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18ELE13/23

First/Second Semester B.E. Degree Examination, July/August 2021
Basic Electrical Engineering

Time: 3 hrs. Max. Marks: 100

Note: ***Answer any FIVE full questions.***

1 a. State and explain: i) Ohm's law ii) Kirchoff's voltage law. **(06 Marks)**

b. Define: i) frequency ii) time period iii) form factor. **(06 Marks)**

c. Determine:
   i) Current flowing through 12Ω and 8Ω resistances
   ii) Total power dissipated
   iii) Power dissipated in all resistors. **(08 Marks)**

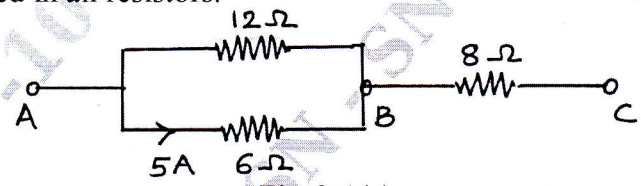

Fig.Q.1(c)

2 a. Define the RMS value of an alternating current and show that its value is proportional to maximum value. **(06 Marks)**

b. Apply Kirchoff's laws to calculate the current in 2Ω resistor in Fig.Q.2(b). **(06 Marks)**

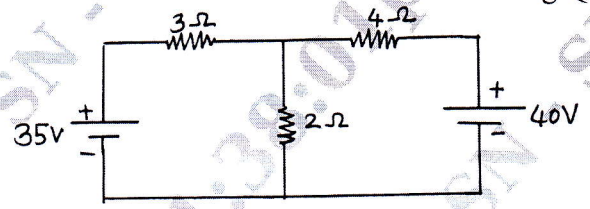

Fig.Q.2(b)

c. An alternating current 'i' is given by i = 141.4 sin 314t, find: i) maximum value ii) frequency iii) time period iv) instantaneous value when t = 3ms. **(08 Marks)**

3 a. Show that current lags the applied voltage v = vm sin wt by 90 in a pure inductive A-C circuit and also power consumed is zero. **(08 Marks)**

b. List the advantages of 3 phase A.C system over 1 phase A.C system. **(06 Marks)**

c. A 318μF capacitor is connected across a 230volts, 50Hz, AC supply. Determine: i) Capacitive reactance ii) RMS value of current iii) Voltage and current expressions. **(06 Marks)**

4 a. Show that the power in a 3 phase balanced star connected load can be measured by two wattmeters with suitable circuit diagram and vector diagrams. **(08 Marks)**

b. Explain the following with respect to single phase A.C system:
   i) Power factor
   ii) True power
   iii) Reactive power
   iv) Apparent power **(06 Marks)**

c. Three 50Ω resistors are connected in star across 400V, 3 phase, 50Hz, AC supply. Find phase current, line current and power taken from the mains. **(06 Marks)**

5 a. Explain the basic working principle of transformer and identify the applications of transformers (any two). **(06 Marks)**

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

c. A single phase, 50Hz, transformer has 30 primary turns and 350 secondary turns. The net cross sectional area of the core is 250cm^2. If the primary winding is connected to a 230V, 50Hz, AC supply. Calculate:

i) Peak value of flux density in the core

ii) Voltage induced in the secondary winding

iii) Primary current when the secondary current is 100A (Neglecting losses). **(08 Marks)**

6 a. Explain the concealed conduit wiring with a neat diagram and mention its advantages. **(08 Marks)**

b. A 10KVA transformer has iron loss of 450W and full load copper loss of 650W. If the power factor of the load is 0.8 lagging. Calculate: i) Full load efficiency ii) Load at maximum η iii) Maximum efficiency at unity power factor. **(06 Marks)**

c. Explain the following with respect to electric circuit i) Earthing ii) Electric shock iii) Fuse wire iv) MCB v) meter board. **(06 Marks)**

7 a. Explain the basic working principle of d.c generator with suitable diagrams. **(06 Marks)**

b. What is torque? Show that the armature torque is proportional to armature current in d.c motor. **(06 Marks)**

c. An 8 pole lap connected armature has 960 conductors, a flux of 40mwb per pole and a speed of 400RPM. Calculate the emf generated. If the armature were wave connected, at what speed it must be driven to generate 400V? **(08 Marks)**

8 a. How the dc generators are classified? Explain each one in brief. **(06 Marks)**

b. Explain the D.C series motor characteristics with suitable plots. **(06 Marks)**

c. A 250V, shunt motor takes a total current of 20A Rsh = 200Ω, Ra = 0.3Ω. Find the current in armature and back emf. **(08 Marks)**

9 a. Explain the constructional details of 3 phase synchronous generator. **(06 Marks)**

b. A 3 ph, induction motor is wound for 4 poles and is supplied from 50Hz system. Calculate: i) Synchronous speed ii) Speed of motor when slip is 4% iii) rotor current frequency when motor runs at 600rpm. **(08 Marks)**

c. Derive an expression to calculate the frequency of generated emf. **(06 Marks)**

10 a. Explain the basic working principle of 3 phase induction motor with suitable diagrams. **(06 Marks)**

b. A 6 pole, 3 phase, 50Hz, alternator has 12 slots per pole and 4 conductors per slot. A flux of 25mWb is sinusoidally distributed along the air gap. Determine the i) Phase EMF ii) Line EMF, is the alternator is star connected. Assume pitch factor = 1 winding factor = 0.96. **(06 Marks)**

c. Why the 3 phase induction motor stops at slip = 0, explain the working of star-delta starter with a neat diagram. **(08 Marks)**

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