Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER– V (New) EXAMINATION – WINTER 2019

Subject Code: 2153406 **Date: 21/11/2019**

Subject Name: Mechatronics

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)**	What are the key elements of Mechatronics system?	**03**
	(b)	List out various heat treatment processes? Explain any Two heat treatment process.	**04**
	(c)	Explain conductors, semiconductor & Insulators.	**07**
Q.2	**(a)**	List out solid state switches. Explain any one.	**03**
	(b)	Name types of stepper motors. Explain any two with neat diagram.	**04**
	(c)	Brief the construction and working principle of following; (i) Linear and rotary potentiometer (ii) Strain gauge.	**07**
		OR	
	(c)	Explain "C" type bourdon gauge.	**07**
Q.3	**(a)**	Write short note about the bimetallic strips.	**03**
	(b)	Write short note on Optical encoders.	**04**
	(c)	List out the different actuating methods for hydraulic direction control valve. Explain Two stage hydraulic direction control valve.	**07**
		OR	
Q.3	**(a)**	Explain belt and Chain drives.	**03**
	(b)	Write short notes on the working of a Ratchet and pawl mechanism.	**04**
	(c)	With neat diagrams illustrate the working of Filter-Regulator- Lubricator (FRL) unit in a pneumatic system	**07**
Q.4	**(a)**	Explain Thermocouple.	**03**
	(b)	Explain Two step control mode in controllers.	**04**
	(c)	Demonstrate the details about inductive transducer used to measure the linear displacement.	**07**
		OR	
Q.4	**(a)**	Explain Thermistors.	**03**
	(b)	List down the various stages in mechatronic system design.	**04**
	(c)	What is Proportional-Integral-differential (PID) controller? Explain each of constituents with neat sketch.	**07**
Q.5	**(a)**	Explain 3 basic laws of robotics	**03**
	(b)	Elaborate the construction and Input/output details of PLC.	**04**
	(c)	Draw the ladder logic diagram of OR, NOR, NANO and XOR logic.	**07**
		OR	
Q.5	**(a)**	What is an internal relay in PLC?	**03**
	(b)	Design a robot to pick and place the object and comment on the various elements in the system.	**04**
	(c)	Write abort notes on PLC for the following: . (1) Data Movement (2) Data Comparison.	**07**

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