATORY

Instructions	:	3 hours per week
Duration of SEE	:	3 Hours
SEE	:	50 Marks
CIE	:	25 Marks
Credits	:	1.5

Objectives :

1. To understand the terminology of electric circuit and electrical components.
2. To be able to familiarize with electrical machines, apparatus and appliances.
3. To acquire knowledge on various Electrical Engg. software's.

Outcomes:

At the end of the course students will be able to

1. Identify and draw different components of electrical systems
2. Draw different control and wiring diagrams
3. Draw winding diagrams of electrical machines.

Drawing of the following using Electrical CADD / Corel Draw / MS Word / PPT/Visio

1. Lines, Arcs, Curves, Shapes, Filling of objects, Object editing & Transformation.
2. Electrical, Electronic & Electro – mechanical symbols.
3. House – wiring diagrams and layout.
4. Simple power and control circuit diagrams.
5. Electrical machine winding diagrams. (A.C & D.C)
6. Transmission tower, Over head lines – ACSR conductors, Single circuit, Double circuit, Bundle conductor.
7. Constructional features of D.C motors, AC motors and Transformers.
8. D.C and A.C motor starter diagrams.
9. Lamps used in illumination
10. Single line diagram of Power System

Suggested Readings:

1. KB. Raina, S.K. Bhattacharya, *Electrical Design, Estimating and Costing*, Wiley Eastern Ltd., 1991.
2. Nagrath, Kothari, *Electrical Machines*, Tata McGraw Hill Publishing Company Ltd., 2000.
3. A.K. Sawhney*, A Course in Electrical Machines Design*, Dhanpat Rai and Sons, 1996.

PC351EE

ANALOG ELECTRONICS LABORATORY

Instructions	:	2 hours per week
Duration of SEE	:	3 Hours
SEE	:	50 Marks
CIE	:	25 Marks
Credits	:	01

Course Objectives:

1. To understand the diode characteristics.
2. To study the input and out characteristics of different Transistor configurations.
3. To understand the design concepts of amplifier.
4. To understand the design concepts of Combinational and Sequential circuits.
5. To understand the design concepts of OP-Amp.

Course Outcomes:

Students will be
1. Able to design diode circuits.
2. Able to understand the applications of zener diode.
3. Able to understand the operation of HWR & FWR circuits with & without filters.
4. Able to analyze the characteristics of BJTs and FETs.
5. Able to analyze the performance of operation amplifier.

List of Experiments:

1. Characteristics of Semiconductor Diodes(Si, Ge and Zener).
2. Characteristics of BJT (CB,CE).
3. CRO and its Applications.
4. Rectifiers: Half Wave Rectifier, Full Wave Rectifier with and without filters
5. Characteristics of FET.
6. Transistors as an Amplifier.
7. Inverting, Non-Inverting Amplifier using Op amp.
8. RC phase shift Oscillator
9. Wien Bridge Oscillator
10. Integration and Differentiation using Op-amp.

Suggested Readings:

1. David Bell A., Operational Amplifiers and Linear ICS, Prentice Hall of India, 2005.
2. Maheshwari and Anand, Laboratory Experiments and PSPICE Simulations in Analog Electronics, 1st edition, Prentice Hall of India, 2006.

ES101EE

BASIC ELECTRICAL ENGINEERING

(Common to BME, CE, CSE, EEE, ECE and ME)

Instructions	:	4 hours per week
Duration of SEE	:	3 Hours
SEE	:	70 Marks
CIE	:	30 Marks
Credits	:	04

Course Objectives:

1. To understand the fundamentals of DC and AC electrical circuits.
2. To understand the working principles of DC motor, DC generator, Transformers and single phase induction motors.
3. To understand working principles of protection devices used in electrical circuits.

Course Outcomes:

The students will able to

1. Analyze the performance of simple electrical circuits exciting with Dc and AC excitations.
2. Apply different theorems to solve complicated electrical circuits to obtain the current, voltage and power.
3. Understand the main components, Characteristics, applications of different DC and AC electrical machines used in industry.
4. Understand the importance of protective devices and their rating used in electrical circuits.

