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**Question Paper Code: 44013**

B.E. / B.Tech. DEGREE EXAMINATION, NOV 2017

Fourth Semester

Civil Engineering

14UCE403 - HIGHWAY ENGINEERING

(Regulation 2014)

Duration: Three hours

Maximum: 100 Marks

Answer ALL Questions

(Steam table with Mollier charts are permitted)

PART A - (10 x 1 = 10 Marks)

- The sequence of four stages of survey in a highway alignment is
  - Reconnaissance, map study, preliminary survey and detailed survey
  - Map study, preliminary survey, recon-naissance and detailed survey
  - Map study, reconnaissance, preliminary survey and detailed survey
  - Preliminary survey, map study, recon-naissance and detailed survey
- The road foundation for modern highways construction, was developed by
  - Tresguet and telford simultaneously
  - Telford
  - Telford and macadam simultaneously
  - Macadam
- The type of transition curves generally provided on hill roads, is
  - Circular
  - Cubic parabola
  - Lemniscate
  - Spiral
- Pick up the incorrect statement from the following. The super-elevation on roads is
  - Inversely proportional to acceleration due to gravity
  - Directly proportional to velocity of vehicles
  - Directly proportional to width of pavement
  - Inversely proportional to the radius of curvature

5. 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
6. The thickness of a pavement may be reduced considerably by  
 (a) Compaction of soil                      (b) Stabilisation of soil  
 (c) Drainage of soil                      (d) All the above
7. Which of the following tests measures the toughness of road aggregates?  
 (a) Crushing strength test                      (b) Abrasion test                      (c) Impact test                      (d) Shape test
8. In water bound macadam roads, binding material, is  
 (a) Sand                      (b) Stone dust                      (c) Cement                      (d) Brick dust
9. The maximum spacing of contraction joints in rigid pavements is  
 (a) 2.5 m                      (b) 3.5 m                      (c) 4.5 m                      (d) 5.5m
10. Minimum thickness of a layer of fine sand required to cut off capillary rise of water completely, should be  
 (a) 40 cm                      (b) 52 cm                      (c) 64 cm                      (d) 76 cm

PART - B (5 x 2 = 10 Marks)

11. State the classification of urban and non-urban roads as suggested by Nagpur plan.
12. What are the three condition based on design of sight distance at intersection?
13. List the components of flexible pavement.
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)            (i) Describe the factors governing highway alignment.                      (8)
- (ii) Write brief note on Highway Development in India.                      (8)

Or

- (b) Describe the history of developments of Highway in India based on Jayakar committee and twenty year road development plan.                      (16)

17. (a) 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 needed 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)

Or

- (b) Explain the points to be considered for planning of hair pin bends in hill roads. (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) Compare Bituminous and concrete roads. (6)
- (ii) Explain the CBR method of pavement design. Discuss the limitations of this method. (10)
19. (a) (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)

Or

- (b) List the types of bituminous roads. Explain the bituminous macadam type of road construction. (16)
20. (a) Briefly explain the maintenance management system? (16)

Or

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

