Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE- SEMESTER– 1st / 2nd • EXAMINATION – WINTER 2018

Subject Code:110005 Date: 18/01/2019

Subject Name: Elements of Electrical Engineering

Time:10:30 AM TO 1:00 PM Total Marks: 70

Instructions:

1. **Attempt any five questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

Q.1 **(a)** Derive an expression for temperature coefficient at temperature t, $\alpha_t = \alpha_0 /(1+\alpha_0 t)$. Where notation have usual meaning. **07**

(b) Derive an expression for calculating equivalent start to delta transformation. **07**

Q.2 **(a)** The resistance of a certain length of wire is 4.6 Ω at 20° C and 5.68 Ω at 80° C. Determine (i) temperature co-efficient of resistance of the material of wire at 0° C (ii) resistance of wire at 60°C. **07**

(b) Find the effective resistance of the network shown in Figure I. **07**

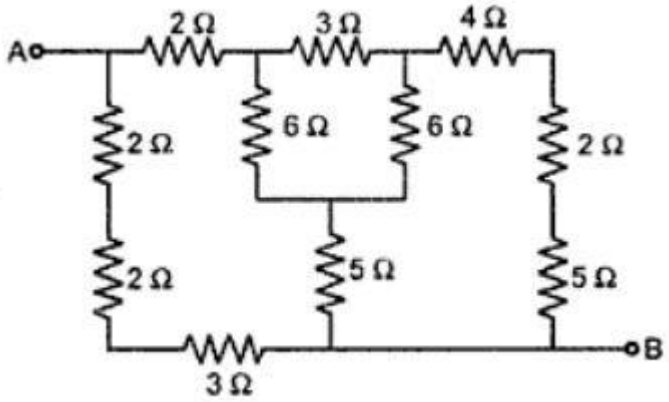

Fig. I

Q.3 **(a)** Compare electric circuit with magnetic circuit. **07**

(b) Two metal plates of area 100 cm^2 are separated by a dielectric of a 2 mm having a relative permittivity of 5.When a dc voltage of 500 V is applied across the capacitor plates, find (i) capacitance (ii) charge on the capacitor (iii) electrical field strength and (iv) electric flux density. **07**

Q.4 **(a)** Define capacitance. Derive an expression for the total capacitance of a group of capacitance when (i) they are connected in series (ii) they are connected in parallel. **07**

(b) Two coils having 100 and 1000 turns respectively have common magnetic circuit of 25 cm diameter and 625 cm^2 cross-section and a constant relative permeability of 2000.Calculate, **07**

(i) Self inductance of both the coils

(ii) Mutual inductance between them if the co-efficient of coupling is 0.5.

Q.5 **(a)** Prove that current in purely inductive circuit lags its voltage by 90° and average power consumption in pure inductor is zero. **07**

(b) An air-cored choke coil takes a current of 3 A and dissipates 200 W, when connected to 200 V, 50 Hz supply. In another similar coil, current is 3 A and power is 270 W under the same conditions. Calculate the (i) current taken (ii) power factor (iii) total power absorbed when two coils are connected in series to the same supply. **07**

Q.6 **(a)** State relation between line voltage and phase value of voltage and current for **07**

(i) Balanced star connected load.

(ii) Balanced delta connected load.

(b) Explain variation of wattmeter readings for 3-phase power measurement by two watt method as power factor takes values of unity, 0.5, between 0.5 and 0 and 0. **07**

Q.7 **(a)** Explain charging of battery from AC supply with schematic diagram. **07**

(b) Explain construction of cable. Explain each part and its importance. **07**

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