**53 (CE 502) TREN-I**

**2019**

# TRANSPORTATION ENGG.–I

Paper : CE 502

*Full Marks : 100*

Time : Three hours

***The figures in the margin indicate full marks for the questions.***

*Answer* ***all*** *questions.*

1. *(a)* Explain the history of road development across the world. 5

   *(b)* What are the recommendations of Jayakar Committee ? Write its implementations. 5

   *(c)* Match the following : 5

| A | B |
|---|---|
| *(i)* First 20 Year Plan | *(a)* Lucknow plan |
| *(ii)* Second 20 Year Plan | *(b)* Nagpur plan |
| *(iii)* Third 20 Year Plan | *(c)* Scientific approach |
| *(iv)* Macadam | *(d)* Bombay plan |
| *(v)* Cross drainage | *(e)* Camber |

*Contd.*

(d) What are the different types of road patterns ? 5

2. (a) Explain Engineering surveys for highway alignment. 10

(b) What are the purposes of providing camber ? Write recommended values of camber for different road surfaces. 10

3. (a) Calculate the SSD on a highway at a descending gradient of 2% for a design speed of 80*km/hr.* Assume other data as per IRC recommendations. 5

(b) On a two-way traffic road, the speed of overtaking vehicles are 80 and 45 *km/hr.* If the average acceleration is 0·92 $m/s^2$, determine the overtaking sight distance indicating the details of overtaking operations. 10

(c) Find the length of transition curve and extra width of pavement required on a horizontal curve of radius 300*m* of a 2-lane highway passing through rolling terrain for a design speed of 80*km/hr.* Assume all other data as per IRC recommendations. 5



4. (a) Explain various methods adopted to obtain origin and destination data. 10

(b) The free mean speed on a highway is found to be 80 *km/hr.* Under stopped condition, the average spacing between vehicles is 6·9*m.* Determine the capacity flow. Also find out the minimum time headway and minimum space headway. 10

5. (a) What are the desirable properties of aggregates used in road construction ? 10

(b) A vehicle applies brakes and skids through a distance of 60*m,* before colliding with another parked vehicle, the weight of which is 50% of former. Compute the critical speed of moving vehicle, if the distance travelled by both the vehicles after collision is 15*m* before stopping $f = 0{\cdot}6$. 10