
BASIC CIRCUIT THEORY

UNIT- 1: (12Hrs)

SINUSOIDAL ALTERNATING WAVEFORMS:

Definition of current and voltage. The sine wave, general format of sine wave for voltage or current, phase relations, average value, effective (R.M.S) values. Differences between A.C and D.C. **Basic elements and phasors:** Basic Response of R, L & C elements, frequency response of basic elements. **(problems)**

UNIT-II: (12hrs)

PASSIVE NETWORKS: (D.C)

Kirchhoff's current and Voltage Law's ,Resistor, Capacitor, and Inductor, series and parallel networks.R-L and R-L-C Circuits with DC inputs. Branch current method, Mesh Analysis, Nodal Analysis, star to delta & delta to star conversions.

UNIT-III: (14hrs)

NETWORKS THEOREMS: (D.C)

Superposition Theorem, Thevenin's Theorem, Norton's Theorem, Maximum Power, Milliman and Reciprocity theorems **(problems).**

UNIT-IV: (12hrs)

RC AND RL CIRCUITS:

Transient response of RL and RL circuits with step input, Time constants, Frequency response of RC and RL circuits, their action as low pass, high pass and Band pass filters. Passive differentiating and integrating circuits. (problems)

UNIT-V: (10hrs)

SERIES AND PARALLEL RESONANCE CIRCUITS:

Series resonance and parallel resonance circuits, Q - Factor, Selectivity and band width, Comparison of series and parallel resonance, Tank circuit-LC oscillations.

TEXT BOOKS:

1. Introductory circuit Analysis (UBS Publications) ---- **Robert L. Boylestad.**
2. Electronic Devices and Circuit Theory --- **Robert L. Boylestad & Louis Nashelsky.**
3. Circuit Analysis by **P.Gnanasivam- Pearson Education**

REFERENCE BOOKS:

1. Engineering Circuit Analysis **By: Hayt & Kemmerly - MG.**
2. Networks and Systems – **D.Roy Chowdary.**
3. Unified Electronics (Circuit Analysis and Electronic Devices) **by Agarwal-Arora**
4. Electric Circuit Analysis- **S.R. Paranjothi- New Age International.**

ELECTRONICS LAB-1

(CIRCUIT LAB)

Demonstration of C.R.O: Demonstration using CRO Kit - Block diagram concepts etc., in lab session (Using slides.)

(Assignments are to be given-Marks shall be allotted to this work as internal part.)

LAB LIST:

1. Measurements of D.C & A.C voltage, frequency using CRO
2. Verification of Kirchhoff's laws
3. Thevenin's Theorem-verification
4. Norton's Theorem-verification
5. Maximum Power Transfer Theorem-verification
6. RC circuit-Frequency response (low and High pass)
7. RL circuit-Frequency response (low and High pass)
8. LCR series resonance circuits-Frequency response-Determination of Q and Band Width.
9. LCR parallel resonance circuits-Frequency response-Determination of Q and Band width

Lab experiments are to be done on breadboard and simulation software (using multisim) and output values are to be compared and justified for variation.

B.Sc. Electronics Syllabus under CBCS

w.e.f. 2015-16 (revised in April 2016)

Semester-2

PAPER – 2

Electronic Devices and Circuits

UNIT 1: (12Hrs)

PN JUNCTION DIODES:

P-N junction Diode, Depletion region, Barrier Potential, Working in Forward and Reverse bias condition – Junction capacitance, Diode current equation– Effect of temperature on reverse saturation current – construction, working, V-I characteristics and simple applications of varactor diode, Zener diode and Tunnel diode.

UNIT –II:(12hrs)

BIPOLAR JUNCTION TRANSISTOR AND ITS BIASING: (D.C)

Introduction, Transistor Construction, Operation, and characteristics of CB, CE, and CC – Configurations. Complete hybrid equivalent model, Transistor as a switch
BJT Biasing: Fixed-Bias Circuit, Emitter-Stabilized Bias Circuit, Voltage-Divider Bias, Bias Stabilization.

UNIT-III:(16hrs)

FIELD EFFECT TRANSISTORS , UJT & SCR:

Introduction, Construction, Operation and Characteristics of FET/JFET, Drain and Transfer characteristics, Depletion-type, and Enhancement-Type MOSFETs.

