Seat No.: _____ Enrolment No.

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER– IV EXAMINATION – SUMMER 2020

Subject Code: 2141907 **Date:02/11/2020**

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.**

			MARKS
Q.1	**(a)**	List with application the different theories of failures	**03**
	(b)	Describe Hertz contact stress theory giving suitable examples	**04**
	(c)	Explain the step by step design procedure of spigot and socket cotter joint.	**07**
Q.2	**(a)**	Distinguish between cotter joint and knuckle joint.	**03**
	(b)	Define cotter. Why taper is provided on a cotter?	**04**
	(c)	Design a knuckle joint for a tie rod of a circular section to sustain a maximum pull of 70 kN. The ultimate strength of the material of the rod against tearing 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**
		OR	
	(c)	Explain the design procedure for Rocker Arm.	**07**
Q.3	**(a)**	List the different types of shafts and write the material properties required for a shaft.	**03**
	(b)	Draw neat sketches of different types of keys and state their applications.	**04**
	(c)	Two 35 mm shafts are connected by a flanged coupling. The flanges are fitted with 6 bolts on 125 mm bolt circle. The shafts transmit a torque of 800 N-m at 350 r.p.m. For the safe stresses mentioned below, calculate 1. diameter of bolts ; 2. thickness of flanges ; 3.power transmitted. Safe shear stress for shaft material = 63 MPa Safe stress for bolt material = 56 MPa Safe stress for cast iron coupling = 10 MPa	**07**
		OR	
Q.3	**(a)**	Differentiate shaft, spindle and axle.	**03**
	(b)	Discuss the function of a coupling. Give at least three practical applications.	**04**
	(c)	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**
Q.4	**(a)**	Define pitch, transverse pitch and diagonal pitch of riveted joints.	**03**
	(b)	Explain the various ways in which a riveted joint may fail.	**04**
	(c)	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 MPa;shear stress =	**07**

100 Mpa,compressive= 150 Mpa.Find the efficiency of joint taking the strength of the rivet in double shear as twice than that of single shear.

OR

Q.4	**(a)**	Explain eccentric loaded welded joint?	**03**
	(b)	Differentiate welded and threaded joints.	**04**
	(c)	A plate 75 mm wide and 12.5 mm thick is joined with another plate by a single transverse weld and a double parallel fillet weld as shown in Fig.1. The maximum tensile and shear stresses are 70 MPa and 56 MPa respectively. Find the length of each parallel fillet weld, if the joint is subjected to both static and fatigue loading.Tthe stress concentration factor for transverse welds is 1.5 and for parallel fillet welds is 2.7.	**07**
Q.5	**(a)**	What is self-locking of power screw? Explain the condition for self-locking.	**03**
	(b)	Calculate the tolerances for the shaftdesignated as 40 H8 / f7.Take standard tolerance for the hole of grade 8 =25i and shaft of grade 7 =16 i.	**04**
	(c)	Differentiate between with neat sketches 1.shaft basis system and hole basis system of fits 2.clearance,interference and transition fit	**07**
		OR	
Q.5	**(a)**	What do you mean by a column? What is the effect of end condition on the crippling load capacity of a column?	**03**
	(b)	What are the parameters used for surface roughness measurement? Explain any two.	**04**
	(c)	Explain Johnson's formula for columns. Justify the use of Johnson's formula and Euler's formula for different applications.	**07**

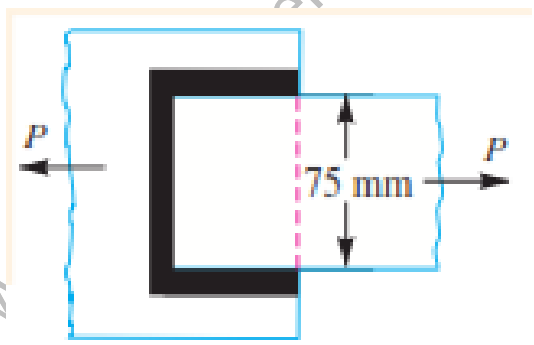

Figure 1.

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