Code No. 2344 / N

FACULTY OF ENGINEERING

B.E. 3/4 (M/P) I-Semester (Main)(New) Examination, November / December 2012

Subject : Design of Machine Elements

Time : 3 Hours **Max. Marks: 75**

Note: Answer all questions of Part - A and answer any five questions from Part-B.

PART – A (25 Marks)

1. Define the terms: (a) CODES (b) STANDARDS used in design. (3)
2. How do you distinguish a brittle and a ductile materials? (3)
3. What is stress concentration factor? Explain its significance. (3)
4. What is the difference between a standard specimen and an actual specimen? (3)
5. How do you design a shaft subjected to torsion, bending and axial load all together? (3)
6. Why a flexible coupling is called by that name? Explain with a sketch. (2)
7. Where the cotter and knuckle joints are used? (2)
8. What are bolts of uniform strength? (2)
9. Explain about differential and compounds screws. (2)
10. How do you calculate efficiency of a riveted joint? (2)

PART – B (5x10=50 Marks)

11. An 1-section beam of depth 250 mm and M.I. of $8x10^7$ mm^4 is supported 4m apart. It is loaded by a weight of 4 KN through a height of 'h' and striking the beam at mid span. Determine the height of fall if allowable stress of beam material = 120 N/mm^2 and E=210 KN/mm^2. (10)

12. The principle stresses induced at a point in a machine component made of steel 50C4(S_{yt}=460MPa) are as follows. σ_1 = 200 MPa, σ_2 = 150MPa, σ_3=0; Calculate the factor of safety by (a) Maximum shear stress theory (b) The distortion energy theory. (10)

13. A bar of circular cross section is subjected to alternating tensile force varying from a minimum of 200 KN to a maximum of 500 KN. It is to be manufactured of a material with σ_{ut}= 900 MPa and σ_e = 700 MPa. Determine the diameter of the bar using FS=3.5 and a stress concentration factor K_f=1.65; Use Goodman criteria for design. (10)

14. Design a knuckle joint to transmit a load of 150 KN. The design stresses may be taken as 75 MPa in tension, 60 MPa in shear and 150 MPa in compression. (10)

15. Design a CI protective type flange coupling to transmit 15 KW at 900 rpm. The following permissible stresses may be used. Shear stress for shaft, bolt and key=40 MPa. Crushing stress for bolt and key =80 MPa, shear stress for C.I. = 8 MPa, Draw a neat sketch of the coupling. (10)

16. A Shaft of rectangular cross section is welded to a support by means of fillet welds as shown in figure 1. Determine the site of welds, if the permissible shear stress in the weld is limited to 75 MPa.

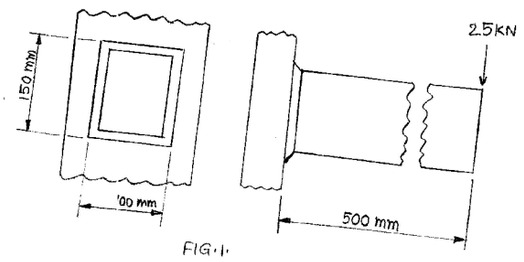

FIG.1.

17. Write short notes on: (10)
(a) Preferred numbers (b) Fluctuating stresses (c) Design of pulleys

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