CBCS SCHEME

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21ELE13/23

First/Second Semester B.E. Degree Examination, June/July 2024
Basic Electrical Engineering

Time: 3 hrs. Max. Marks: 100

Note: ***Answer any FIVE full questions, choosing ONE full question from each module.***

Module-1

1 a. State Ohms Law and mention its limitations. **(05 Marks)**

b. Find the currents in the various branches of the given network shown in Fig.Q1(b).

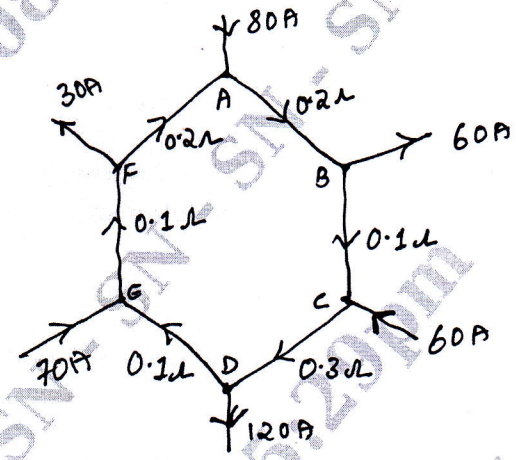

Fig.Q1(b) **(07 Marks)**

c. State and derive the condition to draw maximum power from the load using maximum power transfer theorem. **(08 Marks)**

OR

2 a. Define RMS value and average value of an alternating quantity and derive the expression for the same. **(10 Marks)**

b. List the advantages of sinusoidal waveform. **(05 Marks)**

c. Show that, the power consumed in a pure capacitance is zero. **(05 Marks)**

Module-2

3 a. Derive an expression for the power consumed in a series RL – AC circuit and draw voltage current and power waveform. **(08 Marks)**

b. A circuit show in Fig.Q3(b) consists of a resistance of 10Ω, an inductance of 16mH and a capacitance of 150μF connected in series. A supply of 100V, 50Hz is given to the circuit. Find the current, p.f and power consumed by the circuit.

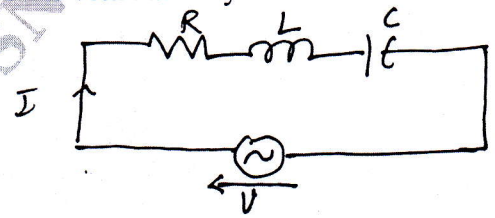

Fig.Q3(b) **(06 Marks)**

c. Draw the power triangle and define active power, reactive power and apparent power. **(06 Marks)**

OR

4 a. Derive the relationship between line and phase values of current in a three phase balanced star connected system. **(06 Marks)**

b. A three phase load of three equal impedances connected in delta across a balanced 400V supply takes a line current of 10A, a power factor of 0.7 lagging. Calculate :
i) The phase current
ii) The total power
iii) Total reactive KVA. **(06 Marks)**

c. Show that two wattmeters are sufficient to measure 3 phase power and power factor of the circuit in a 3 phase balanced circuit. **(08 Marks)**

Module-3

5 a. Explain the construction of a DC generator with a neat sketch. **(08 Marks)**

b. Derive an equation for the torque developed in the armature of a DC motor. **(06 Marks)**

c. A 4-pole, 1500rpm DC generator has a lap wound armature having 24 slots with 10 conductors per slot. If the flux per pole s 0.04wb, calculate the emf generated in the armature. What would be the generated emf. If the winding is wave connoted? **(06 Marks)**

OR

6 a. Derive the EMF equation of a transformer. **(06 Marks)**

b. Explain different losses occurring in a transformer. **(06 Marks)**

c. A transformer is rated at 100KVA, at full load its copper loss is 1200W and the iron loss is 960W calculate:
i) The efficiency of full load, u.p.f
ii) The efficiency of at half load 0.8pf
iii) The load KVA at which maximum efficiency occurs
iv) Maximum efficiency at 0.85 pf. **(08 Marks)**

Module-4

7 a. Explain the concept of rotating magnetic field in case of a 3-phase induction motor. **(08 Marks)**

b. Distinguish between wound rotor (slip ring) and squirrel large rotor of induction motor. **(06 Marks)**

c. Define slip of an induction motor and derive the relation between the supply frequency and rotor current frequency. **(06 Marks)**

OR

8 a. Derive the emf equation of alternator (Three phase synchronous generator). **(08 Marks)**

b. Explain the construction of two types of alternator with a neat diagram. **(06 Marks)**

c. A 3-phase 50Hz, 16-pole alternator with star connected winding has 144 slots with 10 conductors/slot. The flux/pole is 24.8mwb and the coils are full pitched. Find :
i) The speed ii) Line EMF. Assume the distribution factor $k_d = 0.96$. **(06 Marks)**

Module-5

9 a. Explain the concept of power transmission and power distribution with a neat diagram of power system. **(08 Marks)**

b. Explain tariff and list out the types of tariffs. **(06 Marks)**

c. What are the desirable characteristics of a tariff and explain two-part tariff. **(06 Marks)**

OR

10 a. Explain the necessity of earthing and also explain pipe earthing with a neat diagram. **(08 Marks)**

b. Explain the working RCCB with a neat diagram. **(06 Marks)**

c. Write about precautions against electric shock. **(06 Marks)**

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