Time: 3 Hours   **Max.Marks:100**
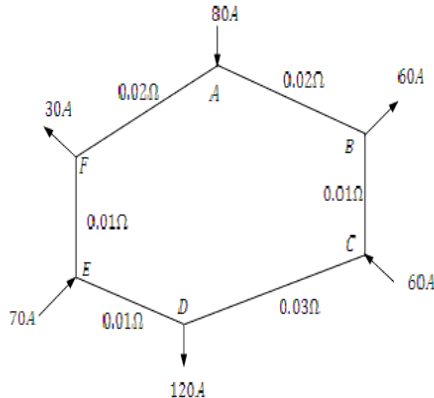
Note:Answer any FIVE full questions, choosing one full question from each module.
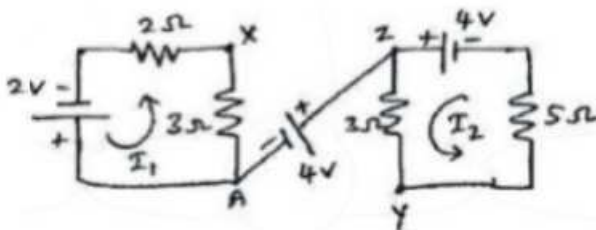
Module 1

1. a) State and explain Kirchhoff's laws with example.(7 Marks)
    b)Find the current in all the branches of the network shown.   (7 Marks)

c) Define Average value of alternating current and derive an expression for it in terms of maximum value.   (6 Marks)

OR

2. a) Explain the phasor representation of alternating quantities with suitable diagrams. (6 Marks)
    b) What is the potential between the point x and y in the network shown below? (6 Marks)

c) If the total power dissipated in the circuit shown below is 18W, find the value of R

and its current.   (8 Marks)
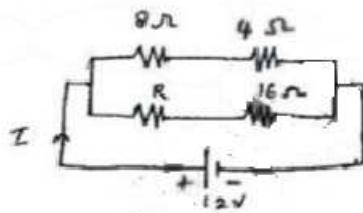
Module 2

3. a) Obtain expression for the current through the pure inductor and show that power consumed is zero. (6 Marks)

   b) Obtain the relationship between line and phase voltages and currents in threephase balanced delta connected system (8 Marks)

   c) Two impedances z_1= (6-8i) Ω and z_2= (16+12i) Ωare connected in parallel. If the total current of the combination is (20+10i) amperes, find (i) Voltage across the combination (ii) Currents in the two branches. (6 Marks)

OR

4. a) List out the advantages of three phase system as compared to single phase system (6 Marks)

   b) What is meant by power factor in AC circuit? What is its significance in AC Circuits? (6 Marks)

   c) A balanced star connected load of (8+6i)Ω/phase is connected to 3phase 230V supply. Find the line current, power factor, power reactive volt-ampere.(8 Marks)

Module 3

5. a) Derive the condition for which the efficiency of a transformer is maximum. (6 Marks)

   b) Define earthing. List the different type of earthing and explain anyone with a neat diagram. (7 Marks)

   c)A single phase 20KVA transformer has 1000turns and 2500 secondary turns. The net cross section area of the core is 100cm^2. When the primary winding is connected to 550V, 50Hz supply, calculate (i) the maximum value of the flux density in the core, (ii) the voltage induced in the secondary winding and (iii) the primary and secondary full load currents. (7 Marks)

OR

6. a) Derive emf equation of a transformer. (6 Marks)

   b) Write a short note (i) MCB. (ii) Precautions against electric shock. (8 Marks)

   c) With a neat sketch and truth table explain 2 way and 3 way control of lamp. (6 Marks)

Module 4

7. a) With a neat sketch explain the construction of the various parts of DC Generator (8 Marks)

   b) Derive the torque equation of DC motor with usual notations. (6 Marks)

   c) A 200V,4 Pole , lap wound DC shunt motor has 800 conductors on its armature . The resistance of the armature winding is 0.5Ω and that of the shunt field winding is 200Ω. The motor takes 21A and flux /pole is 30mWb. Find speed and gross torque developed in the motor. (6 Marks)

OR

8. a) Derive emf equation of a DC Generator. (6 Marks)

b) Discuss about various characteristics of a DC series motor with neat diagrams.

(6 Marks)

c) A 30 kW, 300V DC shunt generator has armature and field resistances of 0.05Ω and 100Ω respectively. Calculate the power developed by the armature when it delivers full output power.   (8 Marks)

Module 5

9. a) Describe the constructional features of synchronous generator with suitable diagram.
   (6 Marks)
   b) Define slip and slip speed. Derive an expression for frequency of rotor current with suitable considerations.   (6 Marks)
   c) A 12pole 500rpm star connected alternator has 48slots with 15 conductors per slot. Flux per pole is 0.02Wb. The winding factor is 0.97 and pitch factor is 0.98. Calculate the phase emf and line emf.

OR

10. a) Derive the emf equation of Synchronous Generator.   (6 Marks)
    b) With a circuit diagram explain the working of a star delta starter for a three phase induction motor.   (7 Marks)
    c) A three phase 6 pole 50Hz induction motor has a slip of 1% at no load and 3% at full load. Determine: i) Synchronous speed, ii) No load speed iii) Full load speed,iv) frequency of rotor current at stand still. v) Frequency of rotor current at full load.
     (7 Marks)