Question Paper

Exam Date & Time: 25-Apr-2018 (09:30 AM - 12:30 PM)

MANIPAL ACADEMY OF HIGHER EDUCATION

INTERNATIONAL CENTRE FOR APPLIED SCIENCES
II SEMESTER B.Sc. (APPLIED SCIENCES)
END - SEMESTER THEORY EXAMINATIONS APRIL - 2018
DATE: 25 APRIL 2018
TIME: 9:30 AM TO 12:30 PM
Strength Of Materials [IME 123]

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

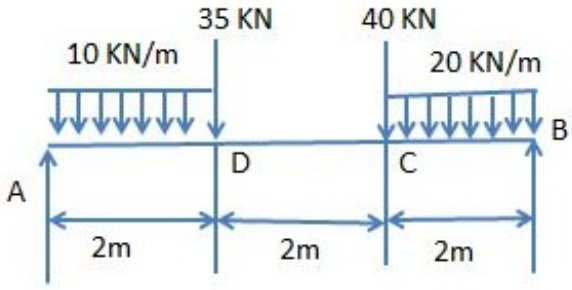
Answer 5 out of 8 questions.

1) A) Derive an expression for deformation in a compound bar due to axial load. (10)

B) Briefly discuss the salient features of stress-strain curve for mild steel. (10)

2) A) Obtain the equation for shear force and bending moment for a cantilever beam subjected to UDL and also draw the shear force and bending moment diagram. (10)

B) Calculate the shear force at each point and also draw the shear force diagram for a simply supported beam as shown in figure. (10)



3) A) A cantilever beam of 6 m long carries a load of 20 KN at its free end and 20 KN at a distance of 3 m from the fixed end. Determine the shear force and bending moment at the salient points and also draw the shear force and bending moment diagram. (10)

B) Derive an expression for shear force and bending moment for a simply supported beam subjected to a concentrated load. Also draw the shear (10)

force and bending moment diagram.

4) A) Discuss the stresses developed due to sagging and hogging moment in a beam. (6)

B) State any FOUR assumptions of simple bending theory. (4)

C) Find the shear stress at the neutral axis of I section with flange100 mm x 10 mm and web is 10 mm x 100 mm and bottom flange is 100 mmx10 mm. The shear force acting on the I section is 20 KN. (10)

5) A) Derive the equation for bending for a beam due to sagging moment. (10)

B) A cantilever beam of length 2 m is fails when a load of 1920 N applied at its free end and the cross- section of the beam is 40 mm x 40 mm. Find the stress at failure. (10)

6) A) Obtain the differential equation for deflection in a beam. (10)

B) Find the diameter of a solid shaft that will not twist more than 3 degree in a 6 m length when subjected to a torque of 12 KN-m. Take G = $83x10^3$ N/mm^2. (10)

7) A) Determine the equation for slope and deflection for a cantilever beam subjected to a moment at its free end. (10)

B) Derive an equation for Torsion for a shaft fixed at one end and subjected with a torque at the other end. (10)

8) A) State the assumptions of Euler's column theory. (6)

B) A hollow rectangular cross section has outer dimension is 200 mm x 150 mm and wall thickness is 50 mm. Find the Euler's load if the effective length is 5 m and both ends are fixed. Take E = 200 $x10^3$ N/mm^2, Ixx = $55.21x10^6$ mm^4 and Iyy = $95.83x10^6$ mm^4. (4)

C) The external diameter of a pipe is 600 mm and 100 mm thickness contains a fluid at a (10)

pressure of 80 N/mm^2. Find the minimum hoop stress in the section of the pipe using
Lame's equation.

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