Code No: R1622012 **R16** SET - 1

II B. Tech II Semester Regular/Supplementary Examinations, November - 2020
STRENGTH OF MATERIALS-II
(Civil Engineering)

Time: 3 hours Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B)**
2. Answer **ALL** the question in **Part-A**
3. Answer any **FOUR** Questions from **Part-B**

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PART –A

1. a) Find the diameter of a bar which is subjected to an axial pull of 120 kN, if the maximum allowable shear stress on any section is 50 MPa. (2M)
b) A close coiled helical spring is to carry a load of 950 N. Its mean coil diameter is 10 times that of wire diameter. Calculate the diameters of coil and wire if the shear stress in the material of the spring is 80 N/mm^2. (3M)
c) Define the terms buckling and slenderness ratio (2M)
d) A rectangular column of width 120 mm and breadth 80 mm carries a point load of 120 kN at an eccentricity of 10 mm. If the minimum stress at the base of the section is zero, find the eccentricity of the load on the section. (3M)
e) State the assumptions made in analyzing a beam for unsymmetrical bending (2M)
f) How method of joint differs from the method of section in the analysis of pin jointed trusses (2M)

PART -B

2. a) At a point in a beam the normal stress along its length is 75 N/mm^2. The shear stress at that point is 25 N/mm^2. Find the stresses on a plane whose normal is inclined at 30° to the longitudinal axis. Also find the principal stresses and planes on which they act (7M)
b) Determine the diameter of the bolt which is subjected to an axial pull of 10 kN and a transverse shear force of 5 kN using maximum principal stress theory. Take elastic limit of material in tension = 220 N/mm^2, factor of safety = 3 and Poisson's ratio = 0.3 (7M)

3. a) A hallow shaft is to transmit 325 kW at 120 rpm. If the shear stress is not to exceed 70 N/mm^2 and the internal diameter is 0.6 of the external diameter, find the internal and external diameters by assuming the maximum torque is 1.4 times the average torque. (7M)
b) A leaf spring carries a central load of 2.5 kN. It is made of 10 steel plates of 5 cm wide and 6 mm thick. If the bending stress is limited to 120 N/mm^2, find the length of the spring and deflection at the centre of the spring. Take E = 200 GPa (7M)

4. a) Determine the crippling load for a T – section of flange 15 cm x 2cm and web 10cmx 2cm and of length 6 m when it is used as strut with both ends hinged. Take E 2x10^5 N/mm^2. (7M)
b) A beam column 35 mm wide and 80 mm deep and 2.5 m long is pinned at the ends. The member carries an axial load of 75 kN along with a transverse u d l of 3 kN/m. Determine the maximum stress in the bar. Take E = 200 GPa. (7M)
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5. a) A masonry dam of rectangular cross section 8 m high and 4 m wide has water upto the top on its one side. If the density of the masonry is 21.25 kN/m^3. Find the resultant force and the point at which it cuts the base of the dam. (7M)

   b) A column 30 cm external diameter and 15 cm internal diameter supports an axial load of 2500 kN and eccentric load of P (in N) at an eccentricity of 35 cm. If the compressive and tensile stresses are not to exceed 130 N/mm^2 and 50 N/mm^2 respectively. Find the value of P. respectively. Find the value of P. (7M)

6. Determine the maximum stresses setup and position of the neutral axis for an angle 50 mm x 30 mm x 6mm. The angle is used as a cantilever of length 600 mm with 30 mm leg horizontal. A load of 1 kN is applied at the free end (14M)

7. a) Find the axial forces in the members DF, EF and GF of the truss loaded and supported as shown in **Fig. 1**. (7M)

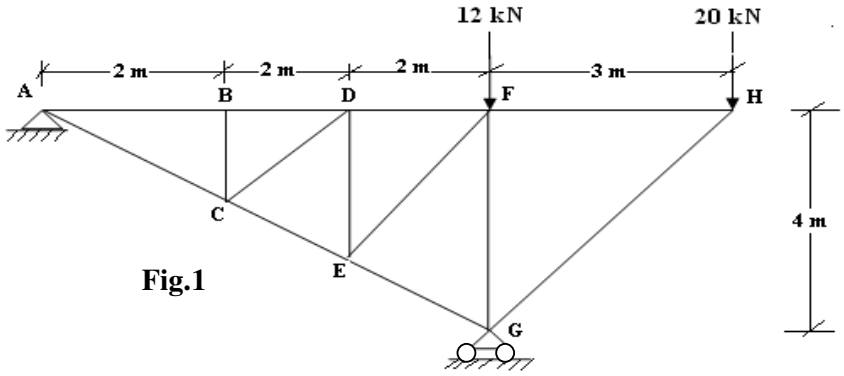

Fig.1

   b) Find the magnitude and nature of forces in the members DE, DJ, IJ and DI for the truss loaded as shown in **Fig.2**. (7M)

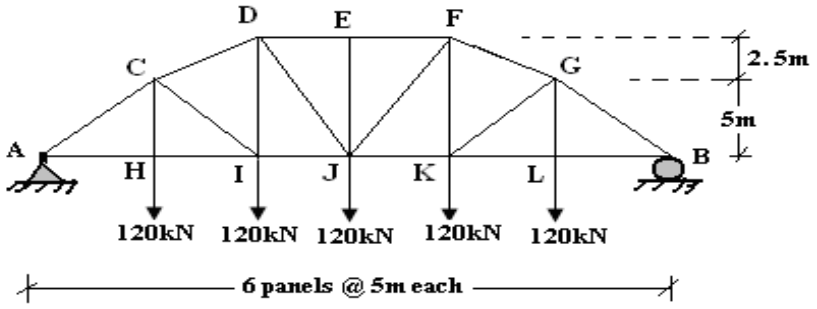

Fig. 2