# GUJARAT TECHNOLOGICAL UNIVERSITY
BE - SEMESTER–IV(NEW) EXAMINATION – WINTER 2022

Subject Code:2141907   **Date:17-12-2022**
Subject Name:Machine Design & Industrial Drafting
Time:10:30 AM TO 01:00 PM   **Total Marks:70**

Instructions:
1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**
4. **Simple and non-programmable scientific calculators are allowed.**

MARKS

Q.1	(a)	Give one example of a component which is under Axial, Shear, Bending and Torsional loading using only neat sketch.	03
	(b)	Compare Welded Joint and Riveted Joint.	04
	(c)	Why coupling is used? Give classification. Explain any one coupling with proper drawing.	07
Q.2	(a)	Compare between column and beam.	03
	(b)	Explain about various forms of thread.	04
	(c)	Derive the equation for the torque required for lifting and torque required for lowering the load acting on screw jack.	07

OR

	(c)	A Beam of uniform rectangular cross section is fixed at one end and carries an electric motor of 800 N weight at a distance of 600 mm from the fixed end. The maximum bending stress in the beam is 160 MPa. Find the width and depth of the beam, if depth is twice that of width.	07
Q.3	(a)	Give example of different type of Levers.	03
	(b)	Discuss about various theories of failures.	04
	(c)	Describe in detail about knuckle joint using proper sketch.	07

OR

Q.3	(a)	Which part in knuckle joint is designed for lowest strength? Why?	03
	(b)	Explain about Factor of safety. And give its effect on costing.	04
	(c)	Design a gib and cotter joint connecting two mild steel rods which are under load of 50 kN. Assume same material for the gib, cotter and rod. The permissible stresses are 70 Mpa in compression, 40 MPa in tension, 30 MPa in shear and 90 MPa in crushing.	07
Q.4	(a)	List various types of load and support for beam design using proper symbols.	03
	(b)	What is buckling? What is the effect of end condition on it?	04
	(c)	A 15 kW, 960 rpm motor has a mild steel shaft of 40 mm diameter and the extension being 75 mm. The permissible shear and crushing stresses for the mild steel key are 56 N/mm^2 and 112 N/mm^2 respectively. Design the keyway in the motor shaft extension. Check the shear strength of the key against the normal strength of the shaft.	07

OR

Q.4 (a) Differentiate between shaft and axle. **03**

(b) Why hollow sections are preferred compared to solid sections for shaft? Use proper example. **04**

(c) Explain the main function of key. List various types of keys using neat sketch. **07**

Q.5 (a) Discus the importance of tolerance for mass production. **03**

(b) Which are various types of fits? Explain their use in different condition. **04**

(c) A double riveted lap joint is shown in fig. The allowable stresses for the plate and rivets in tension, compression and shear are 75 MPa, 100 MPa and 50 MPa. Determine, **07**
(1) Dimeter of rivets, if load on the plate is 10 kN
(2) Width of the plate (thickness is 4 mm)
(3) Pitch of the rivet if the margin is taken as m=1.5 d.
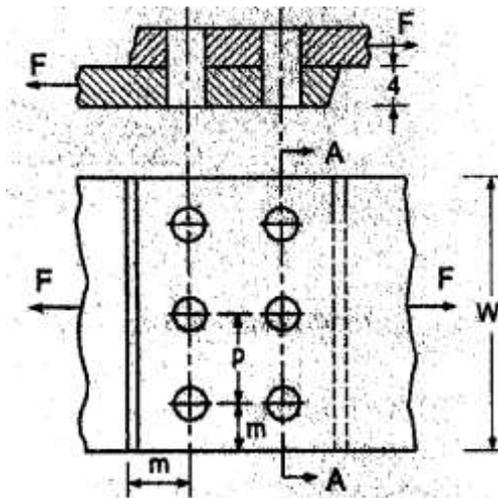
OR

Q.5 (a) What are the advantages and dis-advantages of multi threaded screw. **03**

(b) Discuss importance of stress reliving in welded joint and its methods. **04**

(c) Discuss about maximum metal condition and minimum metal condition using suitable example. **07**

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