QUESTION BANK

SUBJECT CODE & NAME : EE1153 – BASIC ELECTRICAL & ELECTRONICS ENGINEERING

YEAR / SEM : I / II

UNIT – I

ELECTRIC CIRCUITS AND MEASUREMENTS

PART – A (2 MARKS)

1. State Ohm's law and its limitations.
2. State Kirchhoff's voltage and current law.
3. Derive the equation for equivalent resistance of number of resistors connected in parallel.
4. What is meant by electric energy?
5. Distinguish between power and energy.
6. What are lumped circuits?
7. What is meant by electric power? Give different forms of expression for electric power.
8. Draw power triangle.
9. Define time period and frequency of an alternating quantity.
10. Explain the terms (a) instantaneous value and (b) average value for an ac signal.
11. Draw sinusoidal, saw tooth and half- rectified sinusoidal waveforms.
12. Define form factor and peak factor.
13. Define time period and frequency.
14. Define RMS value

15. Define power factor and power in A.C circuit.
16. Give the advantages of phase system.
17. Distinguish between power and true power.
18. Distinguish between apparent power and true power.
19. Mention the 2 types of wattmeter.
20. Mention the 2 types of Moving iron instruments.
21. Why cannot a moving coil instrument be used in AC circuits?
22. State the principle of moving iron instrument.
23. Name the coils in the wattmeter.
24. What are the advantages and disadvantages of MI instruments?
25. List out the measuring instruments you know.
26. How an ammeter and voltmeter are connected in a circuit? Why?

PART – B

1. (i) Derive an expression for RMs value of an A.C supply.(8)
   (ii) A coil of resistance 100Ω and inductive reactance 200 Ω is connected across a supply voltage of 230V. Find the supply current.(8)
2. (i) Explain the working principle of moving iron instruments.(12)
   (ii) Why the PMMC instruments are not used for A.C. measurements.(4)
3. What is the three phase circuit? The load in each branch of star connected three phase circuit consist of 10 Ω resistance and 0.06 H inductance in series. The line voltage is 430V. Calculate the phase voltage and the phase current.(8)
4. (i) Explain the working of a Dynamometer type watt meter with neat diagram. (12)
   (ii) Why the PMMC instruments are not used for A.C. measurements.(4)

5. A circuit is composed of a resistance 6 Ω and a series capacitive reactance of 8 Ω. A voltage e(t)=141 sin 314t is supplied to the circuit. Find (i) Complex impedance, (ii) Effective value of current, (iii) Power delivered to the circuit, (iv) Capacitance of the capacitor.
6. A series RLC circuit is connected to a 230V, 50hz, 1-phase AC supply. The value of R=5Ω, L=13mH and C=140μF. Find total reactance, impedance, current drawn by the circuit and p.f of the circuit.
7. A resistance of 20 Ω and an inductance of 0.2H and a capacitance of 100 μF are connected in series across 220V,50 Hz main. Determine (i) Impedance (ii) current taken from mains, (iii) Power and power factor of the circuit.
8. A coil of resistance 10 Ω and inductance 0.1 H is connected in series with a 150 μF capacitor across 200V,50 Hz supply. Calculate (i) Inductive reactance, Capacitance reactance, impedance, current and power factor. (ii) The voltage across the coil and capacitor respectively.
9. A series circuit having pure resistance of 40 Ω, pure inductance of 50mH and a capacitor is connected across a 400V, 50 Hz ac supply. This LC circuit draws a current of 10A. Calculate 1) Power factor of the circuit, 2) Capacitor value.
10. Three 100 Ω resistors are connected first in star and then in delta across 415 V, 3-phase supply. Calculate the line and phase currents in each case and also the power taken from the source.
11. Explain the working principle of induction type energy meter.(12)
12. Explain the construction and working principle of Dynamometer types wattmeter's.(12)
13. (i) Explain the construction and working principle of moving coil instruments.

