

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.

Module-1

- 1 a. State and explain Ohm's law, write its limitations. (06 Marks)
b. Using Kirchoff's law, find the potential difference between 'a' and 'b'.

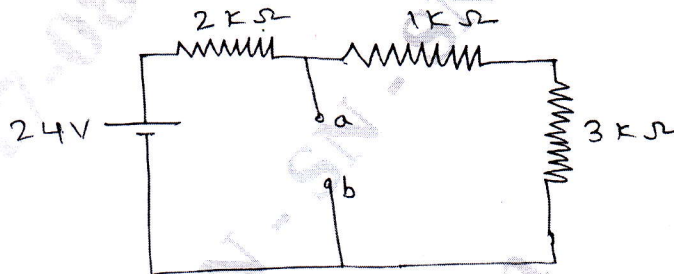


Fig.Q1(b)

- c. Define the following: (06 Marks)
(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 (06 Marks)
(iii) RMS value (iv) The instantaneous value when 't' is 3 ms
c. A resistance of 'R' Ω is connected in series with a parallel circuit comprising two resistors 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 7 Ω 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 $(8 + j6)\Omega$ per phase is connected to a three phase, 230 V supply. Find line current, pf and reactive power. (06 Marks)
c. A resistance of 20 Ω 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 100Ω respectively. Calculate the generated voltages if brush drop is 1V/brush. (07 Marks)
 c. A d.c. motor takes an armature current of 110 A at 480 V. The armature resistance is 0.2Ω . 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)

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)
