Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

PDDC - SEMESTER–III • EXAMINATION – SUMMER • 2014

Subject Code: X 31903 **Date: 24-06-2014**

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)**	Define 'stress concentration'. Describe the causes and remedies of stress concentration with neat sketches.	**07**
	(b)	Explain tensile failure of a component. A mild steel rod supports a tensile load of 50 kN. If the stress in the rod is limited to 100 MPa, find the size of the rod when the cross-section is 1. circular, 2. square, and 3. rectangular with width = 3 x thickness.	**07**
Q.2	**(a)**	Differentiate between fillet weld and butt weld. Write advantages and disadvantages of welded joints.	**07**
	(b)	Explain the failure of a riveted joint with neat sketch.	**07**
		OR	
	(b)	What is factor of safety? Describe various factors influencing the value of factor of safety.	**07**
Q.3	**(a)**	Design a knuckle joint for a tie rod of a circular section to sustain a maximum pull of 70 kN. The ultimate tensile strength of the rod material is 420 MPa. The ultimate tensile and shearing strength of the pin material are 510 MPa and 396 MPa respectively. Determine the tie rod section and pin section. Take factor of safety = 6.	**07**
	(b)	List various types of screw threads. Explain any two of them with the help of neat sketches.	**07**
		OR	
Q.3	**(a)**	List the different types of shaft couplings. Give the design procedure of flange coupling.	**07**
	(b)	Two rods are to be joined in a cotter joint to carry 90 kN of axial force which may change from tension to compression and vice-versa. The ultimate strengths in tension, compression and shear respectively are 255 N/ mm^2, 510 N/mm^2 and 130 N/mm^2. Choose a factor of safety of 5. Design the spigot end of cotter joint.	**07**
Q.4	**(a)**	A belt pulley is keyed to the shaft, midway between the supporting bearings kept at 1000 mm apart. The shaft transmits 20 KW power at 400 rpm. Pulley has 400 mm diameter. Angle of wrap of belt on pulley is 180 ^{0} and the belt tensions act vertically downwards. The ratio of belt tensions = 2.5. The shaft is made of steel having ultimate tensile stress and yield stress of 400 MPa and 240 MPa respectively. Use ASME code to design the diameter of shaft with combined fatigue and shock factors in bending and torsion as 1.5 and 1.25 respectively.	**07**
	(b)	Define the leverage and mechanical advantage. Explain the types of levers and its application in engineering practice.	**07**
		OR	

Q.4	**(a)**	Determine diameter of rivets for Figure 1, if permissible shearing stress is 65 N/mm^2. Assume all rivets have same diameter.	**07**
	(b)	Discuss the design procedure of a rocker arm for operating the exhaust valve.	**07**
Q.5	**(a)**	Draw assembled view of a Plummer block using proportionate dimensions.	**07**
	(b)	List and explain the various co-ordinate systems in AutoCAD.	**07**

OR

Q.5	**(a)**	Explain following AutoCAD command with example: Line, Arc, Move, Chamfer, Fillet, Array, Offset.	**07**
	(b)	Define tolerance and fit. Discuss different types of fits with neat sketches.	**07**

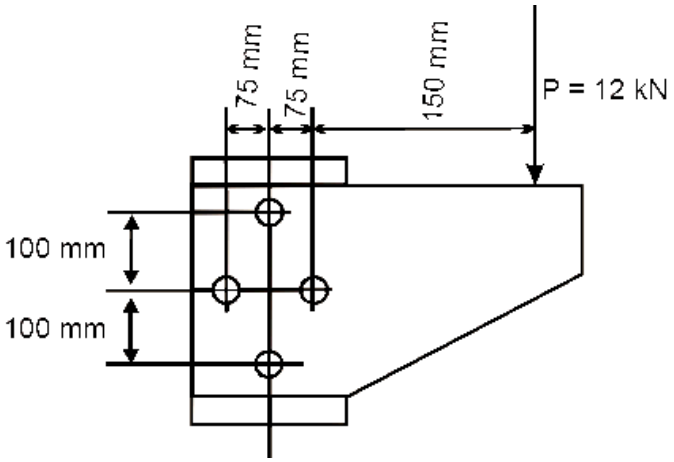

Figure 1

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