FET Biasing: Fixed-Bias Configuration, Self-Bias Configuration, Voltage-Divider Biasing, UJT construction-working, V-I characteristics, UJT as a Relaxation oscillator.

Silicon Controlled Rectifier (SCR):

Structure and working of SCR. Two transistor representation, Characteristics of SCR. Experimental set up to study the SCR characteristics, Application of SCR for power control.

UNIT IV: (08hrs)

PHOTO ELECTRIC DEVICES:

Light-Emitting Diodes (LEDs), IR Emitters, Photo diode, Photo transistors, Structure and operation of LDR, and Opto-Isolators.

UNIT-V:(12hrs)

POWER SUPPLIES:

Rectifiers::Half wave ,full wave and bridge rectifiers-Efficiency-ripple factor-Regulation, Types of filter-choke input(inductor) filter,shunt,L-section& π -section filters.Three terminal fixed voltage I.C.regulators(78XX and &79XX)-Principle and working of SMPS(switch mode power supplies)

TEXT BOOKS:

1. Electronic Devices and Circuit Theory --- **Robert L. Boylestad & Louis Nashelsky.**
2. Electronic Devices and Circuits I – **T.L.Floyd- PHI Fifth Edition**

REFERENCE BOOKS:

1. Integrated Electronics – **Millmam & Halkias.**
2. Electronic Devices & Circuits – **Bogart.**
3. Sedha R.S., A Text Book Of Applied Electronics, S.Chand & Company Ltd

ELECTRONICS LAB-2

(ELECTRONIC DEVICES AND CIRCUITS LAB)

LAB LIST:

1. V-I Characteristics of junction diode
2. V-I Characteristics of zener diode
3. Regulated power supply using zener diode
4. BJT input and output characteristics
5. FET input and output characteristics
6. UJT characteristics
7. LDR characteristics
8. IC regulated power supply(IC-7805)
9. V-I characteristics of SCR.

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multisim) and output values are to be compared and justified for variation.

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SEMESTER – III

PAPER – 3

Digital Electronics

Unit – I (9hrs)

NUMBER SYSTEM AND CODES: Decimal, Binary, Hexadecimal, Octal, BCD, Conversions, Complements (1's, 2's, 9's and 10's), Addition, Subtraction, Gray, Excess-3 Code conversion from one to another.

Unit- II (12hrs)

BOOLEAN ALGEBRA AND THEOREMS: Boolean Theorems, De-Morgan's laws. Digital logic gates, Multi level NAND & NOR gates. Standard representation of logic functions (SOP and POS), Minimization Techniques (Karnaugh Map Method: 4,5 variables), don't care condition.

Unit-III (15hrs)

COMBINATIONAL DIGITAL CIRCUITS:

Adders-Half & full adder, Subtractor-Half and full subtractors, Parallel binary adder, Magnitude Comparator, Multiplexers (2:1,4:1) and Demultiplexers (1:2,4:1), Encoder (8-line-to-3-line) and Decoder (3-line-to-8-line). IC-LOGIC FAMILIES: TTL logic, DTL logic, RTL Logic, CMOS Logic families (NAND&NOR Gates), Bi-CMOS inverter

UNIT-IV (14hrs)

SEQUENTIAL DIGITAL CIRCUITS:

Flip Flops: S-R FF, J-K FF, T and D type FFs, Master-Slave FFs, Excitation tables, Registers:-shift left register, shift right register, Counters - Asynchronous-Mod16, Mod-10, Mod-8, Down counter, Synchronous-4-bit & Ring counter.

