Question Paper

Exam Date & Time: 03-May-2019 (02:00 PM - 05:00 PM)

MANIPAL ACADEMY OF HIGHER EDUCATION

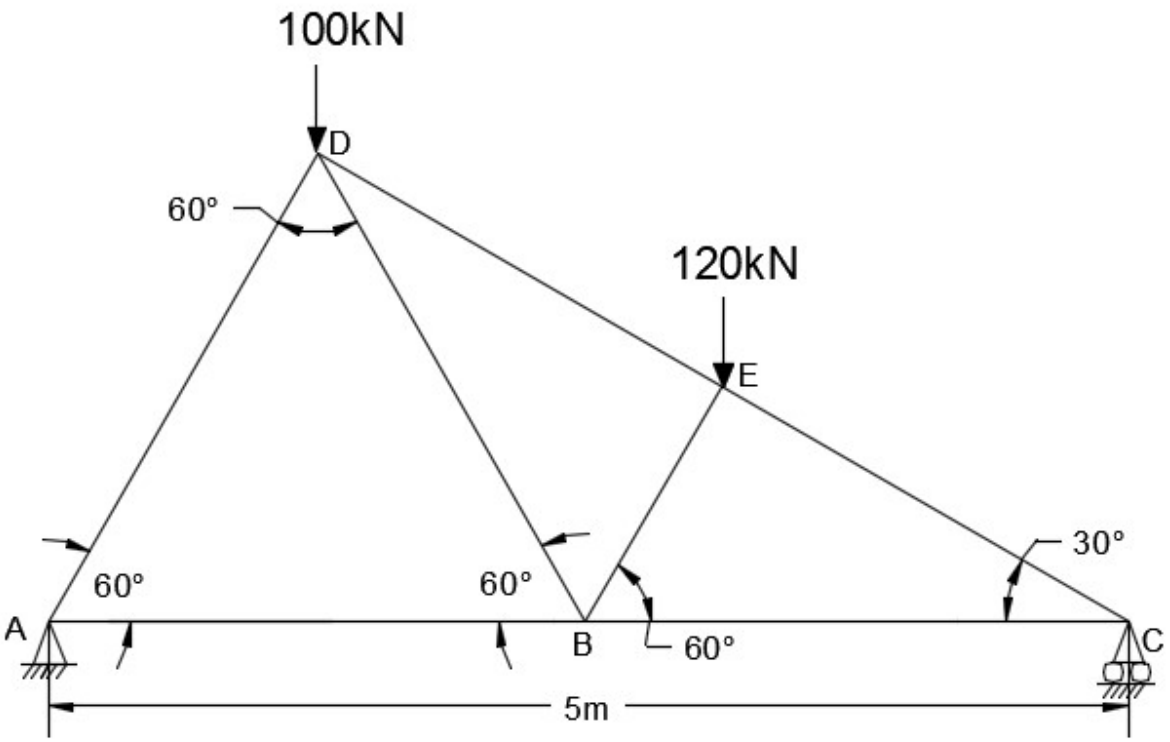
INTERNATIONAL CENTRE FOR APPLIED SCIENES
II SEMESTER B.Sc.(Applied Sciences) IN ENGINEERING END SEMESTER THEORY EXAMINATION-APRIL/MAY 2019

Mechanics Of Structures [ICE 122 - S2]