(ii)State and explain Kirchoff's law. (8)

14.(ii)Explain the working of a Dynamometer wattmeter with a neat sketch. (8)

15. Define the following (16)

(i) RMS Value
(ii) Average Value
(iii) Instantaneous Value
(iv) Real power
(v) Apparent power
(vi) Reactive power
(vii) Frequency
(viii) Balanced three phase circuit

16. Name the instrument used for measuring the electrical power consumed during a specific period. Discuss its principle of operation with suitable diagram. (16)

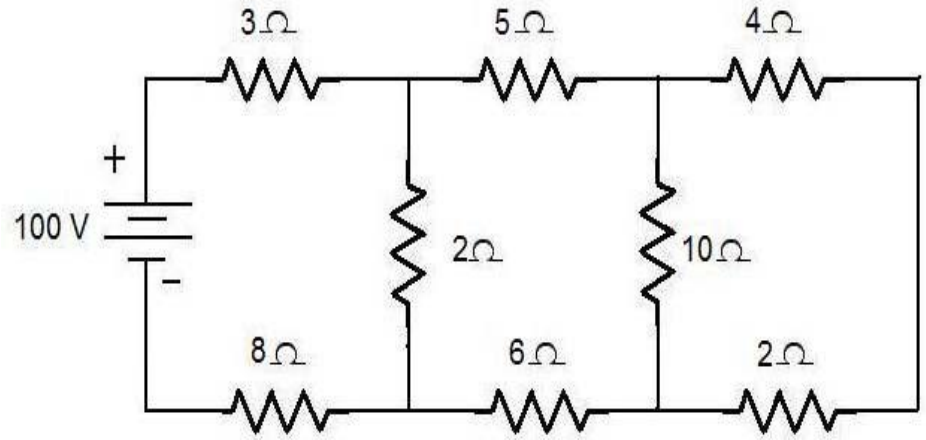
17.(i) A series circuit has R=10Ω, L=50mH, and C=100μF and is supplied with 200V, 50Hz. Find (i) Impedance (ii) current (iii) power (iv) power factor (v) voltage drop across the each element. (8)

(ii)Derive the equation for equivalent resistance of number of resistors connected in parallel. (8)

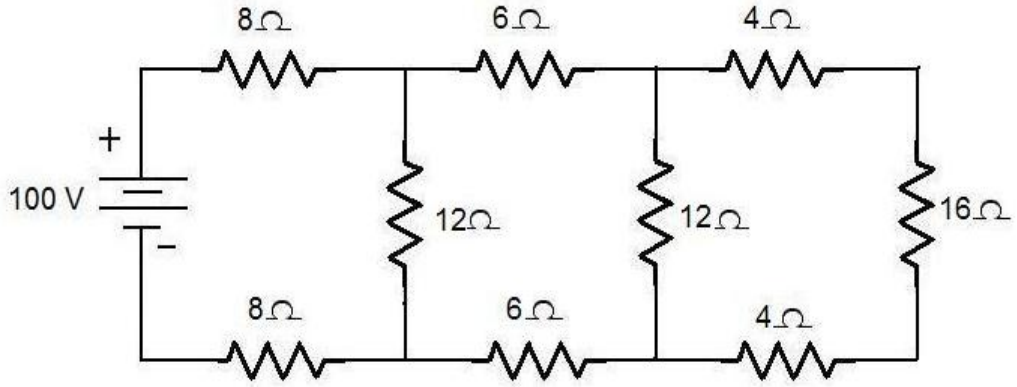
18. Illustrate with a neat diagram, the construction and operation of a permanent magnet moving coil. How could it be modified for use as (i) ammeter (ii) voltmeter (16)

19. A 400V is applied to three star connected identical impedances each consisting of a 40 Ω resistance in series with 3 Ω inductance reactance. Find (i) line current (ii) Total power supplied.

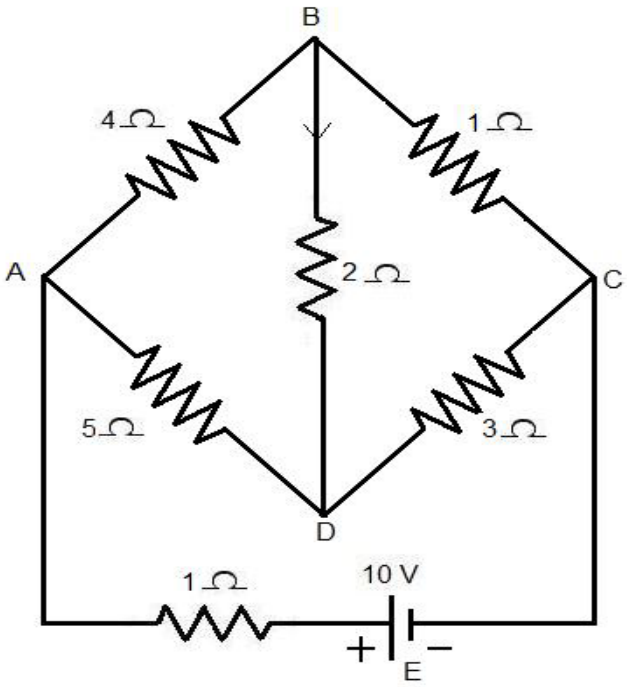
20. Find the current through each branch by network reduction technique. (16)



