INDIAN MARITIME UNIVERSITY

(A Central University, Government of India)
End Semester Examinations- June-July 2019
Semester – III
B.Tech (Marine Engineering)
Strength of Materials-II (UG11T1304 / UG11T2304)

Date: 16-07-2019	Maximum Marks: 100
Time: 3 Hrs	Pass Marks: 50

PART A

Q1) Answer all the questions   **[3x10=30 marks]**

a) What is principle plane and principle stress?
b) Enlist all types of theories of failure
c) What is strain energy?
d) Why Macaulay's method is preferred over all other methods?
e) Explain Claperyron's three moment theorem.
f) Explain Castigliano's theorem.
g) What is shrunk thick cylinder?
h) Define Lame's Theorem for thick shell.
i) Explain the Buckling of Column.
j) What are the limitations of Euler's formula?

PART-B

Answer any five of the following   [14x5=70 marks]

Q2)

a) Two mutually perpendicular planes of an element of material are subjected to direct stresses of 10.5 MN/m^2(tensile) and 3.5 MPa (comp.) and shear stress of 7 MPa FIND 1] The magnitude and direction of principle stress 2] Magnitude of normal and shear stresses on a plane on which the shear stress is maximum.   **[7 marks]**

b) At a point in a material under stress the intensity of the resultant stress on a certain plane is 50 MPa (tensile) inclined at 30^0 to the normal of that plane.The stress on a plane at right angles to this has a normal tensile

component of intensity of 30 MN/m^2 FIND BY GRAPHICALY 1] The resultant stress on the second plane. 2] The principal planes and stresses. 3] The plane of maximum shear and its intensity. **[7 marks]**

Q 3)

a) A shaft section 100 mm in diameter is subjected to a bending moment of 4 KNm and torque of 6000 Nm FIND 1] The maximum direct stress induced on the section and specify the position of the plane on which it acts.   2] What stress acting alone can produce the same maximum strain ? Assume Poissons ratio 0.3. **[7 marks]**

b) Find maximum slope and deflection of a cantilever beam subjected to UDL on whole span by MOMENT AREA METHOD. **[7 marks]**

Q 4) A beam AB of span 8 m is simply supported at the ends A and B and is loaded as shown in **FIG 1** If E=200 GPa and I= 120 X 10^{-6} m^4 Determine

1] Deflection at the mid span. 2] Maximum deflection 3] Slope at the end.

10 kN/m

A

C

D

B

2 m

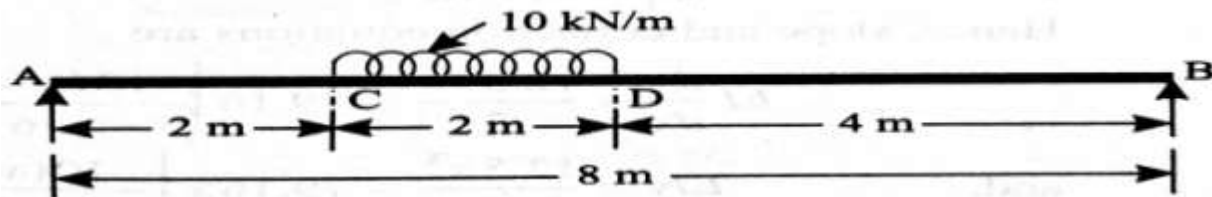2 m

4 m

8 m

FIG 1

[14 marks]

Q 5) A fixed beam of 6 m span carries point loads of 100 KN and 75 KN as shown in **FIG 2** Find the following 1] Fixing moments at the ends 2] Reactions at the supports. Draw SF and BM also.
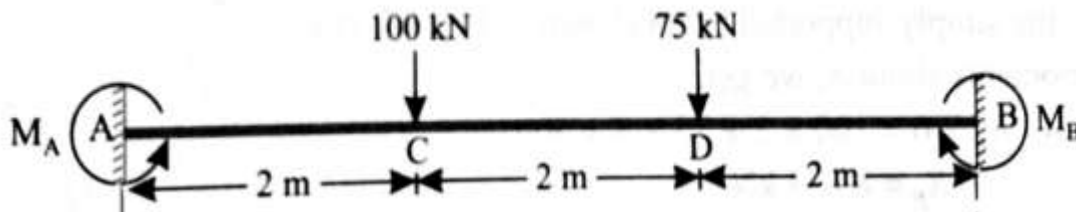
100 kN

75 kN

M_A

A

C

D

B

M_B

2 m

2 m

2 m

FIG 2

[14 marks]

Q 6) A pipe of 200 mm internal diameter and 50 mm thickness carries a fluid at a pressure of 10 MPa.Calculate the maximum and minimum intensities of circumferential stresses across the section.Also sketch the radial stress distribution and circumferential stress distribution across the section

Q 7) Derive Euler's column formula for one end fixed and other end pinned.

[14 marks]

Q 8) A hollow cylindrical cast iron column is 4 m long with both ends fixed.Determine the minimum diameter of the column if it has to carry a safe load of 250 KN with FOS 5.Assume internal diameter as 0.8 times the external diameter.

[14 marks]

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