Seat No.: _____ **Enrolment No._____**

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–IV (NEW) - EXAMINATION – SUMMER 2017

Subject Code: 2141907 **Date: 08/06/2017**

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		**Short Questions**	**14**
	1	Define Leverage	
	2	Define Displacement Ratio	
	3	Why a boss is needed at a fulcrum of the lever.	
	4	List out different types of supports.	
	5	State the assumptions made in Euler's theory	
	6	State the normal stress theory	
	7	List out different types of keys.	
	8	Explain self locking of screw.	
	9	What is collar friction?	
	10	What is turn buckle?	
	11	Draw welding symbol for 1)plug weld 2)spot weld	
	12	Draw rivet heads for 1)pan head 2)countersunk head	
	13	Define Tolerance	
	14	List out types of fits. Define any one.	
Q.2	**(a)**	Define factor of safety. Why it is required?	**03**
	(b)	Short note on Slenderness ratio	**04**
	(c)	Derive expressions for slope and deflection at the free end of a cantilever beam of length L carrying a couple moment M_0 at its free end.	**07**
		OR	
	(c)	Derive Rankine's formula for buckling of column.	**07**
Q.3	**(a)**	Explain stress in beams	**03**
	(b)	Write down steps for design of shafts.	**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 FOS=6.	**07**
		OR	
Q.3	**(a)**	Compare hollow shaft and solid shaft	**03**
	(b)	Define power screw and state it's applications.	**04**
	(c)	For a sleeve and cotter joint to resist a tensile load of 60 KN whose all parts are made from same material with following allowable stresses.σ_t =60Mpa, τ = 70 Mpa and σ_c =125 Mpa.	**07**

Find 1) Diameter of the rods

2)Diameter of the enlarge end of the rod and thickness of cotter

3) Outside diameter of sleeve.

Q.4	**(a)**	What are the different types of screws threads used for power screw? Draw any two sketches of it.	**03**
	(b)	Explain maximum shear stress theory	**04**
	(c)	For a muff coupling which is used to connect to shafts transmitting 40 kw at 350 r.p.m. The allowable shear and crushing stresses may be taken as 40 Mpa and 80 Mpa respectively for shaft and key.For the muff allowable shear stress may be assumed as 15 Mpa. Calculate 1) Design for shaft 2) Design for sleeve	**07**

OR

Q.4	**(a)**	What are the advantages and disadvantages of threaded joints.	**03**
	(b)	Terminology of power screw.	**04**
	(c)	A 45 mm diameter shaft is made of steel with a yield strength of 450 Mpa.A parallel key of size 14 mm wide and 9 mm thick made of steel with yield strength of 340 Mpa 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 FOS=2.	**07**
Q.5	**(a)**	Give symbols for flatness,cylindricity,symmetry and straightness	**03**
	(b)	Explain hole based and shaft based limit system with neat sketch.	**04**
	(c)	A double riveted double cover butt joint in plates 30 mm thick is made with 35 mm diameter rivets at 100 mm pitch. The permissible stresses are .σ_t =120Mpa, τ = 100 Mpa and σ_c =150 Mpa.Find the efficiency of joint, taking the strength of the rivet in double shear as twice than that of single shear.	**07**

OR

Q.5	**(a)**	Explain splines.	**03**
	(b)	What are the advantages and disadvantages of welded joints over riveted joints?	**04**
	(c)	Derive the expression for torque required to overcome collar friction.	**07**

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