

ADMISSION NUMBER											

School of Engineering
M.TECH Transportation Engineering
Mid Term Examination - May 2024

Duration : 90 Minutes
Max Marks : 50

Sem II - G1PD203T - Computational Techniques in Transportation Engineering

General Instructions

Answer to the specific question asked

Draw neat, labelled diagrams wherever necessary

Approved data hand books are allowed subject to verification by the Invigilator

- 1) Historical data shows that the probability of encountering heavy traffic on the route during rush hour is 0.6. What is the probability of not encountering heavy traffic? K2 (2)
- 2) A transportation network has two alternative routes to a destination. The probability of congestion on Route A is 0.25, and the probability of congestion on Route B is 0.35. What is the probability that at least one route will be congested? K1 (3)
- 3) Write a short note on Adam's Formula. K2 (4)
- 4) At an uncontrolled T junction, past experience indicates that the probability of a vehicle arriving on the side road during 15 second interval and turning right into the main road is 1/5. Find the probability that in a period of 1 minute, there will be 0, 1, 2, 3 or 4 vehicles arriving and turning right. K2 (6)
- 5) On a motorway, rate of vehicles arriving at a section is 12 vehicles per minute. If vehicle arrival on the section follows Poisson distribution, find the probability of arriving 0, 1, 2 and more than 2 vehicles in an interval of 10 seconds. K3 (6)
- 6) The spot speeds at a particular location are normally distributed with a mean of 51.7 km/h and a standard deviation of 8.3 km/h. What is the probability that (a) the speeds exceed 65 km/h; (b) speed lie between 40 to 70 km/h; (c) What is the upper speed limit on the section? Given, $\phi(0.00) = 0.50$, $\phi(1.04) = 0.85$, $\phi(1.41) = 0.9207$, $\phi(1.6) = 0.9452$, $\phi(2.21) = 0.9864$. K3 (9)
- 7) Draw the fundamental diagram of the traffic flow. Also, write an equation showing the relationship between speed and concentration (density). K4 (8)

- 8) A transportation agency wants to predict the travel time (in minutes) on a certain road segment based on the average vehicle speed (in km/h). They collected data for 10 different trips and obtained the following results: K4 (12)

Average Speed (km/h)	40	45	50	55	60	65	70	75	80	85
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Travel Time (Minutes)	25	22	20	18	16	14	12	10	9	8
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Find the regression equation to predict travel time based on average vehicle speed. Also, give the value of coefficient of determination for the regression equation found.

OR

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