**GANDHI INSTITUTE OF ENGINEERING AND TECHNOLOGY UNIVERSITY, ODISHA, GUNUPUR**
# (GIET UNIVERSITY)
M.Tech. (Second Semester) Regular Examinations, July – 2025
## 24MSEPE12002 – Advanced Steel 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. | Explain the differences between a slab base and a gusseted base in steel structures | CO1 | K2 |
| b. | Explain what a purlin is and describe its function in a roof structure. | CO2 | K2 |
| c. | Describe the advantages of bolted connections | CO3 | K2 |
| d. | Explain the different types of loads that act on roof trusses | CO5 | K2 |
| e. | Explain the concept of ductility. | CO4 | K2 |

### PART – B                          (10 x 5 = 50 Marks)

Answer **ALL** the questions

|   |   | Marks | CO # | Blooms Level |
|---|---|-------|------|------|
| 2. a. | Design a suitable moment resisting base for a column subjected to an axial load of 360kN and moment of 130kNm. The column section is ISHB 400 @ 822 N/m. safe bearing pressure in concrete is 4000 kN/ m². | 10 | CO1 | K3 |

(OR)

|   |   | Marks | CO # | Blooms Level |
|---|---|-------|------|------|
| b. | Illustrate short notes on: <br> (i) Sag rods <br> (ii) Principal rafter <br> (iii) Roof trusses <br> (iv) Bracing | 10 | CO1 | K2 |
| 3.a. | Distinguish the following: <br> (i) Factor of safety and partial factor for loads <br> (ii) Characteristics loads and design loads | 10 | CO2 | K2 |

(OR)

|   |   | Marks | CO # | Blooms Level |
|---|---|-------|------|------|
| b. | Design a single unequal angle strut to carry a load of 90 kN. The angle is connected by its longer leg to 8 mm thick gusset plate. The effective length of the member is 2.5 m. Also design the plate bolted end connections. | 10 | CO2 | K3 |
| 4.a. | Illustrate elaborately about the items that are to be considered while planning and designing an industrial building. | 5 | CO3 | K2 |
| b. | Explain various steps involved in the design of gantry girder. | 5 | CO3 | K2 |

(OR)

|   |   | Marks | CO # | Blooms Level |
|---|---|-------|------|------|
| c. | Describe and design a simply supported gantry girder to for the following data: <br> Crane capacity: 160 KN <br> Self-weight of crane girder: 200 KN <br> Self-weight trolley, electric motor, hooks etc.: 50KN <br> Min. approach of crane hook to the gantry girder: 1.6 m <br> Wheel base: 2.8 m | 10 | CO3 | K3 |

c/c distance between gantry rail: 12 m

c/c distance between column: 6m

Self-weight of rail section: 300 N/m

Check the section for maximum bending moment due to vertical forces, lateral forces and longitudinal forces.

5.a. Determine the shape factor of the followings:

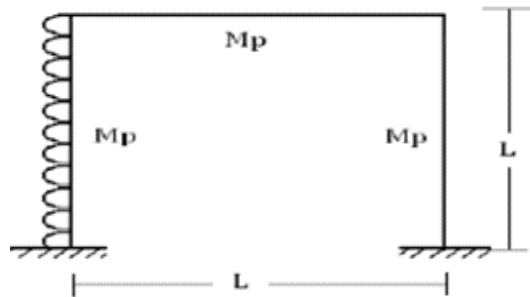    i.    Rectangular Section                                           10    CO4    K3

    ii.    Triangular Section
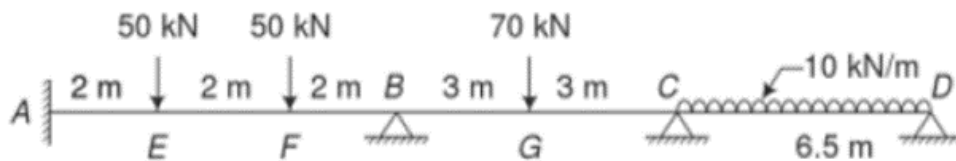
<div align="center">(OR)</div>

b. Determine the collapse load for a portal frame of uniform cross-section as shown in fig.



                                                    10    CO5    K3

6.a. Design the continuous beam with the service load as shown in the fig. The load factor may be assumed as 1.7. Provide a uniform cross-section throughout the beam.



                                                    10    CO5    K3

<div align="center">(OR)</div>

b. Determine the bolt value of a 22mm diameter bolt of grade 4.6 for the following connections. The main plates to be jointed are 12mm thick

(i) Lap joint                                                   10    CO2    K3

(ii) Single cover butt joint the cover plate being 10mm thick

Assume suitable data.

<div align="center">--- End of Paper ---</div>