68

Reg. No. : | | | | | | | | | | | | |

Question Paper Code : 90332

B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2022

Sixth Semester

Civil Engineering

CE 8601 – DESIGN OF STEEL STRUCTURAL ELEMENTS

(Regulations 2017)

Time : Three hours Maximum : 100 marks

Use of IS 800-2007 is permitted

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Are all imposed loads, gravity loads? Justify.
2. What is meant by composite construction?
3. List the merits of bolted connections
4. Mention the type of bolts used in steel connections.
5. Comment on shear lag.
6. Infer the modes of failure in tension members.
7. Define Slenderness ratio.
8. What is meant by a column splice.
9. Differentiate web buckling and web crippling.
10. Enlist the functions of purlins.

PART B — (5 × 13 = 65 marks)

11. (a) Explain the advantages of steel as a structural material.

Or

(b) Explain the type of loads on structures and load combinations with respect to the Code of practice.

12. (a) Determine the strength and efficiency of the lap joint shown in Fig.1. The bolt are 20mm in diameter and of grade 4.6. Two plates to be joined are 10mm and 12mm thick. The steel grade is Fe410.

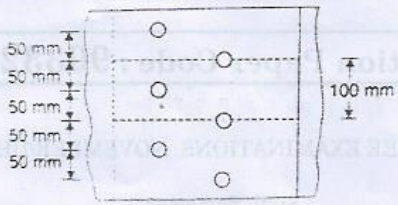

Fig. 1

Or

(b) A bracket plate 10mm thick is used to transmit a reaction of 140 kN at an eccentricity of 100mm from the column flange as shown in Fig.2. Design the weld.

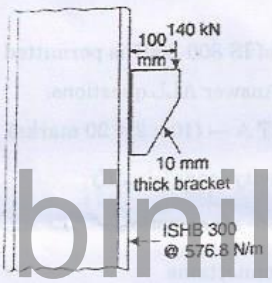

Fig. 2

13. (a) With six 16 mm diameter bolts to transfer tension as shown in Fig.3. Determine the design tensile strength of the angle assuming that the yield and the ultimate stress of steel used are 250 MPa and 410 MPa:

(i) if the gusset plate is connected to the 100mm leg, and

(ii) if the gusset plate is connected to the 75mm leg.

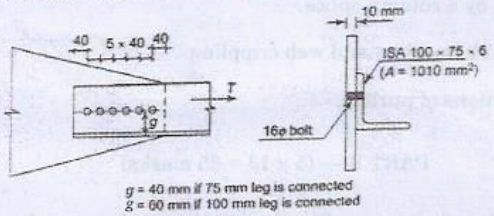

Fig. 3

Or

70

(b) Design a splice for tension member sections 160 × 10mm and 250 × 14mm. The member is subjected to a factored tensile load of 300 kN. Assume Fe410 grade of steel. Provide 20mm diameter bolts of grade 4.6 for making the connections.

14. (a) A built-up column of effective length 4m is made of two ISMC 350 channels placed face to face, separated by a distance of 250 mm (between web ends) and carries a load of 800 kN. Design a suitable lacing system with connections.

Or

(b) Design a column splice for a column ISHB 300 @ 577N/m to transfer an axial load of 500 kN and a moment of 20 kNm.

15. (a) Design a built-up beam for an effective span of 5m to carry a load of 40kN/m. The beam is laterally supported.

Or

(b) Calculate the moment carrying capacity of a laterally unrestrained ISMB400 member of length 3 m.

PART C — (1 × 15 = 15 marks)

16. (a) Design a bolted bracket connection to support an end reaction of 400 kN at an eccentricity of 250mm from the center of the column ISHB 150 @ 300.19N/m. Steel grade Fe410 and 4.6-grade bolts are to be used. The thickness of the bracket plate may be taken as 10mm.

Or

(b) Design a I-section purlin for the following data:

Spacing of truss	= 5 m
Spacing of purlins	= 1.25 m
Span of truss	= 12m
Wind intensity	= 1.25kN/m²
Weight of GI sheets	= 120 kN/m².