Karunya University

(Karunya Institute of Technology and Sciences)
(Declared as Deemed to be University under Sec.3 of the UGC Act, 1956)

End Semester Examination – April/May 2010

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 was IRC constituted?
2. State the types of Kerbs.
3. Mention the components of widening the road on horizontal curves.
4. How are terrains classified?
5. How does change in temperature produce frictional stress in rigid pavements?
6. Define the radius of relative stiffness.
7. What are the components of permanent way?
8. What is meant by buckling of rail?
9. Define number of crossing.
10. What is shunting?

PART – B (5 x 3 = 15 MARKS)

11. What are the duties of CRRI and IRC?
12. What is sight distance? State its types.
13. What are the factors to be considered for designing highway pavements?
14. What is sleeper density and how is it calculated?
15. How are stations classified?

PART – C (5 x 15 = 75 MARKS)

16. a. Explain the economic factors influencing highway alignment. (7)
     b. Briefly explain the role of MORTH and IRC in highway development. (8)

(OR)

17. Write a detailed note on engineering surveys to be carried out for the alignment of a highways project.

18. a. Derive an expression for stopping sight distance at plain and at slopes for an highway. (7)
     b. Calculate the stopping sight distance for a two lane road with two way traffic and a single lane with two way traffic for the following data: (8)

         Design speed   =   100kmph
         Co-efficient of friction   =   0.35
         Reaction time of drivers   =   2.5 sec
         Descending gradient   =   4%

(OR)

19. a. What are the objectives of providing transition curves in horizontal curves? Mention the method of designing the transition curve length. (8)
     b. A Valley curve is formed by a descending gradient of 1 in 25 meeting an ascending gradient of 1 in 30. Design the length of valley curve to fulfill both comfort condition for a design speed of 80 kmph (C=0.6 m/sec^2) and a head light sight distance of 127 m for this speed. (7)

[P.T.O]

20. a. Differentiate between rigid and flexible pavements. (8)
    b. Explain the concept of Equivalent Single Wheel Load. (7)

(OR)

21. a. Explain the principle of designing the diameter, length and spacing of dowel bars. (7)
    b. Design the spacing between expansion and contraction joints in plain cement concrete pavement using the following data. Also design the tie bars at longitudinal joints for the slab width 3.5m and thickness 20cm. Assume any other data suitably. Construction temperature = 20°C, maximum temperature = 56°C, expansion joint space = 2.5cm, co-efficient of friction = 1.2, allowable tensile stress in concrete = 0.8 kg/cm^2, allowable tensile stress in tie bar = 1800kg/cm^2 and allowable bond stress in concrete = 24.6kg/cm^2. (8)

22. Bring out the requirements of an ideal permanent way.

(OR)

23. What are the various rail fixtures and fastenings? Explain them.

24. Calculate all the necessary elements required to set out a 1in 8½ turnout taking off from a straight B.G track with its curve starting from the toe of the switch (i.e.) tangential to the gauge face of the outer main rail and pass through theoretical nose of crossing. The heel divergence (d) is 11.4 cm.

(OR)

25. Describe briefly about the different control system of movement of train.