

**B.Tech. – VIEP – MECHANICAL ENGINEERING
(BTMEVI)**

Term-End Examination

00792

December, 2017

BIME-008 : MACHINE DESIGN – I

Time : 3 hours

Maximum Marks : 70

*Note : Attempt any **five** questions. All questions carry equal marks. Use of scientific calculator is permitted. Use of Machine Design Data Handbook is permitted. Assume missing data suitably.*

1. How are mechanical fasteners classified ?
Differentiate between riveted structural joints and riveted pressure vessel joints. Also explain the eccentric loading of riveted joints. 14

2. Design a cotter joint made from 0.2% carbon steel, to support a load of 35 kN which is subjected to slow reversals of direction. 14

3. 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 Figure 1.

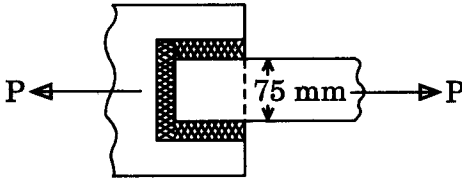


Figure 1

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.

14

4. Design a spring for a balance to measure 0 to 1000 N over a scale of length 80 mm. The spring is to be enclosed in a casing of 25 mm diameter. The approximate number of turns is 30. The modulus of rigidity is 85 kN/mm^2 . Also calculate the maximum induced shear stress.

14

5. Find the diameter of a solid steel shaft to transmit 20 kW at 200 rpm. The ultimate shear stress for 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 diameters. The ratio of inside to outside diameter is 0.5.

14

6. Design a bushed pin type flexible coupling to connect the output shaft of an electric motor to the shaft of a centrifugal pump. The motor delivers 20 kW power at 720 rpm. The starting torque of the motor may be assumed to be 150% of the rated torque.

14

7. (a) What is the function of a power screw ? Explain 'self-locking' of power screws. How is it related to the helix angle of the screw ?
- (b) Discuss the factors considered for selection of materials for the design of machine elements.

7+7

8. Write short notes on any *four* of the following :

$$4 \times 3 \frac{1}{2} = 14$$

- (a) Reverse Engineering
- (b) Creative Design
- (c) Power Screws
- (d) Effect of Stress Concentration
- (e) Bolted Joints
- (f) Types of Screw Jacks
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