Total number of printed pages: **03**

UG/5th Sem./UCE502

2023

TRANSPORTATION ENGINEERING-I

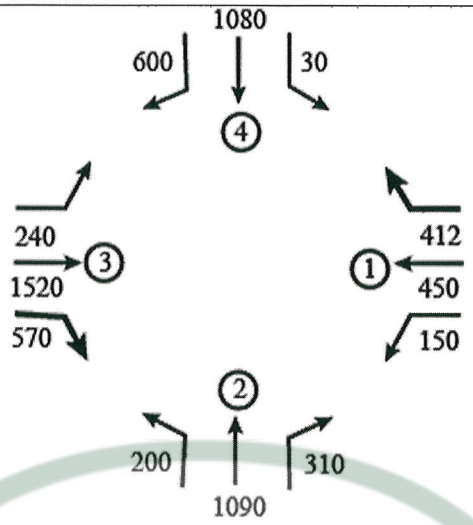
Full Marks: 100

Time: Three hours

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

*Answer **any five** questions.*

1.	a)	The speeds of overtaking and overtaken vehicles are 80 kmph and 60 kmph respectively. If the acceleration of the overtaking vehicle is 2.5 kmph per second, calculate the OSD for single lane one way traffic.	5
	b)	Calculate the SSD for a vehicle travelling at 90 kmph on an upward gradient of 3%.	5
	c)	The average normal flow of traffic on cross roads 1 and 2 during design period are 440 and 280 PCU per hour. The saturation flow values on these roads are estimated as 1300 and 1100 PCU per hour respectively. The all-red time required for pedestrian crossing is 12 sec. Design two phase traffic signal with pedestrian crossing by Websters's method.	10
2.	a)	The design speed of a highway is 80 kmph. There is a horizontal curve of radius 200 m in a certain locality. What should be the superelevation required to maintain this design speed? If the maximum superelevation of 0.07 in not to be exceeded, what should be the maximum allowable speed on this curve?	5
	b)	A two-lane, two-way highway is designed for a design speed of 80 kmph. A vertical curve is to be provided at an intersection of downward gradient of 1 in 50 with another downward gradient of 1 in 20. Calculate the length of the vertical curve fulfilling the requirement of SSD and OSD. The coefficient of friction and the acceleration may be taken as 0.35 and 1 m/s^2 respectively.	15
3.	a)	Two vehicles A and B of equal weight, approaching from cross roads (at right angles) collide with each other. They skid through distances 30 m and 20 m before collision and 20 m and 35 m 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. Average value of friction coefficient is 0.55.	10

	b)	 The traffic at the rotary intersection is given above. If the entry width of rotary is 6m and exit width is 8m, Determine the capacity of the rotary.	10
4.	a)	Draw the sketch of full clover leaf interchange showing the direction of traffic at various locations.	5
	b)	In a road test for measuring skid resistance using skid resistance equipment, the timer indicating 4.25 seconds of brake application and the braking distance indicated by the colour spray was measured as 32.3 metre before the vehicle was brought to stop. What is the average skid resistance of the surface?	5
	c)	A two-lane NH passes through a plain terrain in open area. Draw the cross section of road and show the following widths in metre. (i) Width of carriageway (ii) Width of roadway (iii) Normal value of land width (iv) Overall width between building lines (v) Overall width between control lines	10
5.	a)	Write the recommended values of camber for different types of road surfaces in areas of heavy and low rainfall.	5
	b)	Write the width of carriageway in metre recommended by the IRC for different class of roads.	5
	c)	Draw the diagram for the following traffic sign (i) Overtaking prohibited (ii) No parking (iii) Straight prohibited or No entry (iv) Narrow bridge (v) Stop	10

<table>
<tr><td>6.</td><td>a)</td><td>Speed of four vehicles on a highway are 20 kmph, 35 kmph, 40 kmph and 45 kmph. Calculate the time mean speed and space mean speed. Length of section is 300m.</td><td>5</td></tr>
<tr><td></td><td>b)</td><td>A plate load test is conducted on 45 cm diameter plate. The load verses settlement values are given below. Calculate the modulus of subgrade reaction for the standard plate.
<table><tr><th>Load (kg)</th><th>Settlement (mm)</th></tr><tr><td>1480</td><td>1.01</td></tr><tr><td>1610</td><td>1.12</td></tr><tr><td>1820</td><td>1.21</td></tr><tr><td>1990</td><td>1.38</td></tr></table></td><td>5</td></tr>
<tr><td></td><td>c)</td><td>With a neat sketch show the cross section of Macadam's construction.</td><td>10</td></tr>
</table>