Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

PDDC - SEMESTER–III • EXAMINATION – SUMMER 2013

Subject Code: X 31903 **Date: 15-05-2013**

Subject Name: Machine Design and Industrial Drafting

Time: 02.30 pm - 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)**	Explain general procedure of machine design.	**07**
	(b)	Describe the following terms. (i) Factor of Safety (ii) Bearing Stress	**07**
Q.2	**(a)**	What do you understand by the term welded joint? Discuss pros and cons of welded joint over riveted joints.	**07**
	(b)	Explain the failure of a riveted joint with neat sketch.	**07**
		OR	
	(b)	A double riveted double cover butt joint in plates 20 mm thick is made with 25 mm diameter rivets at 100 mm pitch. The permissible stresses are: Tensile stress = 120 N/mm^2, Shear Stress = 100 N/mm^2 and Crushing stress = 150 N/mm^2. Find the efficiency of joint, taking the strength of the rivet in double shear as twice than that of single shear.	**07**
Q.3	**(a)**	Explain the design of sleeve and cotter joint with neat sketch.	**07**
	(b)	Design a knuckle joint to transmit 150 kN. The design stresses may be taken as 75 N/mm^2 in tension, 60 N/mm^2 in shear and 150 N/mm^2 in compression.	**07**
		OR	
Q.3	**(a)**	Describe the design of flange coupling with neat sketch.	**07**
	(b)	A 45 mm diameter shaft is made of steel with a yield of 400 N/mm^2. A parallel key of size 14 mm wide and 9 mm thick made of steel a yield of 340 N/mm^2 is to be used. Find the required length of key, if the shaft is loaded to transmit the maximum permissible torque. Use maximum shear stress theory and assume a factor of safety of 2.	**07**
Q.4	**(a)**	Compare the weight, Strength and stiffness of 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 shafts have the same material and length.	**07**
	(b)	A mild steel shaft transmits 20 kW at 200 r.p.m. It carries a central load of 900 N is simply supported between the bearing 2.5 meters apart. Determine the size of the shaft, if the allowable shear stress in 42 N/mm^2 and the maximum tensile or compressive stress is not to exceed 56 N/mm^2.	**07**
		OR	
Q.4	**(a)**	Why are square threads preferable to V threads for power transmission? How does the helix angle influence on the efficiency of square threaded screw?	**07**
	(b)	Explain the design of screw jack with neat sketch.	**07**
Q.5	**(a)**	Define the leverage and mechanical advantage. Explain the types of levers and its application in engineering practice.	**07**
	(b)	Describe the design procedure of rocker arm for operating the exhaust valve.	**07**
		OR	
Q.5	**(a)**	Define fit and tolerance. Explain the different types of fit with example.	**07**
	(b)	1. Discuss the torsional rigidity and lateral rigidity for shaft.	**04**
		2. Distinguish clearly, giving examples between axle and shaft.	**03**

****