Reg. No. : | | | | | | | | | | |

Question Paper Code: 44103

B.E. / B.Tech. DEGREE EXAMINATION, MAY 2018

Fourth Semester

Civil Engineering

14UCE403 - HIGHWAY ENGINEERING

(Regulation 2014)

Duration: Three hours Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 1 = 10 Marks)

1. The road foundation for modern highways construction, was developed by

   (a) tresguet and telford simultaneously (b) telford
   (c) telford and macadam simultaneously (d) macadam

2. Border Roads Organisation for hilly regions, was formed in

   (a) 1947 (b)1954 (c)1958 (d) 1960

3. To calculate the minimum value of ruling radius of horizontal curves in plains, the design speed is given by

   (a) 8 *kmph* (b) 12 *kmph* (c) 16 *kmph* (d) 20 *kmph*

4. Pick up the incorrect statement from the following. The super-elevation on roads is

   (a) inversely proportional to acceleration due to gravity
   (b) directly proportional to velocity of vehicles
   (c) directly proportional to width of pavement
   (d) inversely proportional to the radius of curvature

5. Design of flexible pavements is based on

   (a) mathematical analysis
   (b) empirical formulae
   (c) compromise of pure theory and pure empirical formula
   (d) none of these

6. AS per IRC, maximum load of axle of a vehicle should not exceed

   (a) 8165 *kg* (b) 9500 *kg* (c) 800 *kg* (d) 7500 *kg*

7. Percentage of free carbon in bitumen is

   (a) more than that in tar (b) less than that in tar
   (c) equal to that in tar (d) none of the above

8. Which of the following tests measures the toughness of road aggregates?

   (a) crushing strength test (b) abrasion test
   (c) impact test (d) shape test

9. Reflection cracking is observed in

   (a) Flexible pavement
   (b) Rigid pavement
   (c) Rigid overlay flexible pavement
   (d) Bituminous overlay over cement concrete pavement

10. The maximum spacing of contraction joints in rigid pavements is

    (a) 2.5 *m* (b) 3.5 *m* (c) 4.5 *m* (d) 5.5*m*

PART - B (5 x 2 = 10 Marks)

11. Define Kerb. What is its purpose?

12. Write PIEV theory.

13. Mention three grades of bitumen in general use on road work and state where and why each grade is suitable.

14. What are the functions of geo-textiles?

15. What is skid resistance? What are the various factors governing skid resistance?

PART - C (5 x 16 = 80 Marks)

16. (a) Explain in detail the various investigations and surveys to be undertaken in proper sequence for the successful planning, estimation and execution of a major highway project. (16)

Or

(b) (i) Describe the factors governing highway alignment. (8)

(ii) Write brief note on Highway Development in India. (8)

17. (a) (i) Calculate the length of transition curve and the shift using the following data: Design speed = 65 *Kmph*, radius of circular curve = 220 *m*, allowable rate of introduction of super elevation = 1 in 50, pavement width including extra widening = 7.5 *m*. (8)

(ii) Explain various factors to be taken into consideration in the design of transition curved? (8)

Or

(b) The design speed of a high way of 10 *kmh*. there is a horizontal curve of radius 200 *m* on a certain locality. Calculate the super elevation receded to maintain this speed. If maximum super elevation allowable speed on this horizontal curve as it is not possible to increase the radius. The safe limit transverse co-efficient of friction is 0.15. (16)

18. (a) (i) Design of flexible pavements: Which is located in hilly area present traffic intensity is 350 vehicles for a design period of 8 years and a traffic growth rate of 7.5% take lane distribution factor as 0.75 take VDF 2.5; design of CBR value for soil subgrade is 10%. (8)

(ii) Discuss the merits and demerits of CBR method of flexible design. (8)

Or

(b) (i) Design the flexible pavement for the construction of a new highway with the following data:

(1) Category of road : four lane dual carriageway

(2) Number of commercial vehicles in the year : 5600 commercial vehicles completion of construction per day per direction

(3) Annual growth rate of commercial vehicles : 8%

(4) Design life : 15 years

(5) Design CBR of sub-grade soil : 5% (8)

(ii) Compare rigid and flexible pavements. (8)

19. (a) List the types of bituminous roads. Explain the bituminous macadam type of road construction. (16)

Or

(b) (i) Explain the various sub surface drainage system with neat sketches. (8)

(ii) Explain the construction procedure of cement concrete road as per IRC specification. (8)

20. (a) Briefly explain the maintenance management system? (16)

Or

(b) Explain the various surface defects in flexible pavements. Also mention their causes. (16)