No. of Printed Pages : 3 + Drawing Sheet

BIME-008

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B.Tech. MECHANICAL ENGINEERING (BTMEVI)

Term-End Examination December, 2011

BIME-008 : MACHINE DESIGN - I

Time : 3 hours *Maximum Marks : 70*

Note: *Attempt **any seven** questions. All questions have equal marks. All the questions are to be answered in English Language only. Design data book is allowed.*

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1. A double riveted lap joint with zig-zag riveting is to be designed for 13 mm thick plates. Assume $\sigma_t = 80$MPa ; $\tau = 60$ MPa and $\sigma_c = 120$ MPa. **10**

State how the joint will fail and find the efficiency of the joint.

[where, σ_t is tensile stress, τ is shear stress and σ_c is crushing stress]

2. Explain the procedure for designing an axially loaded unsymmetrical welded section. **10**

3. A wall bracket with a rectangular cross-section is shown in fig 1. The depth of the cross-section is twice the width. The force p acting on the bracket at 60° to the vertical is 5 kN. The material of the bracket is grey cast - iron FG 200 and the factor of safety is 3.5. Determine the dimensions of the **10**

cross-section of the bracket, using the maximum normal stress theory of failure.

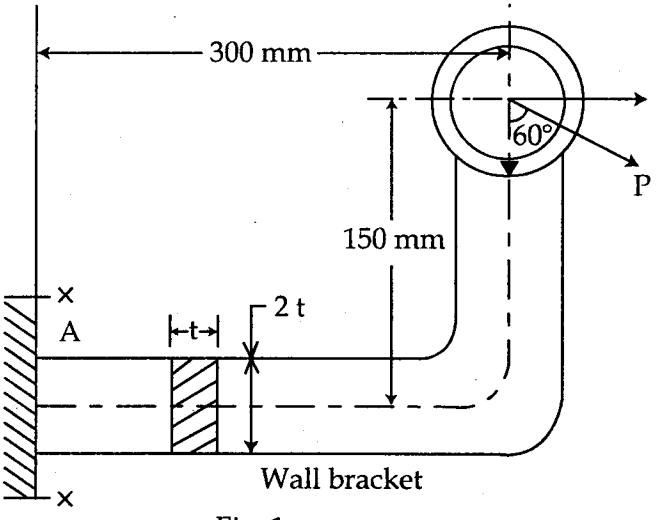

Fig. 1

4. Write short notes (with diagram). **10**
   (a) Universal coupling
   (b) Flexible coupling

5. Prove that the maximum shear stress induced in the wire of a close-coiled helical spring is given by : **10**

$$\tau = \frac{16.W.R}{\pi d^3}$$

where τ = maximum shear stress induced in the wire.

W = Axial load on spring
R = Mean radius of the spring coil
d = Diameter of the spring wire

6. A power screw driven by an electric motor, moves a nut in a horizontal plane against a force of 75kN at a speed of 300 mm/min. The screw has a single square thread of 6 mm pitch on a major diameter of 40 mm. The co-efficient of friction at screw threads is 0.1. Estimate power of the motor. **10**

7. Discuss the tentative design procedure for designing a screw jack with neat and clean diagram ? **10**

8. Write short notes on : **10**
   (a) Concurrent Engineering
   (b) Reverse Engineering

9. Explain the maintenance and its type. What is reliability. **10**

10. Write short notes. Attempt ***any two*** : **10**
    (a) Hydraulic Press
    (b) Pneumatic Press
    (c) Screw Press