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Question Paper Code: 70357

B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2023.

Sixth Semester

Civil Engineering

CE 8601 – DESIGN OF STEEL STRUCTURAL ELEMENTS

(Regulations 2017)

Time: Three hours

Maximum: 100 marks

IS800, SP6, S.I. units STEEL TABLES

Answer ALL questions.

PART A —
$$(10 \times 2 = 20 \text{ marks})$$

- Mention the various types of loads considered in steel design.
- 2. Define Poisson's Ratio.
- 3. What are the expected failures occur in riveted joint?
- 4. Define Slip Ratio.
- 5. What is Slenderness Ratio?
- 6. Justify the circumstance where gusset plates are used.
- 7. Recall the uses of column base provision.
- 8. What is web buckling?
- D. Justify the condition of adopting curtailment of flanges.
- 10. What is web crippling?

PART B —
$$(5 \times 13 = 65 \text{ marks})$$

11. (a) Explain the design aspects of tension and compression members with respect to working stress method.

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(b) Determine the design axial load on the column section ISHB250, given the height of the column is 3 m and it is pin ended and braced along minor axix. $f_y = 250 \, N/mm^2$, $f_u = 410 \, N/mm^2$, $E = 2 \times 10^5 \, N/mm^2$.

12. (a) Calculate the strength of a 16 mm diameter bolt of grade 4.6 for a lap joint. The main plates to be joined are 12 mm thick of FE410 grade Assume pitch and end distance of a bolt is 40 mm and 30 mm respectively and thread of a bolts is intercepting the shear plane.

Or

- (b) Discuss about connection failures with neat sketch.
- 13. (a) Design a tensile splice to connect two plates of size 350×12 mm and 350 mm \times 20mm using bolt connections. The factored axial tension is 750 kN.

Or

(b) (i) Discuss shear lag in tension member.

(6)

- (ii) Discuss the provisions does the lug angle provide in tension member. (7)
- 14. (a) (i) Classify the modes of failure in compression member. (6)
 - (ii) Discuss the common types of column base with neat sketch. (7)

Or

- (b) Describe the lace column and explain its significant and design aspects with neat sketch.
- 15. (a) (i) Evaluate the economical depth of a plate girder. (7)
 - (ii) Construct the failure more of laterally unsupported beams. (6)

Or

(b) Design a purlin for a roof truss having the following data:

Span of the truss = 6.0 m

Spacing of truss = 3m c/c.

Inclination of roof = 30°

Spacing of Purlin = 2m c/c

Wind pressure = 1.5 kN/m^2

Roof coverage = A.C Sheeting weighing 200 N/m² 1

Provide a channel section Purlin.

PART C — $(1 \times 15 = 15 \text{ marks})$

16. (a) Discuss the critical factors to be considered when designing eccentrically loaded bolted bracket connections. How does the location of the applied load affect the design of such connections? What measures are to be taken to ensure their structural integrity?

Or

(b) Find the moment capacity of the laterally unsupported beam ISMN 300 of the effective span of 5 m.