CBCS Scheme

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14ELE15/25

First/ Second Semester B.E. Degree Examination, Dec.2017/Jan.2018
Basic Electrical Engineering

Time: 3 hrs. Max. Marks: 100

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

Module-1

1 a. Explain Ohm's law and its limitations. **(04 Marks)**

b. An 8 ohms resistor in series with a parallel combination of two resistors 12 ohms and 6 ohms. If the current in the 6 ohm resistor is 5A, determine the total power dissipated in the circuit and also power consumed in all individual resistors. **(08 Marks)**

c. Define 'coefficient of coupling and establish relation between self inductance, mutual-inductance with coefficient of coupling. **(08 Marks)**

OR

2 a. State and explain Kirchhoff's laws. **(06 Marks)**

b. The total power consumed by the network shown in Fig. Q2(b) is 16 watts. Find the value of 'R' power dissipated in 'R' and total current. **(06 Marks)**

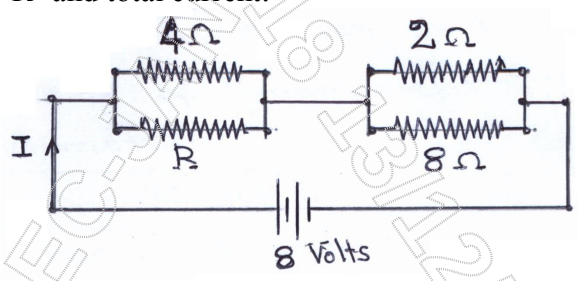

Fig. Q2(b)

c. An air cored solenoid with length 30cm and internal diameter 1.5cm has a coil of 900 turns wound on it. Estimate its inductance. Also calculate the amount of energy stored in it when the current through the coil rises from 0 to 5A. **(08 Marks)**

Module-2

3 a. Draw a neat cross section of a d.c machine and explain the functions of each part. **(08 Marks)**

b. With a neat sketch, explain the working of an induction type single phase energy meter. **(08 Marks)**

c. A 4 pole 1500 rpm dc generator has a lap wound armature having 24 slots with 10 conductors per slot. If the flux per pole is 0.04 Wb. Calculate the emf generated in the armature. What would be the generated emf if the winding is wave connected? **(04 Marks)**

OR

4 a. Derive emf equation of a dc generator and mention the classification of dc generators. **(08 Marks)**

b. A 200V, 4 pole, lap wound dc shunt motor has 800 conductors units armature. The resistance of the armature winding is 0.5Ω and that of shunt field winding is 200Ω. The motor takes a current of 21A, the flux per pole is 30 mwb. Find the speed and gross torque developed in the motor. **(06 Marks)**

c. With a neat sketch, explain the working of Dynamometer type wattmeter. **(06 Marks)**

Module-3

5 a. Obtain an expression for power in a series RLC circuit when applied by an ac. **(08 Marks)**

b. A circuit having a series combination of 20Ω and inductance of 0.07H is connected n parallel with a series combination of 50Ω resistance and 60μF capacitance calculate the total current, when the parallel combination is connected across 230 volts, 50Hz supply. **(08 Marks)**

c. With a relevant circuit, explain the three way control of Lamp. **(04 Marks)**

OR

6 a. Derive equations for the rms value and average value of a sinusoidally varying current. **(06 Marks)**

b. A non-inductive resistance is connected in series with a coil across a 230 volts 50Hz supply. The current is 1.8 A and the potential difference across the resistance and coil are 80 volts and 170 volts respectively. Calculate the resistance and inductance of the coil and the phase difference between the current and the supply voltage and the power dissipated in the coil. Draw the phasor diagram. **(08 Marks)**

c. Name the two types of Earthing and with a neat sketch. Explain the "Plate Earthing". **(06 Marks)**

Module-4

7 a. Obtain the relationship between the phase and line values of voltage and currents in a delta connected system and also derive the expression for three phase power. **(08 Marks)**

b. With a neat diagram, explain the constructional features of three phase alternator (consider salient pole rotor). **(06 Marks)**

c. A balanced three phase star connected load draws power from 440 V supply. The two watt meters connected indicate W_1 = 5kW and W_2 = 1.2kW. Calculate power, power factor and line current in the circuit. **(06 Marks)**

OR

8 a. Show that two Watt-meters are sufficient to measure power in three phase balanced star connected system with the aid of neat circuit diagram and phasor diagram. **(08 Marks)**

b. A two pole, three phase alternator running at 3000 rpm has 42 armature slots with two conductors in each slot. Calculate the flux per pole, required to generate a line voltage of 2,300 V. Distribution factor is 0.952 and the pitch factor is 0.956. **(06 Marks)**

c. A balanced 3-phase star connected load of 150kW takes a leading current of 100A, with a line voltage of 1,100V, 50Hz. Find the circuit constants of the load per phase. **(06 Marks)**

Module-5

9 a. Explain the various power losses in a transformer. **(04 Marks)**

b. A 200 KVA, 10000V/400V, 50Hz single phase transformer has 100 turns on the secondary. Calculate: i) The primary and secondary currents ii) the number of primary turns iii) the maximum value of flux. **(08 Marks)**

c. A 4 pole, 3-phase, 50Hz induction motor runs at a speed of 1,470 rpm. Find the synchronous speed, the slip and frequency of the induced emf in the rotor under this condition. **(08 Marks)**

OR

10 a. Derive an expression for the emf induced in the secondary winding of a transformer. **(06 Marks)**

b. A single phase 25KVA, 1000V/2000V, 50Hz transformer has maximum efficiency of 98% at full load Upf. Determine its efficiency at
i) (3/4) full load, upf ii) (1/2) full load 0.8pf iii) 1.25 full load 0.9pf. **(08 Marks)**

c. Explain the principle of operation of a three – phase induction motor. **(06 Marks)**