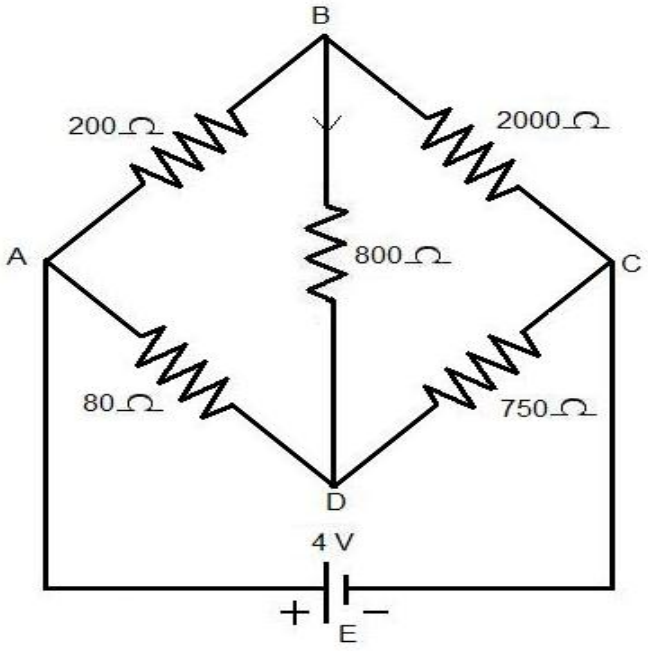
21. Calculate a) the equivalent resistances across the terminals of the supply, b) total current supplied by the source and c) power delivered to 16 ohm resistor in the circuit shown in figure. (16)



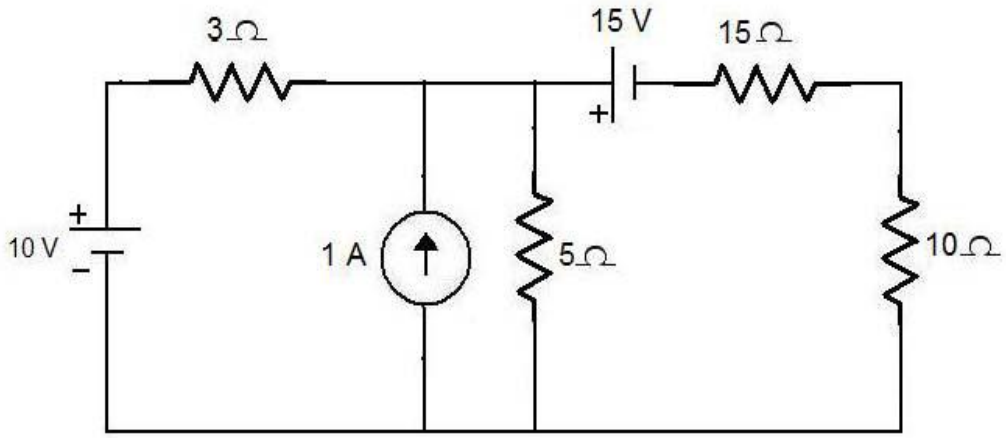
22. In the circuit shown, determine the current through the 2 ohm resistor and the total current delivered by the battery. Use Kirchhoff's laws. (16)



