CBCS SCHEME

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15ELE15/25

First/Second Semester B.E. Degree Examination, June/July 2019
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 Kirchhoff's laws. For the circuit shown in Fig.Q1(a) if $V_a = 60V$, $V_b = 20V$, $R_a = 20\Omega$, $R_b = 5\Omega$. Find V_c the voltage across R_c. **(07 Marks)**

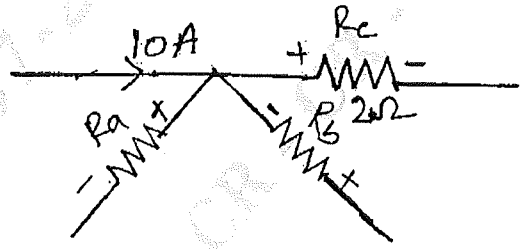

Fig.Q1(a)

b. Explain statically and dynamically induced EMF's. **(04 Marks)**

c. Two identical coils of 1200 turns each are placed side by side such that 60% of flux produced by coil links the other. A current of 10Amps in first coil sets up a flux of 0.12milli webers. If current in first coil changes from 10 Amps to –10 Amps in 20 milli seconds. Find :
i) Self inductance of coils
ii) The E.M.F's induced in both the coils. **(05 Marks)**

OR

2 a. For the circuit shown in Fig. Q2(a). i) Find 'R' ii) current through 20Ω resistance iii) power supplied by source if power dissipated in 40Ω is 160 watts. **(06 Marks)**

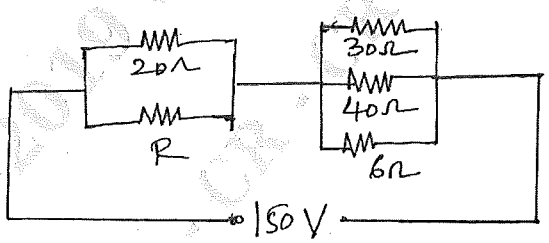

Fig.Q2(a)

b. State Lenz's law and Flemings left hand rule. **(04 Marks)**

c. For the circuit shown if Fig. Q2(c). Find voltage across AB i) with switch 'S' open ii) with switch 'S' closed. **(06 Marks)**

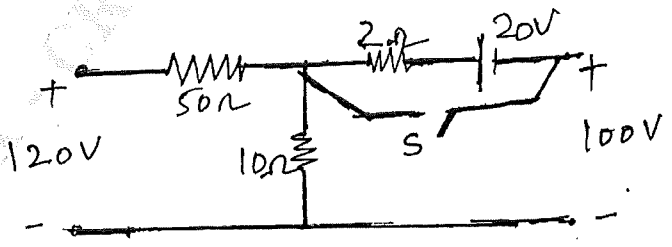

Fig.Q2(c)

Module-2

3 a. Derive Torque equation for a DC motor **(04 Marks)**

b. Explain with neat diagram the constructional features and operation of an induction type single phase energy meter. Show that revolution of disc is proportional to energy consumed. **(06 Marks)**

c. A 40 KW long shunt compound generator supplies full load current at a load voltage of 400V. The shunt and series field resistances are 100Ω and 0.05Ω respectively. Find :
i) Load resistance ii) armature current iii) induced EMF. **(06 Marks)**

OR

4 a. A 4-pole DC shunt motor working on 250 volts takes a current of 2 amperes when running at 1000 RPM. What will be its back EMF, speed if motor takes 51A at certain load? Armature and shunt field resistances are 0.2Ω and 250Ω respectively. **(06 Marks)**

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

c. Explain the significance of back EMF and necessity of a starter for a DC motor. **(04 Marks)**

Module-3

5 a. For circuit shown in Fig.Q5(a) find current in all branches. Draw vector diagram. **(06 Marks)**

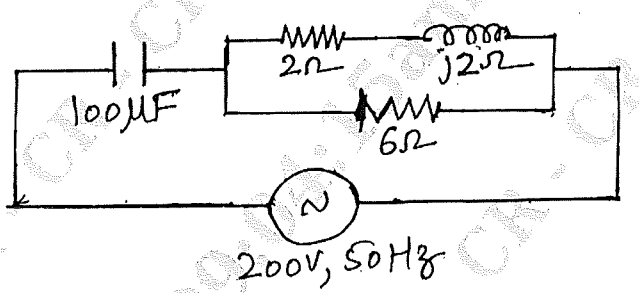

Fig.Q5(a)

b. With neat diagram, explain plate Earthing. **(05 Marks)**

c. Derive the expression for average power consumed in an R-L series circuit. **(05 Marks)**

OR

6 a. Derive RMS value for sinusoidal voltage with definition. **(05 Marks)**

b. With suitable circuit diagrams table the operations of two way control of lamps. **(05 Marks)**

c. A certain takes a current of (–5 + j10) amperes when applied voltage is (50 + j200) volts. If the frequency of the supply is 50Hz, Find :
i) Circuit elements ii) apparent power iii) reactive power iv) power factor. **(06 Marks)**

Module-4

7 a. Show that with necessary circuit and vector diagram the two wattmeters used to measure power reads equal in a 3-phase balanced star connected purely resistive load. **(06 Marks)**

b. Derive the EMF equation of an 3 – phase synchronous generator. **(04 Marks)**

c. Three identical resistors are connected in star across 400V, 50Hz AC supply. The line current is 10Amps. Find power consumed when resistors are reconnected in delta with line current remaining the same. **(06 Marks)**

OR

8 a. A 3 – phase star connected alternator on open circuit is required to generate a line voltage of 3600V, 50Hz when driven at 500 RPM. The stator has 3 slots/pole/phase and 10 conductors/slot. Calculate useful flux/pole by assuming full pitched coils. **(07 Marks)**

b. A certain 3–phase load takes 20KW at 25 KVA. Find the reading of two wattmeters to measure power. **(04 Marks)**

c. With neat diagram, explain the construction and working of salient pole alternator. **(05 Marks)**

Module-5

9 a. Derive the EMF equation of a single-phase transformer. **(04 Marks)**

b. Derive the condition for maximum efficiency and define voltage regulation for a single phase transformer. **(06 Marks)**

c. The EMF in the stator of an 8-pole induction motor has a frequency of 50Hz and that of rotor is 1.5Hz. Find the speed of the rotor and slip. **(06 Marks)**

OR

10 a. With neat diagram, explain the star-delta starter for an 3-phase induction motor. **(05 Marks)**

b. A transformer has a maximum efficiency of 98% at three–fourth load and unity power factor. The copper loss at this load is 314 watts. Compute the efficiency of transformer at 80% load with same power factor. **(07 Marks)**

c. Explain the working of an squirrel cage induction motor with neat diagrams. **(04 Marks)**

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