

R09

Code No: 09A50305

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY, HYDERABAD

B. Tech III Year I Semester Examinations, November/December-2013

DESIGN OF MACHINE MEMBERS-I

(Mechanical Engineering)

Time: 3 hours

Max. Marks: 75

Answer any five questions
All questions carry equal marks

- 1.a) Define clearly factor of safety. Explain briefly the difference between design procedure based on strength and rigidity
- b) What do you mean by alloy steel? Write the effects of the following alloying elements on steel:
i) nickel ii) chromium. [15]
- 2.a) What is difference between Goodman line and Soderberg line..
- b) Determine the thickness of a 120 mm wide uniform plate for safe continuous operation if the plate is to be subjected to a uniformly varying tensile load that has a maximum value of 250 kN and a minimum value of 100 kN. Properties of plate material: endurance limit stress=225 MPa, yield point stress=280 MPa, factor of safety=1.8. [15]
3. Design and sketch a triple riveted double strap, chain butt joint suitable for a longitudinal joint for a pressure vessel having 1,5 m diameter and working pressure of 2N/mm^2 . The permissible stresses are: 80 MPa in tension, 120 MPa in crushing and 60 MPa in shear. [15]
- 4.a) What is the effect of gasket, on the resultant load on the bolt, in a bolted joint.
- b) A single plate clutch transmits 20 kW at 1200 rpm. The driving unit is connected to the shaft by means of 4 bolts placed at 12 cm p.c.d. Find the suitable bolt diameter if permissible stress is limited to 2 kN/cm^2 . [15]
- 5.a) Discuss different types of keys with sketches.
- b) Design a socket and spigot type cotter joint to resist a load of 3.5 kN. Assume safe stresses as: $f_t=5.6\text{ kN/cm}^2$; $f_s=4.5\text{ kN/cm}^2$; $f_c=9.8\text{ kN/cm}^2$ [15]
6. A shaft 90 cm between bearings supports a 60 cm pulley 30 cm to the right of the left hand bearing and the belt drives a pulley directly below. Another pulley 45 cm in diameter is located 20 cm to the left of the right hand bearing and the belt is driven from a pulley horizontally to the right. The angle of contact of both the pulleys is 180° and the tension ratio is 2.2. The maximum tension in the belt on a 60 cm diameter pulley is 2250 N. Determine suitable diameter for a solid shaft allowing $f_t=63\text{ N/mm}^2$, $f_s=42\text{ N/mm}^2$. [15]