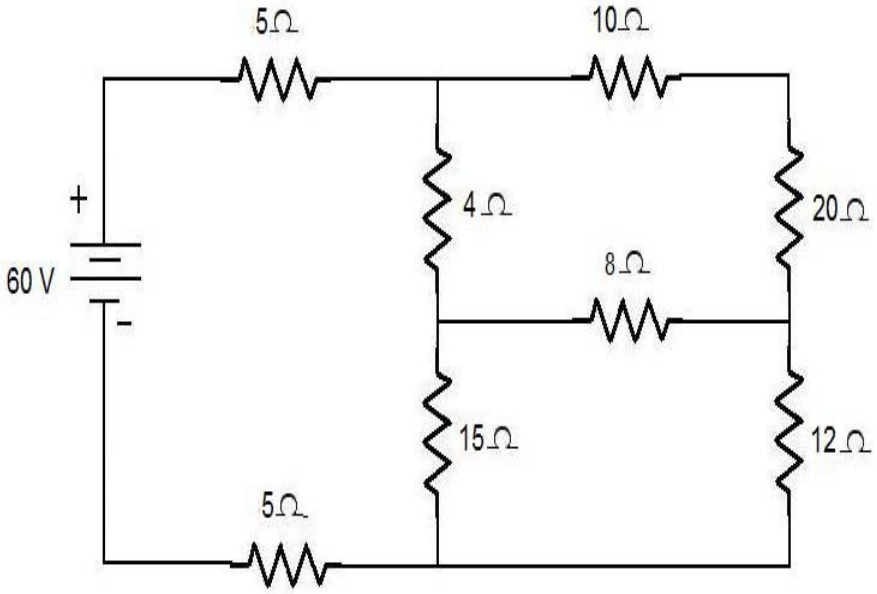
23. (i) Determine the current through 800 ohm resistor in the network shown in figure. (8)



(ii) Find the power dissipated in 10 ohm resistor for the circuit shown in figure. (8)

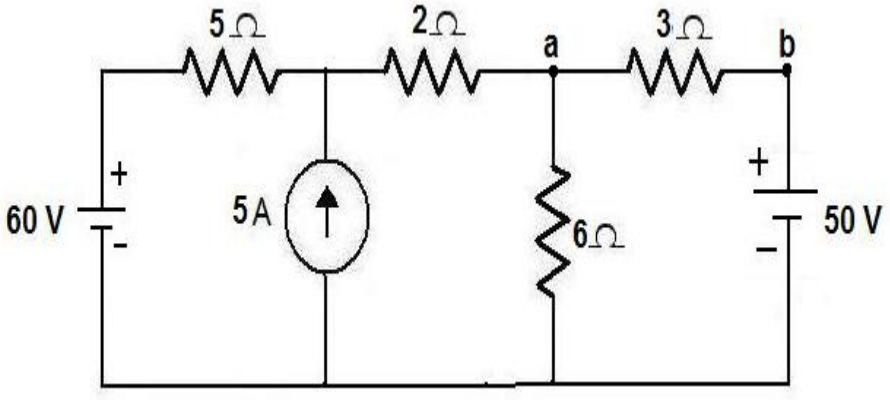


24. (i) In the network shown below, find the current delivered by the battery. (10)

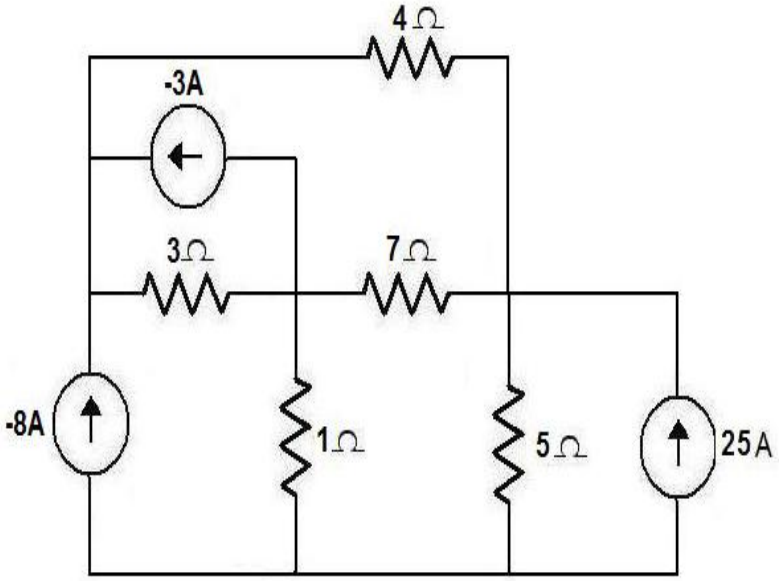


(ii) Discuss about voltage and current division principles. (6)

