Seat No.: _____ **Enrolment No._____**

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–V (NEW) - EXAMINATION – SUMMER 2017

Subject Code: 2153406 **Date: 03/05/2017**

Subject Name: Mechatronics

Time:02:30 PM to 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.**

			MARKS
Q.1		**Short Questions**	**14**
	1	A bread toaster is an example of (a) Open-loop System (b) Closed-loop System (c) Servo Mechanism System (d) All of above	
	2	The element which converts the signal from one physical form to another without changing the information is called as (a) Transducer (b) Transistor (c) TRIAC (d) Converter	
	3	Which type of DC motor is used for large starting torque? (a) Compound Motor (b) Shunt Motor (c) Servo Motor (d) Series Motor	
	4	_____ can be used to convert rotary motion to linear motion? (a) Rack and Pinion (b) Lead Screw (c) Slider-Crank Mechanism (d) All of above	
	5	Which of the following is used to detect the presence of an object? (a) Proximity Sensor (b) Flow Sensor (c) Light Sensor (d) All of above	
	6	_____Valve is used to control the speed of a hydraulic piston. (a) Pressure Relief (b) Non Return (c) Flow Control (d) All of above	
	7	Which of the following device is used to control high power systems (up to 30 MW)? (a) Diode (b) Transistor (c) Thyristor (d) None of above	
	8	In Robotics, the motion in which the axis of rotation is perpendicular to the axes of two connecting links is known as_____. (a) Rotational motion (b) Twisting motion (c) Revolving motion (d) Linear motion	
	9	Which one of the following is not a feature of a sensor? a) Accuracy b) Repeatability c) Precision d) Work Volume	
	10	Gear pump is _____ pump. a) Positive Displacement b) Rotary c) Positive Displacement and Rotary d) None of above	
	11	Define Hall Effect.	
	12	Define Hysteresis.	
	13	Define Back emf.	
	14	Define displacement volume in terms of pump.	
Q.2	**(a)**	What are the advantages of Mechatronics System?	**03**
	(b)	Explain LVDT with neat sketch.	**04**

	(c)	Explain Mechatronics design process.	**07**
		OR	
	(c)	What is a 'Control System'? Compare 'Open-Loop' and 'Closed-Loop' control system.	**07**
Q.3	**(a)**	Explain relay driver circuit with one application.	**03**
	(b)	Explain different types of belt drive used to transmit the power.	**04**
	(c)	Explain with circuit diagram, speed control of D.C shunt, series and compound motor by flux reduction method.	**07**
		OR	
Q.3	**(a)**	Explain solenoid with neat sketch.	**03**
	(b)	Explain different types of gear train used to transmit the power.	**04**
	(c)	What is DC stepper motor? Explain its working and construction in detail.	**07**
Q.4	**(a)**	Explain Hydraulic load cell with neat sketch.	**03**
	(b)	Design a Hydraulic Circuit to control the velocity of reverse stroke using lever operated 4/3 direction control valve and flow control valve with non-return valve.	**04**
	(c)	What is a Microprocessor? Explain all types of buses used in Microprocessor.	**07**
		OR	
Q.4	**(a)**	Explain Pneumatic load cell with neat sketch.	**03**
	(b)	Design a Pneumatic Circuit to control a double acting cylinder using 5/2 air-air valve. The piston should extend when two push buttons are pressed simultaneously and automatically retract after fully extended.	**04**
	(c)	Explain structure of PLC with its components.	**07**
Q.5	**(a)**	Explain Digital Counter with suitable application.	**03**
	(b)	Explain Forward and Reverse Kinematics with suitable examples.	**04**
	(c)	Explain Automatic Car Parking System as Mechatronics System.	**07**
		OR	
Q.5	**(a)**	Explain Digital Timer with suitable application.	**03**
	(b)	List types of Robot Configuration. Explain any one with neat sketch.	**04**
	(c)	Explain Antilock Braking System (ABS) as Mechatronics System.	**07**

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