Marks: 100 **Duration: 180 mins.**

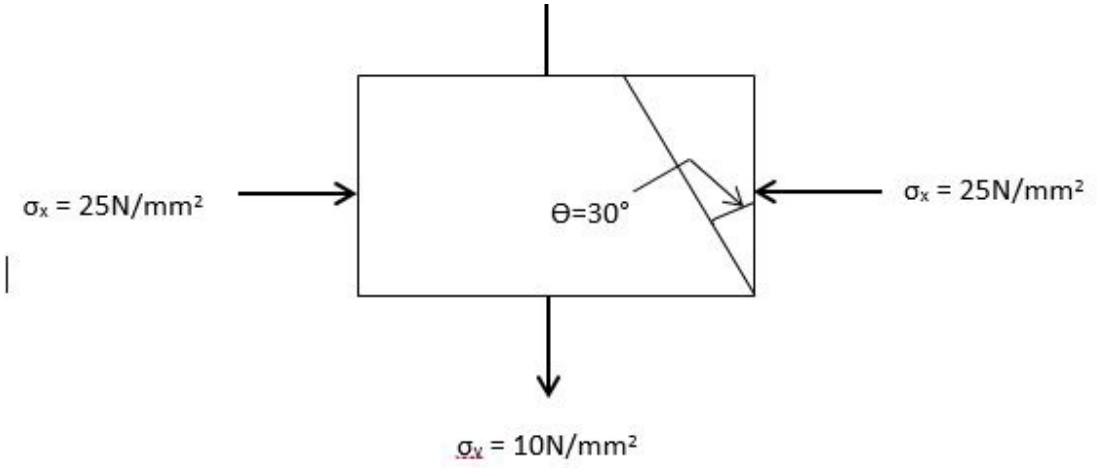
Answer FIVE full questions.
Assume missing data, if any, suitably and indicate them clearly.

1) Find all the member forces in all members of the plane pin jointed truss loaded and supported as shown in figure using method of joints. And tabulate the results. Take CE=DE=2.165m, AB =2.5m. (20)



2) A) An element in a strained body is subjected to biaxial stresses as shown in fig. Determine the normal , tangential stresses on an inclined plane which makes an angle Θ = 30° with the vertical as shown. (10)

σ_v = 10N/mm²



B) Write a short note on: (10)
i) Bettis theorem
ii) Castiglianos Theorem
iii) Law of conservation of energy
iv) Statically determinate and Indeterminate members

3) A) The cross section of an inverted T - section of overall depth 80mm, width of flange 60mm, thickness of both flange and web 20mm each . Draw the shear stress distribution if it carries shear force of 12kN. (12)

B) A simple beam of I section has two flanges of 100mm x 30mm and a total depth of 300mm with web thickness of 30mm. The beam carries UDL of 10kN/m over the entire span 8m. Determine the top and bottom bending stress for the given beam and draw stress distribution diagram. (8)

4) With usual notations derive the torsion equation T/J = τ/R = GΘ/L. (12)

A)

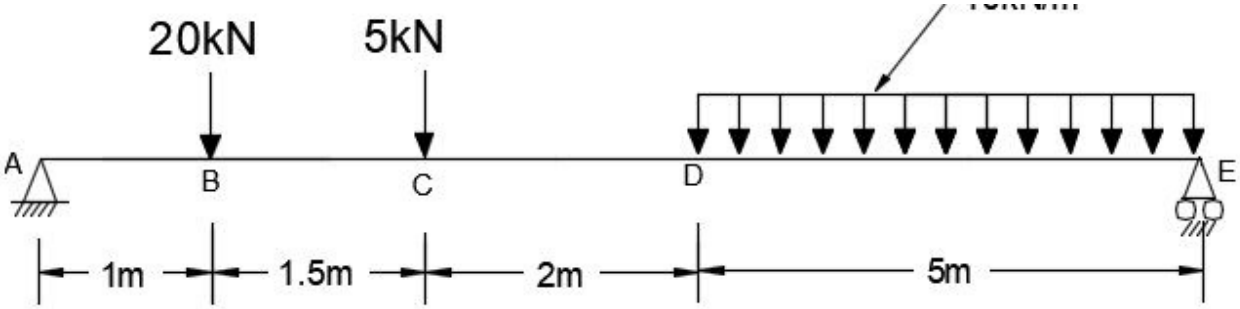
B) A T-section of flange 100mm x 12mm and web of 12mm x 88mm size is used as a compression member of 4m long with hinged at its both ends. Calculate the crippling load, if E =200GPa. (8)

5) A three hinged circular arch of span 16m and rise 4m is subjected to two point loads of 100kN and 80kN at the left and right quarter span points respectively. Find the reactions at the supports. Find also the bending moment, radial shear and normal thrust at 6m from left support. (20)

6) A suspension cable of span 100m and central dip 10m carries an UDL of 8kN/m of horizontal span over the entire span. Find the vertical and horizontal forces transmitted to the supporting pylons if (20)
a) The cable is passed over a smooth pulley
b) The cable is clamped to a saddle with the rollers on the top of the piers Also calculate the bending moment at the tower base if the tower height is 10m. The anchor cable makes 30^0 to the horizontal at the pylons.
c) If the permissible stress in cable is 90N/mm^2, calculate the cross sectional area required for each cable.