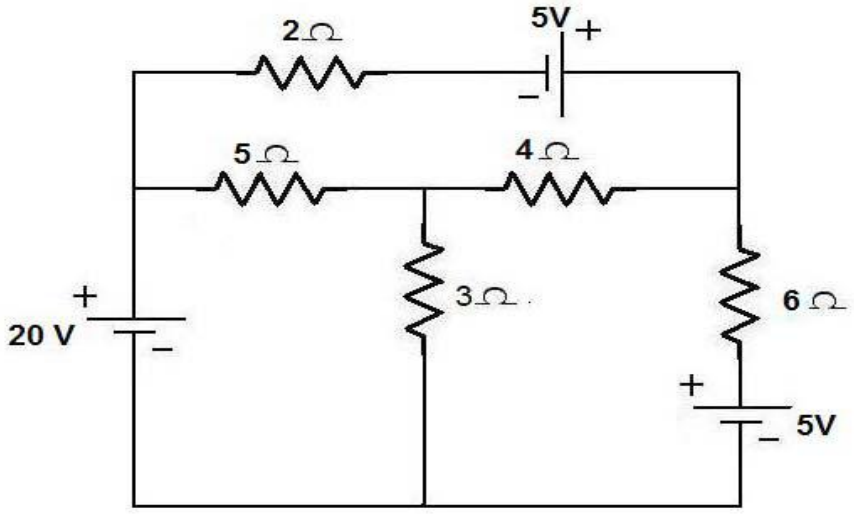
25. Find the current through branch a-b using mesh analysis shown in figure below. (8)



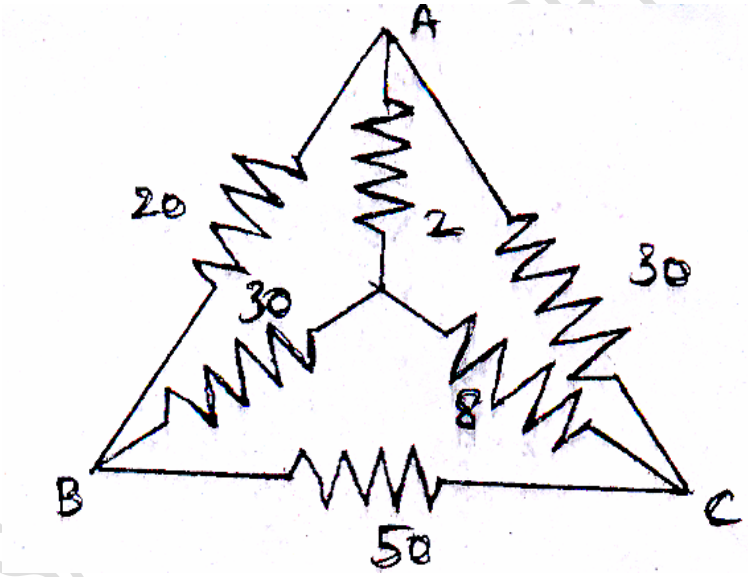
26. Find the nodal voltages in the circuit of figure. (16)



27. Using Mesh analysis, find current through 4 ohm resistor. (16)



28.Find the resistance between A & B , A & C



UNIT – II

ELECTRICAL MACHINES

PART – A (2 MARKS)

1. What is the basic principle of a dc generator?
2. What are the basic parts of a dc generator?
3. What is the purpose of yoke in a dc machine?
4. Mention the 2 types of armature winding in a dc machine.
5. What is the function of commutator in a dc generator?
6. Write down the emf equation of a dc generator.
7. What are the different types of dc generators?
8. Draw the circuit diagram of any two types of DC generators.
9. What is the material used for armature core, field winding, commutator and brushes?
10. List out the different types of DC motor.
11. Why is a shunt motor called constant speed drive?
12. Define the term "speed regulation" of a DC motor.
13. Write down the torque equation of a DC motor.
14. Give the significance of back emf in a dc motor.
15. Define transformation ratio.
16. Define voltage regulation of a transformer.
17. A transformer with 40 turns on the high voltage winding is to be used to step down the voltage from 240V to 120V. Find the number of turns in the low voltage in the low voltage winding.
18. What are the types of transformers based on construction?
19. What are the different types of single phase induction motor?

