Register Number……

B.E. DEGREE EXAMINATIONS: NOVEMBER 2009

Fifth Semester

CIVIL ENGINEERING

U07CE502: Basic Structural Design (Timber, Masonry & Steel)

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

Answer ALL the Questions:-

Assume the data wherever necessary.
Relevant IS code and steel table are permitted.

PART A (10 × 1 = 10 Marks)

1. The separation along the grain between the annual rings are called as

   (a) Checks (b) wanes (c) shake (d) grain

2. How many number of timber grades are available as per IS 883 1970

   (a) 1 (b) 2 (c) 3 (d) 4

3. A 200 mm thick wall made of modular brick is 5m long between cross walls and 3.8m clear height between RC Slabs at top and bottom .the slenderness ratio of the wall is

   (a) 15 (b) 19 (c) 20 (d) 25

4. The depth of footing for an isolated column is governed by

   (i) Maximum B.M (ii) shear force (iii) Punching shear

   The correct answer is

   (a) only (i) (b) (i) and (ii) (c) i and iii (d) i, ii , iii

5. When a beam is subjected to lateral load then designer choice for section should be

   (a) Angle (b) H (c) I section with channel section at tap flange (d) I section

6. The load factor to be used for plastic design of steel structures for dead and imposed load is

   (a) 2.2 (b) 2.0 (c) 1.7 (d) 1.5

7. In double riveted double covered butt joint, the strength of the joint per length in shearing rivets ‘n ‘ times the shear strength of one rivet in single shear , where ‘n’ is equal to

   (a) 1 (b) 2 (c) 3 (d) 4

8. Load on connection for is not eccentric

   (a) Lap joint (b) Single cover butt joint

   (c) Double cover butt joint (d) All the joints mentioned in (a), (b), (c) of the question

9. When the B.M approaches zero as a limit the member is theoretically subjected to axial load only means that is called as

(a) Beam (b) column (c) beam column (d) none of these

10. When the axial load approaches zero as a limit the member is theoretically subjected to axial load only means that is called as

(a) Beam (b) column (c) beam column (d) Joints

PART B (10 × 2 = 20 Marks)

11. What is meant by shakes?

12. Write the form factor for rectangular section

13. How do you find the slenderness ratio for wall?

14. Differentiate cantilever and counterfort retaining wall.

15. What are the stresses developed in the steel structures?

16. Draw the stress strain relationship curve for carbon steel

17. What is meant by gross diameter of rivet?

18. What is meant by tacking rivet?

19. Write design procedure categories for beam column connections

20. Write the interaction equation for uniaxial bending

PART C (5 × 14 = 70 Marks)

21. (a) (i) Design a rectangular column of Group B timber to be used in an open shed to carry an axial load of 550 kN. The effective length of column is 3 m. (7)

(ii) A column of 200 mm dia is made of Sal wood. Determine the safe axial load, if its effective length is 2 m. f_{cp} = 10.6 N/mm^2 and E = 12700 N/mm^2 (7)

(OR)

(b) A tee - joint consists of a horizontal member of 100 mm x 200 mm in section and a vertical member consisting of two planks 50 mm x 200 mm. The members are made of class A timber. Use 16 mm dia bolts. Design the joint if the vertical member transmits a compressive force of 50 kN to the horizontal member. (14)

22.(a) Design a gravity retaining wall 4.5m high vertical back to retain a dry cohesionless back fill of unit weight 20 kN/m^3 and angle of shearing resistance $30^{0.}$ Find also factor of safety against sliding assuming the angle of friction between the base of the wall and the foundation soil as 30^0. The wall is to be 1.5 m wide at the top and to be constructed of brick masonry having unit weight 20 kN/$m^{3.}$ Use Rankine's theory. (14)

(OR)

(b) A two storey building carry 150 mm thick RCC slab with 3m height and its support 2.5 m wide wall . Live load on the roof is 1.25 kN/m^2, live load on the floor is 1.5 kN/m^2, weight of the weathering course is 1.95 kN/m^2. Assume floor finish 0.25 kN/m^2. Design an interior cross wall. Adopt CM 1:5 mix; Crushing strength of brick is 12.5 N/mm^2. Eccentric is 19 mm on minor axis. (14)

23. (a) (i) Explain about common uses of light gauges with a neat sketch. (7)

(ii) Explain about forms of light gauges with a neat sketch. (7)

(OR)

23. (b) Explain about available forms of tension and compression members (14)

24. (a) A double cover butt joint is used to connect plates of 12 mm thick. Design the riveted joint and determine its efficiency. Use power driven rivets and take permissible stresses as per IS 800. Take permissible axial tension in plate =0.6f_y where f_y = 250 N/mm^2 (14)

(OR)

24. (b) A tie bar consisting of a single angle 60 mm x 60 mm x 10 mm is to be welded to a gussets plate. The tie bar carries a load of 150 kN along its centroidal axis. Design the joint if both the side fillets and end fillets are to be provided. The centrodial axis of the angle lies at 18.5 mm from heel of the angle. (14)

25. (a) A column of effective height 6 m is subjected to an axial force of 300 kN along with end moments 50 kN-m about its major axis and 10 kN-m about minor axis . Take Cm = 1 for bending about major axis and 0.8 for bending about minor axis, find suitable H-section for the column. (14)

(OR)

25. (b) A beam- column of effective length of 6 m carries an axial load of 450 kN and equal end moments of 50 kN-m each about the major axis . Design the H-Section of the column. Assume that column bends either single (or) double curvature (14)

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