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BIME-008

**B.TECH.-VIEP-MECHANICAL ENGINEERING
(BTMEVI)**

Term-End Examination, 2019

BIME-008 : MACHINE DESIGN - I

Time : 3 Hours]

[Maximum Marks : 70

Note : Answer any five questions. All questions carry equal marks. Use of design data hand book and scientific calculator is permitted. Assume missing data suitable if any.

1. A rectangular steel plate is welded as a cantilever to a vertical column and supports a single concentrated load P , as shown in Figure 1. Determine the weld size if shear stress in the same is not to exceed 140 MPa. [14]

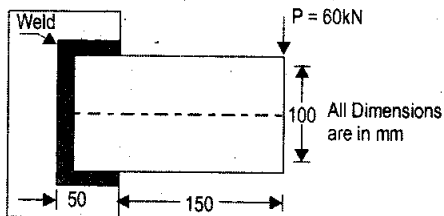


Figure 1

2. 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 bearing. The diameter of the pulley is 200 mm and the maximum power transmitted is 1 kW at 120 rpm. The angle of lap of the belt is 180° and the 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. [14]

3. Design a knuckle joint to transmit 150 kN. [14]

The design stress may be taken as :

75 MPa in tension;

60 Mpa in shear ; and

150 Mpa in compression.

Show the joint is safe.

4. (a) Explain how the factor of safety is determined under steady and varying loading. [4+6+4=14]

(b) Show by neat sketches the various ways in which a rivetted joint may fail.

- (c) Discuss the basic design requirements for machine elements.
5. (a) What is function of a power screw ? What is 'self locking' of power screw ? How is it related to helix angle of the screw ? [7]
- (b) Discuss the factors to be considered for the selection of materials for the design of machine elements. [7]
6. Write short notes on **any four** of the following : [4×3.5=14]
- (a) Design for assembly
- (b) Reliability
- (c) Computer aided design
- (d) Effects of stress concentration
- (e) Designing of screw Jack

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