B.E DEGREE EXAMINATIONS: APRIL/MAY 2014

(Regulation 2009)

Fifth Semester

CIVIL ENGINEERING

CEE115: Highway Engineering

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

Answer all the Questions:-

PART A (10 x 1 = 10 Marks)

1. Which one of the following is the chronological sequence in regard to road construction
   a) Telford, Tresaguet, C.B.R, Macadam
   b) Telford, Tresaguet, Macadam, C.B.R
   c) Macadam, C.B.R, Tresaguet, Telford
   d) Telford, Macadam, Tresaguet, C.B.R

2. Indian Road congress was formed in the year
   a) 1927
   b) 1928
   c) 1934
   d) 1935

3. Super elevation depends on
   a) speed of the vehicle
   b) radius of the horizontal curve
   c) speed of the vehicle and radius of the horizontal curve
   d) speed of the vehicle, radius of the vertical and horizontal curves

4. The best method of attaining super elevation in flat terrain is by rotating
   a) Centre line
   b) Inner edge
   c) Outer edge
   d) None

5. Flexible pavement distributes the wheel load
   a) Through slab action
   b) Grain to grain transfer
   c) Directly to sub-grade
   d) None of the above

6. Los Angeles abrasion test is actually
   a) A abrasion test only
   b) Abrasion cum impact test
   c) Strength test also
   d) None.

7. The approximate gap width in expansion joints in rigid pavement is
   a) 25 to 30mm
   b) 30 to 35mm
   c) 35 to 40mm
   d) 20 to 25mm

8. The value of flakiness index for stone aggregate in road pavement is
   a) 20% max
   b) 15% max
   c) 25% max
   d) 30% max

9. The overlay thickness required is given by the relation, if h_d & h_e are design thickness and existing thickness respectively.
   a) $h_o = h_d + h_e - 20cm$
   b) $h_o = h_d + h_e$
   c) $h_o = h_d / h_e - 10cm$
   d) $h_o = h_d - h_e$

10. Reflection cracking is observed in
    a) Flexible pavement
    b) Rigid pavement
    c) Bituminous overlaying rigid pavement
    d) Rigid overlaying flexible pavement

PART B (10 x 2 = 20 Marks)

11. How are urban roads classified?
12. What is footpath and write its standards according to Indian Roads Congress (IRC)?
13. A national highway located in rolling terrain has a radius of 250 m. Determine the length of the transition curve making suitable assumptions.
14. State the functions of sub grade soil.
15. What is meant by Vehicle Damage Factor in IRC method of flexible pavement design?
16. How change in temperature produce frictional stresses in rigid pavements?
17. Define "Flakiness Index".
18. What are the functions of prime coat and seal coat in the construction of bituminuous road?
19. What do you understand by the term "Mud pumping"?
20. Mention any two equipments used for the measurement of skid resistance of road surface.

PART C (5 x 14 = 70 Marks)

21. a) (i) Describe the factors governing highway alignment. (7)
       (ii) Brief the elements of "Remote Sensing". (7)

    (OR)

    b) (i) Explain briefly the principles and objectives of IRC. (7)
       (ii) Briefly outline the classification of roads based on function as suggested in the Nagpur road plan. (7)

22. a) (i) What are the objects of providing transition curves on the horizontal alignment? (7)
       (ii) Discuss the factors to be considered in the design of transition curve. (7)

    (OR)

    b) Describe the factors affecting the sight distance in hill roads.

23. a)   Explain in detail the CBR method of design highlighting the important points
         recommended by the IRC.

                                        (OR)

    b)   Explain briefly about the IRC recommendation for the cement concrete roads.

24. a)   What are the various tests to be conducted for aggregates in pavements? Discuss
         any one of them in detail.

                                        (OR)

    b) (i)   What are the requirements of a good highway drainage system?   (7)

        (ii) Explain the importance of drainage system for road pavement.   (7)

25. a)   Explain the various types of failures in a rigid pavement and their causes.

                                        (OR)

    b)   Explain the principle and uses of Benkelman beam test.

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