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

**B.Tech II Year I Semester Supplementary Examinations June 2019**

**STRENGTH OF MATERIALS**

(Common to AGE & ME)

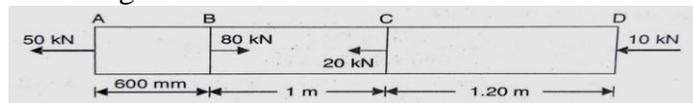
Time: 3 hours

Max. Marks: 60

(Answer all Five Units 5 x 12 = 60 Marks)

**UNIT-I**

- 1 a Explain briefly about the stress strain diagram for mild steel. 4M  
 b A brass bar, having cross-sectional area of  $1000 \text{ mm}^2$ , is subjected to axial forces as shown in figure. Find the total elongation of the bar. Take  $E=1.05 \times 10^5 \text{ N/mm}^2$ . 8M



**OR**

- 2 Determine the changes in length, breadth and thickness of a steel bar which is 4 m long, 30 mm wide and 20 mm thick and is subjected to axial pull of 30 kN in the direction of its length. Take  $E=2 \times 10^5 \text{ N/mm}^2$  and  $\mu=0.3$ . 12M

**UNIT-II**

- 3 Draw the shear force and bending moment diagram for a simply supported beam AB of span 10 meters carrying a uniformly distributed load of 18 kN per meter for a distance of 5 meters from the left support A. 12M

**OR**

- 4 Simply supported beam of length 8 m carries a uniformly increasing load of 800 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. 12M

**UNIT-III**

- 5 Derive the bending equation  $M/I = f/y = E/R$  Writing all the assumptions made. 12M

**OR**

- 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  $8 \text{ N/mm}^2$ , find the dimensions of the cross section. 12M

**UNIT-IV**

- 7 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  $E = 2 \times 10^5 \text{ N/mm}^2$  and  $I = 1 \times 10^8 \text{ mm}^4$ . 12M

**OR**

- 8 A hollow shaft is 1 m long and has external diameter 60 mm. It has 20 mm internal diameter for a part of length and 30 mm for the rest of the length. If the maximum shear stress in it is not exceeding  $100 \text{ N/mm}^2$ , determine the maximum power transmitted by it at a speed of 300 r.p.m. If the twists produced in the two portions of the shafts are equal. Find the lengths of the two portions. 12M

**UNIT-V**

- 9 A cylindrical thin drum 100 cm in diameter and 5 m long has a shell thickness of 1 cm. If the drum is subjected to an internal pressure of  $3.5 \text{ N/mm}^2$ , determine (i) change in diameter (ii) change in length and (iii) change in volume. Take  $E= 2 \times 10^5 \text{ N/mm}^2$  Poisson's ratio 0.25. 12M

**OR**

- 10 Derive the expression for stresses developed in a compound thick cylinder (Lame's theorem). 12M

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