Register Number.....

M.E. DEGREE EXAMINATIONS: OCTOBER / NOVEMBER - 2008

Third Semester

STRUCTURAL ENGINEERING

P07SEE04: Design of Bridges

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

Instructions:
1. Answer ALL questions:
2. Use M25 grade of concrete and Fe 415 steel wherever required
3. Use of relevant IS and IRC codes is permitted
4. Assume data, if necessary.

PART A (20 x 1 = 20 Marks)

1. The standard IRC loads are given in

A. IRC 6 B. IRC7 C. IRC 8 D. IRC 9

2. The Impact factor of IRC class A loading = A/ (B+2) where the constants A and B are

A. 4.5 and 6 B. 4 and 6 C. 5 and 6 D. 4.5 and 5

3. What type of gauge is adopted as unigauge by the Indian Railways

A. Broad gauge B. Meter gauge C. Narrow Gauge
D. Standard Gauge

4. For a single concentrated load the effective width of dispersion may be

A. $kx(1-x/l) + bw$ B. $kx^2(1-x/l) + bw$ C. $kx(1-2x/l) + bw$
D. $kx(1-x/l) + 2bw$

Where k = constant, x = CG of load from nearer support , l = effective span and bw = effective width of slab

5. The angle of dispersion of load through the wearing coat and deck slab according to IRC 21 is

A. 45^0 B. 40^0 C. 55^0 D. 50^0

6. The courbon's method of design is applicable when the ratio of span to width of deck is between

A. 2 and 4 B. 2 and 5 C. 3 and 5 D. 3 and 6

7. Tee beam slab decks are suitable for spans

A. 10m to 20m B. 20m to 30m C. 20m to 40m D. 40m to 50m C

8. Ministry of Transport (road wing) has prepared standard design for skew slab culverts of skew angles between

A 15 ° to 60 ° B. 20 ° to 80 ° C. 25° to 60 ° D. 25 ° to 80 °

9. Most common type of continuous bridge used for highway bridges having spans

A. 2 B. 3 C. 4 D.6

10. The bridge which is not affected by settlement of support is

A. T – beam B. Continuous Bridge C. Box Girder
D. Balanced Cantilever

11. Lubha bridge in Assam having span of

A. 130m B. 120m C. 140m D. 150m

12. The variation of shear in balanced cantilever beam is obtained by

A. (M/h) tan α B. (M/h) sin α C. (M/h) cos α D. (M/h) cot α

Where M = Moment at the section
h = Depth at that section
α = Angle made by the tangent to the curve with horizontal

13. Analysis of continuous bridges can be done using

A. Influence lines B. Moment Distribution C. Slope deflection
D. Substitute Frame

14. Partially prestressed concrete bridge is considered as

A. Type I structure B. Type II structure C. Type III structure
D. Type IV structure

15. Minimum grade of concrete required for pretensioned prestressed concrete bridge is

A. M20 B. M30 C. M40 D. M50

16. In steel roller and rocker bearings, the suitable diameter of roller is

A. 100mm to 150mm B. 150mm to 200mm C. 175mm to 225mm

D. 200mm to 250mm

17. A Reinforced concrete bed block is placed over the pier to

A. Distribute the load evenly B. Distribute the load laterally
C. Provide support C. Prevent movement of slab

18. The main function of wing wall is to

A. Retain the earthfill B. Distribute the lateral load
C. Distribute the vertical load D. Resist load from slab

19. The design of bridge foundation should confirm to the standard

A. IRC 21 B. IRC 6 C. IRC 8 D. IRC 78

20. In well foundations, as per IRC standard the minimum diameter of dredge hole should not be less than

A. 0.5m B. 1m C. 1.5m D. 2m

PART B (5 x 16 = 80 Marks)

21 a. Briefly discuss about the classification, planning and choice of type of road bridges. (16)

(OR)

21. b. Write about the general design principles of various types of bridges. (16)

22. a. Design a reinforced concrete slab culvert for the following data: (16)

Carriageway = two lane with 7.5m wide
Foot path = 1m on either side
Clear span = 6m
Wearing coat = 80mm
Width of bearing = 400mm
Loading IRC Class AA tracked Vehicle

(OR)

22. b.For the above data given in Question No. 22a. Calculate design moments and shears using Courbon's method by taking the bridge as tee beam girder bridge. (16)

23. a. i. What are the advantages of continuous bridges? (6)
ii. Discuss about the analysis of continuous bridge using influence lines. (10)

(OR)

23. b. Write the step by step procedure of design of balanced cantilever bridge. (16)

24. a.For the data given in Question No. 22.a., design a post tensioned prestressed concrete slab bridge deck using M40 grade of concrete and HTS wires. Take loss as 20%. and class type 1 member. (16)

(OR)

24. b. i. What are the advantages of prestressed concrete bridges? (6)
ii. With neat sketches of typical cross sections, explain about the pretensioned and post tensioned bridge decks. (10)

25. a. Explain about the types of bridge bearings with neat diagrams. (16)

(OR)

b. i. Write about the types of piers and forces acting on piers. (8)

ii. Write about the general features of abutments. (8)

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