

R09

Code No: 55019

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B. Tech III Year I Semester Examinations, November/December - 2016

DESIGN OF MACHINE MEMBERS-I

(Mechanical Engineering)

Time: 3 hours

Max. Marks: 75

Answer any five questions
All questions carry equal marks

1. The stresses induced at a critical point in a machine component made of steel 45C8 ($S_{yt} = 380 \text{ N/mm}^2$) are as follows:
 $\sigma_x = 100 \text{ N/mm}^2$; $\sigma_y = 40 \text{ N/mm}^2$; $\tau_{xy} = 80 \text{ N/mm}^2$
Calculate the factor of safety by (a) the maximum normal stress theory, (b) the maximum shear stress theory and (c) the distortion energy theory. [5+5+5]

2. A cantilever beam made of steel Fe 540 ($S_{ut} = 540 \text{ N/mm}^2$ and $S_{yt} = 320 \text{ N/mm}^2$) and subjected to a completely reversed load (P) of 5 kN is shown in figure 1. The beam is machined and reliability is 50%. The factor of safety is 2 and the notch sensitivity factor is 0.9. Calculate
a) Endurance limit at the fillet section
b) Diameter d of the beam for infinite life. [7+8]

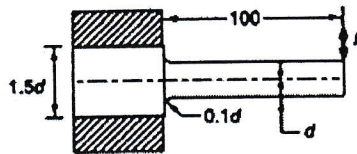


Figure 1

3. A welded connection of steel plates is shown in figure 2. It is subjected to an eccentric force of 50 kN. Determine the size of the weld, if the permissible shear stress in the weld is not to exceed 70 N/mm^2 . [15]

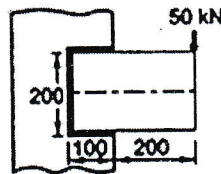


Figure 2

4. A cast iron bracket, as shown in figure 3, supports a load of 10 kN. It is fixed to the horizontal channel by means of four identical bolts, two at A and two at B. The bolts are made of steel 30C8 ($S_{yt} = 400 \text{ N/mm}^2$) and the factor of safety is 6. Determine the major diameter of the bolts. [15]

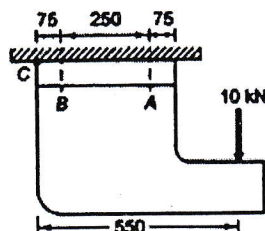


Figure 3