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

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–III (OLD) - EXAMINATION – SUMMER 2017

Subject Code: 131902 **Date: 02/06/2017**

Subject Name: Machine Design & Industrial Drafting

Time: 10:30 AM to 01:30 PM **Total Marks: 70**

Instructions:

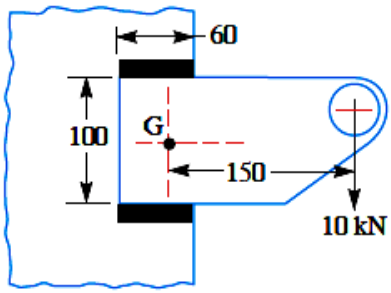
1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

Q.1 **(a)** Describe the various types of stresses with simple sketches. **07**

(b) Describe the various steps involved in machine design process. **07**

Q.2 **(a)** Explain the difference between caulking and fullering with the help of neat sketches. **04**

(b) A bracket, as shown in figure-1, carries a load of 10 KN. Find the size of the weld if the allowable shear stress is not to exceed 80 MPa. **10**



All dimensions in mm.

Figure-1

OR

(b) A bracket, as shown in figure-2, is attached to a vertical column by mean of four identical rivets and is subjected to an eccentric load of 30KN. Determine the diameter of rivet if permissible shear stress is 60 MPa. **10**

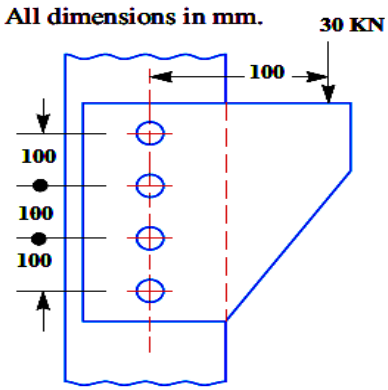


Figure-2

Q.3 **(a)** Explain the machining symbol with all parameters. **04**

(b) Explain the design procedure of knuckle joint. **10**

OR

Q.3 **(a)** Explain the fits and tolerances used in design. **04**

(b) It is required to design a cotter joint to connect the two steel rods of same diameter. The permissible stresses for rods, cotter, spigot ends and socket end **10**

are; Tensile stress = Compressive stress = 50MPa, Shear stress = 35MPa, Crushing Stress = 90MPa. Each rod is subjected to an axial tensile and compressive
force of 30KN.

Q.4	**(a)**	Design a clamp coupling to transmit 30 KW at 100 R.P.M. The allowable shear stress for the shaft and key is 40 MPa and the number of bolts connecting the two halves are six. The permissible tensile stress for the bolts is 70 MPa. The coefficient of friction between muff and shaft surface may be taken as 0.3.	**08**
	(b)	Explain the design procedure of sunk key.	**06**
		OR	
Q.4	**(a)**	Design a shaft to transmit power from an electric motor to a lathe head stock through a pulley by means of a belt drive. The pulley weighs 200 N and is located at 300 mm from the centre of the bearing. The diameter of the pulley is 200 mm and maximum power transmitted is 1 KW at 120 R.P.M. The angle of lap of the belt is 180^0 and coefficient of friction between the belt and the pulley is 0.3. The shock and fatigue factors for bending and twisting are 1.5 and 2 respectively. Allowable shear stress in the shaft may be taken as 35 MPa.	**08**
	(b)	A hollow shaft has greater strength and stiffness than solid shaft of equal weight. Justify.	**06**
Q.5	**(a)**	A power screw having double start square threads of 25 mm nominal diameter and 5 mm pitch is acted upon by an axial load of 10 KN. The outer and inner diameters of screw collar are 50 mm and 20 mm respectively. The coefficient of thread friction and collar friction may be assumed as 0.2 and 0.15 respectively. The screw rotates at 12 R.P.M. Assuming uniform wear condition at the collar and allowable thread bearing pressure of 5.8 N/mm^2, Find: 1. the torque required to rotate the screw; 2. the stress in the screw; and 3. the number of threads of nut in engagement with screw.	**10**
	(b)	Explain any four editing commands of AUTOCAD.	**04**
		OR	
Q.5	**(a)**	Derive an equation for torque required to raise and lower the load of square threaded power screw.	**10**
	(b)	Define: lever, leverage, arm of the lever and mechanical advantage.	**04**

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