

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.

MODEL PAPER
B.Sc (Three year) degree Examinations.
SEMESTER-1 ELECTRONICS
PAPER-1 : BASIC CIRCUIT THEORY

Time: 3Hrs

Max. Marks:75

PART – A

Answer any **FIVE** questions

5X5= 25 Marks

1. Define sine wave. Explain the sine wave for voltage and current.
2. Explain Node-voltage method for analyzing an electrical network.
3. State and prove Maximum power transfer theorem.
4. State and prove superposition theorem.
5. Discuss passive integrating and differentiating circuits.
6. Distinguish between series & parallel resonance circuits.
7. Explain transient response of RL circuit with time constant and step input
8. What is meant by Q- factor of a resonance circuit ? Write its importance.

PART – B

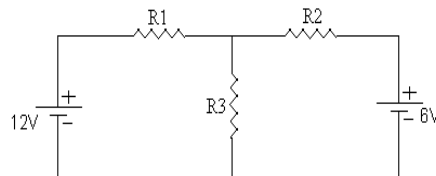
Answer **ALL** Questions

5X10=50 Marks

9. (A) Define and derive the relation for Average and RMS value of an ac voltage source.

or

- (B) Explain loop current method. Determine the currents I_1, I_2 and I_3 for the Network shown below. [$R_1=8\Omega$, $R_2=6\Omega$, $R_3=2\Omega$]

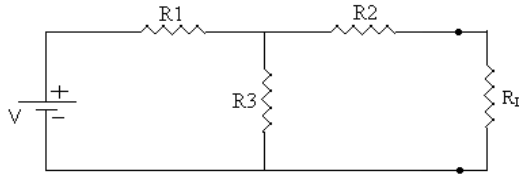


10. (A) State and prove Maximum power transfer theorem and Nortons theorem.

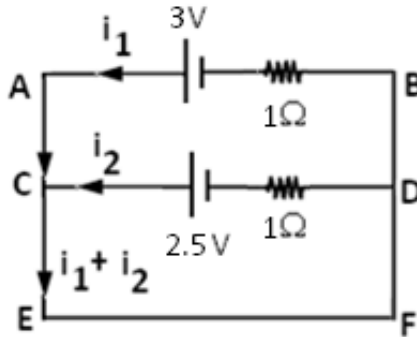
or

- (B) State and prove Thevenin's theorem and Draw Thevenin's equivalent circuit to find the load current for the network shown below.

[$V= 6\text{Volts}$, $R_1= 2 \Omega$, $R_2=2 \Omega$, $R_3= 4\Omega$, $R_L= 4\Omega$]



11. (A) Discuss the frequency response of C-R circuit as Low pass filter & High pass filter
or
(B) Explain the Transient Response of RC circuits with step input and time constant.
12. (A) Define resonance and Q factor of a LCR series circuit. Obtain the resonance Frequency of a Series LCR circuit.
or
(B) Derive the resonant frequency of LCR parallel circuit and find the relation between bandwidth and resonance frequency.
13. (A). State and explain Kirchoff's law. In the given circuit find current flowing from each cell and in the 2 ohm resistor.



(or)

- (B). Explain the frequency response of a circuit containing inductance only.

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 – **Millman & 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.

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

MODEL PAPER
B.Sc (Three year) Degree Examinations.
SEMISTER-II ELECTRONICS
Paper-II ELECTRONIC DEVICES AND CIRCUITS

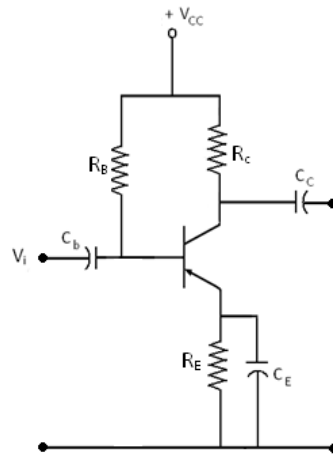
Time: 3 Hrs
MaxMarks:75

PART-A

Answer any FIVE Questions

5x5 = 25 Marks.

1. Explain Zener and Avalanche break down.
2. Explain Junction capacitance of a P-N Junction diode.
3. Define Hybrid parameters of a Transistor.
4. Find the operating point for the bias circuit shown in the fig. provided $V_{CC} = 9V$,
 $R_B = 50K\Omega$, $R_C = 250\Omega$, $R_E = 500\Omega$ and $\alpha = 80$.



5. What are the advantages of FET over BJT.
6. Write short notes on photo diode.
7. Draw the circuit diagram of π - section filter and discuss its working.
8. Explain three terminal fixed IC voltage regulator(78XX).

PART-B

Answer ALL Questions

10X5 =50marks.

- 9(a) . Explain forward and reverse bias effects in the V-I Curves of a P-N Junction diode.

(or)

(b) Describe the construction and working of a Tunnel diode. Draw its V-I Characteristics and explain.

10(a). Draw the input and Output Characteristics of a CE mode of a Transistor . Define Cut-off , Active and saturation region in the characteristics.

(or)

(b). Describe about fixed bias and voltage divider bias of a Transistor . Give their merits and demerits.

11(a). Explain the Construction , working of JFET.

(or)

(b). What is a UJT ? Describe the Volt-Ampere Characteristics of a UJT.

12(a). Explain operation of photoconductive cell and discuss its spectral response.

(or)

(b). Explain Construction and working of LED and write its merits and uses.

13(a). A full wave rectifier uses a centre tapped Transformer . The a.c. Voltage from its centre tap to either end is $10 \sin 314t$. The load resistance of the circuit is 40Ω and Diode resistance 10Ω . Find I_{dc} , I_{rms} , ripple factor and rectifier efficiency.

(or)

(b). Explain the Principle and working of switch mode power supply (SMPS) with the help of block diagram.