Question Paper Code: 94103

B.E./B.Tech. DEGREE EXAMINATION, DEC 2021

Fourth Semester

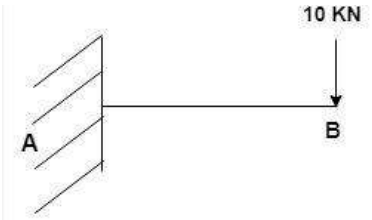
Civil Engineering

19UCE403 – DESIGN OF REINFORCED CONCRETE ELEMENTS

(Regulation 2019)

PART-A (10 x 2=20Marks)

Answer any 10 Questions

1.	Write down the Bending Equation stating all the variables used.	*CO 1*	*R*
2.	Draw the bending moment for the beam as shown in fig. 	*CO 2*	*App*
3.	How many point of contra flexure you will have for simply supported beam overhanging at one end only?	*CO 4*	*Ana*
4.	What are the advantages of Macaulay's method over other methods in calculating slope and deflection of a beam?	*CO 1*	*U*
5.	Calculate the Deflection at free end for a Cantilever beam of Length l carrying point load W at its free end.	*CO 2*	*App*
6.	List out the methods for finding out slope and deflection of a loaded beam also suggest which method is suitable for single load and several loads.	*CO 4*	*Ana*
7.	How sinking of a prop is differ from a rigid prop?	*CO 4*	*Ana*
8.	Calculate the reaction at prop of cantilever, if the span of beam is 5m and load is 20 kN.	*CO 2*	*App*
9.	In which type of Indeterminate beams, the slope and deflection at both ends will be zero?	*CO 4*	*Ana*
10.	Euler's formula gives 5 to 10% error in crippling load as compared to experimental results in practice because of: (a) Effect of direct stress is neglected (b) Pin joints are not free from friction (c) The assumptions made in using the formula are not met in practice (d) The material does not behave in an ideal elastic way in tension and compression	*CO 4*	*Ana*
11.	A hollow pressure vessel is subject to internal pressure.	*CO 4*	*Ana*

Consider the following statements:

a) Radial stress at inner radius is always zero.

b) Radial stress at outer radius is always zero.

c) The tangential stress is always higher than other stresses.

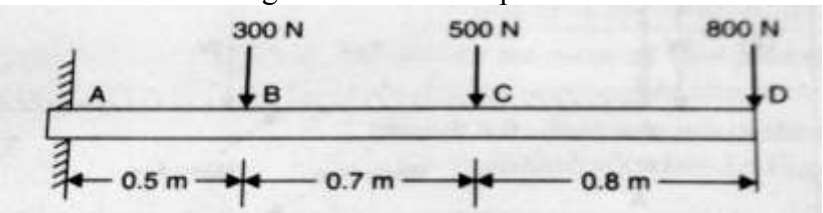
d) The tangential stress is always lower than other stresses.

Which of the statements given above are correct?

12.	A water main of 1.5 m diameter and 20 mm thick is subjected to a pressure of 1.5N/mm^2. Calculate the circumferential stress induced in the pipe.	*CO 3*	*App*
13.	If a ring is subjected to a tension, where the maximum stress will occur?	*CO 3*	*App*
14.	Enlist the reasons of unsymmetrical bending.	*CO 1*	*U*
15.	A cylindrical shaft is subjected to a permissible shear stress of 150 MN/m^{2}and maximum shear stress of 50 MN/m^2. Calculate the Factor of Safety of the Shaft.	*CO 3*	*App*

PART-B (5 x 16=80 Marks)

1.	(a) A cantilever beam of length 2m carries the point loads as shown in fig.	*CO 2*	*App*



Draw the shear force and bending moment diagrams for the cantilever Beam.

or

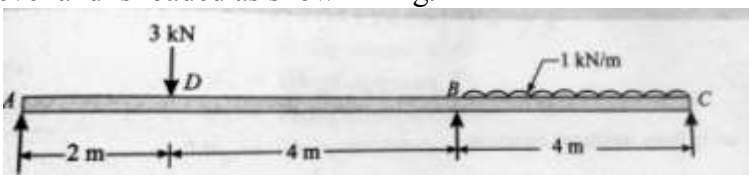
	(b) A Steel plate of width 120 mm and of thickness 20 mm is bent into a circular arc of radius 10 m. Determine the maximum stress induced and the bending moment which will produce the maximum stress. Take E=2x 10^5 N/mm^2.	*CO 2*	*App*
2.	(a) A cantilever 3 m long is loaded with audl of 15 kNm over a length of 2m from the fixed end. Determine the Slope and Deflection at the free end of the cantilever. Take E=2.1*108 kN|m2& I=0.000095 m4	*CO 2*	*App*

or

	(b) A beam has effective dimension of 230mmx450 mm with a span of 5 m & 10 m. Determine the deflection of the beams and check which one is within limit by using Codal provisions.	*CO 2*	*App*
3.	(a) A propped cantilever beam 3 m long. If the allowable bending stress and the deflection at centre is 4.5 MPa and 2.5 mm respectively, Determine the safe udl the beam can carry. Assume the datas required.	*CO 5*	*Eva*

or

(b) A continuous beam ABD 10m long rests on three supports A, B and C at the same level and is loaded as shown in fig. *CO 5* *Eva*



Determine the moments over the beam and draw the BMD.

4. (a) Determine the crippling load for a T section of dimensions 10 cm x 10 cm x 2 cm and of length 5m when it is used as a strut with both of its ends hinged. Take Young's Modulus E=2 x 105 N/mm^2 *CO 3* *App*

or

(b) A slender pin ended aluminum column 1.8 m long and of circular cross section is to have an outside diameter of 50 mm. *CO 3* *App*
Calculate the necessary internal diameter to prevent failure by buckling if the actual load applied is 13.6 KN and the critical load applied is twice the actual load.
Take E for aluminum as 70 GN/m2.

5. (a) Determine the Diameter of the bolt which is subjected to an axial pull of 9 kN together with a transverse shear force of 4.5 kN. *CO 4* *Ana*
Using
1. Maximum Principal Stress Theory
2. Maximum Principal Strain Theory

Interpret the Results.
Given the elastic limit in tension = 225 N/mm2, Factor of Safety = 3 and Poisson's Ratio = 0.3

or

(b) The principal stresses at a point in an elastic material are 200 N/mm^2 (tensile) and 50 N/mm^2 (compressive). *CO 4* *Ana*
If the stress at the elastic limit in simple tension is 200 N/mm^2, Determine
(a) Whether the failure of the material will occur according to maximum principal strain theory
(b) Whether failure of material will occur or not according to maximum shear stress theory.
Interpret the Results.