INDIAN MARITIME UNIVERSITY

(A CENTRAL UNIVERSITY, GOVT. OF INDIA)

End Semester Examination December 2018

B. Tech. (Marine Engineering)

Semester - III

Strength of Materials - II (UG11T2304)

Date: 04/01/2019 Max Marks: 100

Time: 3 Hrs. Pass Marks: 50

Part –A **Marks: 10X3 = 30**

(All Questions are Compulsory)

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

(b). A beam of length 6 m is simply supported at its ends and carries a point load of 40 KN at a distance of 4 m from the left support. Find the **deflection** under the load and **maximum deflection**. Also calculate the point at which maximum deflection takes place. Given M.O.I of Beam = 7.33×10^7 mm^4 and E = 2×10^5 N/mm^2

(c). Describe technically the meaning of **Deflected Beam** with sketch ?

(d). A beam 3 m long, simply supported at its ends, is carrying a point load W at the centre. If the slope at the ends of the Beam should not exceed one degree, Find the deflection at the centre of the Beam.

(e). Differentiate between an **actual Beam** and the corresponding **conjugate Beam**

(f). What are the **advantages** of a **fixed beam** over a simply supported beam .

(g). Differentiate between **Thin Cylinders** and **Thick Cylinders** .

(h). Describe how **Columns fail** due to the stresses set up in the columns.

(I).What are the **assumptions made in the Euler's Column Theory**?

(j). Sketch **Compound Cylinders** and describe briefly .

Part- B **Marks: 5X14 = 70**

Answer any five of the following seven questions.

(2)(a)The tensile stresses at a point across two mutually perpendicular planes are 120 N /mm ^{2} and 60 N/ mm ^{2} . Determine the normal, tangential and resultant stresses on a plane inclined at 30 degree to the axis of the minor stress by **analytical method** .

(7 Marks)

(b)The tensile stresses at a point across two mutually perpendicular planes are 120 N /mm ^{2} and 60 N/ mm ^{2}. Determine the normal , tangential and resultant stresses on a plane inclined at 30 degree to the axis of the minor stress

Solve the problem by using Mohr's Circle Method

(7 Marks)

(3)A beam of length 6 m is simply supported at its ends and carries two point loads of 48 KN and 40 KN at a distance of 1 m and 3 m respectively from the left support find

(i) Deflection under each load,

(ii) Maximum deflection and

(iii) the point at which maximum deflection occurs .

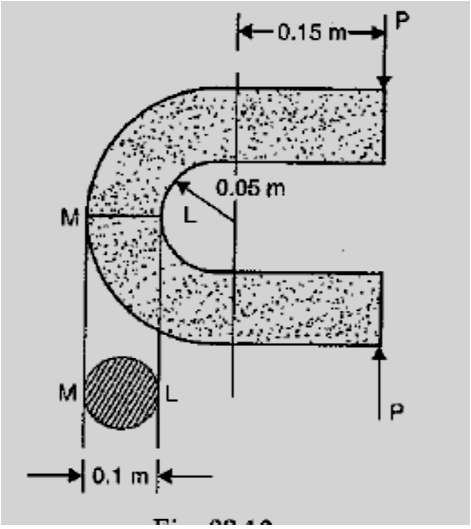
Given E = 2x10 ^{5} N/mm ^{2} and I = 85 x 10 ^{6} mm ^{4} . (14 Marks)

(4) A cantilever of length 2 m carries a point load of 20 KN at the free end and another load of 20 KN at its centre. If E = 10 ^{5} N /mm ^{2} and I = 10^8 mm^4 for the cantilever then determine by the moment area method, the slope and deflection of the cantilever at the free end. (14 Marks)

(5) A continuous beam ABC covers two consecutive span AB and BC of lengths 4 meter and 6 meter, carrying uniformly distributed loads of 6 KN /m and 10 KN/m respectively. If the ends A and C are simply supported, Find the support moments at A, B and C. Draw also B.M. and S.F. diagrams.

(14 Marks)

(6) The curved member shown in figure has a solid circular cross section 0.10 m in diameter. If the maximum tensile and compressive stresses in the member are not to exceed 150 x 10^6 N /m2 and 200 x 10^6 N /m2 respectively, determine the value of load P that can safely be carried by the member.



(14 Marks)

(7) Using Euler's Formula , Calculate the critical stresses for a series of struts having slenderness ratio of 40 , 80,120 , 160 and 200 under the following conditions :

(i) Both ends hinged and (ii) both ends fixed

Take E = 2.05 x 10^5 N / mm^2 (14 Marks)

(8) A steel tube of 200 mm external diameter is to be shrunk on to another steel tube of 60 mm internal diameter. The diameter at the junction after shrinking is 120 mm. Before shrinking on, the difference of diameters at the junction is 0.08 mm. Calculate the radial pressure at the junction and the hoop stresses developed in the two tubes after shrinking on .Take E as 2 x 10^5 N mm^2 (14 Marks)

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