

USN

--	--	--	--	--	--	--	--	--	--

15CV62

Sixth Semester B.E. Degree Examination, July/August 2022
Design of Steel Structural Elements

Time: 3 hrs.

Max. Marks: 80

Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. Use of IS : 800 – 2007 and Steel Tables is permitted.

Module-1

- a. Explain briefly various types of loads to be considered for the design of steel structures. (08 Marks)
b. Distinguish between working stress design and limit state design of steel structure. (08 Marks)

OR

- a. Explain the theorems of plastic collapse. (06 Marks)
b. Analyze the continuous beam ABC subjected to working load shown in Fig.Q2(b) and determine the plastic moment. Adopt a load factor of 1.85.

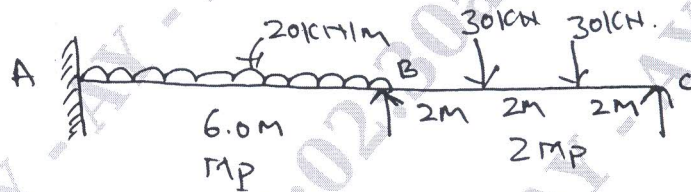


Fig.Q2(b)

(10 Marks)

Module-2

- a. List the failure modes of bolted joint. (06 Marks)
b. Two plates 10mm and 18mm thick are to be connected by double cover butt joint. The joint is double bolted with cover plates each 8mm thick. The load to be transmitted by the joint is 200kN. Design the joint and bolts on packing. (10 Marks)

OR

- a. What are the advantages of welded connection over bolted connection? (06 Marks)
b. A Tie member consisting of an ISA 80mm × 50mm × 8mm (Fe410 grade steel) is welded to a 12mm thick gusset plate at site. Design welds to transmit load equal to the design strength of the member. (10 Marks)

Module-3

- a. Explain the various modes of failure of compression member. (06 Marks)
b. Design a single angle section for discontinuous strut to carry a load of 80kN. The length of the member is 2.5m. (10 Marks)

OR

- Design a laced column with two channels back to back of length 8m to carry an axial factored load of 950kN. The column is hinged at both ends. Use 20mm diameter bolts of property class 4.6 for connection. (16 Marks)

Module-4

- 7 a. List various factors affecting the strength of tension member. (06 Marks)
 b. Determine the design tensile strength of a roof truss diagonal ISA 90 × 60 × 8mm connected to the gusset plate, as shown in Fig.Q7(b), if the yield strength and the ultimate strength of the steel used are 250MPa and 410Mpa. Using 20 mm diameter bolts in one row along the length of long leg and short leg is kept outstanding.

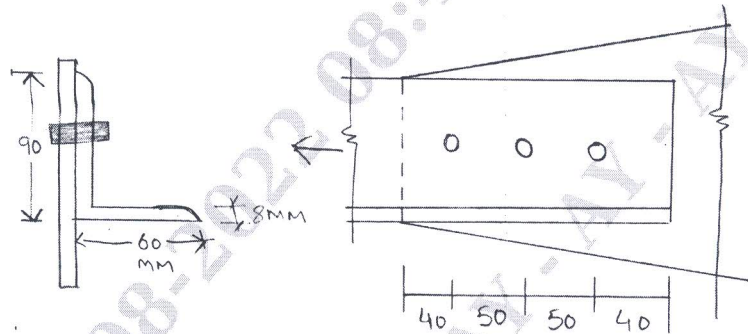


Fig.Q7(b)

(10 Marks)

OR

- 8 Design a slab base for an ISHB350@ 661.2N/m column to carry a factored load of 1000kN. M25 concrete and Fe415 grade steel is used for the foundation. Indicate the details in a sketch. (16 Marks)

Module-5

- 9 a. What are the factors affecting lateral stability of beams. (06 Marks)
 b. Determine :
 i) Design bending strength
 ii) Design shear strength
 iii) Intensity of UDL the beam can carry under service condition
 iv) Maximum deflection of simply supported beam section used in ISLB350 @ 486 N/m.

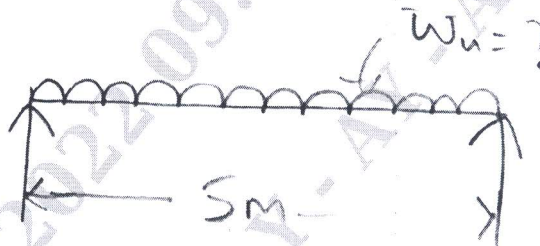


Fig.Q9(b)

(10 Marks)

OR

- 10 Design a steel beam section for supporting roof of a big hall for the following data and apply the usual checks.

Assume steel of grade Fe 410

Clear span = 6.5m

End bearing = 150mm

C/C Spacing of beam = 3m

Imposed load on the beam = 10 kN/m²Dead load (inclusive of SW) = 4 kN/m²

Restriction of beam depth = 375mm

The compression flange of the beam is laterally supported throughout.

(16 Marks)