20. What are the applications and characteristics of capacitor-start capacitor run motor?
21. What are the classifications of single phase induction motor based on the method of starting?
22. Draw the circuit diagram of any one type of 1-phase induction motor.
23. Name the motors used in ceiling fan and in lathes.
24. Which type of single phase induction motor is to be selected for driving fans and blowers and why?

PART – B

1. Explain the principle of operation of a DC generator and derive the emf equation. Discuss in detail about the construction of DC generator with the neat sketch. (16)
2. Derive the equation for induced emf of a DC machine. (16)
3. Give the significance of back emf in a DC motor. (16)
4. Derive the torque equation of DC motor. (16)
5. Describe the construction details of transformer and also explain the principle of operation. (16)
6. Explain the principle of operation of single phase 2-winding transformer. (16)
7. Derive the emf equation of a transformer. (16)
8. Explain the principle of operation of single phase induction motor. (16)
9. Explain double field revolving theory. (16)
10. What are the classifications of single phase induction motor based on the method of starting? (16)
11. A transformer with 40 turns on the high voltage winding is used to step down the voltage from 240V to 120V. Find the number of turns in the low

voltage winding. (16)

12. A 4 pole, wave wound generator having 40 slots and 10 conductors placed per slot. The flux per pole is 0.02 wb. Calculate the generated emf when the generator is drive at 1200 rpm. (16)
13. A 25kw, 250V, dc shunt generator has armature and field resistances of 0.06ohm and 100ohm respectively. Determine the total armature power developed when working (1) as a generator delivering 25 kw output and (2) as a motor taking 25kw. (16)
14. A 4-pole dc motor has a wav e –wound armature with 594 conductors. The armature current is 40A and flux per pole is 7.5mwb. Calculate the torque developed by the motor.
15. A single phase transformer has 50 primary and 1000 secondary turns. Net cross sectional area of the core is 500 cm2. If the primary winding is connected to 50 Hz supply at 400 V, Calculate the value of maximum flux density on core and the emf induced in the secondary.
16. A transformer supplied a load of 32A at 415V. If the primary voltage is 3320V,find the following:
    1. Secondary volt ampere
    2. Primary current
    3. Primary volt ampere. Neglect losses and magnetizing current.

UNIT – III

SEMICONDUCTOR DEVICES AND APPLICATIONS

PART – A (2 MARKS)

1. Define electron volt.
2. Define (a) intrinsic semiconductor and (b) extrinsic semiconductor.
3. What is meant by doping in a semiconductor?
4. What are majority and minority carriers in a semiconductor?
5. What are the types of solids based on energy band theory? Give examples for each.
6. Give the energy band description of conductors, semiconductors and insulators.
7. Draw the energy band diagram for an insulating material.
8. What is a zener diode?
9. Define break down voltage in zener diode.
10. How does a PN junction behave under forward and reverse biased condition?
11. Differentiate Avalanche breakdown and zener breakdown.
12. What do you mean by ripple factor?
13. Define peak inverse voltage.
14. What is the peak inverse voltage of centre tapped full wave rectifier?
15. What are the advantages and disadvantages of full wave rectifier?
16. Draw the symbol of npn and pnp transistor.
17. Compare the three transistor configuration with regard to input and output resistance,current and voltage gain.
18. Calculate IE in a transistor for which $\beta=50$ and $I_B=20\mu A$.
19. Why transistor is called current controlled device?
20. What are the different configurations of BJT?

PART – B

1. Explain intrinsic and extrinsic semiconductors with neat diagrams. (16)
2. Describe the working of a PN junction diode with neat diagrams. Also explain its V-I characteristics. (16)
3. Explain how a PN junction is formed and state its properties under no bias, forward bias and reverse bias condition. (16)
4. What is a Zener diode? Explain the operation of Zener diode and draw its characteristics. (16)
5. Explain the operation of halfwave rectifier with neat sketch. (16)
6. Explain the operation of centre tapped fullwave rectifier with neat diagram. (16)
7. Derive an expression for efficiency of a half-wave rectifier. (16)
8. Explain with a neat diagram how the input and output characteristics of a CE configuration can be obtained. (16)
9. Compare the input resistance, output resistance and voltage gain of CB, CC and CE configuration. (16)
10. Explain the working of the CB configuration of a BJT. (16)
11. Explain in detail about small signal CE amplifier. (16)