UNIT-I

DC Circuits (8 hours)

Electrical circuit elements (R, L and C), voltage and current sources, Kirchhoff current and voltage laws, analysis of simple circuits with dc excitation, Superposition, Thevenin's and Norton's Theorem.

UNIT-II

AC Circuits (8 hours)

Representation of sinusoidal waveforms, peak and rms values, phasor representation, real power, reactive power, apparent power, power factor. Analysis of single-phase ac circuits consisting of R, L, C, and RL, RC, RLC combinations (series only). Three phase balanced circuits, voltage and current relations in star and delta connections.

UNIT-III

Transformers and 3-ph Induction Motors (8 hours)

Transformers: Electromagnetic induction, Faradays laws, Statically induced emf, Lenz law, BH characteristics, ideal and practical transformer, losses and efficiency, Auto-transformer and three phase transformer connections.

Three Phase Induction motor: Generation of rotating magnetic fields, Construction and working of a three-phase induction motor, squirrel cage IM, slip-ring IM, Applications.

UNIT-IV

Single-phase induction motor & DC Machines (6 hours)

Single-phase induction motor: Construction and principle of operation, Capacitor start & capacitor run motor, applications.

DC Generators: Dynamically induced emf, Fleming's Right hand and Left hand rules, Construction and principle of operation of DC generator, EMF equation, Types of DC Generators, OCC characteristics, applications.

DC Motors: principle of operation of DC Motor, Types of DC motors, applications.

UNIT-V

Electrical Installations (6 hours)

Components of LT Switchgear: Switch Fuse Unit (SFU), MCB, ELCB, MCCB, Types of Wires and Cables, Earthing. Types of Batteries, Important Characteristics for Batteries. Elementary Calculations for energy consumption, power factor improvement and battery backup.

Suggested Readings:

1. J.B.Gupta, “Fundamentals of Electrical Engineering and Electronics” S.K.Kataria & Sons Publications, 2002.
2. J.B.Gupta, “Utilization of Electric Power and Electric Traction” S.K.Kataria & Sons Publications, 2010
3. Abhijit Chakrabarti, Sudipta Nath, Chandan Kumar Chanda, “ Basic Electrical Engineering” Tata McGraw Hill, Publications, 2009.
4. Hughes, "Electrical Technology", VII Edition, International Student -on, Addison Welsey Longman Inc., 1995.

SCHEME OF INSTRUCTION AND EXAMINATION

AICTE MODEL CURRICULUM

B.E. (Electrical and Electronics Engineering)

SEMESTER – IV

S.No	Course Code	Course Title	Scheme of Instruction			Contact Hrs/wk	Scheme of Examination		Credits
			L	T	P / Dg		CIE	SEE	
1.	MC101HS	Environmental Science	3	-	-	3	30	70	-
2.	PC401EE	Electrical Circuits - II	3	1	-	4	30	70	4
3.	PC402EE	Electrical Machines II	3	1	-	4	30	70	4
4.	PC403EE	Power System – II	3	1	-	4	30	70	4
5.	PC404EE	Power Electronics	3	1	-	4	30	70	4
6.	PC405EE	Digital Electronics and Logic Design	3	-	-	3	30	70	3
Practicals									
7.	PC451EE	Electrical Circuits Laboratory	-	-	2	2	25	50	1
8.	PC452EE	Electrical Machines Laboratory – I	-	-	2	2	25	50	1
9.	PC453EE	Digital Electronics and Logic Design Laboratory	-	-	2	2	25	50	1
Total			**18**	**04**	**06**	**28**	**255**	**570**	**22**

MC101HS

ENVIRONMENTAL SCIENCE

(MANDATORY COURSE I)

Instructions	:	3 hours per week
Duration of SEE	:	3 Hours
SEE	:	70 Marks
CIE	:	30 Marks
Credits	:	-- Nil-

Course Objectives:

1. To know about natural resources and their benefits to the public
2. To study the concept of ecosystems and biodiversity
3. To understand the types of pollutions, social issues and disaster management

Course Outcomes:

1. Will have an awareness of effects of hazardous environment.
2. Will have an idea about optimum utilization of natural resources.
3. Will be a catalyst in moving towards Green technologies
4. Will have information about rules and regulations of pollution control

Unit-I

Environmental studies: Definition, scope and importance, need for public awareness. Natural resources: Water resources; use and over utilization of surface and ground water, Floods, drought, conflicts over water, dams-benefits and problems. Effects of modern Agriculture, Fertilizer pesticide problems, water logging and salinity.

