(Pages : 3) E – 2997

Reg. No. : .....

Name : .....

Sixth Semester B.Tech. Degree Examination, June 2018

(2008 Scheme)

08.605 : DESIGN OF MACHINE ELEMENTS – I (M)

Time : 3 Hours Max. Marks : 100

Instructions *: 1) Approved design data hand book* ***permitted****.*
2) Assume ***missing*** *data,* ***if any suitably****.*
3) Answer ***all*** *questions from Part –* ***A*** *and* ***one full*** *question from* ***each*** *Module from Part –* ***B****.*

PART – A

1. What is meant by hole basis system ?
2. What is factor of safety ? Explain the factors that influence the factor of safety.
3. Explain maximum distortion energy theory.
4. What is fatigue failure ? Explain the mechanism of fatigue failure.
5. Write a short note on preloading of bolts.
6. What is the best relative position of keys in the shaft of a coupling ? Justify your answer.
7. Explain the different types of welded joints with neat sketch.
8. What is the advantage and limitation of hollow shaft over solid shaft ?
9. How shaft is designed when it is subject to twisting moment only ?
10. What is critical speed of shaft ? Explain its importance in design. **(10×4=40 Marks)**

P.T.O.

PART – B

Module – 1

11. Determine the diameters of a round rod to sustain a combined torsional load of 1500 Nm and a bending moment of 1000 Nm by the following theories of failure. Material selected for the rod has a values of 300 MPa and 180 MPa for the normal stress and shear stress at the yield respectively. Take a value of 2.5 for the factor of safety

    1) Maximum shear stress theory.

    2) Maximum normal stress theory. **20**

OR

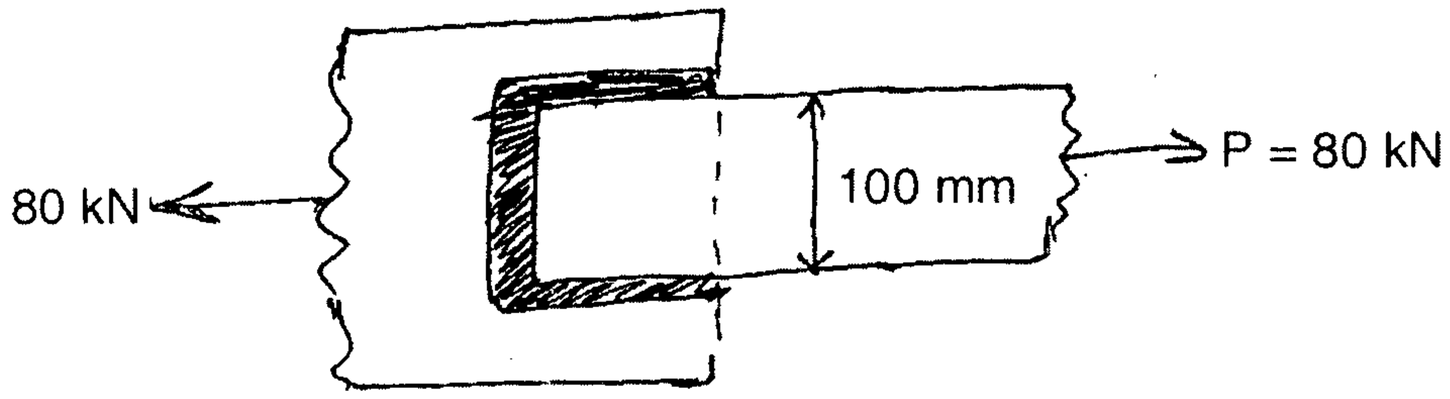
12. A hot rolled steel shaft is subjected to a torsional load that varies from 330 Nm clockwise to 110 Nm counter clockwise as an applied bending moment at a critical section varies from +440 Nm to –220 Nm. The shaft is of uniform cross section and no keyway is present at the critical section. Determine the required shaft diameter. The material has an ultimate strength of 550 MN/m^2 and a yield strength of 410 MN/m^2. Take the endurance limit as half the ultimate strength and factor of safety as two. **20**

Module – 2

13. A shaft and a key are made of the same material and the key width is 25% of the shaft diameter. Consider shear only, determine the minimum length of the key in terms of the shaft diameter. The shearing strength of the key material is 60% of its crushing strength. Determine the thickness of the key to make the key equally strong in shear and crushing. **20**

OR

14. A plate 100 mm wide and 10 mm thick is to be welded to another plate by means of a single transverse fillet weld and a double parallel fillet weld. If it is subjected to a pull of 80 kN, find the length of each parallel fillet weld, if the joint is subjected to both static and fatigue loading. The maximum allowable normal and shear stresses are 70 N/mm^2 and 56 N/mm^2 respectively. **20**



Module – 3

15. A machine shaft is subjected to an axial thrust of 60 kN and bending moment of 92 kN mm while transmitting 70 kW at 900 RPM. The shaft is supported between two ends of span of 2.4 M. Determine the shaft diameter. **20**

OR

16. Design a leaf spring for the following specifications

    Total load = 140 kN

    Number of springs supporting the load = 4

    Maximum number of leaves = 10

    Span of the spring = 1000 mm

    Permissible deflection = 80 mm

    Young's modulus = 200 kN/mm^2

    Allowable stress in spring material = 600 MPa. **20**