Registration No. : | | | | | | | | | | |

Total number of printed pages – 3

B. Tech

PCCI 4302

Fifth Semester Regular Examination – 2014

TRANSPORTATION ENGINEERING – I

BRANCH : CIVIL

QUESTION CODE : H 144

Full Marks – 70

Time : 3 Hours

*Answer Question No. **1** which is compulsory and any **five** from the rest.*

The figures in the right-hand margin indicate marks.

1. Answer the following questions : 2 ×10

   (a) What are the objects of highway planning ?

   (b) What are the various requirements of an ideal highway alignment ?

   (c) List the various geometric elements to be considered in highway design.

   (d) Draw the typical cross section of a National Highway in cutting indicating details.

   (e) State the objects of widening the pavement on horizontal curves.

   (f) What is the significance of road user characteristics in traffic engineering ?

   (g) What are the objects of carrying out traffic volume studies ?

   (h) What are the various tests carried out on bitumen ?

   (i) Why is it important for a highway engineer to study the behavior of soil ?

   (j) Bring out the points of difference between 'Flexible and Rigid' pavements.

2. What are the factors on which the stopping sight distance depends ? Derive an expression for finding the stopping sight distance at level and at grades. 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. 10

P.T.O.

3. What are the objects of providing transition curves on the horizontal alignment in highways ? Derive an expression for finding length of transition curve on horizontal alignment.

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 superelevation (pavement rotated about the centre line) = 1 in 150

Pavement width including extra widening = 7.5 m

Assume other data as per IRC. 10

4. (a) What are the various methods of classifying roads ? Briefly outline the main features of various road patterns commonly in use with the help of sketches. 5

(b) Explain the principle and uses of Benkelman Beam test with neat sketch. 5

5. (a) Explain Origin and Destination study: What are the various uses of O & D studies ? 5

(b) Explain traffic capacity, basic capacity, possible capacity and practical capacity. Discuss briefly the various factors affecting the practical capacity of road. 5

6. (a) Explain the CBR method of pavement design. How is this method useful to determine thickness of component layers ? Discuss the advantages and limitations of this method. 5

(b) A valley curve is formed by a descending gradient of 1 in 40 which meets an ascending gradient of 1 in 30. Design the total length of valley curve if the design speed is 100 kmph so as to fulfill both comfort condition and head light sight distance for night driving after calculating the SSD required. (Assume data, if necessary, as per IRC.) 5

7. (a) Discuss the characteristics of an ideal site selection for a bridge. 5

(b) What is economic span of a bridge ? Derive an expression for the same. 5

8. Write short notes on the following : 2×5

(a) Grade Separated Intersections

(b) Flakiness and Elongation Index

(c) Maintenance Management System of Roads

(d) Cross slope or Camber

(e) Surface Drainage System.