Q.P. Code: 18CE0103 **R18**

Reg. No: | | | | | | | | | | |

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR

(AUTONOMOUS)

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

INTRODUCTION TO SOLID MECHANICS

(Civil Engineering)

Time: 3 hours Max. Marks: 60

PART-A

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

1	a	Define: Modulus of rigidity and Modulus of Elasticity.	**2M**
	b	Write down the bending stress equation.	**2M**
	c	What are the assumptions made in torsion equation?	**2M**
	d	State the condition for the use of Macaulay's method	**2M**
	e	Define Slenderness Ratio and Buckling.	**2M**

PART-B

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

UNIT-I

2	a	A rod 150 cm long and of diameter 2 cm is subjected to an axial pull of 20 kN. If the modulus of elasticity of the material of the rod is $2x10^5$ N/mm^2; determine: the Stress, Strain and Elongation of the rod.	**7M**
	b	Explain about St.Venant's principle.	**3M**

OR

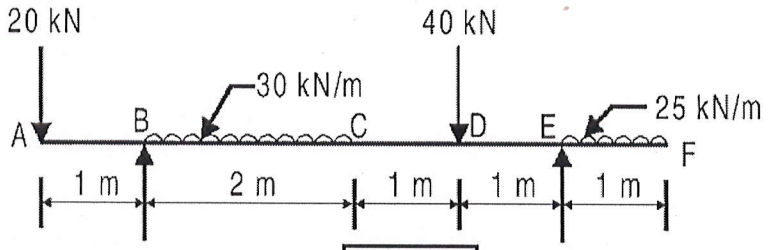
3		Derive the relation between Young's Modulus (E), Rigidity Modulus (G) and Bulk Modulus (K)	**10M**

UNIT-II

4		Draw shear force and bending moment diagram for cantilever beam subjected to uniformly distributed load.	**10M**

OR

5		Draw shear force and bending moment diagram for the following beam	**10M**



UNIT-III

6		A rectangular beam 100 mm wide and 250 mm deep is subjected to a maximum shear force of 50KN. Determine i) Average shear stress ii) Maximum shear stress iii) Shear stress at a distance of 25 mm above neutral axis.	**10M**

OR

7		Prove that the maximum shear stress in a circular section of a beam is 4/3 times the average shear stress.	**10M**

UNIT-IV

8		Prove that the relation that $M = EI\frac{d^2y}{dx^2}$	**10M**

OR

9		Derive the expression for slope and deflection of a simply supported beam carrying a point load at Centre using Moment area method	**10M**

UNIT-V

10 A rectangular column of wood, 3m long, carries a load of 300kN. Determine whether a section of size 200mm x 150mm will be able to carry this load if a factor of safety of 3 is to be used, assuming Euler's formula is applicable. E=12.5GPa and the permissible stress is 12MPa. If this section will not be able to carry this load, design a square section to do so. **10M**

OR

11 **a** What are the limitations of Euler's theory? **3M**

b Derive the Euler's equation for the condition both ends are hinged. **7M**

END