GIET UNIVERSITY, GUNUPUR – 765022

B. Tech (Sixth Semester Regular) Examinations, May – 2024

21BCVPC36002 – Design of Steel Structures

(Civil)

(IS 800:2007 Code Book and Steel Tables book are allowed in the exam hall)

Time: 3 hrs   Maximum: 70 Marks
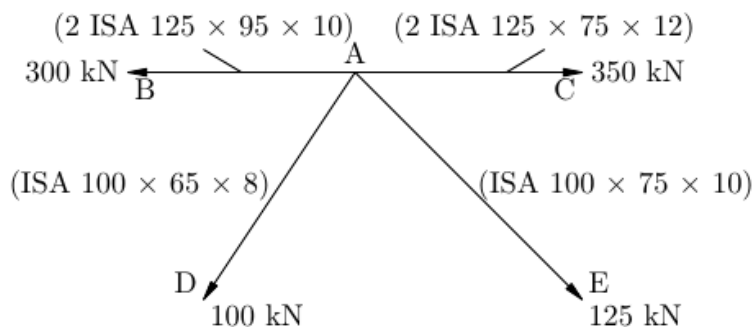
(The figures in the right hand margin indicate marks)

PART – A   **(2 x 5 = 10 Marks)**

Q.1. Answer *ALL* questions

		CO #	Blooms Level
a.	What are the advantages and disadvantages of welded connections?	CO1	K2
b.	Write the formula to find the web crippling strength due to concentrated load and due to support.	CO4	K2
c.	Write the formulas for transverse shear, longitudinal shear and bending moment for battened column.	CO3	K2
d.	Determine the gross and net area in shear of plate 150 mm x 12 mm with the hole of 16 mm diameter bolt. (p=60 mm & e=40 mm)	CO2	K2
e.	What is meant by gauge distance and edge distance?	CO1	K2

PART – B   **(15 x 4 = 60 Marks)**

Answer *ALL* questions

		Marks	CO #	Blooms Level
2. a.	Design the connections for the members of a roof truss with a gusset plate 16 mm thick, as shown in Fig. Use 18 mm diameter bolts of grade 4.6	10	CO1	K3

b.	Write about the various types of welded connection? Write the advantages and disadvantages of welded connection.	5	CO1	K2

(OR)

c.	Design a double-cover butt joint to connect two plates, each 12 mm thick and 300 mm wide. The service load to be transferred is 250 kN. (Use 20mm diameter bolts of grade 4.6)	8	CO1	K2
d.	Two plate (fe410 grade steel) each 300mm× 16mm are to be joined using 20mm diameter bolts of grade 4.6 to form a lap connection. The connection is supposed to transfer a service load of 375 KN. Calculate number of bolts required for connection with minimum pitch and end distance for bolts.	7	CO1	K2

Assume thread of the bolt doesn't intercept the shear plane.

3.a.	Design a suitable angle section to carry a factored tensile force of 250 kN assuming a single row of M20 bolts. The length of member is 4m.	15	CO2	K3

(OR)

c.	A single angle discontinuous member ISA 100 X 100 X 10 mm with single bolted connection is 2 m long. Calculate the design compressive strength of the section.	8	CO2	K2
d.	Determine the design compressive strength of column section ISHB 300@63.0 kg/m. Length of the column is 3m. The column is fixed in position but not in direction at both ends.	7	CO2	K2
4.a.	Design a built up column of 8 m long using channels placed face to face subjected to factored compressive force of 1600 kN. The column is restrained in position but not in direction at both ends. Design end batten, intermediate batten and connection using M20, 4.6 grade bolts.	15	CO3	K3

(OR)

b.	Design a built up column 12 m long to carry factored axial load of 1500 kN. The column is restrained in position but not in direction at both ends. Design the column with two channels placed back to back. Provide single lacing system with bolted connections.	15	CO3	K3
5.a.	Design a slab base for a column ISMB 350 carrying a factored load of 1000 kN. Also design the welded connection between slab base and column.	10	CO4	K3
b.	Determine the design bending strength of ISLB 400 @ 56.9 kg/m considering the beam to be laterally supported. The design shear force V is less than the design shear strength and is of low shear. The unsupported length of the beam is 4.0 m. Assume steel of grade Fe 410.	5	CO4	K2

(OR)

c.	A simply laterally supported beam of length 5m supports a dead load (including self-weight) of 18kN/m and a live load of 15 kN/m. Assume a bearing length of 100mm. Design the beam. (Check for deflection, web buckling and web crippling).	10	CO4	K3
d.	Write short note on web buckling with neat sketches.	5	CO4	K2

--- End of Paper ---