CBCS SCHEME

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17ELE15/25

First/Second Semester B.E. Degree Examination, Dec.2018/Jan.2019
Basic Electrical Engineering

Time: 3 hrs. Max. Marks: 100

Note: Answer any FIVE full questions, choosing 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. State and explain Kirchoff's law as applied to DC circuits. **(07 Marks)**

b. What are the differences between series and parallel circuit. **(06 Marks)**

c. Find the inductance of a coil of 200 turns wound on a paper core tube of 25cm length and 5cm radius. Also calculate energy stored in it if current rises from zero to 5A (μ_r for paper = 1). **(07 Marks)**

OR

2 a. State and explain the faradays law of Electromagnetic induction (EMI). **(06 Marks)**

b. Define the coefficient of coupling and find its relation with L_1,L_2 and M. **(06 Marks)**

c. Find the currents I_1, I_2 and I_3 and the voltages V_a, V_b in the network shown below :

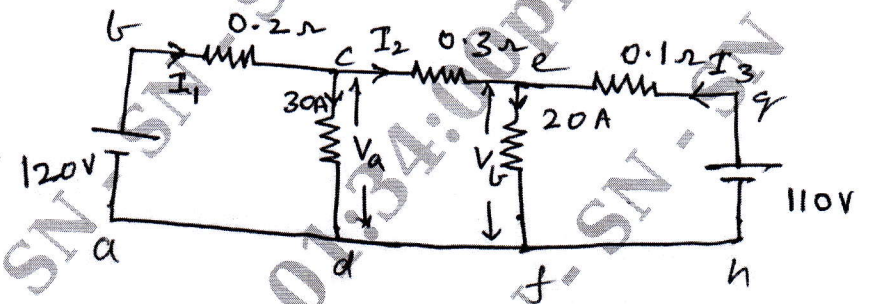

Fig.Q2(c)

(08 Marks)

Module-2

3 a. With a neat sketch, explain the construction of the various parts of DC generator. **(08 Marks)**

b. Explain with a neat diagram the constructional features and operation of an induction type single phase energy meter. **(07 Marks)**

c. Explain the significance of back Emf in DC motor. **(05 Marks)**

OR

4 a. Derive the EMF equation of DC generator. **(06 Marks)**

b. Describe with a neat sketch, the constructional details and working principle of a dynamometer type wattmeter. **(06 Marks)**

c. A 4 pole, 100V shunt generator with lap connected armature, having field and armature resistance of 50Ω and 0.1Ω respectively. Supplies a load of sixty lamps. Each lamp rated 100V, 40W. Calculate the total armature current, the current per path and the generated emf. Allow a contact drop of 1 volt per brush. **(08 Marks)**

Module-3

5 a. Derive an expression for power in pure inductance circuit and draw voltage, current and power waveforms. **(06 Marks)**

b. Draw and explain the wiring diagrams for the two-way control of lamp. **(06 Marks)**

c. A choke coil takes a current of 2A lagging 60° behind the applied voltage of 200V at 50Hz. Calculate the resistance, inductance and impedance of the coil. Also determine the power consumed when it is connected across 100V, 25Hz supply. **(08 Marks)**

OR

6 a. Derive an expression for power in series resistance and inductance circuit and draw voltage and current waveform. **(07 Marks)**

b. With a neat diagram, explain pipe earthing. **(05 Marks)**

c. A voltage V = 100 sin 314 t is applied to a circuit consisting of a 25Ω resistor and an 80 μF capacitor in series. Determine :

i) Peak value of current

ii) Power factor

iii) Total power consumed by the circuit. **(08 Marks)**

Module-4

7 a. In a three phase delta connection, find the relation between line and phase values of currents and voltages. Also derive the equation for three phase power. **(06 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 12 pole 500 rpm star connected alternator has 48 slots with 15 conductors per slot. The flux per pole is 0.02wbs. The winding factor is 0.97 and pitch factor is 0.98. Calculate the phase emf and line emf. **(08 Marks)**

OR

8 a. Mention the advantages of three phase system over single phase system. **(06 Marks)**

b. With neat sketches, explain the construction of salient pole alternator. **(07 Marks)**

c. A balanced star connected load of (8 + J6)w per phase is connected to a three phase, 230V supply. Find the line current, power factor, power and reactive voltampere and total voltamper. **(07 Marks)**

Module-5

9 a. Derive EMF equation of transformer. **(07 Marks)**

b. Explain construction and working principle of a transformer with diagram. **(07 Marks)**

c. The frequency of the emf in the stator of a 4 pole induction motor is 50Hz and in the rotor is 1.5Hz. What is the slip and at what speed is the motor running. **(06 Marks)**

OR

10 a. Derive the condition for which the efficiency of a transformer is maximum. **(06 Marks)**

b. What is slip in an induction motor? Explain why slip is never zero in an induction motor. **(06 Marks)**

c. The maximum efficiency at full load and unity pf of a single phase 25KVA, 50/1000V, 50Hz transformer is 98%, determine the efficiency at :

i) 75% load, 0.9 pf ii) 50% load, 0.9pf. **(08 Marks)**

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