CBCS SCHEME

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18ELE13/23

First/Second Semester B.E. Degree Examination, June/July 2023
Basic Electrical Engineering

Time: 3 hrs. Max. Marks: 100

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

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

Module-1

1 a. State and explain Ohm's law, write its limitations. **(06 Marks)**

b. Using Kirchhoff's law, find the potential difference between 'a' and 'b'.

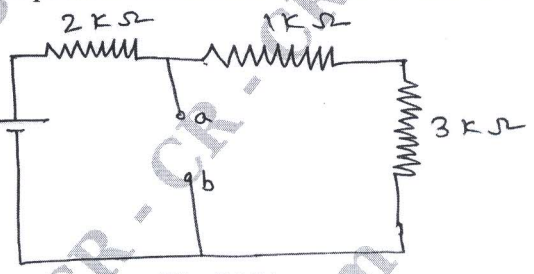

Fig.Q1(b) **(06 Marks)**

c. Define the following:
(i) Amplitude (ii) Time period
(iii) Frequency (iv) Instantaneous value for sinusoidal wave **(08 Marks)**

OR

2 a. Derive an expression for RMS value of sinusoidal current. **(06 Marks)**

b. An alternating current i is given by ; i = 141.4 sin 314t. Find:
(i) Maximum value (ii) Frequency and time period
(iii) RMS value (iv) The instantaneous value when 't' is 3 ms **(06 Marks)**

c. A resistance of 'R' Ω is connected in series with a parallel circuit comprising two resisters of 12 Ω and 8 Ω respectively. The total power dissipated in the circuit is 70 W when the applied voltage is 22 Volts. Calculate value of 'R'. **(08 Marks)**

Module-2

3 a. Show that the average power consumed by pure inductor is zero. Draw the waveforms of current voltage and power. **(08 Marks)**

b. A coil having resistance of 7Ω an inductance of 31.8 mH is connected to 230 V, 50 Hz supply. Calculate: (i) Current (ii) Phase angle (iii) Power factor (iv) Power consumed **(08 Marks)**

c. Define active, reactive and apparent power. **(04 Marks)**

OR

4 a. In three phase delta connection, find the relation between line and phase values of currents and voltages. Also derive the equation for three phase power. **(08 Marks)**

b. A balanced star connected load of (8 + j6)Ω per phase is connected to a three phase, 230 V supply. Find line current, pf and reactive power. **(06 Marks)**

c. A resistance of 20Ω and a coil of inductance 31.8 mH are connected in parallel across 230 V, 50 Hz supply. Find : (i) Current (ii) p.f. (iii) Power consumed by circuit. **(06 Marks)**

Module-3

5 a. Explain construction and working of single phase transformer. **(06 Marks)**

b. With neat sketch, explain plate earthing. **(06 Marks)**

c. In a certain 50 kVA transformer, the number of turns on the primary and secondary windings is 834 and 58 respectively. If primary is connected to a 3300 V supply, find:

(i) Secondary voltage

(ii) The primary and secondary currents

(iii) Maximum flux required if primary voltage is 3300 V and 50 Hz. **(08 Marks)**

OR

6 a. With the truth table, explain controlling lamp by three way control. **(07 Marks)**

b. With neat sketch, write the function of service main, meter board and distribution board. **(06 Marks)**

c. In a 50 KVA transformer the iron loss is 500 Watts and full load copper loss is 800 Watts. Find the efficiency at: (i) Full load UPF (ii) $\frac{1}{2}$ load, 0.8 pf lead **(07 Marks)**

Module-4

7 a. With the neat sketch, explain the construction of D.C. generator. **(07 Marks)**

b. Derive torque equation for D.C. motor. **(06 Marks)**

c. A 6-pole lap-wound d.c. generator has 600 conductors on its armature. The flux per pole is 0.02 Wb. Calculate:

(i) The speed at which the generator must be run to generate 300 V.

(ii) What would be the speed if the generator were wave-wound? **(07 Marks)**

OR

8 a. Explain the characteristics of D.C. series motor. **(06 Marks)**

b. A 30 KW, 300V d.c. shunt generator has armature and field resistance of 0.05Ω and 100 Ω respectively. Calculate the generated voltages if brush drop is 1V/brush. **(07 Marks)**

c. A d.c. motor taxes an armature current of 110 A at 480 V. The armature resistance is 0.2 Ω. The machine has 6-poles and the armature is lap connected with 864 conductors. The flux per pole is 0.05 Wb. Calculate the gross torque developed by the motor. **(07 Marks)**

Module-5

9 a. With neat sketch, explain the construction of three phase synchronous generator. **(07 Marks)**

b. 500 H.P, 3-phase, 440 V, 50 Hz induction motor has a speed of 950 rpm on full load. The machine has 6-poles. Calculate full load slip. Also find rotor frequency. **(06 Marks)**

c. A 3-phase, 50 Hz, star connected alternator (synchronous generator) has 180 conductors per phase and flux per pole is 0.0543 Wb. Find e.m.f. generated per phase and line if $K_c = 1$ and $K_d = 0.96$. **(07 Marks)**

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OR

10 a. Explain, how a rotating magnetic field generated in 3-phase induction motor. **(07 Marks)**

b. Derive e.m.f. equation of three phase synchronous generator. **(07 Marks)**

c. A 6-pole alternator running at 1000 rpm supplied on 8-pole induction motor. Find the actual speed of the motor if the slip is 2.5%. **(06 Marks)**

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