Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

M. E. - SEMESTER– II • EXAMINATION – SUMMER 2017

Subject Code: 2722914 **Date:31/05/2017**

Subject Name: Industrial Electronics & Control

Time: 02:30 PM – 05:00 PM **Total Marks: 70**

Instructions:

1. **Attempt all the questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Notations and symbols used have usual technical meaning.**

Q.1	**(a)**	Draw only the basic structure of a Power MOSFET and briefly explain its principle of operation with neat diagram.	**07**
	(b)	A UPS is driving a 1kW load which has a lagging power factor of 0.85. The efficiency of the inverter is 84%. The battery voltage is 24V DC. If there is a separate charger for battery, determine: (i) kVA rating of the inverter, (ii) Wattage of rectifier and (iii) AH rating of battery for a backup time of 15 minute.	**07**
Q.2	**(a)**	What is an electric drive? What is the basic difference between DC drive and AC drive? Explain any one method of breaking of a DC motor with neat diagram.	**07**
	(b)	Why electrical power is transmitted at high voltage level? Enlist advantages and disadvantages of HVDC transmission over HVAC transmission.	**07**
		OR	
	(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) Induction heating is used for hardening of an aluminum pulley. Required depth of penetration is 1.3mm. Relative permeability and specific resistance of aluminum is 1.0 & $5\times10^{-7}\Omega$m respectively. Determine the supply frequency.	**02**
Q.3	**(a)**	Compare Online UPS and Offline UPS. Explain Offline UPS with neat block diagram.	**07**
	(b)	Explain the principle of operation of SCR using two-transistor equivalent model.	**07**
		OR	
Q.3	**(a)**	Why battery charging is required? What are the different charging modes? Draw and explain a basic battery charging circuit.	**07**
	(b)	Explain feed-forward SMPS with neat circuit diagrams and waveforms.	**07**
Q.4	**(a)**	Explain battery operated vehicle with basic block diagram.	**07**
	(b)	Explain the principle of operation of dielectric heating with neat diagrams. What are the applications of dielectric heating?	**07**
		OR	
Q.4	**(a)**	Explain energy storage welding system with neat diagram.	**07**
	(b)	Enlist various speed control methods of DC series and shunt motors. Explain any one method.	**07**

Q.5	**(a)**	Explain the concept of V/f control of induction motor.	**07**
	(b)	Explain push-pull SMPS with neat circuit diagrams and waveforms.	**07**

OR

Q.5	**(a)**	Draw only the basic structure of an IGBT and briefly explain its principle of operation with neat diagram.	**07**
	(b)	Classify various welding methods. Explain spot welding with neat diagram.	**07**

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