CBCS Scheme

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15ELE15

First Semester B.E. Degree Examination, Dec.2015/Jan.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 ohm's law. Mention its limitations. **(05 Marks)**

b. A coil consists of 600 turns and a current of 10 A in the coil gives rise to a magnetic flux of 1 mWb. Calculate: (i) self inductance, (ii) The emf induced, (iii) The energy stored when a current s reversed in 0.01 sec. **(05 Marks)**

c. A circuit of two parallel resistors having resistance of 20Ω and 30Ω respectively, connected in series with 15Ω. If the current through 15 Ω resistor is 3A, find (i) current in 20Ω and 30Ω resistors, (ii) voltage across the whole circuit. (iii) The total power and power consumed in all resistors. **(06 Marks)**

OR

2 a. Define dynamically induced emf and statically induced emf with examples. **(05 Marks)**

b. State and explain Kirchoff's current law and Kirchoff's voltage law. **(06 Marks)**

c. In the network shown in Fig.Q2(c), determine current flow in the ammeter 'A' having resistance of 10 Ω.

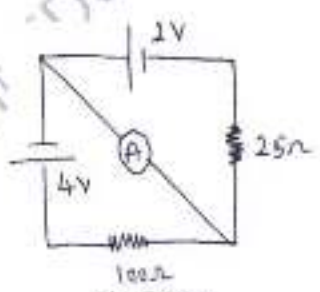

Fig.Q2(c) **(05 Marks)**

Module-2

3 a. Sketch torque versus armature current and speed versus armature current characteristics of a D.C. shunt motor and mention its applications. **(06 Marks)**

b. With the help of neat diagram, explain the construction and working principle of electrodynamometer type wattmeter. **(06 Marks)**

c. An 8 pole D.C. generator has 500 armature conductors and has useful flux per pole of 0.065 Wb. What will be emf generated if it is lap connected and runs at 1000 rpm? What must be the speed at which it is to be driven to produce the same emf if it is wave connected? **(04 Marks)**

OR

4 a. Derive EMF equation of DC generator. **(04 Marks)**

b. With a neat diagram, explain the construction and working of a induction type energy meter. **(06 Marks)**

c. A 200V, 4 pole, lap wound DC shunt motor has 800 conductors on its armature. The resistance of the armature winding is 0.5 Ω and that of the shunt field winding is 200 Ω. The motor takes 21A and flux/pole is 30 mWb. Find speed and gross torque developed in the motor. **(06 Marks)**

5 a. Explain two way contr and connection diagram. **(05 Marks)**

b. An alternating voltage rcuit and the current flowing is (-4+j10)A. Find: (i) the impedance of the circuit, (ii) the phase angle, (iii) power consumed. **(05 Marks)**

c. Two impedances $z_1 = (10 + j15)\Omega$ and $z_2 = (6 - j8)\Omega$ are connected in parallel. If the total current supplied is 15A, what is power taken by each branch? **(06 Marks)**

OR

6 a. Show that power consumed in an AC circuit is P = VI cos ϕ, where V is RMS value of the applied voltage, I is the RMS value of current and ϕ is the angle between voltage V and current I. **(05 Marks)**

b. What is earthing? Explain any one type of earthing with neat figure. **(06 Marks)**

c. A coil of power factor 0.6 is in series with 100 μF capacitor. When connected to a 50 Hz supply, the potential difference across the coil is equal to potential difference across the capacitor. Find the resistance and inductance of the coil. **(05 Marks)**

Module-4

7 a. Mention the advantages of three phase system over single phase system. **(05 Marks)**

b. Three similar coils each having resistance of 10Ω and reactance of 8Ω are connected in star, across 400 V, 3 phase supply. Determine (i) line current, (ii) total power, (iii) reading of each of two wattmeter connected to measure power. **(06 Marks)**

c. A 2 pole 3phase alternator running at 3000 rpm has 42 slots with 2 conductors per slot. Calculate the flux per pole, required to generate a line voltage of 2300 V. Assume $K_d = 0.952$ and $K_p = 0.956$. The armature is star connected. **(05 Marks)**

OR

8 a. With the help of a circuit diagram and vector diagram, show that two wattmeters are sufficient to measure total power and power factor in a balanced three phase circuit. **(08 Marks)**

b. With neat sketches, explain the construction of salient pole alternator. **(04 Marks)**

c. A three phase load of three equal impedances connected in delta across a balanced 400 V supply, takes a line f 10 A at a power factor of 0.7 lagging. Calculate:
i) the phase current, ii) the total power, iii) the total reactive volt amperes. **(04 Marks)**

Module-5

9 a. Derive EMF equation of transformer. **(04 Marks)**

b. The iciency at full load and Upf of a single phase, 25 kVA, 500/1000 V, 50 Hz transformer is 98%. Determine the efficiency at (i) 75% load 0.9 pf, (ii) 50% load 0.8 pf, (iii) 25% load 0.6 pf. **(08 Marks)**

c. If a 6 pole induction motor supplied from a three phase 50 Hz supply has a rotor frequency 2.3 Hz, calculate (i) the percentage slip, (ii) the speed of the motor. **(04 Marks)**

OR

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

b. Define slip. Derive an expression for frequency of rotor current. **(05 Marks)**

c. A three phase 6 pole 50 Hz induction motor has a slip of 1% at no load and 3% at full load. Determine: i) Synchronous speed, (ii) No load speed, (iii) Full-load speed, (iv) Frequency of rotor current at stand still, (v) Frequency of rotor current at full-load. **(05 Marks)**

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