GUJARAT TECHNOLOGICAL UNIVERSITY
BE - SEMESTER– III(OLD) EXAMINATION – SUMMER 2019

Subject Code: 131902   **Date: 04/06/2019**

Subject Name: Machine Design & Industrial Drafting

Time: 02:30 PM TO 05:30 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)**	Differentiate: axle, spindle & shaft	**07**
	(b)	Find the diameter of a solid shaft to transmit 25 KW at 225 RPM. The allowable shear stress is 50 MPa. If a hollow shaft is to be used in place of solid shaft find the inside & outside diameter when the ratio of inside to outside diameter is 3:4	**07**
Q.2	**(a)**	Define welded joints. Explain any three types of welded joints with neat sketch	**07**
	(b)	A plate 80 mm wide & 100 mm thick is welded with another plate by means of single transverse & double parallel fillet welds. Find the length of each parallel fillet if allowable tensile & shear stresses in the weld material are 75 MPa and 56 MPa respectively.	**07**

OR

	(b)	The following data is available for double riveted lap joint. Determine efficiency of joint. Permissible stresses Tensile = 120 N/mm^2, Shearing = 96 N/mm^2, Crushing = 190 N/mm^2 Rivet diameter = 27 mm, Plate thickness = 180 mm, Pitch = 80 mm	**07**
Q.3	**(a)**	Discuss design procedure of Knuckle joint.	**07**
	(b)	Design a knuckle joint to connect two mild steel bars under a tensile load of 25 KN. The allowable stresses are 65 MPa in tension, 50 MPa in shear and 83 MPa in crushing	**07**

OR

Q.3	**(a)**	Enlist types of flange couplings and explain any two with neat sketch	**07**
	(b)	Design a cast iron flange coupling for a mild steel shaft transmitting 90 KW at 250 RPM. The allowable shear stress in the shaft is 40 MPa and the angle of twist is not to exceed 1 degree in a length of 20 diameters. The allowable shear stress in the coupling bolts is 30 MPa. Take width of key = d/6. Assume number of bolts = 4	**07**
Q.4	**(a)**	Explain terminologies used for power screw with neat sketch	**07**
	(b)	A vertical screw with single start square threads of 45mm mean diameter & 12 mm pitch is raised against a load of 15 KN by means of a hand wheel. The boss of which is threaded to act as a nut. It is used with a collar having an outer diameter of 95 mm & inner diameter as 60 mm. The coefficient of friction is 0.125 for screw & 0.19 for the collar. Tangential force applied by each hand is 110 N find the suitable diameter of hand wheel.	**07**

OR

Q.4	**(a)**	Derive the equation of maximum efficiency of power screw with square threads	**07**
	(b)	A power screw having triple start square threads of 33 mm mean diameter & 6 mm pitch is acted upon by an axial load of 12 KN. The mean diameter of screw collar is 40 mm. Assume uniform wear condition at the collar & allowable bearing pressure at thread of 6 N/mm^2. Find torque required to rotate the screw, stresses in screw and height of nut.	**07**

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Q.5 **(a)** Explain types of levers based on fulcrum positions with neat sketch **07**

(b) Design a right angled bell cranked lever having one arm of 500 mm and other **07**
150 mm long. The load of 5 KN is to be raised acting on a pin at the end of 500
mm arm and the effort is applied at the end of 150 mm arm. The lever consists
of steel forgings, turning on a point at the fulcrum. The permissible stresses for
the pin and lever material are 84 MPa in tension or compression and 70 MPa in
shearing. The bearing pressure on the pin is not to exceed 10 N/mm^2

OR

Q.5 **(a)** (1) Explain screw jack with assembly drawing using proportionate dimensions **04**

(2) What is interchangeability? Enlist advantages of it **03**

(b) (1) Define Limits. Explain upper and lower limit with suitable example **04**

(2) What is deviation? Enlist types of deviations **03**

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