H.T.No. | | | | | | | | | | |

Code No: ME1522 **GEC-R14**

III B. Tech I Semester Regular / Suppl. Examinations, November 2017

PRINCIPLES OF MACHINE DESIGN

(Mechanical Engineering)

Time: 3 Hours **Max. Marks: 60**

Note: All Questions from **PART-A** are to be answered at one place.
Answer any **FOUR** questions from **PART-B.** All Questions carry equal Marks.

PART-A

6 × 2 = 12M

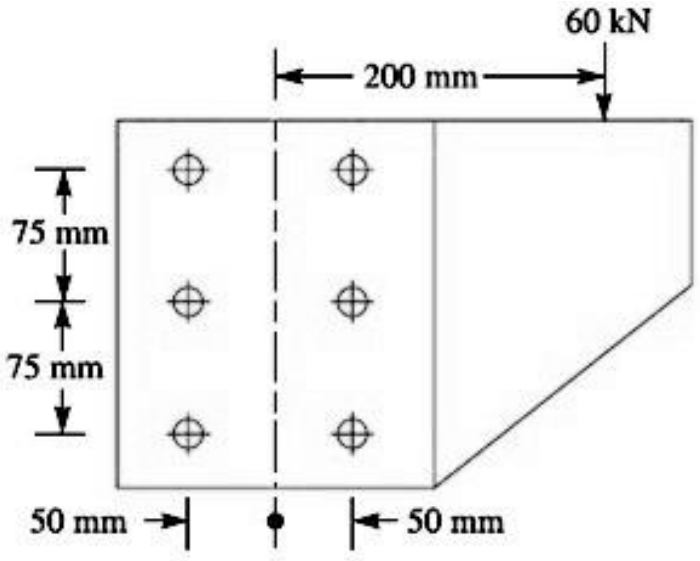
1. a) Define poisson's ratio.
   b) Write the bending equation for design of shaft.
2. Describe Mohr's circle.
3. Draw the S-N Curve and discuss its features.
4. What is relationship between thickness of plate and throat of a fillet weld?
5. What is cotter joint? Classify cotter joints?
6. What are requirements of good coupling? Give at least two applications of couplings.

PART-B

4 × 12 = 48M

1. A shaft is transmitting 95kW at 300 r.p.m. If the allowable shear stress in the material is 60MPa, find the suitable diameter for the shaft. The shaft is not to twist more than 1^0 in a length of 2.5 meters. Take G=80GPa. (12M)
2. A point in a strained material is subjected to mutually stress of 600 N/mm^2 (tensile) and 400 N/mm^2 (compressive). It is also subjected to a shear stress of 100 N/mm^2. Draw Mohr's circle and find the principal stresses and maximum shear stress. Also compare the stresses analytically. (12M)
3. A solid circular shaft made of steel Fe620 (S_{ut} = 620 N/mm^2 and S_{yt} = 380 N/mm^2) is subjected to an alternating bending moment varies from -200 N-m to +400 N-m. The shaft is ground and expected reliability is 90%.The theoretical stress concentration factor is 1.6 and the notch sensitivity factor is 0.9. Assume size factor =0.85, Factor of Safety = 2. Determine the shaft diameter for infinite life using
   i) Soderberg method
   ii) Goodman method. (12M)
4. A knuckle joint is required to withstand a tensile load of 25 kN. Design the joint if the permissible stresses are σt = 56 MPa ; τ = 40 MPa and σc = 70 MPa. (12M)
5. A line shaft rotating at 200 r.p.m. is to transmit 20 kW. The allowable shear stress for the material of the shaft is 42 MPa. If the shaft carries a central load of 900 N and is simply supported between bearing 3 metre apart, determine the diameter of the shaft. The maximum tensile or compressive stress is not to exceed 56 MPa. (12M)

6. A bracket is riveted to a column by 6 rivets of equal size as shown in Figure. It carries a load of 60 kN at a distance of 200 mm from the centre of the column. If the maximum shear stress in the rivet is limited to 150 MPa, determine the diameter of the rivet. (12M)



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