Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER– I & II (NEW) EXAMINATION – WINTER 2019

Subject Code: 3110005 Date: 11/01/2020

Subject Name: Basic Electrical Engineering

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

Instructions:

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

			Marks
Q.1	**(a)**	State Ohm's law and Kirchhoff's Laws in context with DC circuits.	**03**
	(b)	A 100V,60 Watt bulb is to be operated from a 220V supply. What is the resistance to be connected in series with the bulb to glow normally?	**04**
	(c)	Derive an expression for equivalent resistances of a star connected network to transform into a Delta connected network.	**07**
Q.2	**(a)**	State Thevenin's and Norton's Theorems.	**03**
	(b)	Compare series and parallel resonance in ac circuit.	**04**
	(c)	A single phase R-L-C circuit having resistance of 8Ω, inductance of 80mH and capacitance of 100μF is connected across single phase ac 150 V , 50Hz supply. Calculate the current, power factor and voltage drop across inductance and capacitance.	**07**
		OR	
	(c)	Derive an expression for the voltage across the capacitor during charging through the resistor at any instant $V_C = V(1-e^{-t/RC})$. Assume that RC series circuit is connected across a DC supply of voltage V.	**07**
Q.3	**(a)**	Define the following terms in connection with AC waveforms:- 1. Q-Factor 2. Power Factor 3.Form factor.	**03**
	(b)	Draw impedance triangle, Voltage triangle, Power triangle for single phase R-L series circuit.	**04**
	(c)	Derive the relationship between Phase and Line values of voltages and currents in case of 3-phase Star- connection.	**07**
		OR	
Q.3	**(a)**	Define the terms:- 1. Real power 2. Reactive power 3. Apparent power.	**03**
	(b)	Derive the EMF equation of single phase transformer.	**04**
	(c)	With neat circuit diagram and a phasor diagram prove that two watt meters are sufficient to measure total power in 3-phase system.	**07**
Q.4	**(a)**	Explain working principle of single phase Transformer.	**03**
	(b)	Give Merits, Demerits and Applications of Induction Motor.	**04**
	(c)	Explain in detail the construction of an Alternator.	**07**
		OR	
Q.4	**(a)**	Explain working principle of D.C. Motor.	**03**
	(b)	Compare poly phase Induction Motor and single phase Induction Motor.	**04**

	(c)	Explain Generation of Rotating Magnetic Field in 3-phase Induction Motor with diagrams and equations.	**07**
Q.5	**(a)**	Classify different types of cables with reference to voltage and insulation materials.	**03**
	(b)	Explain the terms:- 1. Residual magnetism 2. Coercive Force.	**04**
	(c)	Explain the process of charging and discharging of Lead acid cell.	**07**

OR

Q.5	**(a)**	Compare MCB and ELCB.	**03**
	(b)	Write safety precautions for electrical Applications.	**04**
	(c)	Explain different methods of power factor improvement.	**07**

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