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18ELE13/23

First/Second Semester B.E. Degree Examination, Dec.2019/Jan.2020
Basic Electrical Engineering

Time: 3 hrs. Max. Marks: 100

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

Module-1

1 a. State Ohm's Law. Mention its limitations. **(06 Marks)**

b. Find E_2 and I when the power dissipated in the 50 resistor is 125W.(Ref. Fig.Q1(b)). **(07 Marks)**

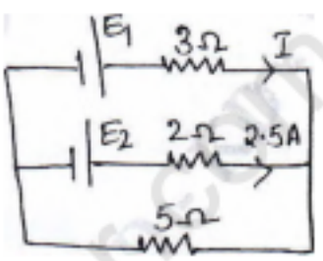

Fig.Q1(b)

c. Define RMS value of alternating current, show that its value is proportional to maximum value. **(07 Marks)**

OR

2 a. Two 12V batteries with internal resistances 0.20 and 0.250 respectively are joined in parallel and a resistance of 10 is placed across the terminals. Find the current supplied by each battery. **(07 Marks)**

b. The equation for an AC voltage is given as V = 0.04sin (2000t + 60°)V. Determine the frequency, the angular frequency, instantaneous voltage when t = 160i.is. What is the time represented by a 60° phase angle. **(06 Marks)**

c. Explain the generation of 1(AC induced emf with suitable diagram. **(07 Marks)**

Module-2

3 a. Show that in a pure inductor the current lags behind the voltage by 90°. Also draw the voltage and current waveforms. **(06 Marks)**

b. Given V = 200 sin 377 volts and i = 8 sin (377t — 30°)Amps for an AC circuit, determine : i) Power factor ii) True power iii) Apparent power iv) Reactive power indicate the unit of power calculated. **(08 Marks)**

c. 3 similar coils each having resistance of 10Q and reactance of 8Q are connected in star across 400V, 3c1) supply. Determine : i) Line current ii) Total power iii) Reading of each of the two wattmeters connected to measure power. **(06 Marks)**

OR

4 a. Show that the power in a balanced 3(1) star connected circuit can be measured by 2 Wattmeter. Draw the circuit and vector diagram. **(08 Marks)**

b. Three coils each of impedance 20160 °Q are connected in star to 3(1) 400V, 50Hz supply. Find the reading on each of the 2 wattmeters connected to measure the power input. **(08 Marks)**

c. What is meant by power factor in AC circuits? What is its significance in AC circuits? **(04 Marks)**

Module-3

5 a. Derive an emf equation of transformer with usual notation. **(06 Marks)**

b. Explain the 2 way control and 3 way control of lamp with suitable circuit diagram and working table. **(06 Marks)**

c. A 40KVA, 1 (transformer has core loss of 450W and full load copper loss 850Watts. If the power factor of the load is 0.8. Calculate
i) Full load efficiency
ii) Maximum efficiency at UPF
iii) Load for maximum efficiency. **(08 Marks)**

OR

6 a. List different types of loss in a transformer and explain each one in brief **(06 Marks)**

b. What is Earthing? Why earthing is required? With the help of sketch explain plate earting. **(08 Marks)**

c. Write a short note :
i) MCB
ii) Precautions agains electric shock. **(06 Marks)**

Module-4

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

b. Explain the significance of back emf in a DC motor. **(06 Marks)**

c. A shunt wound DC generator delivers 496A at 440V to load. The resistance of the shunt field coil is 1100 and that of armature winding is 0.020. Calculate the emf induced in the armature. **(06 Marks)**

OR

8 a. Derive the torque equation of DC motor with usual notations. **(06 Marks)**

b. A 6 pole lap-connected DC series motor, with 864 conductors, takes a current of 110A at 480V. The armature resistance and the series field resistance are 0.180 and 0.020 respectively. The flux per pole is 50mwb. Calculate :
i) The speed ii) The gross torque. **(07 Marks)**

c. Derive emf equation of a DC generator. **(07 Marks)**

Module-5

9 a. Derive the emf equation of synchronous generator. **(06 Marko**

b. With a circuit diagram, explain the working of star-delta starter for a 34) induction motor. **(07 Marks)**

c. **A** 12 pole, 3(1) alternator is coupled to an engine running at 500rpm. **It** supplies an induction motor which has a full load speed of1440rpm. Find the percentage slip and the number of poles of the motor. **(07 Marks)**

OR

10 a. Explain the concept of rotating magnetic field and show that resultant flux remains same at different instants of time. **(07 Marks)**

b. A 3(, 50Hz, 20pole, salient pole alternator with Y-connected stator winding has **180** slots on the stator. There are 8 conductors per slot and the coils are full-pitched. The flues per pole is 25mwb. Assuming sinusoidally distributed flux, calculate :
i) Speed ii) Generated emf per phase iii) Line emf. (07 Mario)

c. Describe the constructional features of synchronous generator wit diagram. **(06 Marks**