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**GIET UNIVERSITY, GUNUPUR – 765022**  
**M. Tech (First Semester) Examinations, January – 2024**  
**MPCSE1020 - Elastic Stability and Behavior of Metal Structures**  
**(Structural Engineering)**

Time: 3 Hrs

Maximum: 70 Marks

(The figures in the right hand margin indicate marks.)

**PART – A****(2 x 10 = 20 Marks)**

Q.1. Answer all questions

	CO#	Blooms Level
a. List the types of structural failure.	CO1	K1
b. What are the approaches to stability analysis?	CO1	K1
c. Draw & label the mode shape of buckling.	CO3	K1
d. What is meant by elastically restrained column?	CO3	K2
e. Illustrate the modes of buckling in frames.	CO1	K2
f. Outline beam column interaction equation.	CO1	K4
g. What is reserve strength?	CO3	K3
h. Define Shear centre.	CO1	K3
i. Identify the factors affect the lateral buckling strength of beam.	CO1	K4
j. Explain inelastic buckling.	CO3	K2

**PART – B****(10 x 5=50 Marks)**Answer ANY FIVE 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	K4
3.a. Derive the differential equation of beam column with continuous lateral load.	5	CO2	K2
b. Derive the deflection curve of beam column with end moments	5	CO1	K4
4. a. Develop the differential equation for maximum deflection and maximum bending moment in case of beam column with central load	5	CO1	K2
b. Assess differential equation for beam column	5	CO1	K3
5.a. Defend the approximate methods used in the stability analysis and discuss their merits.	5	CO1	K4

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| b.    | Explain the failure of beam columns.  | 5 | CO3 | K2 |
| 6. a. | Discuss the differential equation for lateral buckling of cantilever beam.  | 5 | CO1 | K4 |
| b.    | Derive the differential equation of beam column with continuous lateral load.   | 5 | CO3 | K2 |
| 7.a.  | Find out the critical stress and critical moment for an I beam subjected to couples at end.                                 | 5 | CO3 | K4 |
| 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 |
| 8. a. | Find the ultimate load for propped cantilever beam of span 'l' subjected to udl of w/m                                      | 5 | CO3 | K3 |
| b.    | Calculate the shape factor of circular cross section.   | 5 | CO3 | K2 |

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