B.E. DEGREE EXAMINATIONS: NOV/DEC 2012

Fifth Semester

CIVIL ENGINEERING

CEE112: Basic Structural Design (Timber, Masonry and Steel)

Time: Three Hours   **Maximum Marks: 100**

Answer ALL Questions:-

PART A (10 x 1 = 10 Marks)

1. The permissible bending stress for a timber is given by

   a) $F_{br}=pq/p\sin^2\theta +q\cos^2\theta$ b) $F_{br}=p+q/p\sin\theta +q\cos\theta$

   c) $F_{br}=pq/p\cos\theta +q\sin\theta$ d) $F_{br}=p-q/p\sin\theta +q\cos\theta$

2. The safe withdrawal resistance per nail is given by

   a) $p=240G^{\frac{2}{3}}d$ b) $p=247G^{\frac{5}{2}}d$

   c) $p=147G^{\frac{2}{5}}d$ d) $p=140G^{\frac{1}{5}}d$

3. For a wall free at one end and continuous with a cross wall at the other end the effective length is given by

   a) L   b) 2L   c) 1.5L   d) 0.8L

4. The slenderness ratio of a wall or column is defined as the ratio of

   a) Length /height   b) Height /Length

   c) Effective thickness/Effective height   d) Effective height/Effective thickness

5. Design wind speed is calculate by

   a) $V_z=V_b k_1 k_2 k_3$ b) $V_z=V_b(k_1+k_2+k_3)$ c) $V_z=V_b k_1$ d) $V_z=V_b(k_1-k_2-k_3)$

6. The structural advantage of using steel as structural member

   a) Small weight to strength   b) Speed of erection

   b) Speed of dismantling   d) Scrap value

7. The thickness gusset plate should not be less than

   a) 6 mm   b) 8mm   c) 12mm   d) 16mm

8. Which of the following section will be preferred for a

   a) ISLB   b) ISMB   c) ISWB   d) ISHB

9. High strength bolts are designed on the basis of

   a) friction   b)tension   c) compression   d) shear

10. A butt weld is specified by the

    a) Leg length   b) Plate thickness

    c) Effective throat thickness   d) penetration thickness

PART B (10 x 2 = 20 Marks)

11. What are the considerations to be made for design of members with framed joints in a timber structure?

12. How the solid columns are classified in timber structures?

13. How the brick walls are classified?

14. What is faced wall?

15. What are the various loads considered in the design of a steel structure?

16. List out the disadvantages of steel as a structural material.

17. What are the various forms of tension members?

18. What are the assumptions made in the design of a compression member?

19. List out the advantages of bolted connections.

20. Why welded connections are preferred for design of a steel structure?

PART C (5 x 14 = 70 Marks)

21. a) Find the allowable axial loaf on a deodar column 200 mmx150mm in cross section and (a) 3.0m (b) 4.3m in length. Use the following basic values. F_c=7.8N/mm^2 E=9500 N/mm^2.

(OR)

b) A deodar wood tension member 50 mmx200mm in size used in a roof truss carries a load of 45000 N. Design a suitable splice for the member using 19mm bolts.

22. a) Design a brick column 3m high to carry an axial loaf of 110 kN. The width of the pier is limited to 1.5 normal brick size for architectural reasons. Assume cement-lime mortar 1:1:6 and first class brick with 10 Mpa strength. The column may be taken as fixed restrained.

(OR)

b) A beam ISMB 450 supports a total load of 380 kN on a span of 8.5m It rests on 382 mm brick walls at two ends. Provide a suitable bearing on the wall. Brickwork is in good lime mortar with the safe bearing pressure 0.55 MPa.

23. a) Estimate the design wind pressure for a 100 m high lattice tower located on the outskirts of Allahabad. Estimate also the wind load in terms of the effective frontal area for the tower.

(OR)

b) The loads on a floor beam of a commercial building are as below.

Roof loads

Dead load = 6kN/m2

Live load =4 kN/m^2 Floor finish=1.5kN/m^2

Determine the design load for (i) Limit state of strength (ii) Limit state of serviceability

24. a) Design a stanchion 3.5m long in a building subjected to a factored load of 350 kN. Both the ends of the stanchion are effectively restrained in direction and position. Use steel of grade Fe 410.

(OR)

b) A tension member 0.95 m long to resist a service dead load of 20 kN and a service live load of 60 kN. Design a rectangular bar of standard structural steel of grade Fe 410.Assume that the member is connected by one line of 16mm diameter bolts of grade 4.6.

25. a) An ISA 100mmx100 mmx10mm carries a factored tensile force of 100 kN. It is to be joined with 12mm thick gusset plate. Design a high strength bolted joint when (i) no slip is permitted (ii) when slip is permitted. Steel is of grade Fe 410.

(OR)

b) An ISLC 300 @ 324.7 N/m is to carry a factored tensile force of 900 kN. The channel section is to be welded at the site to a gusset plate 12mm thick. Design a fillet weld, if the overlap is limited to 350mm.

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