Unit-II

Ecosystems: Concept of an ecosystem, structure and function of an ecosystem, producers, consumers and decomposers, energy flow in ecosystem, food chains, ecological pyramids, aquatic ecosystem (ponds, streams, lakes, rivers, oceans, estuaries) Energy resources: Growing energy needs renewable and non-renewable energy sources. Land Resources, land as a resource, land degradation, soil erosion and desertification.

Unit-III

Biodiversity: Genetic species and ecosystem diversity, bio-geographical classification of India. Value of biodiversity, threats to biodiversity, endangered and endemic species of India, conservation of biodiversity.

Unit-IV

Environmental Pollution: Cause, effects and control measures of air pollution, water pollution, soil pollution, noise pollution , thermal pollution and solid waste management. Environmental protection act: Air, water, forest and wild life Acts, enforcement of Environmental legislation.

Unit-V

Social issues and the Environment: Water conservation, watershed management and environmental ethics. Climate change, global warming, acid rain, ozone layer depletion. Disaster management: Types of disasters, impact of disasters on environment, infrastructure, and development. Basic principles of disaster mitigation, disaster management and methodology, disaster management cycle, and disaster management in India.

Suggested Text/Reference Books:

1. De A.K., “Environmental Chemistry”, Wiley Eastern Ltd.,
2. Odum E.P., “Fundamentals of Ecology”, W.B. Sunders Co., USA.
3. Rao M.N and Datta A.K., “Waste Water Treatment”, Oxford and IBK Publications.
4. Benny Joseph, “Environmental studies”, Tata McGraw Hill, 2005.
5. Sharma V.K., “Disaster Management”, National Centre for Disaster management, IIPE, Delhi,1999.

PC401EE

ELECTRICAL CIRCUITS – II

Instructions	:	4 hours per week
Duration of SEE	:	3 Hours
SEE	:	70 Marks
CIE	:	30 Marks
Credits	:	4

Objectives :

1. To acquire knowledge in circuits and to understand the Fourier series and Laplace transformation.
2. To be able to understand the techniques of electric network synthesis.

Outcomes:

At the end of the course the students will be able to

1. Examine the behavior of linear circuits using Fourier transform, Laplace transforms and transfer function of single port network.
2. Obtain two port network parameters and applications of graph theory to electric circuits.
3. Synthesize a network in terms of RL, RC and RLC parameters.

UNIT I

Fourier Series and Integral: Fourier series representation of periodic functions, Symmetry conditions, Exponential Fourier series, Discrete spectrum, Fourier integral and its properties, Continuous spectrum, Application to simple networks

UNIT II

Laplace Transform Method of Analysis of Networks: Definition of Laplace pair, Evaluation of Laplace transform of common time function, Laplace properties and theorems, Convolution theorem, Waveforms synthesis, Partial fraction method of inverse transforms, Application to networks, Transfer functions.

UNIT III

Two port network parameters: Open circuit impedance, Short circuit admittance, Transmission, Hybrid parameters & inter-relationships, Series, parallel and cascade connection of two port networks, System function, Impedance and admittance functions

UNIT IV

Topological Description of Networks: Graph, tree, chord, cut-set, incident matrix, circuit matrix and cut-set matrix, Formulation of node equations, loop equations, cut-set equations for RLC networks.

Network synthesis of driving point functions, Positive real function, properties of PR functions, Testing of PR functions,

UNIT V

Synthesis of LC, RC, RL functions, Properties of LC, RC and RL networks, Minimum functions, Synthesis of RLC networks, Brune's method, Properties of networks in terms of poles and zeros.

