

Reg. No. \_\_\_\_\_

# Karunya University

(Declared as Deemed to be University under Sec.3 of the UGC Act, 1956)

## End Semester Examination – November / December 2008

Subject Title: HIGHWAYS AND RAILWAYS ENGINEERING

Time : 3 hours

Subject Code: CE264

Maximum Marks: 100

### Answer ALL questions

#### PART – A (10 x 1 = 10 MARKS)

1. When IRC was formed?
2. What are the basic requirements of an ideal alignment?
3. Define intermediate sight distance.
4. What are the different types of transition curves?
5. Give the formula for contact pressure.
6. How ESWL may be determined.
7. What is ballast?
8. What is the use of CSI in sleeper?
9. What is grade compensation?
10. What is meant home signals?

#### PART – B (5 x 3 = 15 MARKS)

11. Write short notes on shoulders and right of way.
12. A vertical summit curve is formed at the intersection of two gradients, + 3.0 and -5.0 percent. Design the length of summit curve to provide a stopping sight distance for a design speed of 80 kmph.
13. Compute the radius of relative stiffness of 15 cm thick cement concrete slab from the following data: Modulus of elasticity of cement concrete = 2, 10,000 kg/cm<sup>2</sup>. Poisson's ratio for concrete = 0.13 Modulus of sub grade reaction, K = (i) 3.0 kg/cm<sup>3</sup> (ii) 7.5 kg/cm<sup>3</sup>.
14. Draw the various types of rail sections.
15. Explain the concept of track circuiting.

#### PART – C (5 x 15 = 75 MARKS)

16. What are the factors controlling highway alignment? Explain.  
(OR)
  17. How roads are classified based on (i) Weather conditions (ii) Carriageway (iii) location. (3+3+9)
  18. a. Calculate the stopping sight distance on a highway at a descending gradient of 2% for a design speed of 80 kmph. Assume other data as per IRC recommendations. (8)  
b. Design the rate of super elevation for a horizontal highway curve of radius 500 m and speed 100 kmph. (7)
- (OR)
19. a. Calculate the extra widening required for a pavement of width 7m on a horizontal curve of radius 250 m. Take (l) = 7.0 m, design speed = 70 kmph. Compare the value with IRC recommendations. (7)  
b. A national highway passing through rolling terrain in heavy rainfall area has a horizontal curve of radius 500 m. Design the length of transition curve. Take V = 80 Kmph, W = 7.0 m (8)

[P.T.O]

20. Calculate the stresses at interior, edge and corner regions of a cement concrete pavement using Westergaard's stress equations. Use the following data Wheel load  $P = 5100$  kg, Modulus of elasticity of cement concrete  $E = 3.0 \times 10^5$  kg/cm<sup>2</sup>, Pavement thickness  $h = 18$  cm, Poisson's ratio of concrete  $\mu = 0.15$ , Modulus of sub grade reaction,  $K = 6.0$  kg/cm<sup>3</sup>, Radius of contact area,  $a = 15$  cm.

(OR)

21. What are the factors you will consider while designing a pavements. Explain.

22. What are the functions of ballast? Give any four requirement of good ballast and list the different types of ballast.

(OR)

23. What is the purpose welding in rails? Give the advantages of welding and explain the methods of welding.

24. What are the basic requirements of a good railway alignment? Explain.

(OR)

25. Draw and explain the various types of station yards?