(Please write your Exam Roll No.) *Exam Roll No.* 1202510345

END TERM EXAMINATION

FIFTH SEMESTER [B.TECH] DECEMBER 2017

Paper Code: ETCE-305 *Subject: Design of Steel Structures*

Time: 3 Hours *Maximum Marks: 75*

Note: Attempt any five questions including Q.no.1 which is compulsory. Assume any missing data suitably, if not given. Use of relevant Indian Codes/Guidelines is permitted.

Q1 Attempt **any five** parts: **(5x5=25)**

(a) What are the different types of loads to be considered for design of steel structures?

(b) What is the difference between the stringer and crossed girder?

(c) Compare welded joints with bolted joints with respect to strength, efficiency and workmanship.

(d) State purpose of providing Lug angle.

(e) Define Slenderness Ratio of compression member. State its limiting value in case of member carrying axial compression due to dead load and live load.

(f) State the situation where Gusseted base is used. Draw neat labelled sectional elevation.

(g) Differentiate between Laterally supported and laterally unsupported beams.

Q2 An industrial building has trusses for 16 m span. Trusses are spaced at 4 m c/c and rise of truss is 4 m. Calculate panel point load in case of Live Load and Wind Load using following data: **(12.5)**

(a) Coefficient of external wind action = - 0.7

(b) Coefficient of internal wind action = ± 0.2

(c) Design wind pressure = 1.2

(d) No. of panels = 12

Q3 A tie 0.95 m long carries factored load of 150 kN. State whether the ISA 50 x 50 x 6 (A_g = 568 mm²) is suitable as tie or not? Also 16 mm dia bolts are provided in one line. Take f_u = 410 Mpa, f_y = 250 MPa and γ_{m0} = 1.1 and γ_{m1} = 1.25. **(12.5)**

Q4 A hall has trusses spaced at 3 m c/c having span 12 m. Rise of truss is 4 m and no. of panels in truss are 10. Determine panel point load due to Dead Load and Wind Load for following data: **(12.5)**

(a) Intensity of load due to purlin, bracing and sheeting together excluding self-weight = 600 MPa

(b) Coefficient of external and internal wind action are (-0.6) and (± 0.2) respectively.

(c) Design wind pressure is 1.1 kPa.

Q5 An ISMB 400 @ 604.3 N/m is used as a simply supported beam for 3.5 m span. The compression flange of beam is laterally supported throughout the span. Determine design flexural strength of member. Also calculate working uniformly distributed load the beam can carry per m span? Check the member for deflection? Take Z_p = 1176.18x103 mm³, γ_{m0} = 1.1, β_b = 1 and f_y = 250 MPa. **(12.5)**

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ETCE-305

P1/2

Q6 Design a column of effective length 6.5 m. It is subjected to an axial load of 1200 kN. Provide two channel sections back to back with lacing. Design suitable lacing system also? **(12.5)**

Q7 (a) ISLB 200 as a beam carries service uniformly distributed load of 50 kN/m over 3.5 m span and is laterally supported. Check the section for shear capacity if f_y = 250 MPa, γ_{m0} = 1.1 and t_w = 5.4 mm. **(6)**

(b) Calculate value of least radius of gyration of a compound column consisting of ISHB 250 with one cover plate 300 x 20 mm on each flange. For ISHB 250, A = 6971 mm^2, I_{zz} = 7983.9x104 mm^4, I_{yy} = 2011.7 x 104 mm^4. **(6.5)**

Q8 Explain the following terms:

(a) Differentiate modes of failure in columns. **(4)**

(b) Design of gantry girder. **(4)**

(c) Design of frames as per Indian Standard Codal Provisions. **(4.5)**

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