Suggested Reading:

1. Van Valkenburg M.E, *Network Analysis*, Prentice Hall of India, 3rd Edition, 2000.
2. William Hayt H, Kimmerly Jack E. and Steven Durbin M, *Engineering Circuit Analysis*, McGraw Hill, 6th Edition, 2002
3. Jagan N.C, Lakshrninarayana C., *Network Analysis*, B.S. Publications, 3rd Edition, 2014.
4. Chakravarthy A., *Circuit Theory*, Dhanpat Rai & Co., First Edition, 1999

PC402EE

ELECTRICAL MACHINES –II

Instructions	:	4 hours per week
Duration of SEE	:	3 Hours
SEE	:	70 Marks
CIE	:	30 Marks
Credits	:	4

Objectives:

1. To be able to understand in detail about transformers and induction machines. Construction, principle, performance characteristics and testing.
2. To understand the construction, principle and performance characteristics of fractional HP motors.

Course Outcomes:

The students will be able to

1) Acquire the knowledge of construction, principle of operation and testing of single phase transformers.
2) Impart the knowledge about three phase transformers, three phase to two phase transformation and their parallel operation.
3) Acquire the knowledge about the constructional details, equivalent circuit parameters and performance characteristics of three phase induction motors.
4) Acquire the knowledge about starting and speed control methods of three phase induction motors.
5) Impart the knowledge of constructional details, principle of operation and types of single phase induction motors.

UNIT-I

Single Phase Transformers : Constructional features of single phase transformers, principle of two winding transformer, ideal transformer - transformer on no load and on load - phasor diagrams- equivalent circuits, losses , Testing - Polarity test, OC and SC tests, Sumpner's test, Regulation and efficiency, All day efficiency, separation of losses - Excitation phenomena in transformers, Auto transformer - Comparison with two winding transformer and applications.

UNIT-II

Three - Phase Transformers: Connections - Choice of transformer connections – Third harmonic voltages - Phase conversion - 3-phase to 2-phase transformation, Scott connection - constructional features of poly phase transformers - Tertiary winding, Parallel operation of transformers, phase shifting transformer, Tap changer.

UNIT-III

Three - Phase Induction Motor: Constructional features - Rotating magnetic field theory, Principle of operation of Squirrel cage and Slip ring motors, Phasor diagram, Equivalent Circuit – expression for torque - starting torque - Max torque. Slip-torque characteristics, Equivalent circuit parameters from no-load and blocked rotor test, Circle diagram, Determination of performance characteristics of induction motor, Applications.

UNIT-IV

Starting & Speed Control Methods: Starting methods of 3-phase induction motor –Auto transformer, Star-delta Starter. Double cage machine, Speed control methods – Resistance control, Voltage Control, Pole changing, Cascading, Induction Generator - Principle of operation, Applications.

UNIT-V

Single Phase Motors: Double field revolving theory. Equivalent circuit of single phase induction Motor- Principle of operation, speed torque characteristics of a split phase and capacitor motors. Compensated and uncompensated series motor, Repulsion motor and universal motor - Applications.

Suggested Reading:

1. P.S.Bimbhra- Electrical Machinery, Khanna Publishers 2006
2. D.P. Kothari & I.J. Nagrath, Electrical Machines, Tata McGraw Hill, 4th Edition, 2010.
3. M.G.Say - The Performance and Design of AC. Machines Pitman Publication, 2002.
4. Irving L. Kosow - Electric Machinery and Transformers. PPH, Pearson Education 2nd Edition, 2009.

PC403EE

POWER SYSTEMS – II

Instructions	:	4 hours per week
Duration of SEE	:	3 Hours
SEE	:	70 Marks
CIE	:	30 Marks
Credits	:	4

Course Objectives:

1. The student able to learn and understand the performance analysis of transmission lines and cables.
2. To be able to comprehend analysis of symmetrical and unsymmetrical faults in the power system.

