Lukhdhirji Engineering College, Morbi

Department of Mechanical Engineering

Assignment 6- Design Against Static Load (CO2 & CO3)

Subject: Fundamental of Machine Design (3141907) **Semester : 4th**

Year : 2022-23

1. State and explain the different theories of failures and its importance. Explain Distortion energy (von Mises) theory.
2. Explain maximum principal stress theory in detail with its region of safety.
3. Explain maximum shear stress theory in detail with its region of safety
4. Differentiate between cotter and knuckle joint.
5. Why taper is provided on cotter? What is its normal value? State its applications
6. Write a short note on socket and spigot type cotter joint with its design procedure
7. Write a detailed note on: Contact stresses and its examples
8. Explain the use of bush and boss in lever design with neat sketches.
9. The load on a bolt consists of an axial pull of 10 kN together with a transverse shear force of 5 kN. Find the diameter of bolt required according to (1). Maximum principal stress theory; (2). Maximum shear stress theory
10. Design a knuckle joint to transmit load of 150 kN. The design stresses may be taken as 75 MPa in tension, 60 MPa in shear and 150 MPa in compression.

OR

Design a knuckle joint to transmit 70 kN. The design stresses may be taken as 70MPa in tension, compression and crushing for rod. The design stresses may be taken as 120 MPa in tension, 66 MPa in shear and 120 MPa in crushing in shear for pin.

Vision:

- To deliver quality engineering education for Mechanical Engineers with Professional competency, Human values and Acceptability in the society.

Mission:

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- To impart Techno-Managerial skill in students to meet global engineering challenges
- To create ethical engineers who can contribute for sustainable development of society

11. A bell crank lever is to be designed to lift the load of 75 kN acting at the end of short arm of the lever. The length of short arm and long arm is 100 mm and 500 mm respectively. Allowable shear stress and tensile stress for lever and pin materials is 60 N/mm2 and 60 N/mm2 respectively. Allowable bearing pressure for pin material is 10 N/mm2. For pin L/D=1. 5 and for the rectangular cross section of the lever, ratio of height to width is 4. Assume that the arm of bending moment on the lever extends up to the axis of the fulcrum. Determine: (1) dimension of the fulcrum pin (2) dimensions of lever.

OR

Discuss in detail the design procedure of a Bell cranked lever with its necessary diagram.

The big end of a connecting rod is subjected to a maximum load of 50 kN. The diameter of the circular part of the rod adjacent to the strap end is 75 mm. Design the gib and cotter joint, assuming permissible tensile stress for the material of the strap as 25 Mpa and permissible shear stress for the material of cotter and gib as 20 MPa.

12. A wall bracket with a rectangular cross-section is shown in Fig. 1. The depth of the cross-section is twice of the width. The force P acting on the bracket at 600 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 cross-section of the bracket. Assume maximum normal stress theory of failure. All dimensions shown in figure are in millimetre

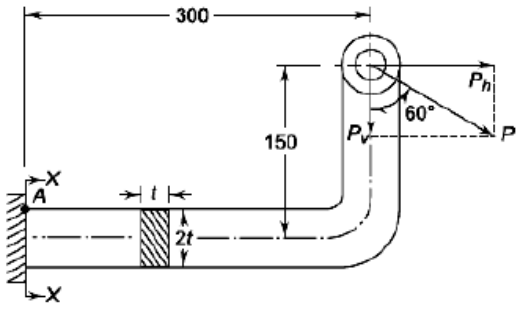

Fig. 1

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