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

B. Tech (Sixth Semester) Examinations, April 2025

21BCVPC36002- Steel Structures/ 22BCVPC36002 – Design of Steel Structures

(Civil Engineering)

(IS 800:2007 Code Book and Steel Table are permitted to be carried into the exam hall)

Time: 3 hrs Maximum: 70 Marks

Answer ALL questions

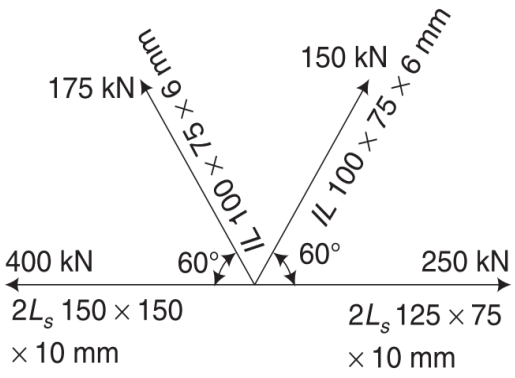
(The figures in the right-hand margin indicate marks)

PART – A **(2 x 5 = 10 Marks)**

Q.1. Answer ***ALL*** questions	CO #	Blooms Level
a. What are the formulas for end distance of a bolted connection for machine flame cut and hand flame cut?	CO1	K2
b. Find the n_n and n_s value for a lap connection.	CO1	K2
c. Determine the gross and net area in shear of plate 130 mm x 12 mm with the hole of 16 mm diameter bolt.(Fe 410 grade steel) (p=60 mm & e=35 mm)	CO2	K2
d. Find the ISLB 600 @ 99.5 kg/m is plastic section or compact section?	CO3	K2
e. Write the buckling class considered for the laced and battened column.	CO4	K2

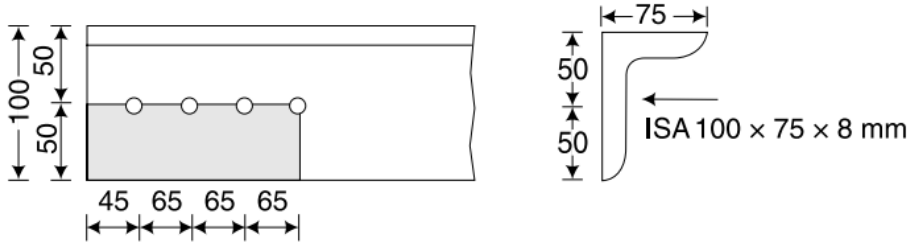
PART – B **(15 x 4 = 60 Marks)**

Answer ***All*** the questions	Marks	CO #	Blooms Level
2. a. Two plates of 16 mm are to be joined using M20 bolts of grade 4.6 in (a) Lap joint (b) Single cover butt joint; the cover plate being 12 mm thick (c) Double cover butt joint; each of the cover plate being 10 mm thick. Evaluate the bolt values.	15	CO1	K3
(OR)			
b. Design the connections for the members of a roof truss with a gusset plate 12 mm thick, as shown in Fig. Use 18 mm diameter bolts of grade 4.6	10	CO1	K6



c. Explain various types of welded connection with neat sketches.	5	CO1	K2

3.a.	A single unequal angle ISA10065, 8 mm is connected to a 10 mm gusset plate at the end with 5 numbers of 16mm bolts (p=50 mm, e=30 mm) to transfer tension. Evaluate the tensile strength of the angle if the gusset plate is connected to 100 mm leg.	10	CO2	K3
b.	Determine the block shear strength of the section.	5	CO3	K2



(OR)

c.	Evaluate the value of load carrying capacity for a compound column consisting of ISHB 250 @ 536.6 N/m with one cover plate 300 mm × 20 mm on each flange and having a length of 4m. One end of the column is fixed, and the other end is pinned.	10	CO2	K5
d.	If $\frac{kL}{r}$ value is 113.76 and f_y is 275 MPa. Compute the design compressive stress for buckling class "b".	5	CO4	K2
4. a.	A cantilever beam of length 4.5m supports a dead load (including self-weight) of 18kN/m and a live load of 12 kN/m. Assume a bearing length of 100mm. Design the beam.	10	CO3	K6
b.	Explain plastic, compact, and semi-compact section.	5	CO3	K2

(OR)

c.	Evaluate the design bending strength of ISLB 350 @ 486 N/m, considering the beam to be (a) laterally supported (b) laterally unsupported The design shear force V is less than the design shear strength. The unsupported length of the beam is 3.0 m. Assume steel of grade Fe 410.	15	CO3	K5
5.a.	Design a gusseted base (Base plate, gusset plate, and gusset angle) for a column ISMB 400 @61.6 kg/m carrying a factored load of 2000kN.	12	CO4	K3
b.	Draw a neat sketch of the gusseted base for a column.	3	CO4	K2

(OR)

c.	Illustrate a short note on plate girder.	5	CO4	K2
	Design a welded plate girder of span 24m to carry superimposed load of 35kN/m. Avoid use of bearing and intermediate stiffeners. Use of Fe415 steel.	10	CO4	K3

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