DESIGN OF MACHINE ELEMENTS (DME-316357)
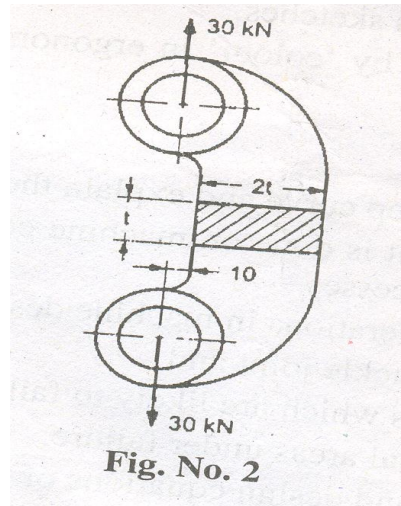
QUESTION BANK (FIRST TEST)

Course:- ME6k

Questions for 2 marks

1) Draw stress stain diagram for ductile and brittle material. Name various points on the diagram.(CO1)
2) Explain the following stresses- i) Transverse shear stress, ii) Bending stress. (CO1)
3) What are the steps involved in general design procedure? Explain in brief. (CO1)
4) What is stress concentration? Illustrate methods to reduce it with sketches. (CO1)
5) Explain the following stresses- i) Bearing pressure, ii) Crushing stress. (CO1)
6) State the meaning of following designations:- i) 72W18Cr4v1, ii)11Mn2, iii) FG150, iv) FeE220, v) SG800/2, vi) FeE400, vii) 35Mn2Mo28, viii) CS840. (CO1)
7) What do you mean by Fatigue failure? (CO1)
8) Define factor of safety. (CO1)
9) Give the importance of shape in aesthetic design. (CO1)
10) What is Aesthetic? (CO1)
11) State any two applications each of a cotter and knuckle joint. (CO2)
12) Distinguish between shaft and axle. What type of stresses are induced in shaft?(CO3)
13) What is key ? State its applications. (CO3)

Questions for 6 marks:-

1) Design a knuckle joint for a tie rod of a circular section to sustain a maximum pull of 70KN. The ultimate tensile and shear strength of the pin material are 510MPa and 396MPa respectively. Take factor of safety as 6. (CO2)
2) Write strength equations in the design of Knuckle joint with relevant sketches. (CO2)
3) Draw neat sketch of turn buckle and write the design procedure. (CO2)
4) Design a Turn buckle to carry a load of 100KN. The tie rod and nut are made from same material having permissible tensile stress as 75N/mm^2 and permissible shear stress as 30N/mm^2. (CO2)

5) An offset link subjected to a force of 30KN as shown in fig. If the permissible tensile stress is 55MPa, determine the dimensions of the cross-section of link. (CO2)

30 kN

2t

10

30 kN

Fig. No. 2

6) Design 'C' clamp frame for a total clamping force of 20KN. The cross-section of the frame is rectangular and width to thickness ratio is 2. The distance between the load line and the neutral axis of rectangular section is 120mm and the gap between two faces is 180mm. Frame is made of cast iron. The permissible tensile stress for cast iron is 100N/mm^2. (CO2)

7) Design a right angled bell crank lever. The horizontal arm is 500mm long and load of 4.5KN acts vertically downwards through a pin at the end of this arm. At the end of 150mm long arm which is perpendicular to the 500mm long arm, a force P acts at right angles to axis of 150mm arm through a pin at the end. The lever consists of forged steel material and a pin at fulcrum. Take following data for both pin and lever material:-

Tensile/compressive/bending stress = 75MPa

Shear stress = 60MPa, Bearing pressure = 10N/mm^2.

Assume width of lever 3 times thickness of lever. (CO2)

8) Design a knuckle joint to transmit 150KN, the design stresses may be taken as 75MPa in tension, 60MPa in shear and 150MPa in compression. (CO2)