Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

ME - SEMESTER–I(New course)• EXAMINATION – WINTER- 2015

Subject Code: 2714701 **Date: 01/01/2016**

Subject Name: Concepts in Mechatronics Engineering

Time:2:30 pm to 5:00 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)**	Define following giving neat sketch. (i)Inversion (ii) Degree of freedom (iii) Binary and ternary links	**07**
	(b)	Explain construction, operating mechanism and characteristics of power diode.	**07**
Q.2	**(a)**	Draw schematic diagram and write a short note on DC Stepper motor.	**07**
	(b)	Explain different type of cams and followers with neat sketches.	**07**
		OR	
	(b)	Explain Gruebler's criterion for degree of freedom giving related equations for planar and spatial mechanisms.	**07**
Q.3	**(a)**	What are the considerations for material selection in mechanical engineering design? Explain briefly giving examples.	**07**
	(b)	Draw circuit diagrams of series, shunt and compound motor and also explain the working principle.	**07**
		OR	
Q.3	**(a)**	Explain (i) bearing (ii)torsion (iii) bending giving related equations and sketch.	**07**
	(b)	Explain construction and working principle of solenoid with neat sketch.	**07**
Q.4	**(a)**	Define (i)circular pitch (ii) module (iii) base circle (iv) pressure angle with reference to gear giving neat sketch.	**07**
	(b)	A cantilever beam of rectangular section having width as half of its depth is subjected to 50 KN axial load and 50 Nm bending moment. Its length is 100mm.Design the section. Assume suitable stresses.	**07**
		OR	
Q.4	**(a)**	Distinguish between longitudinal,transverse and torsional vibrations giving examples and sketches.	**07**
	(b)	What is the generalized procedure of design of machine element? Explain briefly with flow chart.	**07**
Q.5	**(a)**	List out different power electronics switches with their symbols.	**07**
	(b)	Write a short note on single phase AC motors.	**07**
		OR	
Q.5	**(a)**	Explain speed control of DC motor using half wave and full wave rectifier using SCR and also draw the wave forms.	**07**
	(b)	Explain poles and throws in terms of electrical switching.	**07**

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