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First/Second Semester B.E. Degree Examination, June/July 2018
Basic Electrical Engineering

Time: 3 hrs. Max. Marks:100

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

Module – 1

1 a. State and explain Kirchoff's laws. **(06 Marks)**

b. A resistor of 2.6 Ω is coneected in series with a parallel combination of 4Ω and 6Ω resistors. If the power consumed in 4Ω resistor is 36 watts, find :
(i) Voltage across different resistors.
(ii) Source voltage.
(iii) Source current. **(08 Marks)**

c. Compare and contrast electric and magnetic circuits. **(06 Marks)**

2 a. For the circuit shown in Fig. Q2 (a), find
(i) Current supplied by each battery.
(ii) Total current supplied to 10Ω resistor.
(iii) Total energy delivered to 10 Ω resistor, when the circuit is in ON condition for 4 hours. **(07 Marks)**

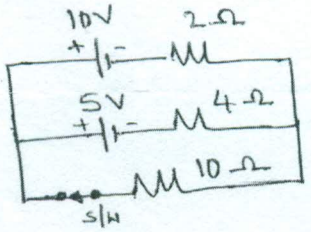

Fig. Q2 (a)

b. Obtain an expression for energy stored in an inductor. **(05 Marks)**

c. Two coils X of 12,000 turns and Y of 15,000 turns, lie in parallel planes such that 45% of the flux produced by coil X links coil Y. A current of 5 A in X produces 0.05 wb while the same current in Y produces 0.075 wb. Calculate
(i) The mutual inductance (ii) The coupling coefficient
(iii) The percentage of flux produced by coil Y linking coil X. **(08 Marks)**

Module – 2

3 a. Give a brief classification of dc generators with equivalent circuits. **(06 Marks)**

b. A 200 V, 4 pole, lap wound dc shunt motor has 800 armature conductors. The resistances of the armature and shunt field windings are 0.5 Ω and 200 Ω respectively. The motor takes a current of 21A and the flux produced per pole is 30 MWb. Find the speed and gross torque. There is brush contact drop of 1 volt across each brush. **(08 Marks)**

c. Explain with a neat diagram, the construction and working principle of dynamometer type wattmeter. **(06 Marks)**

4 a. With usual notations, deduce an expression for emf induced in a dc generator. **(06 Marks)**

b. What is back emf in a dc motor? What is its significance? **(04 Marks)**

c. Explain, why a series motor should not be started without load over it? **(04 Marks)**

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

Module – 3

5 a. Explain the following terms:
(i) Peak value (ii) Frequency
(iii) RMS value with respect to an alternating quantity. **(06 Marks)**

b. Draw the vector diagram of RLC series circuit when:
(i) Inductive reactance exceeds capacitive reactance.
(ii) Capacitive reactance exceeds inductive reactance.
(iii) Both inductive and capacitive reactances are equal. **(06 Marks)**

c. With neat diagram, explain control of a lamp from three different locations. **(05 Marks)**

d. What precautions should be taken against electric shock? **(03 Marks)**

6 a. Prove that current in a pure inductive circuit lags behind the applied voltage by 90°. Also draw the power curves. **(07 Marks)**

b. A circuit drives a current of (4+j3)A from a (180+j160) volt source. Find the circuit elements, if the supply frequency is 50 Hz. **(07 Marks)**

c. Write notes on: (i) Minitature Circuit Breaker (MCB)
(ii) Earth Leakage Circuit Breaker (ELCB). **(06 Marks)**

Module – 4

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

b. Obtain relation between line and phase values of currents in three phase delta system. **(07 Marks)**

c. A 12 pole, 500 rpm star connected alternator has 60 slots with 20 conductors/slot. The flux /pole is 0.02 wb which is sinusoidally distributed. The winding factor is 0.97. Calculate frequency and magnitude of line and phase emfs. **(08 Marks)**

8 a. Obtain an expression for power factor angle, when power is measured using two wattmeters. **(07 Marks)**

b. Three similar coils each having resistance of 10 Ω and inductive reactance of 8 Ω are connected in STAR across 400 V, 3 phase supply. Determine (i) Line current (ii) Phase current (iii) Total power and readings of each wattmeter connected to measure power. **(07 Marks)**

c. Explain different types of rotors in synchronous generators. **(06 Marks)**

Module – 5

9 a. Show that iron losses and copper losses are equal for maximum efficiency in a transformer. **(06 Marks)**

b. A 250 KVA, 1 phase transformer has an efficiency of 98.135% at full load 0.8 lagging power factor. The efficiency was found to be 97.751% at half-full load 0.9 pf. Calculate iron and copper losses. **(08 Marks)**

c. Explain the working principle of a 3 phase induction motor. **(06 Marks)**

10 a. Obtain emf equation of transformer. **(06 Marks)**

b. Write about various losses that occur in a transformer. **(06 Marks)**

c. A four pole, 3 phase induction motor is supplied by 50 Hz AC supply. Find (i) Synchronous speed (ii) Motor speed and (iii) Frequency of rotor induced currents if the slip is 4%. **(08 Marks)**

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