

CBCS SCHEME



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).

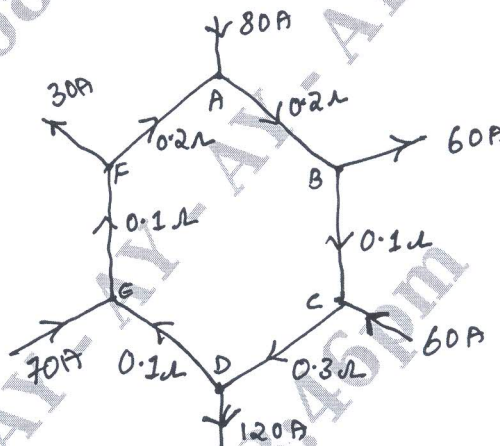


Fig.Q1(b)

- c. State and derive the condition to draw maximum power from the load using maximum power transfer theorem. (07 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 $150\mu\text{F}$ connected in series. A supply of 100V , 50Hz is given to the circuit. Find the current, p.f and power consumed by the circuit.

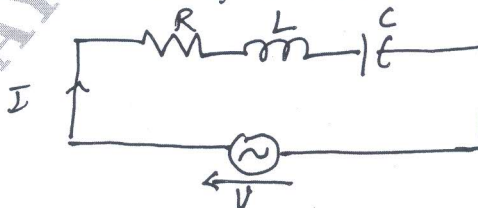


Fig.Q3(b)

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

(06 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

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 :
- The phase current
 - The total power
 - 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 is 0.04wb, calculate the emf generated in the armature. What would be the generated emf. If the winding is wave connected? (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:
- The efficiency of full load, u.p.f
 - The efficiency of at half load 0.8pf
 - The load KVA at which maximum efficiency occurs
 - 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 :
- The speed
 - 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)
