Seat No.: _____ *Enrolment No._____*

GUJARAT TECHNOLOGICAL UNIVERSITY

M. E. - SEMESTER – II • EXAMINATION – WINTER • 2014

Subject code: 1722909 **Date: 08-12-2014**

Subject Name: Industrial Electronics

Time: 02:30 pm - 05:00 pm **Total Marks: 70**

Instructions:

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

Q.1	**(a)**	What are the advantages of electric heating? Classify various electric heating methods.	**07**
	(b)	Briefly explain any one method of generation of ultrasonic wave. Define: (i) Attenuation, (ii) Doppler Effect & (iii) Refraction	**07**
Q.2	**(a)**	What are the different types of welding processes? Define: (i) Squeeze Time, (ii) Weld Time & (iii) Hold Time	**07**
	(b)	Explain network architecture in detail with neat block diagram.	**07**
		OR	
	(b)	Briefly explain various network topologies with neat diagrams.	**07**
Q.3	**(a)**	Explain SMPS design with fly-back topology.	**07**
	(b)	Why battery charging is required? What are the different charging modes? Draw and explain a basic battery charging circuit.	**07**
		OR	
Q.3	**(a)**	Compare Voltage Source Inverter (VSI) & Current Source Inverter (CSI). Draw only the circuit diagram of a CSI-based high frequency power source for induction heating.	**07**
	(b)	Explain the basic principle of operation of SMPS with neat block diagram.	**07**
Q.4	**(a)**	Why electrical power is transmitted at high voltage level? Enlist advantages & disadvantages of HVDC transmission over HVAC transmission.	**07**
	(b)	Enlist the applications of UPS. What is the meaning of Online UPS & Offline UPS? Explain any one of them with neat block diagram.	**07**
		OR	
Q.4	**(a)**	What is the fundamental difference between DC drive & AC drive? Briefly explain various types of duty cycles of drives with Torque→Time characteristics.	**07**
	(b)	(i) What are the applications of high frequency induction heating? Write only the expression of heat generated in the work-piece using high frequency induction heating.	**05**
		(ii) For hardening of an aluminum pulley; required depth of penetration is 1.5mm. Relative permeability & specific resistance of aluminum is 1.0 & 5×10^{-7}Ým respectively. Determine the supply frequency.	**02**
Q.5	**(a)**	What are the various systems for traction? What are the advantages of electric traction? Briefly explain electric traction system with basic block diagram.	**07**
	(b)	(i) Compare induction heating & dielectric heating.	**03**
		(ii) The power required for dielectric heating of a slab of resin of $150cm^2$ in area and 2cm thick is 200W, 30MHz. The material has a	**04**

relative permittivity of 5 and power factor of 0.05. Determine the voltage necessary and current flowing through the material.

If the voltage is limited to 600V; what will be the value of the supply frequency to obtain the same amount of heating?

OR

Q.5 **(a)** Explain the principle of operation of dielectric heating with neat diagrams. What are the applications of dielectric heating? **07**

(b) Explain spot welding with neat diagram. **07**

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