INDIAN MARITIME UNIVERSITY

(A Central University, Government of India)

End Semester Examination Dec 2019/Jan 2020

B.Tech (Marine Engineering)

Semester -III

UG11T3304- 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 Compound Stress.
2. Define Mohr's circle and explain the use of Mohr's circle?
3. State the IInd Mohr's Theorem for moment area method
4. Explain the use of Macaulay's method.
5. Write the equation for Claperyon's three moment Theorem
6. What is the use of Castigliano's Theorem?
7. What are the stresses developed in thick cylindrical shell?
8. What are the assumptions in thick cylindrical shell?
9. Define slenderness ratio?
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 stresses in two mutually perpendicular directions accompanied by a simple shear stress (5 Marks)

b) The stresses at a point in a component are 100 MN/m^2 (tensile) and 50 MN/m^2 (compressive). Determine the magnitude of the normal stress and the shear stresses on a plane inclined at 25^0 with tensile stress. (5 Marks)

12. a) The stresses at a point of machine element are 150 MN/m^2 and 50 MN/m^2 both tensile. 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. Solve by Mohr's circle method. (6 Marks)

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

13. Determine slope and deflection at 'C' in terms of EI for the beam shown in Figure 1. Use Macaulay's Method.

(10 Marks)

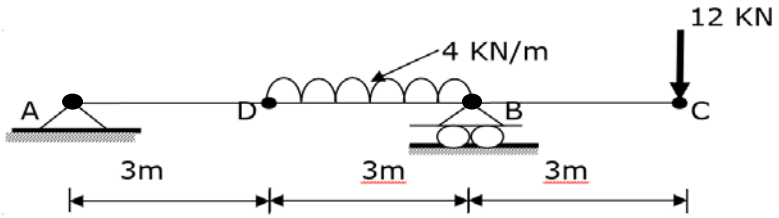

Figure: 1

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 2) (10 Marks)

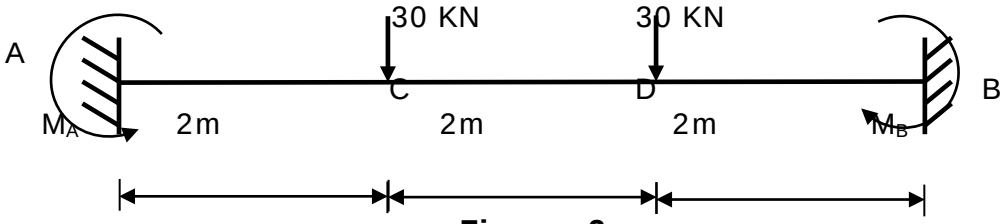

Figure: 2

15. Using Castigliano's theorem, calculate the vertical deflection at the middle of a simply supported beam which carries a uniformly distributed load of intensity 'w' over the full span. The flexural rigidity EI of the beam is constant and only strain energy of bending is to be considered. (10 Marks)

16. A thick metallic cylindrical shell of 150 mm internal diameter is required to with stand an internal pressure of 8 N/mm^2. Find the necessary thickness of the shell, if the permissible tensile stress in the section is 20 N/mm^2. (10 Marks)

17. a) Derive expression for crippling load when both the ends of the columns are fixed.

(5 Marks)

b) The cross-section of column is hollow rectangular section having outside dimension 200 mm X 120 mm and inside dimension 180 mm X 100 mm with the uniform thickness of 10 mm. It is fixed at one end and hinged at other end .If the buckling load is given by Rankine formula is 800 KN. Find the actual length of column, assume crushing stress is 300 MN/m^2 ,E=200 GN/m^2 and a = 1/7500 . (5 Marks)