Course Outcomes:

The students will be able to

1) Acquire modeling of different short, medium and long transmission lines
2) To learn the use of per unit quantities and calculation of symmetrical faults on OH transmission lines
3) Understand the impact of different types of faults on overhead transmission lines and calculation of fault currents and their significance.
4) Explain the reasons for voltage variation, importance of maintaining constant voltage in power system and different voltage control methods.
5) Acquire the knowledge of natural impedance of transmission line and significance in the operation of power system network.

UNIT-I

Transmission Line Theory: Performance of short, medium, long lines - Line calculations - Tuned lines, Power circle diagram and their applications. Corona - Causes - Disruptive and Visual critical voltages - Power loss - Minimization of corona effects.

UNIT-II

Symmetrical Faults: Use of per unit quantities in power systems, advantages of per unit system. Symmetrical Three-phase Faults, Transients in RL series circuits - Short circuit currents - Reactance‘s of synchronous machines - Symmetrical fault calculations, Short circuit capacity of bus.

UNIT-III

Unsymmetrical Faults: Symmetrical components of unsymmetrical phasors - Power in terms of symmetrical components - Sequence impedance and sequence networks, Sequence networks of unloaded generators - Sequence impedances of circuit elements - Single line to ground, line to line and double line to ground faults on unloaded generator - Unsymmetrical faults of power systems, Open circuit faults.

UNIT-IV

Voltage Control: Phase modifiers, Induction Regulators -Tap changing Transformers, Series and Shunt Capacitors, Reactive Power requirement calculations, Static VAR compensators - Thyristor Controlled reactor, Thyristor switched capacitor.

UNIT-V

Travelling Wave Theory *:* Causes of over voltages - Travelling wave theory - Wave equation - Open circuited line - The short circuited line - Junction of lines of different natural impedances - Reflection and Refraction Coefficients - Junction of cable and over head lines - Junction of three lines of different natural impedances- Bewley Lattice diagram.

Suggested Readings:

1. CL Wadhwa - Electrical Power Systems, New Age International, 4th edition, 2006.
2. Grainger and Stevenson - Power System Analysis, Tata McGraw Hill, 4th edition, 2003.
3. Nagarath and Kothari - Modern Power System Analysis, Tata McGraw Hill, 4th edition- 2012.

PC404EE

POWER ELECTRONICS

Instructions	:	4 hours per week
Duration of SEE	:	3 Hours
SEE	:	70 Marks
CIE	:	30 Marks
Credits	:	4

Objectives

1. To be able to understand various power switching devices, characteristics and applications.
2. To learn and understand the various converters like rectifiers, choppers and inverters principle operation, characteristics and applications.

Course Outcomes:

The students will be able to

1) Understand the differences between signal level and power level devices.
2) Analyze controlled rectifier circuits.
3) Analyze the operation of DC-DC choppers.
4) Analyze the operation of voltage source single phase inverters.
5) Analyze the three phase inverters and ac voltage controllers

UNIT-I

Power switching devices: Diode, Thyristor, MOSFET, IGBT: static and dynamic Characteristics; Firing circuit for thyristor; Voltage and current commutation of a thyristor; Gate drive circuits for MOSFET and IGBT.

UNIT-II

Thyristor rectifiers: Single-phase half-wave, full-wave and semi controlled rectifiers with R-load and highly inductive load; Three-phase half wave, full wave and semi controlled bridge thyristor rectifier with R-load and highly inductive load; Input current wave shape and power factor.

UNIT-III

DC-DC Converters: Elementary chopper with an active switch and diode, concepts of duty ratio and average voltage, power circuit and operation of buck, boost and buck-boost converters in continuous conduction mode, duty ratio control of output voltage.

AC-AC Converter: Power circuit and operation of single phase AC Voltage Controller with R & RL Load. Basic concepts of Cycloconverter and Matrix converter.

UNIT-IV

Single-phase inverter: Power circuit and operation of single-phase voltage source inverter in square wave mode, sinusoidal pulse width modulation (Unipolar and bi-polar), relation between modulation index and output voltage. Calculation of performance parameters of inverter.

