Reg. No. : ....

Name : ....

Sixth Semester B.Tech. Degree Examination, May 2012
(2008 Scheme)
08-605 : DESIGN OF MACHINE ELEMENTS – I(M)

Time : 3 Hours   Max. Marks : 100

Instructions : a) *Answer all questions from Part A. Each question carries 4 marks.*

b) *Answer one question from each Module in Part B. Each question carries 20 marks.*

c) *Assume missing data if any.*

PART – A

1. Explain the properties to be considered while selecting material for engineering design.

2. Explain use of stress concentration factor and notch sensitivity factor in conservative design procedure.

3. Explain how principal stresses are estimated for part subjected to direct loading and torque simultaneously.

4. Explain the different types of keys and their application.

5. Differentiate between rigid and flexible coupling and explain their application.

6. Discuss about the stress distribution in welds.

7. Explain the modes of failure of a compression spring.

8. What is Nipping as referred to in leaf sprigs ?

9. Explain preloading of bolts.

10. Describe how the Wahl stress factor is used in springs.

PART – B

MODULE – I

11. A bolt is subjected to a direct tensile load of 25 kN and shear load of 15 kN. Find the suitable size of the bolt, using various theories of failure. Yield stress in tension = 25 N/mm^2. Assume factor of safety = 2 and poisson ratio = 0.3.

OR

12. A large gear of 1500 N, transmits torque through a shaft whose bearings are preloaded with 500 N force so that the load in shaft varies from 0 to 1000 N. The diameter of shaft changes at the critical area. Take σ_u = 1400 N/mm^2 D/d = 2, factor of safety = 2. Find the diameters of the shaft.
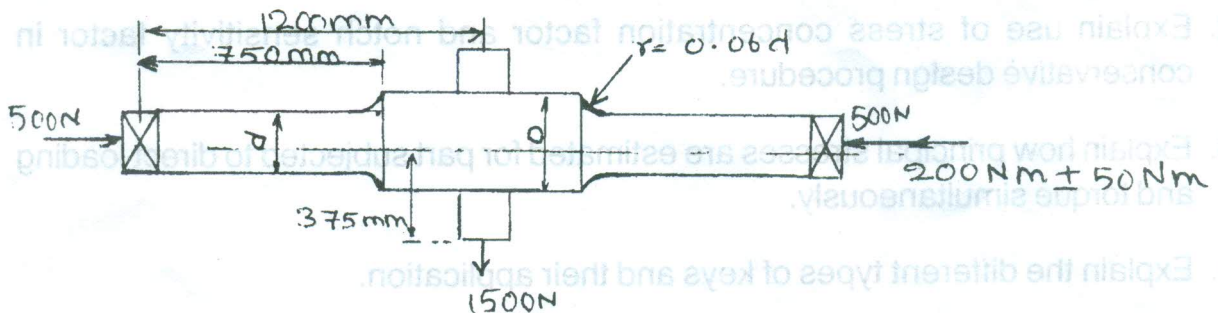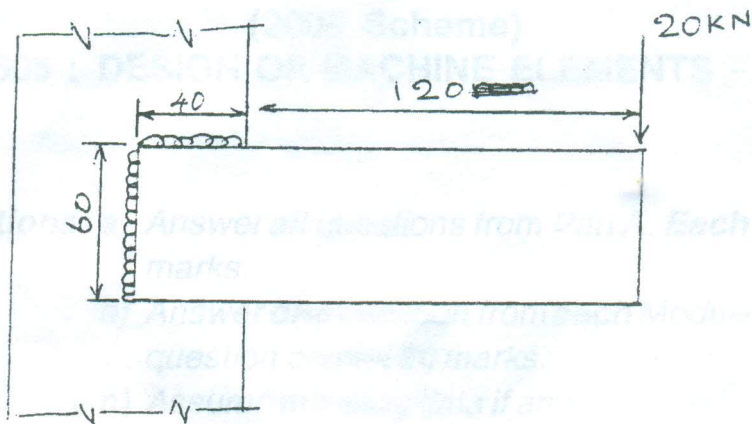

MODULE – II

13. Design a bush-pin type flexible coupling to transmit 32 kW at 1000 rpm. Select suitable materials for the coupling. Allowable bearing pressure is 1 N/mm^2. Draw a neat sketch.

OR

14. The fig. shows a welded joint subjected to an ecentric load of 20 kN. Find the size of weld. Take permissible shear stress for the weld material as 90 MPa.

All dimensions in mm

MODULE – III

15. Design a compression spring for a safety valve with the following data

Blow off pressure – 1 N/mm²

Valve diameter – 50 mm

Maximum lift of value – 16 mm

Spring index – 6

Initial compression – 30 mm

Maximum shear stress – 450 N/mm²

Modulus of rigidity – $0.8×10^5$ N/mm²

OR

16. A shaft is supported at the ends in ball bearings. It carries a straight tooth spur gear at its midspan, and transmits 8 kW at 400 rpm. The pitch circle diameter is 120 mm. The distance between centre line of bearings and gear are 100 mm each. If the shaft is made of (40 steel) find the diameter of shaft. The pressure angle of the gear may be taken as 20°.