GANDHI INSTITUTE OF ENGINEERING AND TECHNOLOGY UNIVERSITY, ODISHA, GUNUPUR
(GIET UNIVERSITY)
M.Tech. (First Semester) Regular Examinations, February – 2025
24MSEPC11002 - Elastic Stability and Behaviour of Metal Structures
(Structural Engineering)

Time: 3 hrs Maximum: 60 Marks

Answer ALL questions
(The figures in the right hand margin indicate marks)

| PART – A | | (2 x 5 = 10 Marks) |

Q.1. Answer *ALL* questions

		CO #	Blooms Level
a.	Write the approaches to stability analysis.	CO1	K1
b.	Draw & label the mode shape of buckling.	CO3	K1
c.	Explain perfect column.	CO1	K2
d.	Define Euler load.	CO1	K2
e.	Write the types of torsion.	CO2	K2

| PART – B | | (10 x 5 = 50 Marks) |

Answer _ALL_ the questions

		Marks	CO #	Blooms Level
2. a.	Find the elastic buckling load of cantilever column using fourth order differential equation of beam column.	5	CO2	K3
b.	State the necessary and sufficient conditions for general collapse condition of a structure	5	CO2	K2
	(OR)			
c.	Develop the differential equation for maximum deflection and maximum bending moment in case of beam column with central load	5	CO1	K2
d.	Assess differential equation for beam column	5	CO1	K3
3.a.	Find out the critical stress and critical moment for an I beam subjected to couples at end.	5	CO3	K2
b.	A thin walled bar of open cross section is subjected to couples at the end. Derive the expression for warping displacement	5	CO2	K2
	(OR)			
c.	Find the ultimate load for propped cantilever beam of span 'l' subjected to UDL of W/m	5	CO3	K3
d.	Calculate the shape factor of circular cross section.	5	CO3	K2
4.a.	Write short notes on Stresses in plastic analysis	5	CO3	K2
b.	Write short notes on Assumption in plastic analysis	5	CO3	K3
	(OR)			
c.	A T-section consists of a flange 150x10 mm and a web of 140x10 mm. The section modulus of the T-section is $54600mm^3$ This section is used as a simply supported beam of 4m span and carries a UDL of 25kN/m on the whole span. Determine the shape factor of the beam and also calculate the collapse load for the beam. Assume yield stress as 250 MPa	5	CO3	K2
d.	Determine the shape factor for the rectangular and circular section	5	CO3	K3

5.a.	Explain "Lateral buckling" in beams and performance of the beam subjected to lateral buckling.	5	CO2	K3
b.	Analyze the main difference between torsional and flexural buckling with appropriate examples	5	CO1	K4
	(OR)			
c.	Write a short notes on torsional buckling and also explain pure torsion of thin walled bars of open cross section	5	CO1	K4
d.	Derive the critical load of cantilever columns	5	CO1	K4
6.a.	State the necessary and sufficient conditions for general collapse condition of a structure.	5	CO1	K3
b.	Explain ideal column with examples.	5	CO1	K4
	(OR)			
c.	Write short notes on Pure torsion.	5	CO3	K4
d.	Write short notes on Buckling by flexure.	5	CO3	K2

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