INDIAN MARITIME UNIVERSITY

(A Central University, Government of India)

End Semester Examination Dec 2019/Jan 2020

B.Tech (Marine Engineering)

Semester III

UG11T1304/2304- Strength of Material- II

Date: 17.12.2019 **Max Marks: 70**

Time: 3 Hours **Pass Marks: 35**

Part – A (compulsory)

Answer the following (10x2=20 Marks)

1. Define Principal stress? Which are the methods to calculate the stresses on an oblique section of a body?
2. What is the use of Mohr's circle?
3. State the Mohr's Theorem for Moment area method
4. What are the methods for calculating slope and deflection?
5. Write the equation for Claperyon's Three moment Theorem
6. What is the use of Castigliano's Theorem
7. What is the use of compound cylinder over a single cylinder?
8. What down the Lame's equation for stresses in thick cylindrical shell?
9. How the struts are differs from Column?
10. Write down the Rankine Gordon formula?

Part – B

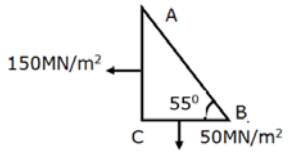
Answer any 5 out of 7 questions (5 x 10= 50 marks)

11. a) Derivation for normal and tangential stresses on an Oblique Section of a body subjected to a direct stress in two mutually perpendicular directions. (5 Marks)

b) An element in a strained body is subjected to a tensile stress of 150 MN/m^2 and a shear stress of 50 MN/m^2 tending to rotate the element in an anticlockwise direction. Find the magnitude of the normal stress and the shear stresses on a section inclined at 40^0 (5 Marks)

12. a) Find the intensities of normal, shear, resultant stress and Maximum shear stress on a plane inclined at an angle of 55^0 with the axis of major tensile stress as shown in figure 1. Solve by Graphical method**.** (6 Marks)

Figure: 1



b) Using moment area method, find maximum deflection of a cantilever beam of length 'L' subjected with a concentrated load 'W' acting at a distance 'a' from the fixed end. (4 Marks)

13. A beam AB of span 8 m is simply supported at the ends.It carries a UDL of 30 KN/m run over it's entire length and a concentrated load of 60 KN at 3 meters from the support A. Calculate the maximum deflection of the beam and the location where the deflection occurs. Use Macaulay's Method. Take E= 200 X 10^6 KN/m^2 and I = 80 X 10^{-4} m^{-4}. (10 Marks)

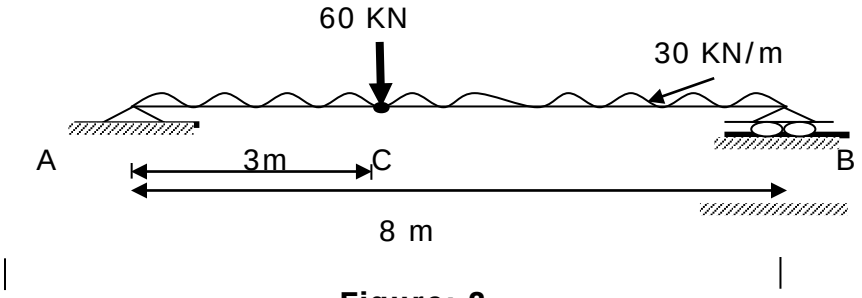


Figure: 2

14. A fixed beam of 6 m span is loaded with a point loads of 30 KN at a distance 2 meter from each support. Determine the Fixed end moments at the ends and draw bending moment diagram. (Refer figure 3) (10 Marks)

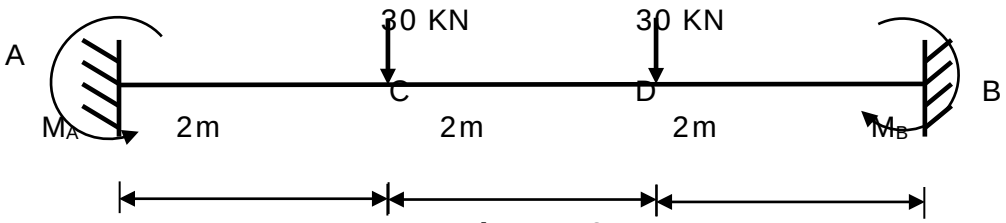


Figure: 3

15. Using Castigliano's theorem, obtain the deflection under single concentrated load applied to a simply supported beam as shown in the figure 4.
Take EI = 2.2 MN-m^2 (10 Marks)

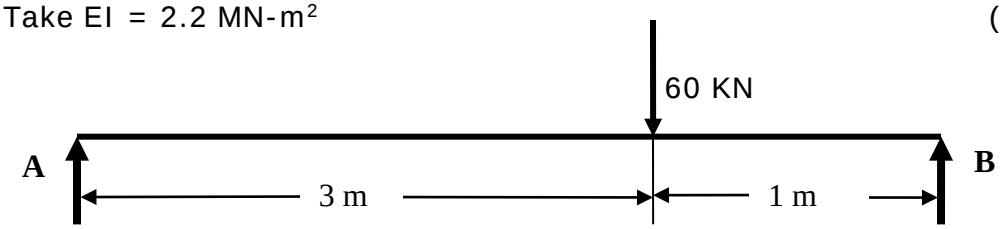


Figure: 4

16. Determine the maximum and minimum hoop stresses across the section of a pipe 400 mm internal diameter and 100 mm thickness, when a pipe contain a fluid at a pressure of 8 MN/m^2. (7 Marks)
Also sketch the radial stress (pressure) distribution & hoop stress distribution across the section. (3 Marks)

17. a) Derive Euler's formula for column of one end is fixed & other end is free. (5 Marks)

b) A hollow C.I. column whose outside diameter is 200 mm has a thickness of 20 mm .It is 4.5 m long and is fixed at both ends. Taking factor of safety as 4, calculate safe load using Rankine-Gordon formula. Take yield stress as 550 MN/m^2 and a = 1/1600. (5 Marks)