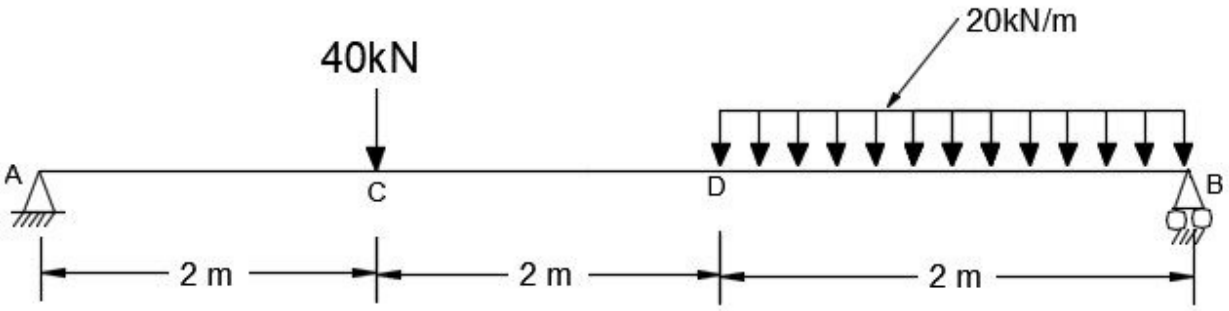
7) Draw SFD and BMD for the beam shown in Fig. Locate the maximum bending moment and point of contra flexure if any. (20)

10kN/m

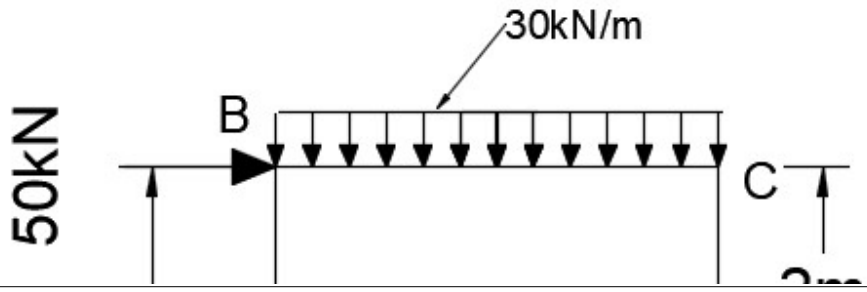


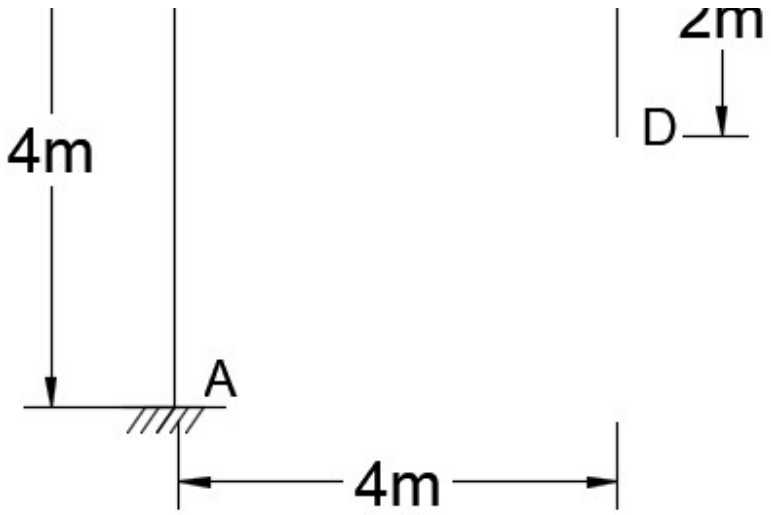
8) Find the maximum deflection at C using Macaulay's method for the beam loaded as shown in fig. Take EI=15 x 10^9 kN-mm^2 (10)

A)



B) Using Castinglianos theorem determine the horizontal displacement at the free end D in the frame shown in fig. Take EI= 12 x 10^{13}N-mm^2. (10)





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