UNIT – IV

DIGITALS ELECTRONICS

PART – A (2 MARKS)

1. Represent the decimal number 13910 into a binary number.

2. State Demorgan's theorem

3. Draw the logic symbol and truth table of EX-OR gate.

4. What are universal gates? Why?

5. What is a filp-flop? Where it is used?

6. What are the different types of flip-flops?

7. What is meant by racing in the operation of a flip-flop?

8. State a method to avoid racing problem in JK flip-flop.

9. Mention the types of digital to analog converters.

10. Give the logic diagram and truth table of D flip-flop.

11. What are the different types of counters?

12. What are shift registers?

13. Draw the symbol and truth table of NAND gate.

14. Draw the symbol and truth table of AND gate.

15. Draw the symbol and truth table of NOR gate.

16. Draw the equivalent circuit of NOT gate.

17. Add binary number 1011 and 1110, and write the answer.

18. Convert 1610 into a binary number.

19. Convert the following numbers to decimals. (a) 2378 (b) 23F16

20. Explain the radix of a number system.

PART – B

1. Draw and explain the operation of AND, OR, NOT, NAND and NOR gates with suitable truth table. (16)

2. How to get NOR from NOT and OR. Also give the truth table for NOR. (16)

3. What are universal gates? Explain their principle of working with necessary truth table. (16)

4. Design half adder and full adder. (16)

5. Design a full adder and implement it using logic gates. (16)

6. Write short notes on: (16)

a. RS-flip flop

b. D-flip flop

c. JK -flip flop

d. T-flip flop

e. JK-master slave flip flop

7. Briefly explain the working of JK flip flop. (16)

8. Explain the operation of various types of shift register. (16)

9. Explain in details about Analog Digital and Digital to Analog conversion.(16)

10. Explain the operation of RS flip-flop with logic diagram and truth table. (16)

11. With necessary diagrams explain the functioning of any one type of the following: (16)

a. Decade counter b. D/A converter

12. What is a counter? Discuss briefly about Mod-5 counter. (16)

13. With necessary diagrams explain the functioning of any one type of A/D converter. (16)

14. Show that NAND and NOR gates are universal building blocks. (16)

15. Describe the operation of a 4-bit binary, ripple counter. (16)

UNIT – V

FUNDAMENTALS OF COMMUNICATION ENGINEERING

PART – A (2 MARKS)

1. Define Communication.
2. What is an antenna?
3. Define analog signal.
4. Define digital signal.
5. What is the difference between analog signal and digital signal?
6. What is meant by modulation and demodulation?
7. What are the types of modulation?
8. Compare amplitude modulation and frequency modulation.
9. What is meant by sampling?
10. Why are AM systems preferred in broadcasting than FM systems?
11. What are the various standards used in TV transmission systems?
12. What are the advantages of optical fiber communication?
13. What is packet loss?
14. Write briefly on principle of total internal reflection used in fibre optics.
15. What is interlaced scanning?
16. What is meant by signal to noise ratio and noise figure of a receiver?
17. What is meant by Amplitude shift keying?
18. What is bandwidth for AM wave?
19. What is meant by modulation index for AM wave?
20. What is meant by radio transmitter?

PART – B

1. Draw the basic diagram of a wireless communication system and explain. (16)
2. What is meant by modulation? Explain different types of modulation techniques with neat diagrams. (16)
3. What is meant by amplitude modulation? Explain. Give AM wave equation spectrum of AM wave. (16)
4. Explain pulse code modulation and show various coding techniques. (16)
5. Explain with neat block diagrams, the principle and working of AM and
6. FM transmitter. (16)
7. What are the characteristics of a radio receiver? Explain any one radio receiver with a neat diagram. (16)
8. Explain the working of TV transmitter and receiver. (16)
9. Explain the working of AM transmitter and receiver. (16)
10. Explain the working of FM transmitter and receiver. (16)
11. Explain satellite communication system. (16)
12. Explain in details about FAX. (16)
13. Draw the block diagram of optical fibre communication system and explain it. (16)
14. Explain in detail about microwave communication system. (16)

ALL THE BEST