INDIAN MARTIME UNIVERSITY
(CENTRAL UNIVERSITY, GOVT. OF INDIA)
DEC 2017 – END SEMESTER EXAMINATIONS
B.TECH (Marine Engineering)
Third Semester
STRENGTH OF MATERIALS II
UG11T2304/1304

Date: 12.12.2017 MAX MARKS: 100

Time: 3 Hrs PASS MARKS: 50

Note: 1. Question 1st Compulsory from Part"A" carried 30 Marks.
2. Part "B" contains 7 questions and any "Five" questions can be solved from it. Each question carries 14 Marks.

Part A

Q.1 :

i. Define Thick – Cylinder.

ii. Define Principal Stresses and Planes.

iii. State Assumption made in Euler's Theory.

iv. Define Continuous Beam and over hangs.

v. Define Stiffness of Beam with respect to Loading 'W'

vi. State advantages Macaulay's Method.

vii. Prove $M = EI \frac{d^2y}{dx^2}$ w.r.t. bending moment M.

viii. Sate Assumptions made in Lame's Theory.

ix. Explain with diagram the strain energy stored in material for the application of gradual force.

x. Relation between the suddenly applied load & gradual load w.r.t. stress in the material.

Part B

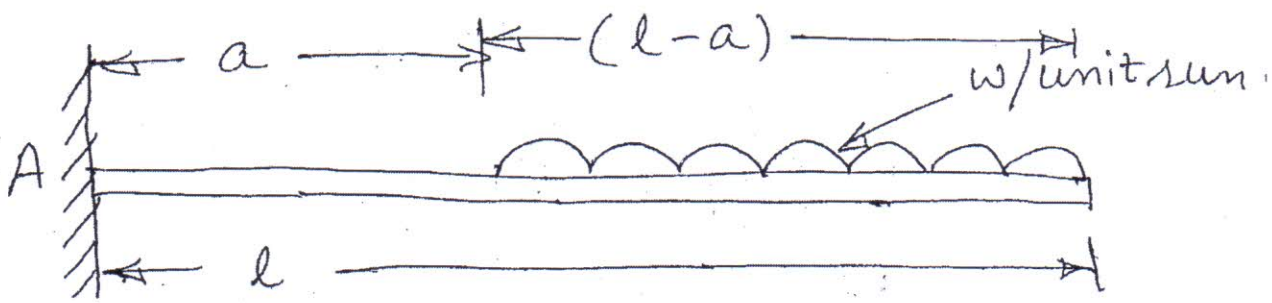
Q.2 : A Continuous beam ABCD carrying a uniformly distributed load w/unit length rests an three supports B, C, D; all at same level. It has two equal overhangs of length '1o' on either side.

Assume EI constant; find the ratio of $\frac{l_o}{l}$ for the three support reactions to be equal.

Q.3: Prove Lame's Theorem for thick cylinder form 1st Principal.
State assumption made and conventions used for the proof.

Q.4: A Compound Cylinder formed by shrinking one tube to another is subjected to an internal pressure of 90 MN/m^2. Before the Fluid is admitted, the internal and external diameters of the compound cylinder are 180 mm and 300 mm respectively and the diameter at the junctions is 240 mm. If after Shrinking on, the radial pressure at the common surface is 12 MN/m^2 Determine the final stresses developed in the compound cylinder.

Q.5: A cantilever of length '1" carrying a uniformly distributed load of 'W' per Unit run on a part of span from the free end as shown in the figure. Prove the down ward deflection at B is $Y_B = \frac{W}{24\,EI}(3l^4 - 4la^3 + a^4)$ First Principal.



Q.6: At a point in a Strained material, the state of stress is a shown in figure.

Determine:

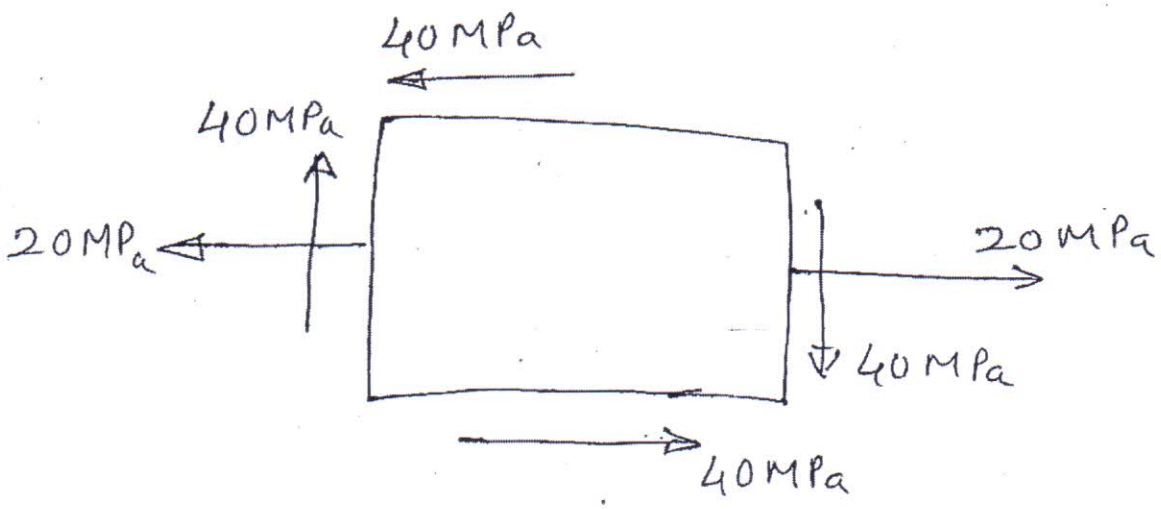
i. Principal stresses.

ii. Principal Planes.

iii. Maximum shear stress and plane on which it acts.

iv. The tensile stress which acting alone will produce same maximum shear stress and

v. The Shear stress acting alone will produce same maximum tensile Principal stress.



Q.7: When one end of the column is fixed and the other end is pinned or hinged And P is the buckling load.

Prove $\underline{P} = \frac{2\pi^2 EI}{L^2}$

When E = Modulus of Elasticity and I = Moment of inertia.

Q.8: The Cross section of column is hollow rectangular section having outside Dimensions 200 m x 120 mm and inside dimensions 180 mm x 100 mm With uniform thickness of 10 mm. It is fixed at one end and hinged at the other end. If the buckling load given by Rankine's formula is 800 KN.

Find actual length of column.

Assume crushing stress = 300 MPa

E = 200 GPa and $a = \frac{1}{7500}$