TE - sem-VI - CBGS - Civil

TE-II

8/12/15

Q.P. Code : 6378

(3 Hours) **[Total Marks : 80**

Instructions
1. **Q 1** is **compulsory**. Answer **Any three** out of the remaining questions.
2. Legible handwriting, neat & labeled sketches will be appreciated.

Q.1 **(All answers in the question should be brief and to the point.)** **(20)**

a Enlist the different organizations which plan & fund the construction of roads in India. 03

b Draw a neat sketch showing different components of a bridge. 02

c State the values for : 04
i) Design speed for state highways in mountainous terrain.
ii) Camber for WBM roads.
iii) Minimum ductility of bitumen as per IRC.
iv) Slope of an embankment in unin undated condition.

d Enlist the different loads and stresses to be considered in the design of bridges. 03

e Mention the purpose of provision of expansion and contraction joints in cement concrete pavement. 03

f Mention the values given by IRC for following elements involved in the design of a rotary island in an urban section: 03
i) Design speed ii) Entrance and exit angle. iii) Radius at entry.
iv) Radius at entry v) Radius of central island. vi) PCU for passenger bus.

g You are being asked to identify a parking space in a city. Which traffic studies will you carry out? 02

Q.2 **(20)**

a Define Stopping sight distance. Calculate the SSD required to avoid head on collision of two cars approaching from opposite direction at 65 & 55 kmph. Assume a reaction time of 2.5 sec,co-efficient of friction as 0.6 & brake efficiency of 50 % in either case. 10

b A highway has a horizontal curve of radius 280 metres. It is observed that many vehicles are off-tracked on this curve. What may be the reason for this? What will you do under such circumstances? The highway has a design sped of 70 kmph, width of 7.50 metres and wheel base of longest vehicle using the highway is 8 metres. 10

Q.3 **(20)**

a Explain the purpose of: i) Origin and destination study. ii) Accident study 12

b Explain CBR method of testing of soil subgrade. 08

Q.4 **(20)**

a The details of a 2 lane RCC pavement are as follows : 13
i) Slab thickness = 25 cm ii) Design wheel load = 5200 kg.
iii) Expansion joint width = 2.5 cm iv) Radius of relative stiffness = 80 cm.
v) Maximum variation in temperature = 25 deg C. vi) Co-efficient of friction = 1.5
vii) Load capacity of dowel group = 40 % viii) Thermal coefficient of concrete = 10^{-5}/deg C.
ix) Unit weight of concrete = 2400 kg/m^3 x) Allowable tension in concrete = 0.8 kg/cm^2
xi) Values of Fs, Fb, and Ff are 1000 kg/cm^2 ,100 kg/cm^2 ,1400 kg/cm^2 respectively.
Design the spacing of expansion and contraction joint, size and spacing of dowel bars and draw neat sketch showing the location of dowel bars and tie bars.

b Write a detailed note on different types of bearings. 07

[TURN OVER

Q.5 **(20)**

a Define economic span for a bridge and derive the equation for the same. The cost of one pier and foundation is Rs 100,000.The constant of variation for superstructure can be taken as 3.5.Calculate the economic span. 07

b Write notes on: i) Information signs. ii) Highway drainage. 08

c Explain Area-velocity method of determination of design discharge for a bridge. 05

Q 6 **(20)**

a Calculate the length of a transition curve in plain and rolling terrain for the following data : 12
i) Design speed = 80 kmph. ii) Pavement is rotated about the centerline.
iii) Rate of introduction of superelevation = 1 in 150. iv) Superelevation provided = 7 %
v) Width of pavement including extra widening = 7.6 m vi) Radius of circular curve = 240 m.

b What is equilibrium superelevation? Design the superelevation for a horizontal curve of radius 300 metres having mixed traffic condition for a design speed of 80 kmph. 08