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B.E./B.Tech. DEGREE EXAMINATION, APRIL/MAY 2018
Sixth Semester
Civil Engineering
CE 6603 – DESIGN OF STEEL STRUCTURES
(Regulations 2013)

Time : Three Hours | Maximum : 100 Marks

Answer ALL questions

PART – A **(10×2=20 Marks)**

1. Formulate the equation for calculating the effective throat thickness of weld.
2. Illustrate the advantages of HSFG bolts.
3. When gusset plates are used ?
4. Classify the modes of failure in Tension member.
5. State the purpose of column base.
6. Evaluate the effective length of column based on end conditions.
7. What is laterally unsupported beam ? Give an example.
8. Write the formula for calculating the thickness of beam bearing plate.
9. What is the purpose of the purlin in a roof truss ?
10. Calculate the Design wind speed for Dehradun and Chennai.

PART – B **(5×13=65 Marks)**

11. a) Find the dimensions of a doubly bolted lap joint for plates 16 mm thick to carry its full load. Take permissible axial tension in plate 150 N/mm².

(OR)

b) Find the safe load and efficiency of a double cover butt joint. The main plates are 12 mm thick connected by 18 mm diameter bolts at a pitch of 100 mm. Design the cover plate also. What is the percentage reduction in the efficiency of the joint if the plates are lap jointed ?

12. a) A double angle ISA 75 mm × 75 mm × 8 mm back to back welded to one side of a 12 mm gusset have allowable stress 150 MPa. Predict the allowable tensile load on the members, and weld length and overlap length of gusset plate.

(OR)

b) Design a tension member to carry a factored force of 340 KN. Use 20 mm diameter black bolts and a gusset plate of 8 mm thick.

13. a) Find the suitable design for a built-up column consisting of two channels connected by batten to carry an axial load of 800 KN; the effective length of the column is 6 m.

(OR)

b) Find the suitable design for a rolled steel beam section column to carry an axial load 1100 KN. The column is 4 m long and adequately in position but not in direction at both ends.

14. a) Find the suitable design for a simply supported steel joist with a 4.0 m effective span carries a udl of 40 kN/mover its span inclusive of self-weight. The beam is laterally unsupported. Take fy = 250 N/mm².

(OR)

b) Design a simply supported beam of effective span 1.5 m carrying a factored concentrated load of 360 KN at mid span.

15. a) Design a purlin for a roof truss having the following data : Span of the truss = 6.0 m, Spacing of truss = 3 m c/c, Inclination of roof = 30° spacing of Purlin = 2 m c/c, Wind pressure = 1.5 kN/m², Roof coverage = A.C Sheeting weighing 200 N/m², Provide a channel section Purlin.

(OR)

b) Calculate the dead load, live load and wind load on a 'Fink' type truss for the following data and mark the loads on the nodes of the truss. Span = 12 m, Pitch = ¼ of span, Height at eves level = 10 m from the ground Spacing of truss = 5 m c/c.

PART – C **(1×15=15 Marks)**

16. a) Design a suitable slab base for a column section ISHB 400@ 822 N/m. Supporting an axial load 500 KN. The base plate is to rest on a concrete pedestal of M20 grade concrete.

(OR)

b) A plate girder of span 15 m is made-up of web plates of 1600 mm × 8 mm flange angles 150 mm × 115 mm × 10 mm and two flange plates 480 mm × 10 mm it carries a uniformly distributed load of 100 kN/m including its own weight. Identify the suitable design and sketch the web splices at 5 m from one end.

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