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Reg. No. : .....

Name : .....

Sixth Semester B.Tech. Degree Examination, March 2015
(2008 Scheme)
08-605 : DESIGN OF MACHINE ELEMENTS – I (M)
(Special Supplementary)

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 Soderberg method for combination of stresses.
2. What is endurance limit ? What are the factors affecting it ?
3. Briefly explain the S-N diagram.
4. Discuss about the effect of stress concentration in welds.
5. Differentiate between stress concentration factor and stress intensity factor.
6. Discuss modes of failure for a parallel fillet weld which is eccentrically loaded.
7. Discuss commonly used spring materials and their applications.
8. What is surge in springs ?
9. Discuss how the stress in equalized in leaf springs.
10. Differentiate between thin and thick cylinder.

PART – B

Module – I

11. A cylindrical shaft made of steel of yield strength 700 MPa is subjected to a static loads consisting of bending moment 10 kN-m and torsional moment 30 kN-m. Determine the diameters of the shaft using

    a) Rankine's theory

    b) Trescas theory

    c) Haigh theory. Assume a factor of safety 1.5, E = 210 GPa and Poisson ratio = 0.25.

OR

12. A pulley keyed to a shaft midway between two antifriction bearings is subjected to a bending moment varying between 130 Nm to 380 Nm and a varying torsional moment of 70 Nm to 190 Nm. Ultimate strength and yeild strength of shaft material are 600 MN/m^2 and 280 MN/m^2. Find the diameter of shaft for infinite life stress concentration of key way in bending and torsion may be taken as 1.6 and 1.4 respectively. Design factor = 1.8, size factor = 0.85 surface correction factor = 0.88. Correction factor for torsional loading = 0.6.

Module – II

13. Design a flange coupling for a steel shaft transmitting 15 kw at 300 rpm. Assume the following stresses.

    Shear stress for shaft, key and bolt material = 40 N/mm^2

    Crushing strength for key and bolt material = 85 N/mm^2

    Shear stress for cast iron = 15 N/mm^2

    Draw a sketch of the coupling and show important dimensions.

OR

14. A circular bar 60 mm diameter is welded to a steel plate. A load of 1000 N acts at a distance of 200 mm. The bar acts as a cantilever. Determine the size of weld if the stress developed should not exceed 80 N/mm^2.

Module – III

15. A direct reading tension spring balance consists of a helical tension spring, which is attached to a rigid support at one end and carries masses at other free end. The length of scale is 100 mm, which is divided into 50 equal divisions. Each division indicates 0.5 kg. Maximum capacity of the balance is 25 kg. The spring index is 6. Assuming a suitable material design the spring and give the specifications.

OR

16. A semielliptic leaf spring used for automobile suspension consists of three extra full length leaves and 15 graduated leaves, including master leaf. Centre to centre distance between eyes is 1m. Maximum force acting an spring is 70 kN. For each leaf ratio of width to thickness is 9 :1. Modulus of elasticity is 207000 N/mm^2

    The leaves are prestressed in such a way that when force is maximum the stresses induced in all leaves are 450 N/mm^2. Find

    a) The width and thickness of leaves

    b) Initial nip

    c) Initial preload required to close gap between the extra full length leaves and graduated length leaves.