Code No. : 5033

FACULTY OF ENGINEERING
B.E. 3/4 (Civil) I Sem. (Main) Examination, December 2011
TRANSPORTATION ENGINEERING

Time: 3 Hours] [Max. Marks:75

Note : *Answer **all** questions from Part **A**, answer **any five** questions from Part **B**.*

PART – A **(25 Marks)**

1. State any 4 design principles of road, employed by Macadam that are still applicable as on today ? **3**
2. Explain fourth power rule. **2**
3. Define the following terms related to geometric design of road alignment. **3**
   a) Average curvature
   b) Average rise and fall of a section.
4. Write the precautionary measures to be taken to avoid road accidents on curves and junctions. **2**
5. Determine the capacity of a single lane, unidirectional pavement on a rural road in India, when design speed = 50 km/hr. and spacing between vehicles = 60 m. **2**
6. Write a short note on Deval's abrasion test. **3**
7. Draw typical dimensional cross-section of a BG track in embankment on straight track. **3**
8. Write the classification of ballast based on material. State generally used range of size applicable for BG track. **3**
9. Graphically represent
   a) path of nose gear and
   b) path of main gear of a standard aircraft ? **2**
10. State the basic configuration of runways commonly used. **2**

PART – B **(50 Marks)**

11. While aligning a highway in a built up area, it was necessary to provide a horizontal curve of radius 326 m. Design the following geometric features :
    a) Super elevation
    b) Extra width of pavement and
    c) Length of transition curve.

    Data given as, design speed = 65 km/hr.; wheel base length = 6.0 m, pavement width = 10.5 m. **10**

12. a) What is a traffic rotary and what is its main object ? Define terms, weaving length and weaving angle. 5

    b) The speed-density relationship for a particular road was found to be :

    $u = 42.76 - 0.22\,k$, where, u = speed in km/hr. and k = density of vehicles per km. Find the capacity of the road. 5

13. a) Compare and justify why viscosity test is more preferred than needle penetration method of determination of consistency of paving bitumen ? 6

    b) Calculate the radius of equivalent distribution of pressure for the data given as, radius of circular contact area = 16 cm. CC slab thickness = 26 cm. 4

14. a) Determine the equilibrium cant on a M.G. curve of a railway track of 3 degrees for an average speed of 65 km/hr. Also find the maximum permissible speed after allowable maximum value of cant deficiency ? 5

    b) State the different type of rail sleepers used in railway track. Write any two of them with geometric details. 5

15. a) Determine the airport reference temperature and the required correction for runway length, for the following given data.

    Yearly mean of the maximum daily temperature = 49°C

    Mean of the average daily temperature = 41°C

    Assume the runway is at MSL and take ICAO standards. 4

    b) Explain, what are the factors affecting for selection of a suitable site for an airport. 6

16. a) Describe the bicycle and pedestrian facilities to be provided in an urban area. Mention their geometric standards as per IRC. 5

    b) What are the parking studies to be organised to assess the parking deman in a CBD area ? Discuss different possibilities for creation of parking facilities. 5

17. a) Write the basic principle of CBR test. State why CBR value is an empirical parameter used for design of flexible pavement ? 4

    b) Write the importance of 85^{th} and 98^{th} percentile of speed in geometric design of highways. 3

    c) State the concept of signal design. 3