Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–1/2 EXAMINATION – WINTER 2017

Subject Code: 110005 Date: 09/01/2018

Subject Name: Elements of Electrical Engineering

Time: 10:30 AM TO 01:00 PM Total Marks: 70

Instructions:

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

Q.1	**(a)**	State and explain Kirchoff's voltage law and current law with suitable examples	**07**
	(b)	A coil has a resistance of 18 Ω when the mean temperature is 20° C and 20 Ω when the temperature is 50° C . Find its mean temperature rise when the resistance is 21 Ω and the ambient temperature is 15°C.	**07**
Q.2	**(a)**	Derive the expression for charging current in a R-C circuit. Hence, define the time constant of RC circuit.	**07**
	(b)	Obtain the relation $L = (L_1L_2 – M^2)/ (L_1+ L_2 + 2M)$ for the equivalent inductance when two coils are connected in parallel such that the mutually induced emf opposes the self induced emf.	**07**
Q.3	**(a)**	Define capacitance and derive the equation of the same for a parallel plate capacitor with uniform dielectric medium. Also, derive the equation for the energy stored in it.	**07**
	(b)	Explain Faraday's law of electromagnetic induction. Hence explain statically induced e.m.f and dynamically induced e.m.f.	**07**
Q.4	**(a)**	Explain the similarities & dissimilarities between electric and magnetic circuits.	**07**
	(b)	Define i. RMS value ii. Average value for an a.c waveform. Write the mathematical expression for the same. Hence, define also Form Factor and Peak Factor.	**05 02**
Q.5	**(a)**	Derive the expression for current through a series connected R- L circuit when supplied by a.c sinusoidal voltage. Draw the vector diagram. Also derive the expression of average power consumption in this circuit over 1 cycle	**07**
	(b)	A circuit contains a resistance of 4 Ω , inductance of 0.5 H and a variable capacitance C connected in series across 100 V, 50 Hz supply. Calculate i). The value of capacitance to produce resonance ii). Voltage and current across C at resonance iii). Q factor of the circuit.	**07**
Q.6	**(a)**	Derive the relation between line voltage and phase voltage, line current and phase current in a star connected electric circuit.	**07**
	(b)	Draw the diagram and explain the working of i. Staircase wiring ii. Parallel or domestic wiring.	**07**
Q.7	**(a)**	Explain the two wattmeter method to measure power in a balanced 3 phase circuit.	**07**
	(b)	Explain the working of ELCB and MCB.	**07**

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