

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER-IV (NEW) EXAMINATION – WINTER 2018

Subject Code:2142506

Date:10/12/2018

Subject Name:Fundamentals of Machine Design

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.

MARKS

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|------------|--|-----------|
| Q.1 | (a) Explain methods of riveting. | 03 |
| | (b) Discuss caulking and fullering. | 04 |
| | (c) Find the efficiency of the following riveted joints: (1). Single riveted lap joint of 6 mm plates with 20 mm diameter rivets having a pitch of 50 mm. (2). Double riveted lap joint of 6 mm plates with 20 mm diameter rivets having a pitch of 65 mm. Assume:
Permissible tensile stress in plate = 120 MPa
Permissible shearing stress in rivets = 90 MPa
Permissible crushing stress in rivets = 180 MPa | 07 |
| Q.2 | (a) Explain various types of butt joint with sketch. | 03 |
| | (b) Explain procedure for evaluation strength of butt joints. | 04 |
| | (c) Discuss step by step design procedure of socket and spigot cotter joint. | 07 |
| | OR | |
| | (c) Explain step by step design procedure of knuckle joint. | 07 |
| Q.3 | (a) Explain lock nut with sketch. | 03 |
| | (b) Give advantages and disadvantages of screwed joints. | 04 |
| | (c) What is stress concentration? Explain various methods of relieving stress concentration. | 07 |
| | OR | |
| Q.3 | (a) Define principle stress and residual stresses. | 03 |
| | (b) Discuss design of shaft on the basis of rigidity. | 04 |
| | (c) Find the diameter of a solid steel shaft to transmit 20 kW at 200 r.p.m. The ultimate shear stress for the steel may be taken as 360 MPa and a factor of safety as 8. If a hollow shaft is to be used in place of the solid shaft, find the inside and outside diameter when the ratio of inside to outside diameters is 0.5. | 07 |
| Q.4 | (a) Define keys. Give application of keys. | 03 |
| | (b) Explain different types of sunk keys. | 04 |
| | (c) Design the rectangular key for a shaft of 50 mm diameter. The shearing and crushing stresses for the key material are 42 MPa and 70 MPa. | 07 |
| | OR | |
| Q.4 | (a) Explain requirements of good shaft coupling. | 03 |
| | (b) Discuss construction and working of Flange coupling. | 04 |
| | (c) 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 the muff and the shaft surface may be taken as 0.3. | 07 |

- Q.5** (a) Give assumptions in Euler's column theory. **03**
(b) Explain design procedure of piston rod. **04**
(c) Explain step by step design procedure of connecting rod. **07**
- OR**
- Q.5** (a) Define lever. Give applications of levers in engineering practice. **03**
(b) Write design procedure of lever. **04**
(c) Discuss design procedure of Rocker arm for exhaust valve. **07**

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