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Register Number: ………………..

B.E DEGREE EXAMINATIONS: MAY 2015

(Regulation 2009)

Fifth Semester

CIVIL ENGINEERING

CEE112 : Basic Structural Design

(Timber, Masonry & Steel)

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

Answer all the Questions:-

PART A (10 x 1 = 10 Marks)

1.   The design wind pressure is given by ……………., v_z is the design wind velocity

   a) $0.66v_z^2$ b) $0.6v_z^2$

   c) $0.6v_z^3$ d) $0.5v_z^2$

2.   The steel section normally used for steel beams are

   a)   Channel sections   b)   Double angle sections

   c)   I-sections   d)   T-sections

3.   The minimum thickness of load bearing wall is

   a)   228mm   b)   120 mm

   c)   150 mm   d)   300 mm

4.   Strength of masonry depends upon the

   a)   Strength of masonry unit   b)   Thickness of masonry

   c)   Type of mortar   d)   All the above

5.   To prevent lateral buckling, the minimum width 'b' of the timber beam is kept equal to or more than

   a)   l/25   b)   l/50

   c)   l/100   d)   l/200

6.   In the case of cantilever timber beams the deflection should not exceed

   a)   1/240 of clear overhang   b)   1/180 of clear overhang

   c)   1/300 of clear overhang   d)   1/100 of clear overhang

7.   The slenderness ratio KL/r for lacing bars should not exceed the following value

   a)   200   b)   180

   c)   145   d)   250

8. The effective length of a compression member with one end restrained in both translation and rotation and other end restrained in translation but free in rotation is given by

   a) 0.65L   b) 0.8L

   c) 1.2L   d) 2.0L

9. For standard rolled beam sections the plastic modulus of the section Z_p is of the order of

   a) 1.125 to 1.14 times z_{xx} b) 1.52 to 1.65 times z_{xx}

   c) 1.7 to 1.8 times z_{xx} d) 1.435 to 1.55 times z_{xx}

10. For members subjected to dynamic loading the type of bolt recommended is

    a) High strength friction grip bolts   b) Black bolts

    c) Turned bolts   d) Finished bolts

PART B (10 x 2 = 20 Marks)

11. What are the various factors affecting the strength of timber

12. What are the different types of joints used in wooden structures

13. Distinguish between load bearing and non-load bearing walls

14. List any four types of walls

15. List the applicable IS codes used in the design of steel structures and design loads

16. What are the different types of steel section used in structures

17. What are the different modes of failure in tension members

18. What is meant by lacings and battens

19. What is meant by web buckling and web crippling

20. Distinguish between black bolts and turned bolts

PART C (5 x 14 = 70 Marks)

21. a) (i) A rectangular box column is 350mm x 250mm in size and consists of 4 planks, (7) 240mm wide 50 mm thick. The overall unsupported length is 5m. If $F_c = 10.6$ N/mm^2 and E = 12700 N/mm^2 find the allowable load on the column

    (ii) A spaced compression member is 3m long between the end connections and (7) carries an axial load of 65kN. The wood used is Dhaman. Design the member with end connections using 50mm thick planks.

(OR)

   b) Design timber beams and girders for the roof of a beam having 6m x 8m clear dimensions. The timber is sal. The roof covering consists of timber planks with earth and brick tiles, so that the dead load of roofing is 2.5 kN/m^2. The live load on roof is 1.5 kN/m^2.

22. a) (i) Design a brick pier 3m high to carry an axial load of 110kN. The width of the (7) pier is limited to 1 ½ nominal brick size for architectural reasons. Assume cement-lime mortar 1:1:6 and first class brick with 10.5 N/mm^2 strength. The pier may be takes as fixed restrained.

   (ii) In the wall of a room 5m long 300mm thick and 3.5m high, there are three (7) window openings 0.9m wide 1.5m high. The piers between the windows are 200 mm wide each. If the load per metre length of the wall at lintel level is 30 kN/m, determine what minimum mortar strength must be used in the pier. Strength of bricks may be taken as 9 N/mm^2.

(OR)

   b) Determine the allowable axial load per metre length of a

   (i) 200 mm solid wall

   (ii) 240 mm cavity wall with 40mm cavity.

   The height of wall between thicker plinth wall and slab is 3.5m. The wall is continuous and its length between cross wall is 5m. Take F_c = 5.5 kg/cm^2

23. a) (i) What are the different types of steel structures (4)

   (ii) Briefly explain allowable stresses in steel and general design requirements of a (10) steel structure

(OR)

   b) (i) Explain the use of applicable codes for load estimation (7)

   (ii) Explain with neat sketch different types of steel structures (7)

24. a) Design a double angle tension member connected on each side of a 10mm thick gusset plate to carry an axial factored load of 375 kN. Use 20 mm block bolts. Assume shop connection.

(OR)

   b) Design a single angle strut connected to the gusset plate to carry 180kN factored load. The length of the strut between centre to centre intersection is 3m.

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

(OR)

b)   A bracket is bolted to the flange of a column as shown in fig.1, using 8mm thick bracket plate. Using M20 bolts design the connection.
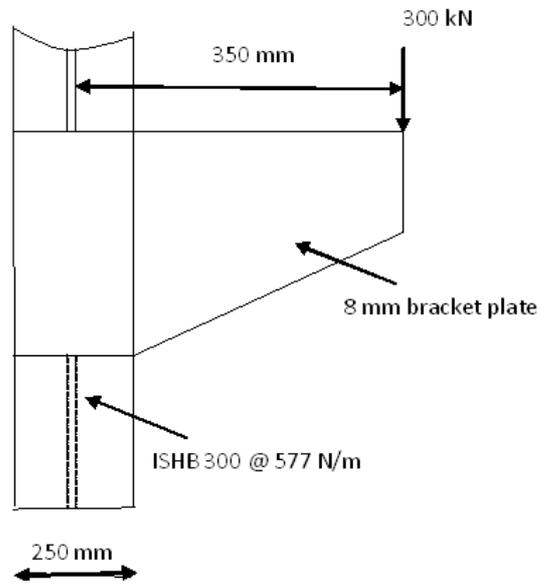

300 kN

350 mm

8 mm bracket plate

ISHB 300 @ 577 N/m

250 mm

Fig.1

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