CBCS Scheme

USN | | | | | | | | | | |

15ELE15/25

First/Second Semester B.E. Degree Examination, June/July 2016
Basic Electrical Engineering

Time: 3 hrs. Max. Marks: 80

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

Module-1

1 a. State and explain Kirchoff's laws. **(05 Marks)**

b. Find the currents in the various branches of the given network shown in Fig. Q1 (b). **(06 Marks)**

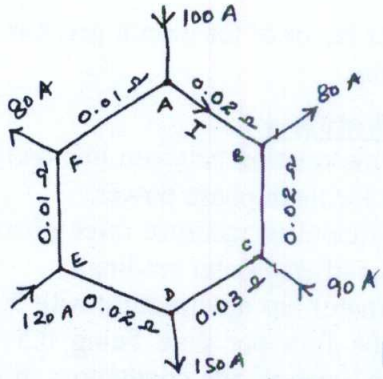

Fig. Q1 (b)

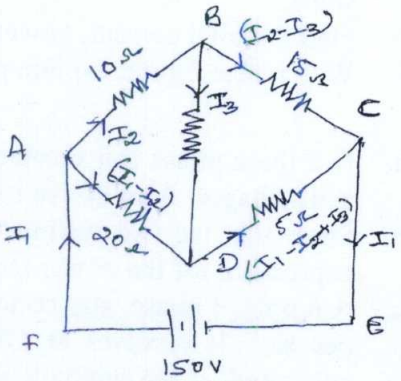

Fig. Q2 (b)

c. Define the co-efficient of coupling and find its relation with L_1, L_2 and M. **(05 Marks)**

OR

2 a. State ohm's law and mention its limitations. **(05 Marks)**

b. In the network shown in Fig. Q2 (b), find the currents flowing in each branch using Kirchoff's laws. **(06 Marks)**

c. Define mutual inductance and explain with respect to two coils placed very close to each other. **(05 Marks)**

Module-2

3 a. With a neat sketch, explain the construction of the various parts of a D.C. generator. **(05 Marks)**

b. What is the significance of back EMF in a D.C. motor? **(05 Marks)**

c. With a neat figure, explain the construction and working principle of a dynamometer type wattmeter. **(06 Marks)**

OR

4 a. Derive the EMF equation of a D.C. generator. **(05 Marks)**

b. Derive an equation for the torque developed in the armature of a D.C. motor. **(05 Marks)**

c. With a neat figure, explain the construction and working principle of an induction type single phase energy meter. **(06 Marks)**

Module-3

5 a. Derive an expression for average value of an alternating quantity. **(05 Marks)**

b. A circuit consists of a resistance of 10 Ω, an inductance of 16 mH and a capacitance of 150 μF connected in series. A supply of 100 V at 50 Hz is given to the circuit. Find the current, pf and power consumed by the circuit. Draw the vector diagram. **(06 Marks)**

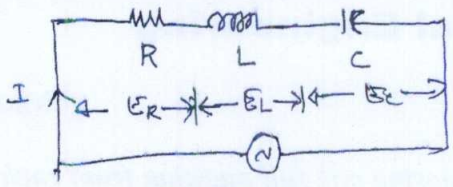

Fig. Q5 (b)

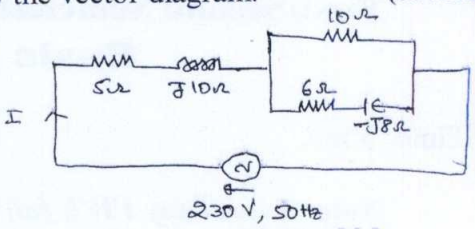

Fig. Q6 (b)

c. With a circuit diagram, explain the working of a three way control of lamp. **(05 Marks)**

OR

6 a. Define RMS value of a sinusoidally varying current and find its relation with its maximum value. **(05 Marks)**

b. Find the total current, power and power factor of the circuit given in Fig. Q6 (b). **(05 Marks)**

c. With a neat figure, explain plate earthing. **(06 Marks)**

Module-4

7 a. In a three phase star connection, find the relation between line and phase values of currents and voltages. Also derive the equation for three phase power. **(05 Marks)**

b. Show that the two wattmeters are sufficient to measure three phase power. Also derive an expression for the power factor in terms of wattmeter readings. **(06 Marks)**

c. A 6 pole, 3 phase, star connected alternator has an armature with 90 slots and 12 conductors per slot. It revolves at 1000 rpm, the flux per pole being 0.5 web. Calculate the emf generated, if the winding factor is 0.97 and all the conductors in each phase are in series. The coil is full pitched. **(05 Marks)**

OR

8 a. In a 3 phase delta connection, find the relation between line and phase values of currents and voltages. Also derive an equation for three phase power. **(05 Marks)**

b. Explain the effect of power factor on the two wattmeter readings connected to measure three phase power. **(06 Marks)**

c. A 6 pole, 3 phase, 50 Hz alternator has 12 slots per pole and 4 conductors per slot. The winding is 5/6 full pitched. A flux of 25 mWb is sinusoidally distributed along the air gap. Determine the line emf, if the alternator is star connected. **(05 Marks)**

Module-5

9 a. Derive the EMF equation of a transformer. **(05 Marks)**

b. Find the number of turns on the primary and secondary side of a 440/230 V, 50 Hz single phase transformer, if the net area of cross section of the core is 30 cm^2 and the flux density is 1 Wb/m^2. **(06 Marks)**

c. Define the slip of an induction motor and derive the relation between the supply frequency and rotor current frequency. **(05 Marks)**

OR

10 a. Explain the different losses occurring in a transformer. **(05 Marks)**

b. A single phase, 20 KVA transformer has 1000 primary turns and 2500 secondary turns. The net cross sectional area of the core is 100 cm^2. When the primary winding is connected to 550 V, 50 Hz 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. **(06 Marks)**

c. With a circuit diagram, explain the working of a star-delta starter for a three phase induction motor. **(05 Marks)**

* * * * *