CBCS SCHEME

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17ELE15/25

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

b. Coils A and B in a magnetic circuit have 600 and 500 turns respectively. A current of 8A in coil A produces a flux of 0.04Wb. If coefficient of magnetic coupling is 2. Calculate : i) self inductance of coil A ii) Mutual inductance iii) Average induced EMF in coil B, when flux with it changes from zero to full value in 0.02 sec. **(07 Marks)**

c. Determine the i) Current flowing through 12Ω and 8Ω resistances ii) Total power dissipated iii) Power dissipated in all resistors. **(07 Marks)**

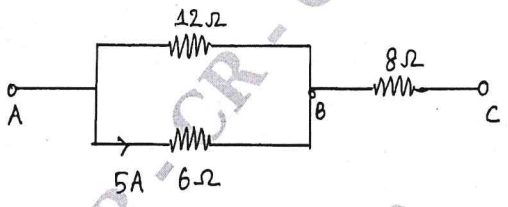

Fig.Q1(c)

OR

2 a. State and explain : i) Faraday's second law ii) Flemings left hand rule. **(06 Marks)**

b. Apply Kirchoff's laws to find pontifical difference between X and Y for below shown electrical circuit diagram IN Fig.Q2(b). **(07 Marks)**

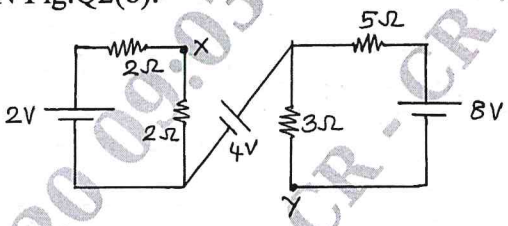

Fig.Q2(b)

c. Derive an expression for energy stored in magnetic field. **(07 Marks)**

Module-2

3 a. Explain the basic working principle of a DC motor. **(06 Marks)**

b. An 8 pole lap connected armature has 960 conductors, a flux of 40 mWb per pole and a speed of 400 RPM. Calculate the emf generated. If the armature were wave connected at what speed must it be driven to generate 400V? **(07 Marks)**

c. Explain the basic working principle of dynamometer type wattmeter with a neat diagram. **(07 Marks)**

OR

4 a. Discuss the classification of DC generators. **(06 Marks)**

b. A 4 pole, DC shunt motor takes 22A from 220V supply. The armature and field resistances are 0.5Ω and 100Ω respectively. The armature is lap connected with 300 conductors. If the flux per pole is 20 mWb. Calculate : i) Speed ii) Torque. **(07 Marks)**

c. Describe the working principle of single phase induction type energy meter with a neat diagram. **(07 Marks)**

Module-3

5 a. Show that current 'i' lags the applied voltage 'v' by 90° in a pure inductive AC circuit and also power consumed is zero. **(06 Marks)**

b. A 200V, 50Hz inductive circuit takes a current of 10A lagging the voltage by 20°. Calculate the resistance and inductance of the circuit. Draw the waveforms of voltage and current. **(07 Marks)**

c. Explain : i) 2 way control of lamp ii) Conduit wiring with neat diagram. **(07 Marks)**

OR

6 a. List out the points for necessity of earthing. Explain the plate earthing a suitable diagram. **(06 Marks)**

b. Derive an expressions for RMS value and average value of sinusoidal AC current. **(07 Marks)**

c. Two impedances $(2 + j3)\Omega$ and $(3 - j4)\Omega$ are connected in parallel across 100Volts, 50Hz supply, Find : i) Branch currents ii) Total current in the circuit diagram. **(07 Marks)**

Module-4

7 a. Obtain the voltage and current relations for a balanced 3phase star connected system with suitable circuit and vector diagram. **(06 Marks)**

b. A balanced delta connected load of $(8 + j6)\Omega$ per phase is connected to a 3 phase 230Volts, 50Hz, AC supply. Find : i) Phase current ii) Line current iii) Power factor iv) Power v) Reactive power vi) Volt – Amp. **(07 Marks)**

c. A 6 pole, 3 phase, start connected alternator has an armature with 90 slots and 12 conductors per slot. If revolves at 1000 RPM, The flux per pole being 0.05 Web.
Calculate : i) Phase EMF ii) Line EMF. Assuming the winding factor is 0.97. **(07 Marks)**

OR

8 a. Explain the generation of 3 phase AC voltages with suitable diagrams. **(06 Marks)**

b. The power input to a 3 phase induction motor running on 400V, 50Hz, AC supply. The wattmeter readings were 3000W and –1000W calculate i) Total input power ii) Power factor iii) Line current. **(07 Marks)**

c. Explain the constructional features of non-salient pole type rotor. **(07 Marks)**

Module-5

9 a. Explain the basic working principle of transformer. **(06 Marks)**

b. A three phase 6 pole, 50Hz induction motor has a slip of 2% at No load and 4% at full load. Determine : i) Synchronous speed ii) Noload speed iii) Full load speed iv) frequency of rotor current at stand still v) Frequency of rotor current at full load. **(07 Marks)**

c. A 200KVA, 10,000/400V, 50Hz single phase transformer has 200 turns on the secondary. Calculate : i) Primary and secondary currents ii) Number of primary turns
iii) Maximum value of flux iv) Flux density at Area = $18cm^2$. **(07 Marks)**

OR

10 a. List the various losses in transformer and discuss each one in brief with their minimization techniques. **(06 Marks)**

b. Describe the basic working principle of 3 phase induction motor and list the applications of induction motor. **(07 Marks)**

c. In a 25KVA, 2000/200V, single phase transformer, the iron and full load copper losses are 350W and 400W respectively. Calculate the efficiency at unity power factor on :
i) Full load ii) Half full load. **(07 Marks)**

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