Total No. of Questions: 6 *Total No. of Printed Pages:3*

Enrollment No.....

Faculty of Engineering

End Sem (Odd) Examination Dec-2022

CE3ES11 Strength of Material

Programme: B.Tech. Branch/Specialisation: CE

Duration: 3 Hrs. **Maximum Marks: 60**

Note: All questions are compulsory. Internal choices, if any, are indicated. Answers of Q.1 (MCQs) should be written in full instead of only a, b, c or d.

Q.1 i. A steel bar of 20mm x 20mm is subjected to a load of 20 kN stress in the bar will be- **1**

(a) 5 N/sqmm (b) 50N/sqmm

(c) 5 kN/sqmm (d) Insufficient data

ii. Two bars of 16mm diameter and 25 mm diameter are welded together to increase the length if it is subjected to a load of 50 kN. Which of the following statement is correct? **1**

(a) The 25 mm bar will be highly stressed

(b) The 16mm dia bar will be highly stresses

(c) The strain in both the bars will be equal

(d) Insufficient data

iii. A Beam Simply supported is loaded with a UDL of 20kN/m. Length of the beam is 5 m. Then What will be the bending moment at the centre of the beam. **1**

(a) 62.5 (b) 125 (c) 41.67 (d) 50

iv. Shear stress in beam section will be maximum at- **1**

(a) Outer most fiber (b) At neutral axis

(c) At neutral layer (d) None of these

v. In double integration method first integration of the equation gives- **1**

(a) Load (b) Shear force (c) Slope (d) Deflection

vi. In Conjugate Beam Method, Area under the curve is divided by- **1**

(a) E (b) I (c) EI (d) 2EI

vii. Torsion is- **1**

(a) Effect of shear (b) Moment about longitudinal axis

(c) Moment about horizontal axis (d) Moment about vertical axis

P.T.O.

viii. A thin cylindrical shell of diameter(d), Length (l) is subjected to an internal Pressure (p). The circumferential stress in the shell is- **1**
(a) pd/(2t) (b) pd/(4t) (c) pd/(6t) (d) pd/(8t)

ix. A material having same elastic properties in all directions, are called- **1**
(a) Isotropic (b) Brittle (c) Homogeneous (d) Hard

x. Equivalent length of a column with one end hinged and other fixed is- **1**
(a) 1.0 L (b) 0.5 L (c) 0.7 L (d) 2.0 L

Q.2 i. Explain principal of superposition. **2**

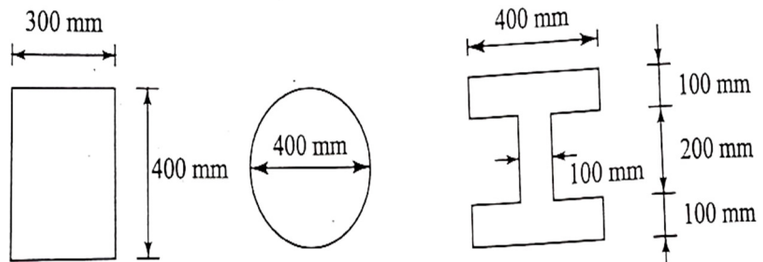
ii. A reinforced concrete column of size 450mm x 450mm is reinforced with 4.30mm diameter steel bars. It carries a load of 600 kN. Find the stresses in steel and concrete, if their modulii of elasticity are 210GPa and 22GPa, respectively. **8**

OR iii. A plane element is subjected to stresses 40MPa compression in X direction, 80MPa in tension Y direction and 60MPa clockwise shear force. Determine the stresses at a plane having its normal 45degree anticlockwise to the direction of the tensile stress. Also determine principal stresses. **8**

Q.3

i. Define neutral axis and neutral layer. **3**

ii. Compare moment of resistance of three sections shown in figure 1 **7**



(a) Rectangular Section (b) Circular Section (c) I-Section

Figure 1

OR iii. Plot shear stress distribution on beam section shown in figure 2, if the shear force at the section is 80 kN **7**

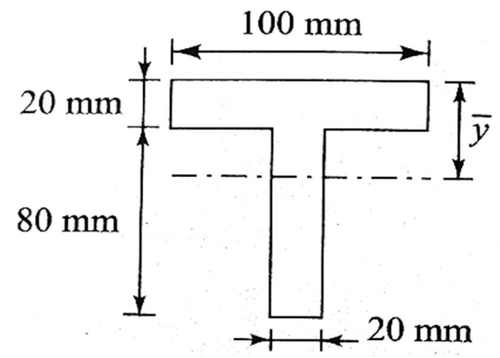


Figure 2

Q.4 i. Explain two theorems of moment area method of deflection determination. **4**

ii. Explain conjugate beam method to find deflection. **6**

OR iii. Determine end slope and mid span deflection of a simply supported beam of length L and carrying an UDL of w/unit. Apply double integration method. **6**

Q.5 i. State the assumptions made in deriving torsion formula. **4**

ii. A steel shaft of 10 cm diameter is subjected to pure torsion and is 20m long. It is driven at one end while the power is taken off at the other end. One end of the shaft moves 30 degree in advance of the other end. Find the maximum shear stress and the power transmitted at 120rpm. Take G=80,000 N/sqmm. **6**

OR iii. A water main of 80 cm diameter contains water at a pressure head of 100 m. If the weight of water is 10 kN/cum, find the thickness of water mains if the permissible stress in the metal is 20N/sqmm. **6**

Q.6 Attempt any two:

i. Differentiate buckling and crippling load. **5**

ii. State Euler's and Rankin's formulas with their limitations. **5**

iii. Derive formula for buckling load of a both ends hinged column. **5**

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Scheme of Marking

MEDI-CAPS UNIVERSITY Knowledge Is Power	Faculty of Engineering End Sem (Odd) Examination Dec-2022 CE3ES11 Strength of Materials Programme: B.Tech. Branch/Specialisation:

Note: The Paper Setter should provide the answer wise splitting of the marks in the scheme below.

Q.1	i	b	**1**
	ii	b	**1**
	iii	a	**1**
	iv	c	**1**
	v	c	**1**
	vi	c	**1**
	vii	b	**1**
	viii	a	**1**
	ix	a	**1**
	x	c	**1**
Q.2	i.	Explaination -2	
	ii.	Area calculation- 2, compatibility condition- 2, stress calculation - 4	
or	iii.	Sketch -1, Formula for each stress-1,calculation- 4 Or Mohr's circle- 4 , values determination- 3	
Q.3	i.	Definition each – 1.5	
	ii.	MR of each-2marks, conclusion-1	
OR	iii.	Shear stress calculation at three points -2 each, formula only -1, diagram -1	
Q.4	i.	2 marks for each	
	ii.	Each	
OR	iii.	Formula-1,applying-3 calculation-2	
Q.5	i.	1 mark for each assumption	
	ii.	Shear stress -3, Power -3	
OR	iii.	Formula-1, calculation -5	
Q.6		Attempt any two	
	i.	2.5 marks to each explanation	
	ii.	Formula -1 each, limitations-1.5 each.	
	iii.	Derivation -5, only formula-1	

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