C14-C-302

4221

BOARD DIPLOMA EXAMINATION, (C-14)
OCTOBER/NOVEMBER-2018
DCE-THIRD SEMESTER EXAMINATION

MACHANICS OF SOLIDS

Time : 3 Hours] [Total Marks: 80

PART-A

3X10=30

Instructions : 1. Answer **All** questions.
2. Each question carries THREE marks
3. Answer should be brief and straight to the point

1. Define (i) Shear Force and (ii) Bending moment.
2. A simply supported beam of 4m long is loaded with a u.d.l. of 20kN/m throughout its span. Find the maximum bending moment.
3. Define " Point of contra flexure".
4. Define "Modulus of section".
5. Obtain the size of the strongest beam that can cut out of a circular log of wood which has 220mm diameter.
6. Draw shear stress distribution across depth of a T-section.
7. Define Mohr's theorem I and Mohr's theorem II.
8. Draw the deflected shapes of the following beams. Under a udl of 10 KN/m
   (i) Cantilever beam (ii) Simply supported beam and (iii) Single overhanging beam.
9. State the relation between slope, deflection and radius of curvature.
10. Distinguish between strength and stiffness of a beam.

PART-B

10X5=50

Instructions :

1. Answer any **five** questions.
2. Each question carries **ten** marks.
3. Answer should be comprehensive and the criterion for valuation is the content but not the length of the answer

11. A simply supported beam AB, 6m long is loaded as shown in fig-1. Construct the Shear force and bending moment diagrams for the beam and find the position and value of maximum bending moment.

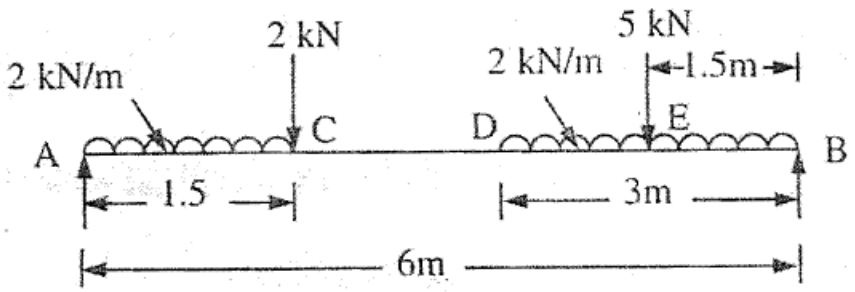

Fig-1

12. A beam ABCDE of 8m length supported at 1m and 6m from L.H.S it is loaded with three point loads of 20kN, 41kN and 10kN at 0m, 4m and 8m from R.H.S respectively. In addition it also carries a u.d.l.. of 5kN/m for a length of 6m from L.H.S. draw the S.F. and B.M. diagrams
13. (a) Write any 4 assumption made in theory of simple bending.
    (b) a rectangular beam of breadth 300mm and depth 500mm in simply supported over a span of 6m. Find the max udl the beam can carry, if the bending stress is limited to 20 N/mm^2.
14. A rectangular timber beam is simply supported at the ends and carries a concentrated load at its mid span. The maximum longitudinal stress is ‘σ’ and the maximum shear stress is ’τ’. Find the ratio of the span to the depth of the beam ignoring the self weight of the beam. Take $\sigma = 8N/mm^2$ and $\tau = 1\ N/mm^2$.

15. A beam simply supported over a span of 10m carries two concentrated loads of 60kN and 40kN at 3m and 7m respectively from L.H.S. and in addition it also carries a u.d.l. of 15kN/m over a length of 3m from L.H.S. determine the position and amount of maximum deflection. Given l=695.054 x 10^6 mm^4 and E=200GPa. Use Macaulay's method.

16. A simply supported beam a span 6m carries a central point load of 20kN and u.d.l. of 10kN/m over entire span. Find the maximum slope and deflection by moment area method. Given that flexural rigidity of the beam is 4000kN-m^2.

17. A cylindrical boiler 2.5m diameter and 5m long is subjected to 4 N/mm2 internal pressure. If the maximum permissible stress is 125N/mm2 in the boiler wall, find the thickness of the shell. Also find the changes in diameter, length and volume. Given E=210 GPa and poisson's ration=0.25.

18. A hollow circular shaft of 4.0m length is to transmit a power of 120kW at 200 r.p.m. determine the outer and inner diameters of the shaft if the diameter ratio is 0.8. the maximum shear stress in the shaft should not exceed 90MPa. Take the maximum Torque as 25% greater than the mean Torque.

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