B.E. DEGREE EXAMINATIONS: NOV/DEC 2010

Fifth Semester

CIVIL ENGINEERING

U07CE504: Highway Engineering

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

Answer all questions:-

PART A (10 x 1 = 10 Marks)

1. Indian Road congress was formed in the year

   a) 1927   b) 1928   c) 1934   d) 1935

2. The width of carriage way in multi lane pavements is

   a) 3.75m per lane   b) 3.50m per lane   c) 5.5m per lane   d) 5.0m per lane

3. The cross slope for shoulders should be
   a) steeper than the cross slope of adjoining pavement
   b) at the same level of adjoining pavement
   c) lower than level of adjoining pavement
   d) any slope irrespective of adjoining pavement

4. 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

5. The theoretical maximum capacity of road is obtained using the relation

   a) $C= \dfrac{1000V}{S}$ b) $\dfrac{100V}{S}$ c) $C=\dfrac{500V}{S}$ d) $\dfrac{750V}{S}$

6. The subgrade modulus for rigid plate is obtained using the following relation

   a) $E_s = 1.5 \dfrac{\Delta}{pa}$ b) $E_s = 1.18 \dfrac{\Delta}{pa}$ c) $E_s = 1.20 \dfrac{pa}{\Delta}$ d) $E_s = 1.30 \dfrac{pa}{\Delta}$

7. The approximate gap width in expansion joints in rigid pavement is

   a) 35 to 40mm   b) 25 to 30mm c) 30 to 35mm   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) $h_o = h_d / h_e - 10cm$ c) $h_o = h_d + h_e$ d) $h_o = h_d - h_e$

10. The cracking in the interior regions are mainly due to

   a) to spalling   b) mud pumping   c) temperature stress   d) structural in adequacy

PART B (10 x 2 = 20 Marks)

11. How are urban roads classified?
12. What are the major modes of transportation?
13. State any four factors that control the highway alignment
14. What are the geometric design elements influenced by design speed?
15. Name any two methods by which design of flexible pavement is done
16. What are warping stresses?
17. What is bituminous emulsion?
18. What is elongation index?
19. What is mud pumping?
20. What are the factors to be considered in the evaluation of surface condition in flexible pavement?

PART C (5 x 14 = 70 Marks)

21. a) (i) Briefly outline the classification of roads based on function as suggested in the Nagpur road plan.   (7)
    (ii) Explain briefly the principles and objectives of IRC.   (7)
    (OR)
    b) Discuss in detail the various factors to be considered in the highway planning survey?

22. a) (i) Explain PIEV theory.   (7)
    (ii) The speeds of two vehicles are 80 and 60kmph respectively. The vehicle at a speed of 80 kmph overtakens the other with an acceleration of 2.5 kmph/s. What is the safe passing sight distance for a two way traffic?   (7)
    (OR)
    b) (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)

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.

****