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14ELE15/25

First/Second Semester B.E. Degree Examination, June/July 2017
Basic Electrical Engineering

Time: 3 hrs. Max. Marks:100

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

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.

Module – 1

1 a. In the network shown, find the current flowing in each branch using Kirchoff's law. **(08 Marks)**

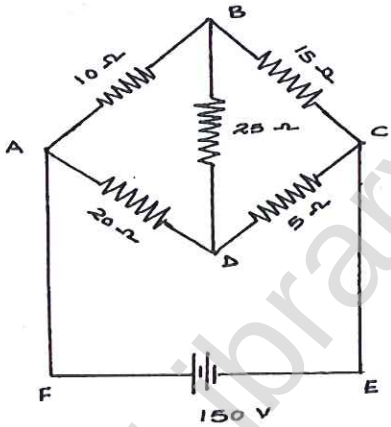

Fig. Q1 (a)

b. Derive an expression for energy stored in an inductor. **(06 Marks)**

c. State and explain Kirchoff's law. **(06 Marks)**

2 a. List the basic analogy between electric and magnetic circuits. **(06 Marks)**

b. When a certain battery is loaded by a 60 Ω resistor, its terminal voltage is 98.4 V, when it is loaded by a 90 Ω resistor, its terminal voltage is 98.9 V. What load resitance would give a terminal voltage of 90 volts? **(08 Marks)**

c. A coil of 1000 turns is wound on a ring of silicon steel, having a mean diameter of 10 cm and relative permeability of 1200. Its cross section area is 12 cm^2. When a current of 5 A flows through the coil, find
(i) Flux in the core (ii) The inductance of the coil
(iii) The induced emf, if the flux falls to zero in 20 milli seconds. **(06 Marks)**

Module – 2

3 a. With a neat diagram, explain the construction and working principle of dynamometer type wattmeter. **(08 Marks)**

b. A DC shunt generator supplies a load of 7.5 kW at 200 volts. Calculate the induced emf if the armature winding resistance is 0.6 Ω and field winding resistance is 80 Ω. **(06 Marks)**

c. Derive an expression for torque developed by the armature of a DC motor. **(06 Marks)**

4 a. A 220 V DC shunt motor has a armature resistance of 0.8 Ω and field resistance of 200 Ω. Find the back emf, when it gives an output of 7.46 kW at 85% efficiency. **(06 Marks)**

b. Derive the emf equation of DC generator. **(06 Marks)**

c. With a neat diagram, explain constructional features of induction type energy meter. **(08 Marks)**

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Module – 3

5 a. With a neat wiring diagram, explain the two-way control of lamp. **(08 Marks)**

b. Derive an expression for average value of an alternating quantity. **(06 Marks)**

c. A coil of power factor 0.6 is in series with 100 μf capacitor. When it is connected to 50 Hz a.c. supply, the potential drop across the coil is equal to potential drop across capacitor. Find the value of resistance and inductance. **(06 Marks)**

6 a. List the precautions to be taken to prevent persons from getting electric shocks. **(06 Marks)**

b. A resistance of 50 Ω and a capacitor of 500 μF, form a series circuit. If an alternating voltage of 100 V at 50 Hz frequency is applied across it. Find the current, power, power factor and draw the phasor diagram. **(08 Marks)**

c. With a neat diagram, explain the generation of sinusoidal voltage. **(06 Marks)**

Module – 4

7 a. Show that two wattmeters are sufficient to measure three phase power. **(08 Marks)**

b. With a neat diagram, explain the constructional features of synchronous generator. **(08 Marks)**

c. Define the terms (i) Phase sequence and (ii) Balanced load. **(04 Marks)**

8 a. A 6 pole, 3 phase star connected alternator has armature with 90 slots and 12 conductors/slot. It rotates with a speed of 1000 rpm. It has a flux/pole of 0.5 wb. Calculate the emf generated / phase. Also calculate the line voltage, if winding factor is 0.97 and the coil is full pitched. **(06 Marks)**

b. List the advantages of 3 phase AC system. **(08 Marks)**

c. When three balanced impedances are connected in star, across 3 phase 415 V, 50 Hz. Supply the line current drawn is 20 A, at 0.4 power factor lagging. Find the parameters of the impedance in each phase. **(06 Marks)**

Module – 5

9 a. A 20 KVA single phase transformer has 200 turns on primary and 40 turns on secondary. The primary is connected to 1000 V, 50 Hz supply. Find the secondary voltage, rated current flowing through two windings and the maximum value of flux. **(06 Marks)**

b. Explain with diagram, working principle of induction motor. **(08 Marks)**

c. Derive the emf equation of 1ϕ transformer. **(06 Marks)**

10 a. A 6 pole induction motor running from 50 Hz supply has an emf in the rotor of frequency 2.5 Hz. Determine the value of slip and speed of motor. **(04 Marks)**

b. Define efficiency and obtain the condition for maximum efficiency of a transformer. **(08 Marks)**

c. With a neat diagram, explain the star-delta starter used to start 3 phase induction motor. **(08 Marks)**

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