INDIAN MARITIME UNIVERSITY

(A Central University, Government of India)

End Semester Examinations- June-July 2019

Semester – III

B.Tech (Marine Engineering)

Strength of Material- II – I (UG11T3304)

Date: 16-07-2019 Maximum Marks: 100

Time: 3 Hrs Pass Marks: 50

PART-A 10X3 =30 Marks

(All questions are Compulsory)

1.

(a) Define Compound Stress.

(b) What is the use of Mohr's circle?

(c) What are the methods of determining slope and deflection at a section in a loaded beam?

(d) Define Over hanging beam.

(e) Write the equation for Claperyon's Three moment Theorem

(f) What is the use of Castigliano's Theorem

(g) Define Thick cylinder

(h) What are the assumptions in Lame's theory?

(i) What are the assumptions assumptions in Euler's theory for long column

(j) Explain Rankine's constant?

PART B

Answer any Five of the Following 5x14=70 Marks

2.

a) Derive an expression for Stresses on an Oblique Section of a body subjected to a direct stress in one plane. (7 Marks)

b)

A piece of steel plate is subjected to perpendicular stresses of 50 N/mm^2 tensile and 50N/mm^2 compressive as in the figure 1. Calculate the normal and shear stresses at a plane making 45º. (7 Marks)

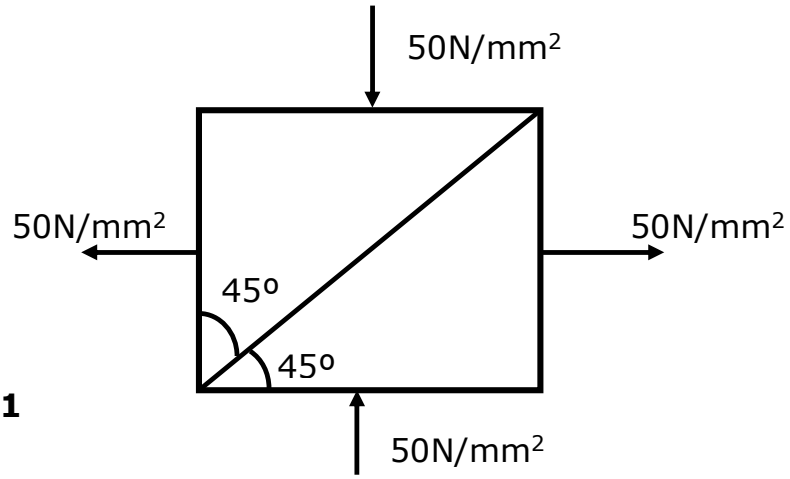

Figure: 1

3. a) Find the intensities of normal, shear ,resultant stress and Maximum shear stress on a plane inclined at an angle of 50^0 with the axis of major tensile stress as shown in figure 2. Solve by Graphical method (8 Marks)

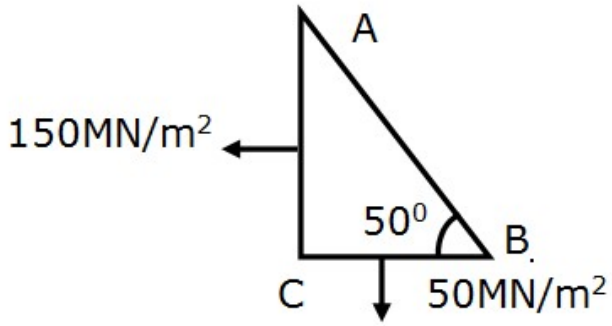

Figure: 2

b) Using moment area method, find maximum deflection of a cantilever beam of length 'L' subjected with a concentrated load 'W' acting at the free end. (6 Marks)

4. A horizontal beam is freely supported at A and B,8 m apart & it carries UDL of 15 KN/m run (including its own weight).A clockwise moment of 160 KNm is applied to the beam at C,3m from the left hand support A. Calculate the slope of the beam at point C ,if EI = 40 MN-m^2. Use Macaulay's Method. (14 Marks)

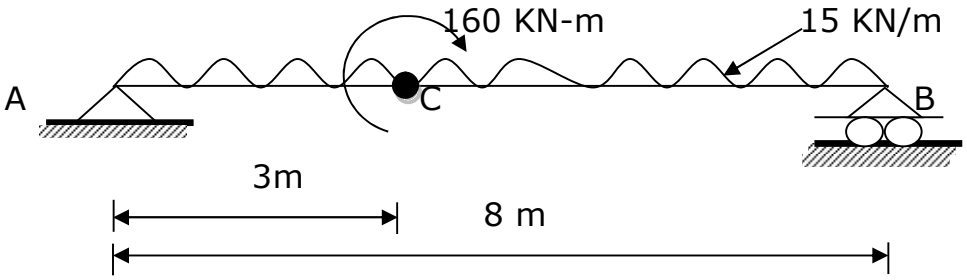

Figure: 3

5. A fixed beam of 6 m span carries point loads of 150 KN at a distance 2 meter from each supports as shown in figure 4. Draws shear force and bending moment diagram. (14 Marks)

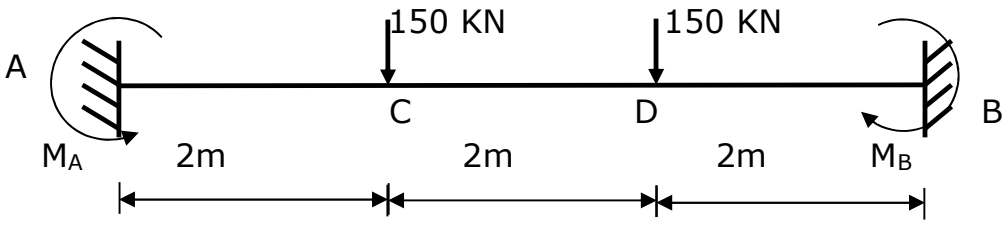

Figure: 4

6 Using Castigliano's theorem, obtain the deflection under single concentrated load applied to a simply supported beam as shown in the figure 5. EI = 2.2 MN-m^2 (14 Marks)

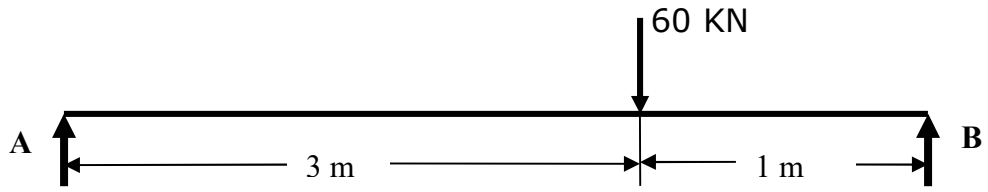

Figure: 5

7. A pipe 200 mm internal diameter and 50 mm thickness carries a fluid at a pressure of 10 MN/m^2. Calculate the maximum and minimum intensities of circumferential stresses across the section.
Also sketch the radial stress (pressure) distribution & circumferential stress distribution across the section. (14 Marks)

8. a) Derive Euler's formula for a both-end pinned column. (7 Marks)

b) A 1.5 m long C.I. column has a circular cross section of 5 cm diameter. One end of the column is fixed in direction and position and the other is free. Taking factor of safety as 3, calculate safe load using : Rankine-Gordon formula .Take yield stress as 560 MN/m^2 and a = 1/1600 for pinned ends.
Take Young's Modulus for C.I.=120 GN/m^2. (7 Marks)

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