UNIT-V

Three-phase inverter: Power circuit and operation of three-phase voltage source inverter in 180^0 and 120^0 modes, Bi-polar sinusoidal pulse width modulation, relation between modulation index and output voltage. Elementary operation of CSI, Comparison of Voltage Source Inverter and Current source Inverter.

Suggested Reading:

1. M. H. Rashid, "*Power electronics: circuits, devices, and applications*", Pearson Education India, 2009.
2. N. Mohan and T. M. Undeland, "Power Electronics: Converters, Applications and Design", John Wiley & Sons, 2007.
3. R. W. Erickson and D. Maksimovic, "Fundamentals of Power Electronics", Springer Science & Business Media, 2007.
4. L. Umanand, "Power Electronics: Essentials and Applications", Wiley India, 2009.
5. Dr. P.S. Bhimbra, " Power Electronics", Khanna Publishers, 2009.

PC405EE

DIGITAL ELECTRONICS AND LOGIC DESIGN

Instructions	:	3 hours per week
Duration of SEE	:	3 Hours
SEE	:	70 Marks
CIE	:	30 Marks
Credits	:	3

Objectives :

1. To be able to understand the principles of digital systems and binary arithmetic circuits.
2. To study the properties and realization of various logic gates, A/D and D/A converters.
3.

Outcomes:

At the end of the course the students will be able to

1. differentiate the number system, convert and compare a number system to another number systems used in digital logic design.
2. understand Boolean algebra and its application to DeMorgan's theorems and karnaugh map reduction method.
3. analyze and design various digital combinational circuits

UNIT I

Boolean algebras and combinational logic, AND, OR and NOT operations. Laws of Boolean algebra, Minimization of Boolean expressions, Truth tables and maps. Sum of products and product of sums, Map method of reduction, Incompletely specified functions, Multiple output minimization.

UNIT II

Tabular minimization, Digital logic families and IC's, Characteristics of Digital IC's, Introduction to RTL, DTL, TTL, CMOS, ECL families, Details of TTL logic family, Totem pole, Open collector outputs, wired AND Operation, Comparison of performance, TTL sub-families, Multiplexer and dc-multiplexer, Encoder and decoder, Code converters, Implementation of combinational logic using standard logic gates and multiplexers.

UNIT III

Binary arithmetic and circuits, Half and Full adder, Subtractor and Magnitude comparator, Number complements, Two's complement arithmetic, Carry look ahead adder, Decimal numbers and their codes, BCD and Excess -3 arithmetic

UNIT IV

Synchronous Sequential Circuits: basic latch circuits, Debouncing switch, SR, JK, D and T flip-flops, Truth table and execution table, Ripple and Synchronous counters, Up/down counters, General BCD counter, Shift registers, ring counters

UNIT V

A/D and D/A Converters: Converter types — Tracking type, Flash type, Successive approximation type: R-2R ladder, Weighed register type, Switched current source type, Switched capacitor type

Suggested Reading:

1. Anand Kumar A., *Fundamentals of Digital Circuits*, Prentice Hall of India, 4th Edition, 2003.
2. Morriss Mano M., *Digital Design*, Prentice Hall of India, 3rd Edition, 2002.
3. Zvykohavi, *Switching & Finite Automata Theory*, Tata McGraw Hill, 2nd Edition, 1991

PC451EE

ELECTRICAL CIRCUITS LABORATORY

Instructions	:	2 hours per week
Duration of SEE	:	2 Hours
SEE	:	50 Marks
CIE	:	25 Marks
Credits	:	01

Objectives :

1. To Train the Students for acquiring practical knowledge in time response and frequency response of series / parallel RC, RL and RLC Circuits.
2. To prepare the students for finds out parameters of a given two port network.
3. To make the students for understanding the verification of theorems.

Outcomes:

At the end of the course the student will be able to.

