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Reg. No:

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR
(AUTONOMOUS)

B.Tech II Year I Semester Supplementary Examinations December-2021

STRENGTH OF MATERIALS

(Common to AGE & ME)

Time: 3 hours

Max. Marks: 60

PART-A

(Answer all the Questions 5 x 2 = 10 Marks)

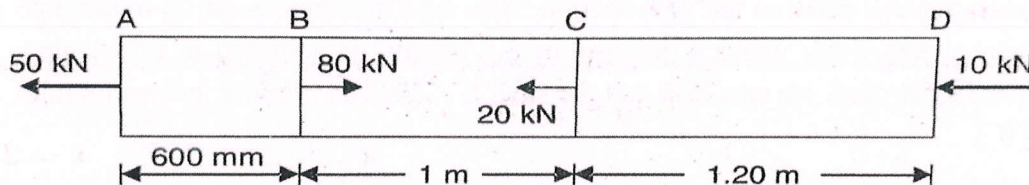
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|---|---|--|----|
| 1 | a | Define the terms Factor of Safety and Poisson's ratio. | 2M |
| | b | Explain the different types of loads with diagrams. | 2M |
| | c | What is neutral layer and neutral axis? | 2M |
| | d | How do you control beam deflection? | 2M |
| | e | Define circumferential and longitudinal stress. | 2M |

PART-B

(Answer all Five Units 5 x 10 = 50 Marks)

UNIT-I

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|---|---|---|----|
| 2 | a | Explain briefly about the stress strain diagram for mild steel. | 5M |
| | b | A brass bar, having cross-sectional area of 1000 mm ² , is subjected to axial forces as shown in figure. Find the total elongation of the bar. Take $E=1.05 \times 10^5$ N/mm ² | 5M |

**OR**

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| 3 | A steel rod of 3 cm diameter is enclosed centrally in a hollow copper tube of external diameter 5cm and internal diameter of 4cm. the composite bar is then subjected to an axial pull of 45000N. if the length of each bar is equal to 15 cm, determine: i) The stresses in the rod and tube, and (ii) Load carried by each bar | 10M |
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UNIT-II

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| 4 | A simply supported beam of length 8 m carries point load of 4 kN and 7 kN at distances 3 m and 6 m from the left end. Draw SFD and BMD for the beam | 10M |
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OR

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| 5 | Draw the SFD and BMD for the cantilever beam carrying uniformly distributed load of whole length and also derive an equation for it. | 10M |
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UNIT-III

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| 6 | A timber beam of rectangular section is to support a load of 30 k N uniformly distributed over a span of 4 m when beam is simply supported. If the depth of section is to be twice the breadth, and the stress in the timber is not to exceed 8 N/mm ² , find the dimensions of the cross section. | 10M |
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OR

- 7 A beam is simply supported and carries a uniformly distributed load of 40KN/m run over the whole span. The section of the beam is rectangular having depth as 500mm. If the maximum stress in the material of the beam is 120 N/mm² and moment of inertia of the section is $7 \times 10^8 \text{mm}^4$, find the span of the beam. **10M**

UNIT-IV

- 8 A beam of length 8 m is simply supported at its ends and carries two-point loads of 36 KN and 46 KN at a distance of 1.5 m and 4 m from the left support. Find: (i) deflection under each load. (ii) Maximum deflection and (iii) The point at which maximum deflection occurs, given $E = 2 \times 10^5 \text{ N/mm}^2$ and $I = 85 \times 10^6 \text{ mm}^4$. Use Macaulay's method? **10M**

OR

- 9 Derive an expression for Torque transmitted by a hollow circular shaft. **10M**

UNIT-V

- 10 A cylindrical vessel, whose ends are closed by means of rigid flange plates, is made of steel plate 3 mm thick. The length and the internal diameter of the vessel are 50 cm and 25 cm respectively. Determine the longitudinal and hoop stresses in the cylindrical shell due to an internal fluid pressure of 3 N/mm². Also calculate the increase in length, diameter and volume of the vessel. Take E as $2 \times 10^5 \text{ N/mm}^2$ and Poisson's ratio 0.3. **10M**

OR

- 11 A cast iron pipe 200 mm internal diameter and 12 mm thick is wound closely with a single layer of circular steel wire of 5 mm diameter, under a tension of 60 N/mm². Find the initial compressive stress in the pipe section. Also find the stresses set up in the pipe and steel wire, when water under a pressure of 3.5 N/mm² is admitted in to the pipe. Take $E = 1 \times 10^5 \text{ N/mm}^2$ for cast iron and for steel $E = 2 \times 10^5 \text{ N/mm}^2$. poisson's ratio is given as 0.3. **10M**

END