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DIPLOMA EXAMINATION IN ENGINEERING/TECHNOLOGY/ MANAGEMENT/COMMERCIAL PRACTICE, NOVEMBER – 2022

THEORY OF STRUCTURES -I

[Maximum Marks: **75**] [Time: **3** Hours]

PART-A

I. Answer *all* the following questions in one word or one sentence. Each question carries *'one'* mark.

(9 x 1 = 9 Marks)

		Module Outcome	Cognitive level
1.	Algebraic sum of all the moments to the left or right of the section is called…….	M1.01	R
2.	The point at which the value of BM changes from positive to negative is known as……...	M1.02	R
3.	The ratio of effective length to least radius of gyration…….	M2.01	R
4.	Fixed end moments for a fixed beam having length L carries a UDL of intensity w/m throughout the span is…….	M3.04	R
5.	The ratio of the carried-over moment at the other end to the fixed-end moment of the initial end is known as……	M4.03	R
6.	Effective length of column with two ends are fixed……..	M2.01	R
7.	Equation of the deflection at the free end of a cantilever beam having length L with UDL w/m throughout the span…….	M3.02	R
8.	The product of Young's Modulus & moment of inertia is known as……	M4.01	R
9.	The deflection for a fixed beam is ……than a simply supported beam with same span & loading.	M3.04	R

PART-B

II. Answer any *eight* questions from the following. Each question carries *'three'* marks.

(8 x 3 = 24 Marks)

		Module Outcome	Cognitive level
1.	Write the assumptions of pure bending.	M1.01	R
2.	Write the limitations of Euler's Formula.	M2.02	R
3.	Arrive the formula for the mid span deflection of a simply supported beam with central concentrated load using Moment area method.	M3.02	U
4.	Write down the steps in Moment distribution method.	M4.03	R
5.	Write the relation between the maximum & average shear stress for a rectangular section & draw the shear stress distribution of the section.	M1.04	R
6.	Draw the core of a rectangular section, by explaining the concept of limit of eccentricity.	M2.04	R

7.	Write the Fixed end moment for a beam of span 6m, a UDL of 3kN/m on the entire span & central concentrated load of 10kN.	M3.04	U
8.	Explain : i) Stiffness ii) Distribution factor	M4.03	R
9.	Draw the BM & SF Diagrams of the simply supported beam with UDL.	M1.02	R
10.	Find the maximum diameter of a solid shaft which will not twist more than 3^0 in a length of 6m when subjected to a torque of 12kN-m? What is the maximum shear stress induced in the shaft? Take Modulus of rigidity = 82 Gpa.	M3.03	A

PART-C

Answer all questions. Each question carries *'seven'* marks.

(6 x 7 = 42 Marks)

		Module Outcome	Cognitive level
III.	A beam of span 8m having cross section 200 x 400 mm simply supported at both ends. The maximum bending stress for the beam material is $20N/mm^2$. What will be the max value of midspan concentrated load that can be applied on the beam?	M1.04	A
	OR		
IV.	A simply supported beam of span 8m carries of UDL of 20kN/m over entire span. The beam is having a cross section of 120mm x 180mm. Draw the shear stress distribution at 1m from the left support, by considering horizontal fiber 30mm apart from top to bottom in the cross section.	M1.04	U
V.	Define: i) Middle third Rule ii) Angle of internal friction iii) Weep holes	M2.05	R
	OR		
VI.	A hollow mild steel tube 8m long & 5cm internal diameter and 10mm thick used as a strut with two ends fixed. Find Euler's Crippling load and safe load if the Factor of safety 3, $E= 2 \times 10^5 N/mm^2$.	M2.02	U

VII.	A cantilever beam having length L carries a point load of W at the center. Determine the slope & deflection at the free end? Use Moment area method.	M3.02	A
	OR		
VIII.	Compare the Bending moment diagrams of simply supported beam & fixed beam having same length. Both have a UDL of w/m throughout the span. Which beam experience maximum bending moment?	M3.04	A
IX.	A two span continuous beam both have equal span, carries a point load of W at the center of each span, all supports are simply supported. Draw the BM & SF Diagrams using Clapeyron's Equation. Take E1 constant.	M4.02	U
	OR		
X.	A beam ABC A & C are fixed and B simply supported. The span AB carries a point load of 15kN at the center. The span BC carries a UDL of 10kN/m. AB=5m, BC=4m. Draw the BM Diagrams using Moment distribution method.	M4.03	U
XI.	Draw BM & SF Diagrams of the beam ABC, BC is the overhanging span. AB=4m, BC=2m. Point load of 36kN act at the midspan of AB & point load of 20kN act at C. supports A & B are simply supported.	M1.02	U
	OR		
XII.	What are the major forces acting on a dam? Describe the stability criteria based on the effect of these forces.	M2.05	U
XIII.	A solid circular shaft has to transmit 150kW of power at 200 rpm. If the allowable shear stress is 75MPa and permissible twist is 1^0 in a length of 3m, find the diameter of the shaft. Take Modulus of rigidity = 82GPa	M3.03	U
	OR		
XIV.	Explain how to find out the distribution factor for the member OA, OB, OC, OD meet at a rigid point O. All member have same EI value. OA=OC=4m, OB=OD=3m. Supports A & B are hinged, C & D are Fixed. Take EI as constant.	M4.03	U

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