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Gandhi Institute of Engineering and Technology University, Odisha, Gunupur
(GIET University)

M.Tech. (First Semester – Regular/Supplementary) Examinations, January – 2026

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. Define Shear centre.	CO3	K1
b. Explain perfect column.	CO2	K2
c. Define superposition.	CO1	K1
d. Explain the beam–column interaction equation.	CO4	K2
e. List the types of structural failure.	CO5	K1

PART – B **(10 x 5 = 50 Marks)**

Answer ***ALL*** the questions	Marks	CO #	Blooms Level
2. a. Determine the elastic buckling load of a cantilever column using the fourth-order differential equation of a beam–column.	5	CO1	K3
b. Apply the necessary and sufficient conditions to assess the general collapse of a structure.	5	CO1	K3
(OR)			
c. Derive and apply the differential equation for a beam–column subjected to continuous lateral load.	5	CO1	K3
d. Derive the deflection curve of a beam–column subjected to end moments.	5	CO1	K3
3.a. Apply the lateral buckling differential equation to a cantilever beam.	5	CO2	K3
b. Determine the critical stress and critical moment of an I-beam subjected to end couples.	5	CO2	K3
(OR)			
c. Derive the expression for warping displacement of a thin-walled open section subjected to end couples.	5	CO2	K3
d. Determine the ultimate load of a propped cantilever beam of span subjected to a UDL of w per meter.	5	CO2	K3
4.a. Calculate the shape factor of a rectangular cross-section	5	CO3	K3
b. Explain the method of evaluating critical load using higher-order differential equations.	5	CO3	K3
(OR)			
c. Explain torsional buckling, lateral buckling, and inelastic buckling.	5	CO3	K3
d. Apply the concept of load factor in determining the collapse load of a structure.	5	CO3	K3
5.a. Explain the effect of eccentric loading on the critical load of a column.	5	CO4	K3
b. Identify and apply stress concepts used in plastic analysis of structures.	5	CO4	K3
(OR)			

c.	Explain the significance of the differential equation governing a beam–column.	5	CO4	K3
d.	Explain the different modes of failure in beam–columns.	5	CO4	K3
6.a.	Formulate and apply the differential equations to determine deflection and end slopes of a beam–column subjected to end couples.	10	CO5	K3
	(OR)			
b.	Determine the critical load of a column fixed at both ends using the equilibrium approach and fourth-order differential equation.	10	CO5	K3

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