1. Evaluate the time response and frequency response character sties of R,L,C Series and parallel circuits.
2. Able to validate the network theorems.
3. Able to find various parameters of a two-port network.
4. Able to simulate electrical circuits using spice.
5. Able to synthesize networks from a given transfer function

List of Experiments:

1. Charging and Discharging Characteristics of RC and RL series circuits.
2. Locus diagrams of RC and RL Circuits.
3. Frequencies Response of a Series RLC Circuits.
4. Frequencies Response of a Parallel RLC Circuits.
5. Parameters of two port network.
6. Series, parallel and cascade connection of two port networks.
7. Verification of Theorems.
   (a) Thevenin's theorem
   (b) Norton's theorem
   (c) Superposition theorem
   (d) Maximum power transfer theorem
8. Two Wattmeter method.
9. Transients in RLC circuits.
10. Network Synthesis.
11. Characteristics of Linear, Non-Linear and Bilinear Elements.

PC452EE

ELECTRICAL MACHINES LABORATORY – I

Instructions	:	2 hours per week
Duration of SEE	:	3 Hours
SEE	:	50 Marks
CIE	:	25 Marks
Credits	:	01

Objectives:

1. To learn operation and performance characteristics of d.c machines by conducting various experiments and tests practically.
2. To understand the operation and performance characteristics of transformers by conducting various experiments and tests.

Course Outcomes:

The students will be able to:

1) Estimate the efficiency and voltage regulation of D.C. generator and transformers under various loading conditions.
2) Acquire the knowledge of efficiency and speed regulation D.C. Motors under various loading conditions.
3) Able to understand the speed control of DC motor by conducting different experiments

LIST OF EXPERIMENTS

1. Magnetization characteristics of a separately excited D.C. generator.
2. Determination of the load characteristics of shunt and compound generators.
3. Determination of the performance and mechanical characteristics of series, shunt and compound motors.
4. Separation of iron and friction losses and estimation of parameters in D.C. machine.
5. Speed control of D.C. Shunt motor using shunt field control and armature control methods.
6. Separation of core losses in a single phase transformer.
7. Open circuit and short circuit and load test on a single phase transformer.
8. Sumpner's test on two identical transformers.
9. Three phase Transformer connections.
10. Three phase to two phase transformation and open delta connection.
11. Retardation test.
12. Hopkinson's test.
13. Swinburne's test.

Note: At least ten experiments should be conducted in the Semester.

Suggested Reading:

1. P.S.Bimbhra- Electrical Machinery, Khanna Publishers 2006
2. D.P. Kothari & I.J. Nagrath, Electrical Machines, Tata McGraw Hill, 4th Edition, 2010.
3. M.G.Say - The Performance and Design of AC. Machines Pitman Publication, 2002.
4. Irving L. Kosow - Electric Machinery and Transformers. PPH, Pearson Education, 2nd Edition, 2009.

PC453EE

DIGITAL ELECTRONICS AND LOGIC DESIGN LABORATORY

Instructions	:	2 hours per week
Duration of SEE	:	3 Hours
SEE	:	50 Marks
CIE	:	25 Marks
Credits	:	01

Objectives

1. To gain the knowledge by conducting experiments on Op-amps, oscillators and timing circuits.
2. To study the properties and realization of the various logic gates.

Course Outcomes:

At the end of the course the students will be able to

1. Differentiate the number system, convert and compare a number system to another number systems used in digital logic design.
2. Understand the applications of 555 timer.
3. Analyze and design various filters, Clippers and Clampers using Op-Amps

LIST OF EXPERIMENTS

1. Combinational logic function realization.
2. Realization of 4 bit binary adder / subtracter.
3. Construction of Decimal to Binary encoder, BCD to Binary, Binary to BCD, BCD 10 Excess- 3.
4. Serial/parallel input shift registers.
5. 4-bit binary up-down counter.
6. 555 timer applications.
7. Op-Amp applications - Integrator, Adder, summer.
8. Active filters - Low pass filter & High pass filter
9. Clippers and Clampers using Op-Amps.
10. Study of 723 linear voltage regulator and fixed voltage regulator.
11. Generation of triangular and square wave using Op-Amp.
12. Schmitt trigger circuit.

Note: At least ten experiments should be conducted in the semester.