Q.P. Code: 18CE0151 **R18**

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SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR

(AUTONOMOUS)

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

STRENGTH OF MATERIALS

(Common to ME & AG)

Time: 3 hours Max. Marks: 60

PART-A

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

1 a Define elasticity and plasticity.
b What is the use of SFD and BMD?
c What is neutral layer and neutral axis?
d What is torsion of circular shaft?
e Define thin cylinder and thick cylinder.

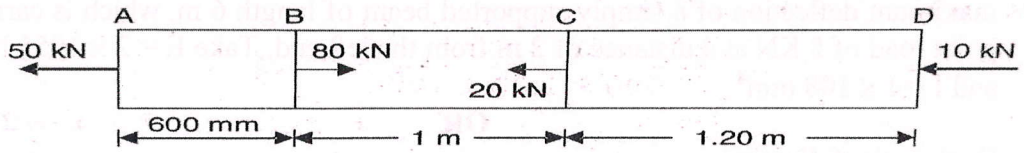
PART-B

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

UNIT-I

2 a Explain briefly about the stress strain diagram for mild steel. **4M**

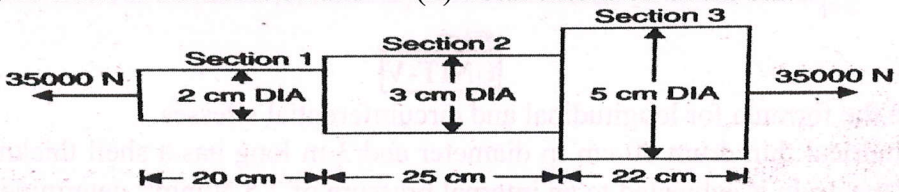
b A brass bar, having cross-sectional area of 1000 mm^2, is subjected to axial forces as shown in figure. Find the total elongation of the bar. Take $E=1.05x10^5$ N/mm **6M**



OR

3 a Define the following terms **5M**
(i) Elasticity & Plasticity (ii) Hooke's law & factor of safety
(iii) Lateral & longitudinal strains

b An axial pull of 35000 N is acting on a bar consisting of three lengths as shown in figure. If the Young's modulus is taken as $2.1x10^5$ N/mm^2, Determine: **5M**
(i) Stresses in each section and (ii) Total extension of the bar.



UNIT-II

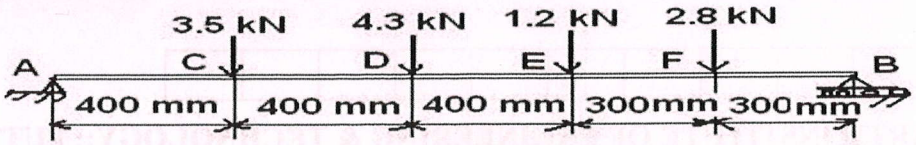
4 a Explain about the following. **3M**
(i) different types of loads with diagrams
(ii) What is the use of SFD and BMD?

b Simply supported beam of length 6 m carries a uniformly increasing load of 600 N/m at one end to 1500 N/m run at the other end. Draw SFD and BMD for the beam. And also calculate the position and magnitude of maximum bending moment. **7M**

OR

5 a Draw the S.F and B.M diagram for a cantilever beam of span 'L'm loaded with UDL of W KN/m. **5M**

b Draw the shearing force and bending moment diagrams for the beam shown in figure. **5M**



UNIT-III

6	a	Explain the following. (i) What is the theory of simple bending? (ii) What is the meaning of strength of section?		3M
	b	A beam of cross – section of an isosceles triangle is subjected to a shear force of 45 KN at a section where base width = 125 mm and height = 400 mm. Determine: (i) Horizontal shear stress at the neutral axis. (ii) The distance from the top to the beam where shear stress is maximum and (iii) Value of maximum shear stress.		7M

OR

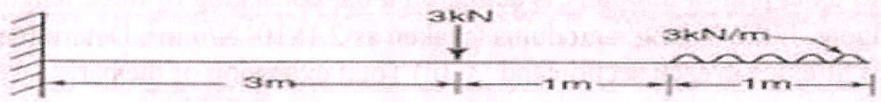
7	a	Define section modulus. Write the units for section modulus. Derive the section modulus for hollow circular cross section.		5M
	b	A timber beam 120 mm wide and 200 mm deep is simply supported over a span of 4 m. The beam carries a UDL of 2.8 KN/m over the entire length. Find the maximum bending stress induced. Plot the bending stress distribution at the quarter span cross section of the beam.		5M

UNIT-IV

8	a	Derive the relation between slope, deflection and radius of curvature		5M
	b	Determine: (i) slope at the left support, (ii) deflection under the load and (iii) maximum deflection of a simply supported beam of length 6 m, which is carrying a point load of 5 KN at a distance of 2 m from the left end. Take E = 2 x 1055 N/mm2 and I = 1 x 108 mm^4.		5M

OR

9	a	Explain the following. (i) What is torsion of circular shaft? (ii) Define polar modulus?		3M
	b	Find the slope and deflection at the free end of the cantilever shown in figure. Take EI = 1 x1010kN-mm^2		7M



Fig

UNIT-V

10	a	Derive the formula for longitudinal and circumferential stresses		5M
	b	A cylindrical thin drum 80 cm in diameter and 3 m long has a shell thickness of 1 cm. If the drum is subjected to an internal pressure of 2.5 N/mm^2, determine (i) change in diameter (ii) change in length and (iii) change in volume. Take E= 2x 10^5 N/mm^2 Poisson's ratio 0.25.		5M

OR

11	a	Define thin cylinder and thick cylinder?		3M
	b	A copper cylinder, 90 cm long, 40 cm external diameter and wall thickness 6 mm has its both ends closed by rigid blank flanges. It is initially full of oil at atmospheric pressure. Calculate additional volume of oil which must be pumped into it in order to raise the oil pressure to 5 N/mm^2 above atmospheric pressure. For copper assume E= 1.0 x 10^5N/mm^2 and Poisson's ratio 1/3. Take bulk modulus of oil as K= 2.6 x 10^3 N/mm^2.		7M

*** END ***