

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER-IV(NEW) – EXAMINATION – SUMMER 2019

Subject Code:2141907

Date:20/05/2019

Subject Name: Machine Design & Industrial Drafting

Time:02:30 PM TO 05:00 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) | Define limits, fits and tolerance. | 03 |
| (b) | Define and explain factor of safety ? Give the various factors to be considered for selection of fos. | 04 |
| (c) | List the different theories of failures and explain maximum shear stress theory in detail with its region of safety. | 07 |

- Q.2**
- | | | |
|-----|--|-----------|
| (a) | Draw standard symbol of surface measurement. | 03 |
| (b) | What is a key ? Discuss the different types of keys. | 04 |
| (c) | Write a short note on knuckle joint with its design procedure. | 07 |

OR

- (c) A bracket made of steel (yield strength of 200 MPa) and subjected to force of 5 KN acting at 30 degree to vertical as shown in fig 1. The factor of safety is 4. Determine dimension of cross section of bracket.

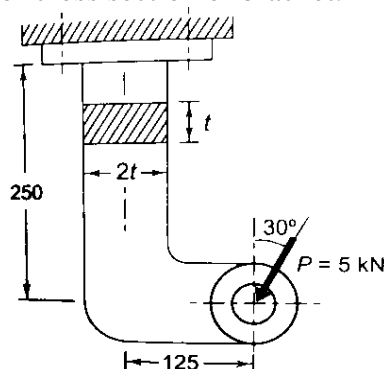


Fig.1

- Q.3**
- | | | |
|-----|--|-----------|
| (a) | How the hollow shafts are beneficial over the solid shaft? | 03 |
| (b) | List the different types of shafts and write the material properties required for a shaft. | 04 |
| (c) | Draw and write design procedure for bushed pin type flexible coupling. | 07 |

OR

- Q.3**
- | | | |
|-----|--|-----------|
| (a) | What is a coupling? Classify the couplings. | 03 |
| (b) | Write a difference between shaft, spindle and axle. | 04 |
| (c) | 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 the maximum power transmitted is 1 kW at 120 r.p.m. The angle of lap of the belt is 180° 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 2.0 respectively. The allowable shear stress in the shaft may be taken as 35 MPa. | 07 |

- Q.4**
- | | | |
|-----|--|-----------|
| (a) | Explain hole based and shaft based limit system with neat sketch. | 03 |
| (b) | A hollow alloy tube 6 meter long with external diameter of 50 mm and internal diameter of 30 mm was found to extend 2.98 mm under a tensile load of 50 KN. | 04 |

Find buckling load when both ends pinned. Also find safe load on the tube, for factor of safety of 3.

- (c) Derive Euler's equation for buckling failure of long column with both ends hinged conditions with assumptions. **07**

OR

- Q.4** (a) Explain with the figure, different types of threads used in power screws. **03**
 (b) What are the advantages and disadvantages of welded joints over riveted joints? **04**
 (c) A 50 mm diameter solid shaft is welded to a flat plate as shown in Fig.2 **07**
 If the size of the weld is 15 mm, find the maximum normal and shear stress in the weld.

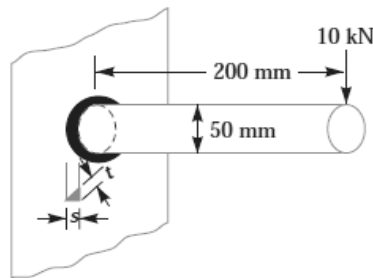


Fig. 2

- Q.5** (a) Explain different types of welded joints with neat sketches. **03**
 (b) What are the advantages and disadvantages of threaded joints. **04**
 (c) 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/mm², 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. **07**

OR

- Q.5** (a) What is self-locking of power screw? Explain the condition for self-locking. **03**
 (b) What is lever and discuss the different types of levers. **04**
 (c) Derive the equation for torque required to raise the load by square threaded screw. **07**
