

Set No. 1

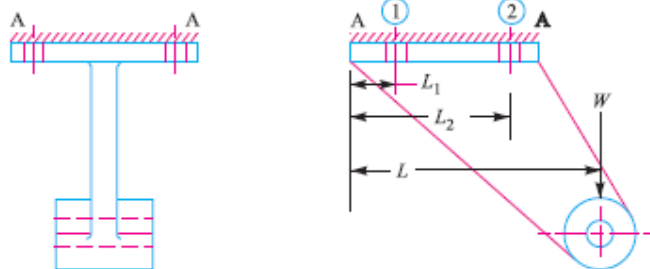
Set No. 1

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Code No: **R31035****R10****Set No. 2****III B.Tech I Semester Supplementary Examinations, May/June - 2015****DESIGN OF MACHINE MEMBERS-I****(Mechanical Engineering)****Time: 3 hours****Max. Marks: 75**

Answer any FIVE Questions
All Questions carry equal marks

- 1 a) Enumerate the various manufacturing methods of machine parts which a designer should know. [7]
b) Write short notes on the following: [8]
(i) Interchangeability; (ii) Tolerance; (iii) Allowance; and (iv) Fits.
- 2 a) Define the terms load, stress and strain. Discuss the various types of stresses and strain. [7]
b) What do you mean by factor of safety? List the important factors that influence the magnitude of factor of safety. [8]
- 3 Explain the failure modes of rivets in a butt joint with two cover plates. [15]
- 4 a) Explain the method of determining the size of the bolt when the bracket carries an eccentric load parallel to the axis of the bolt. [7]
b) A bracket, as shown in figure below, supports a load of 30 kN. Determine the size of bolts, if the maximum allowable tensile stress in the bolt material is 60 MPa. The distances are: $L_1 = 80$ mm, $L_2 = 250$ mm and $L = 500$ mm. [8]



- 5 a) What is a key? State its functions. [7]
b) Design a knuckle joint to transmit 150 kN. The design stresses may be taken as 75 MPa in tension, 60 MPa in shear and 150 MPa in compression. [8]
- 6 a) A hollow shaft has greater strength and stiffness than solid shaft of equal weight. Explain. [7]
b) Find the diameter of a solid steel shaft to transmit 20 kW at 200 r.p.m. The ultimate shear stress for the 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 diameter when the ratio of inside to outside diameters is 0.5. [8]

Set No. 3

Max. Marks: 75

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Code No: **R31035****R10****Set No. 4****III B.Tech I Semester Supplementary Examinations, May/June - 2015****DESIGN OF MACHINE MEMBERS-I****(Mechanical Engineering)****Time: 3 hours****Max. Marks: 75****Answer any FIVE Questions****All Questions carry equal marks**

- 1 a) Discuss the factors to be considered for the selection of materials for the design of machine elements. [7]
b) Discuss the stress and strain relation. Draw a neat sketch of stress-strain diagram and explain various stress points. [8]
- 2 a) What is meant by 'stress concentration'? what are the factors to be considered while designing machine parts to avoid fatigue failure. [7]
b) Determine the diameter of a circular rod made of ductile material with fatigue strength (complete stress reversal) is 265 MPa and tensile yield strength of 350 MPa. The member is subjected to a varying axial load from $W_{min} = -300 \times 10^3 \text{ N}$ to $W_{max} = 700 \times 10^3 \text{ N}$ and has a stress concentration factor = 1.8. Use factor of safety as 2.0. [8]
- 3 a) What do you mean by welded joint? Discuss the types of welded and riveted joints. [7]
b) A double riveted double cover butt joint in plates 20 mm thick is made with 25 mm diameter rivets at 100 mm pitch. The permissible stresses are : [8]
 $\sigma_t = 120 \text{ MPa}$; $\tau = 100 \text{ MPa}$; $\sigma_c = 150 \text{ MPa}$
Find the efficiency of joint, taking the strength of the rivet in double shear as twice than that of single shear.
- 4 a) What do you understand by bolted joint? Discuss various types of screw fastenings [7]
b) Write short notes on: (i) Major diameter, (ii) Minor diameter, (iii) Pitch, (iv) Lead. [8]
- 5 a) Write about working principle of 'sleeve and cotter joint' and 'jib and cotter joint'. [7]
b) A shaft 80 mm diameter transmits power at maximum shear stress of 63 MPa. Find the length of a 20 mm wide key required to mount a pulley on the shaft so that the stress in the key does not exceed 42 MPa. [8]
- 6 a) What types of stresses are induced in shafts? Explain. [7]
b) Find the diameter of a solid steel shaft to transmit 20 kW at 200 r.p.m. The ultimate shear stress for the 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 diameter when the ratio of inside to outside diameters is 0.5. [8]

Set No. 4

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