Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

PDDC - SEMESTER–III EXAMINATION – SUMMER 2016

Subject Code:X31903 **Date:01/06/2016**

Subject Name:Machine Design & Industrial Drafting

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.**

Q.1	**(a)**	Define following terms: (i) Hardness, (ii) Toughness, (iii) Elasticity, (iv) Creep, (v) Tensile stress, (vi) Fatigue,(vii) Bearing stress.	**07**
	(b)	Explain factor of safety and stress concentration factor.	**07**
Q.2	**(a)**	Define Machine Design and Explain various types of Machine Design.	**07**
	(b)	Design a knuckle joint to transmit 6 kN axial tensile load. Allowable stresses in the fork end, eye end and rod and pin are : allowable tensile stress = 55MPa, allowable shear stress = 40MPa, allowable bearing pressure = 80MPa,	**07**
		OR	
	(b)	Design the rectangular key for a shaft of 50 mm diameter. The shearing and crushing stresses for the key material are 45 MPa and 70 MPa	**07**
Q.3	**(a)**	Design a double riveted, double strap, chain type butt joint for plates having 10mm thickness. Also find efficiency of the joint. Take 95 MPa in tension, 155 MPa in crushing, and 80 MPa in shearing.	**07**
	(b)	Explain design procedure for protected type rigid flange coupling.	**07**
		OR	
Q.3	**(a)**	Compare the weight, strength and stiffness of a hollow shaft of the same external diameter as that of solid shaft. The inside diameter of the hollow shaft being half the external diameter. Both the shafts have the same material and length	**07**
	(b)	Design a sleeve coupling for the transmission of 12 kW at 300 rpm by two connected steel shafts. Take service factor Ks = 1.25. Take shear stresses in the key and shaft = 50 MPa, Crushing stress in the key = 100 MPa, Shear stress in the sleeve = 10 MPa.	**07**
Q.4	**(a)**	Explain various types of power screw threads with its advantages and limitations with sketch.	**07**
	(b)	A triple threaded power screw, used in a screw jack, has a nominal diameter of 50 mm and a pitch of 8 mm. The threads are square and the length of nut is 48 mm. The screw jack is used to lift a load of 7.5 kN. The coefficient of friction at the threads is 0.12 and collar friction is negligible. Calculate: (i) the principal shear stress in the screw body, (ii) the transverse shear stresses in the screw and the nut, (iii) the unit bearing pressure. State whether the screw is self-locking or not.	**07**

OR

Q.4	**(a)**	Explain different types of keys with its applications.	**07**
	(b)	A bell crank lever is to be designed to raise a load of 15 kN at the short arm end. The arm lengths are 150 mm and 500 mm. The permissible stresses for lever and pin materials in shear and tension are 60 MPa and 90 MPa respectively. The bearing pressure on the pin is to be limited to 12 MPa. Assume the lever cross section as t x 4t and fulcrum pin length as 1.25 times pin diameter.	**07**
Q.5	**(a)**	Explain following auto cad command with example. 1) copy 2) Trim 3) line 4) Mirror 5) Extend 6) Polyline 7) Hatch	**07**
	(b)	Explain circle, rectangle, polygon, scale, array, mirror and trim commands of AutoCAD.	**07**

OR

Q.5	**(a)**	What are the advantages of welded joint over riveted joints and Cast iron structures?	**07**
	(b)	What is Leverage? Discuss various types of levers and their practical application.	**07**

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