UNIT-V (10hrs)

MEMORY DEVICES:

General Memory Operations, ROM, RAM (Static and Dynamic), PROM, EPROM, EEPROM, EAROM, PLA(Programmable logic Array), PAL(Programmable Array Logic)

TEXT BOOKS:

1. M.Morris Mano, “ Digital Design “ 3rd Edition, PHI, New Delhi.
2. Ronald J. Tocci. “Digital Systems-Principles and Applications” 6/e. PHI. New Delhi. 1999.(UNITS I to IV)
3. G.K.Kharate-Digital electronics-oxford university press
4. S.Salivahana&S.Arivazhagan-Digital circuits and design
5. Fundamentals of Digital Circuits by Anand Kumar

Reference Books :

1. Herbert Taub and Donald Schilling. “Digital Integrated Electronics” . McGraw Hill. 1985.
2. S.K. Bose. “Digital Systems”. 2/e. New Age International. 1992.
3. D.K. Anvekar and B.S. Sonade. “Electronic Data Converters : Fundamentals & Applications”. TMH. 1994.
4. *Malvino and Leach. “ Digital Principles and Applications”. TMG Hill Edition.*

ELECTRONICS LAB-3**(DIGITAL ELECTRONICS LAB)****LAB LIST:**

1. Verification of IC-logic gates
2. Realization of basic gates using discrete components (resistor, diodes & transistor)
3. Realization of basic gates using Universal gates (NAND & NOR gates)
4. Verify Half adder and full adder using gates
5. Verify Half subtractor and full subtractor using gates.
6. Verify the truth table of RS , JK, T-F/F using NAND gates
7. 4-bit binary parallel adder and subtractor using IC 7483
8. BCD to Seven Segment Decoder using IC -7447/7448

Lab experiments are to be done on breadboard and simulation software (using multisim) and output values are to be compared and justified for variation.

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SEMESTER – IV

PAPER – 4

Analog and Digital ic-applications

Unit – I (10hrs)

OPERATIONAL AMPLIFIERS: Definition, Basic op-amp Ideal op-amp, Block diagram of op-amp, inverting, noninverting, virtualground, Adders, subtractors, summing amplifier, voltage follower, op-amp parameters, voltage to current convertor, integrator, differentiator, differential amplifier, Logarithmic amplifier.

Unit- II (15 hrs)

OP-AMP CIRCUITS: voltage regulator, comparator, zerocross detecting circuit, instrumentational amplifier, multivibrators-astable, monostable, Bi-stable, Schmitt trigger. sine wave generator, square wave generator, triangular wave generator, Active filters(Basics)-low pass, high pass, band pass filters

IC-555 –functional block diagram and mention it's applications

Unit-III (15hrs):

COMBINATIONAL & SEQUENTIAL LOGIC CIRCUITS (IC-Applications):

Design of Code convertor: BCD to Seven Segment, BCD to Grey, Grey to Binary.

Design of Counters using State Machine: Mod N counter, Preset Table, Binary Up/Down Counter. Design of Universal Shift Register

UNIT-IV (10hrs)

DATA CONVERTERS:

A/D converter:- Successive Approximation ADC, -Single slope and dual slope converter, Sigma-delta ADC, D/A converter: R-2R Ladder network, Binary Weighted .

UNIT-V (10hrs)

DIGITAL SYSTEM INTERFACING AND APPLICATIONS: interfacing of LED's

Applications of Counters: Digital Clock

Applications of Shift Registers: Parallel to Serial, Serial to Parallel, UART

TEXT BOOKS:

6. G.K.Kharate-Digital electronics-oxford university press
7. M.Morris Mano, “ Digital Design “ 3rd Edition, PHI, New Delhi.
8. Op Amp and Linear Integrated Circuits By Ramakant Gaykwad
9. Linear Integrated Circuits By Roy Choudary

Reference Books :

5. Jacob Millan ,Micro Electronics,McGraw Hill.
6. Mithal G K, Electronic Devices and Circuits Thana Publishers.
7. Allan Motter shead ,Electronic Devices and Circuits – An Introduction- Prentice Hall

Electronics Lab - 4**(Analog and digital ic-applications)****LAB LIST:**

1. Op-Amp as inverting and non-inverting
2. Op-Amp as integrator and differentiator
3. Op-Amp as adder & subtractor
4. Op-Amp as voltage to current converter
5. Op-Amp as sine wave generator (Wien bridge oscillator)
6. Op-Amp as sine wave generator
7. Astable multivibrator determination of frequency (using IC-555)
8. Schmitt trigger using IC-555 timer

Lab experiments are to be done on breadboard and simulation software (using multisim) and output values are to be compared and justified for variation.
