Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE SEMESTER– 1st/2nd (OLD SYLLABUS) EXAMINATION – SUMMER 2015

Subject Code:110005 Date:16/06/2015

Subject Name: Elements of Electrical Engineering

Time: 10:30 am - 01:00 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 equivalent resistances for delta to star transformation.	**05**
	(b)	Derive an expression for temperature coefficient at temperature t, $\alpha_t = \alpha_0 / (1+ \alpha_0.t)$. Where notations have usual meanings.	**05**
	(c)	A 100 A current is shared by three resistances connected in parallel. The resistor wires are of the same material and have their length in the ratio 2:3:4 and their cross sectional area in the ratio 1:2:3.Determine the current in each resistor.	**04**
Q.2	**(a)**	Define & explain following terms: (1) Magneto Motive Force (M.M.F.) (2) Reluctance (3) Magnetic Field Intensity.	**03**
	(b)	Derive equation for energy stored in a capacitor	**05**
	(c)	A 8 μF capacitor is connected with 0.5 MΩ resistor across a 200 V d.c supply. Calculate:(i)the time constant,(ii)the initial charging current,(iii)time taken for the p.d across the capacitor to grow to 160 V and(iv)the current and voltage across the capacitor in 4 second after it is connected to the supply.	**06**
Q.3	**(a)**	Obtain the relation $L = (L_1L_2 – M_2) / (L_1+L_2+2M)$ for equivalent inductance when two inductors are connected in parallel such that the mutually induced emf opposes the self induced emf.	**07**
	(b)	Compare similarities and dissimilarities between electrical and magnetic circuit.	**07**
Q.4	**(a)**	A 10 μF capacitor in series with an 1 MΩ resistor is connected across a 100 V supply.Determine Prove that current in pure inductive circuit lags its voltage by 90º.	**07**
	(b)	Define the following terms with respect to AC waveforms (1) phase (2) Time period	**04**
	(c)	A certain waveform has a form factor of 1.2 and a peak factor of 1.5.If the maximum value is 100,find the r.m.s value and average value.	**03**
Q.5	**(a)**	Explain series resonance circuit. Draw resonance curve.	**07**
	(b)	Established relationship between line and phase voltages and currents in balanced delta connection. Draw complete phasor diagram of voltages and currents.	**07**
Q.6	**(a)**	Explain two wattmeter method for 3-phase power measurement.	**07**
	(b)	What is Battery? Explain the construction and working of any battery.	**03**
	(c)	Draw & explain staircase wiring with necessary sketch.	**04**
Q.7	**(a)**	Explain construction of cable.	**05**
	(b)	What is an electric shock? Why grounding is required?	**05**
	(c)	State types of fuse and explain any one.	**04**

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