Total No. of printed pages = 4

19/5th Sem/UCE502

2021

TRANSPORTATION ENGINEERING – I

Full Marks – 100

Time – Three hours

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

Answer any *five* questions.

1. (a) Explain the role of transportation in the overall development of any country. 10

   (b) Explain the characteristics of road transportation. 10

2. (a) Briefly outline the historical development of road construction. 5

   (b) What are the significant recommendations of Jayakar Committee Report ? Mention how this helped in road development in India ? 5

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(c) Briefly sketch the various road patterns commonly in use. 5

(d) What are the basic requirements of an ideal highway alignment ? List and explain briefly. 5

3. (a) Explain briefly the engineering surveys needed for locating a new highway. 10

(b) A national highway passing through a plain terrain has a horizontal curve of radius equal to the ruling minimum radius. If the design speed is 100 kmph, calculate Absolute minimum sight distance, Ruling minimum radius, Superelevation, Extra widening and length of transition curve. Assume necessary data suitably. 10

4. (a) The stopping sight distance required for a highway is 80m. Find the required set back distance from centre line of a circular curve of radius 300m assuming the length of the curve is greater than the sight distance. 5

(b) An ascending gradient of 1 in 50 meets a descending gradient of 1 in 80. Determine the length of summit curve to provide ISD for design speed of 80 kmph. Assume all other data. 5

(c) A vehicle travelling at 45 kmph was stopped within 2.2 seconds after the application of the brakes. Determine the average skid resistance developed. 5

(d) Differentiate between rigid and flexible pavement. 5

5. (a) What is origin and destination study? Explain its significance. Explain the various methods adopted for the study. 10

(b) Two vehicles A and B of equal weight, approaching from cross-roads (at right angles) collide with each other. They skid through distances 30m and 20m before collision and 20m and 35m respectively after collision. If the directions of skidding vehicles A and B after collision are 45° and 130° with original path of the vehicles, calculate the original speeds of the two vehicles before the application of brakes. Assume average value of friction coefficient as 0.55. 10

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

(b) The following data were obtained from the spot speed studies carried out on a city road during a certain period of time. Suggest : 10

(i) Speed limit for regulation

(ii) Speed to check geometric design elements.

(iii) Lower speed causing congestion

(iv) Median speed

(v) Speed dispersion.

Speed kmph	No. of vehicles	Speed kmph	No. of vehicles
<5	45	30-35	430
5-10	230	35-40	290
10-15	375	40-50	110
15-20	500	50-60	25
20-25	680	60-70	8
25-30	525	>70	2