CBCS SCHEME

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17ELE15/25

First/Second Semester B.E. Degree Examination, June/July 2018
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 and explain Kirchoff's laws with an example. **(07 Marks)**

b. For the bridge circuit shown in Fig.Q1(b), calculate current in all the branches and power supplied by the source. **(08 Marks)**

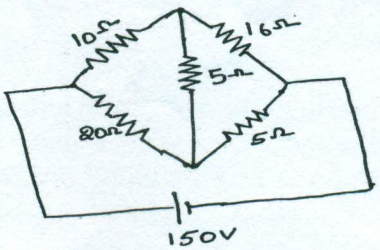

Fig.Q1(b)

c. The winding of an electromagnet is wound with 96 turns and has resistance of 56 Ω. The exciting voltage is 250 volts, and the flux linking coil is 5 mWb. Find the energy stored in magnetic field. If the current is reversed in 0.1 sec, what emf is induced in the coil? **(05 Marks)**

OR

2 a. State and explain Ohm's law and also list out its limitations. **(06 Marks)**

b. Define co-efficient of coupling and its relation with L_1 , L_2 and M. **(06 Marks)**

c. Find the currents in various branches of the given network shown in the Fig.Q2(c).

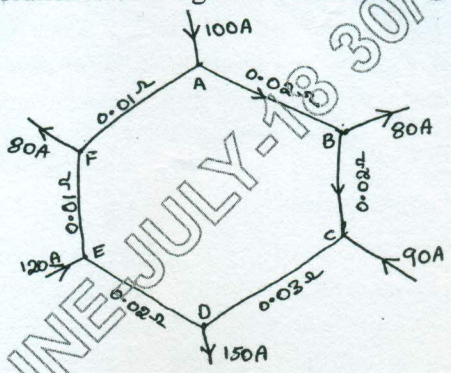

Fig.Q2(c) **(08 Marks)**

Module-2

3 a. Derive emf equation of D.C. generator. **(07 Marks)**

b. With the neat diagram explain the construction and working of dynamometer type wattmeter. **(07 Marks)**

c. A 4 pole lap connected DC generator has 600 armature conductors and runs at 1200 rpm. The generator has flux per pole is 0.06 Wb. Calculate emf induced. Find the speed at which it should be driven to produce the same emf when wave connected. **(06 Marks)**

OR

4 a. Derive the expression for armature torque. **(08 Marks)**

b. With the neat diagram explain the construction and working of induction type energy meter. **(08 Marks)**

c. List the applications of shunt and series motor. **(04 Marks)**

Module-3

5 a. Derive average value of sinusoidal voltage in terms of its maximum value. **(06 Marks)**

b. With the sketch explain the working of three way control of lamp. **(06 Marks)**

c. A voltage e = 100 sin 314t is applied to circuit consisting of 80 μF capacitor in series with 25 Ω resistor. Determine current and power factor in the circuit and also find voltage across the capacitor when current is half of its maximum value. **(08 Marks)**

OR

6 a. Show that power consumed by the pure capacitor is zero. Draw the voltage, current and power wave form. **(06 Marks)**

b. Write a short note on :
(i) Necessity of earthing (ii) Precaution to be taken to prevent electric shock. **(07 Marks)**

c. A circuit consists of a resistance 10 Ω an inductance of 16 mH and a capacitance of 150 μF connected in series. A supply of 100 V, 50 Hz is applied to the circuit. Find the current, power factor and power consumed by the circuit. Draw the phasor diagram. **(07 Marks)**

Module-4

7 a. In 3ϕ star connection find the relation between line and phase values of current and voltage and also derive equation for 3ϕ power. **(08 Marks)**

b. Write the differences between salient pole type and non salient pole type rotor of a synchronous generator. **(06 Marks)**

c. Two wattmeters are connected to measure the input to a 3ϕ, 20 HP, 50 Hz induction motor that works at full load efficiency of 90% and the power factor of 0.85 lagging. Find the readings of two wattmeter. **(06 Marks)**

OR

8 a. Show that the 2 wattmeter are sufficient to measure 3ϕ power. **(08 Marks)**

b. A 3ϕ 6 pole star connected alternator has an armature with 90 slots and 12 conductors per slot. It revolves at 1000 rpm, the flux per pole being 0.05 Wb, calculate the line value of the emf generated. If distribution factor 0.96 and pitch factor is 0.97. **(06 Marks)**

c. A balanced star connected load of (8 + j6) per phase is connected to a 3ϕ, 230 V supply. Find the line current, power factor, reactive power and total volt amperes. **(06 Marks)**

Module-5

9 a. Derive emf equation of a transformer. **(06 Marks)**

b. A 3ϕ induction motor with 4 poles is supplied from the alternator having 6 poles running at 1000 rpm. Calculate synchronous speed of the induction motor, its speed when slip is 0.04 and frequency of the rotor emf when the speed is 600 rpm. **(08 Marks)**

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

OR

10 a. Explain with diagrams the concept of rotating magnetic field in three phase induction motor. **(08 Marks)**

b. A 500 kVA transformer has an efficiency of 92% at full load upf and at half full load 0.9 P.f. Determine its efficiency at 80% of full load and 0.95 P.f. **(06 Marks)**

c. A 3ϕ, 50Hz, 6 pole induction motor has a full load percentage slip of 3% find synchronous speed and actual speed. **(06 Marks)**

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