Code No: P18CET01

R18

HALL TICKET NUMBER

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PACE INSTITUTE OF TECHNOLOGY & SCIENCES::ONGOLE
(AUTONOMOUS)
II B.TECH I SEMESTER END SUPPLEMENTARY EXAMINATIONS, MARCH/APRIL - 2023
STRENGTH OF MATERIALS-I
(CE Branch)

Time: 3 hours Max. Marks: 60

Note: Question Paper consists of Two parts (Part-A and Part-B)

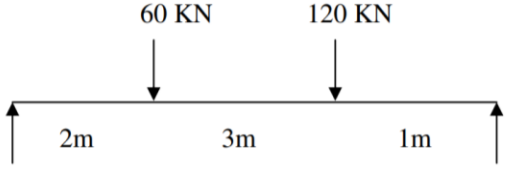
PART-A

Answer all the questions in Part-A (5X2=10M)

| Q.No. | | Questions | Marks | CO | KL |
|---|---|---|---|---|---|
| 1 | a) | Distinguish between plasticity and elasticity. | [2M] | 1 | |
| | b) | Mention the advantages of continuous beam over simply supported beam. | [2M] | 2 | |
| | c) | Write the theory of simple bending equation. | [2M] | 3 | |
| | d) | Differentiate Double integration and Macaulay's methods | [2M] | 4 | |
| | e) | State Lame's theory. | [2M] | 5 | |

PART-B

Answer One Question from each UNIT (5X10=50M)

| Q.No. | | Questions | Marks | CO | KL |
|---|---|---|---|---|---|
| | | UNIT-I | | | |
| 2. | | A reinforced concrete column 50 cm x 50 cm in section is reinforced with 4 steel bars of 2.5 cm diameter, one in each corner. The column is carrying a load of 2000 kN. Find the stresses in the concrete and steel bars. Take modulus of elasticity of steel and concrete as 2.1 x $10^5$ N/mm$^2$ and 1.4 x $10^4$ N/mm$^2$ respectively. | [10M] | 1 | |
| | | OR | | | |
| 3. | a) | A bar 100 cm in length is subjected to an axial pull, such that the maximum stress is equal to 150 MN/m$^2$. Its area of cross section is 2 cm$^2$ over the length of 95 cm and for the middle 5 cm length is only 1 cm$^2$. If E = 200 GN/m$^2$. Calculate the strain energy stored in the bar. | [5M] | 1 | |
| | b) | A steel specimen is 1.5 cm$^2$ in cross section stretches 0.05 mm over 5 cm gauge length under an axial load of 30 kN. Calculate the strain energy stored in the specimen at this point. If the load at the elastic limit for the specimen is 50 kN. Calculate the elongation at the elastic limit. | [5M] | 1 | |
| | | UNIT-II | | | |
| 4. | | A cantilever AB of span 6 m is fixed at the end A and propped at the end B. It carries a point load of 50 kN at the mid span. Determine the reactions at the support. Draw the Shear force and Bending moment diagrams. | [10M] | 2 | |
| | | OR | | | |
| 5. | | A simply supported beam of length 6 m carries two point loads as shown in figure. Draw the shear force and bending moment diagrams for the beam. Also calculate the maximum bending moment.<br>  <br> | [10M] | 2 | |
| | | UNIT-III | | | |

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| 6. | | A rolled steel joist of section has the following dimension. Flange width = 250 mm; Flange thickness = 25 mm Overall depth = 800 mm; Web thickness = 12 mm Calculate the safe 'UDL' per meter length of beam, if the beam, if the effective span is 8 m and the maximum stress in steel is 100 $N/mm^2$. | [10M] | 3 | |
| | | OR | | | |
| 7. | | A rectangular beam 300 mm deep is simply supported over the span of 4 m. Evaluate the uniformly distributed load per metre which the beam may carry, if the bending stress should not exceed 120 $N/mm^2$. Take $I = 8\times10^4$ $mm^4$. | [10M] | 3 | |
| | | UNIT-IV | | | |
| 8. | | A 2 m cantilever is loaded with a point load of 500 N at the free end. If the section is rectangular 80 mm x 160 mm and E = 10 $GN/m^2$. Calculate the deflection (i) at the free end of the cantilever (ii) at a distance of 0.6 m from the free end, by double integration method. | [10M] | 4 | |
| | | OR | | | |
| 9. | | A simply supported beam of length 4 m carries a point load of 3 kN at a distance of 1 m from each end. If $E = 2 \times 10^5$ $N/mm^2$ and $I = 10^8$ $mm^4$ for the beam, then using Macaulay's method. Determine: (i) deflection under each load (ii) deflection at the centre. | [10M] | 4 | |
| | | UNIT-V | | | |
| 10. | | A closed cylindrical vessel made of steel plates 4 mm thick with plane ends, carries fluid under pressure of 3 $N/mm^2$. The diameter of the cylinder is 25 cm and length is 75 cm. Calculate the longitudinal and hoop stresses in the cylinder wall and determine the change in diameter, length and Volume of the cylinder. Take $E = 2.1\times10^5$ $N/mm^2$ and 1/m = 0.286. | [10M] | 5 | |
| | | OR | | | |
| 11. | | 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 stress across the section. Also sketch the radial stress distribution and circumferential stress distribution across the section. | [10M] | 5 | |

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