GALGOTIAS UNIVERSITY

ADMISSION NUMBER

School of Engineering

M.TECH Transportation Engineering
Semester End Examination - Jun 2024

Duration : 180 Minutes
Max Marks : 100

Sem II - G1PD203T - MTPE6003 - 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) Differentiate between classification and regression problem. K1(2)

2) Write a short note on Pearson Type III distribution. K2(4)

3) 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 1/7. 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)

4) Following dataset was collected to predict traffic congestion levels. K3(9)

Road Width (meters)	10	15	8	12	20	18	22	14	16	25
Speed Limit (km/h)	50	60	40	70	80	65	55	45	75	70
Distance to Public Transportation Hub (km)	0.5	1.2	0.8	2.0	1.5	0.7	1.8	1.0	0.9	1.3
Congestion Level	L*	M**	H***	L*	M**	L*	H***	L*	M**	H***

*L= Low, M**=Medium, H***=High

Predict the traffic congestion level for road segment having width 18 m, speed limit 55 km/h and distance to public transportation hub 1.0 km using the KNN algorithm with k = 2. Assume Euclidean distance as the distance metric.

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Congestion Level	L*	M**	H***	L*	M**	L*	H***	L*	M**	H***

*L= Low, M**=Medium, H***=High

Predict the traffic congestion level for road segment having width 18 m, speed limit 55 km/h and distance to public transportation hub 1.0 km using the KNN algorithm with k = 4. Assume Euclidean distance as the distance metric.

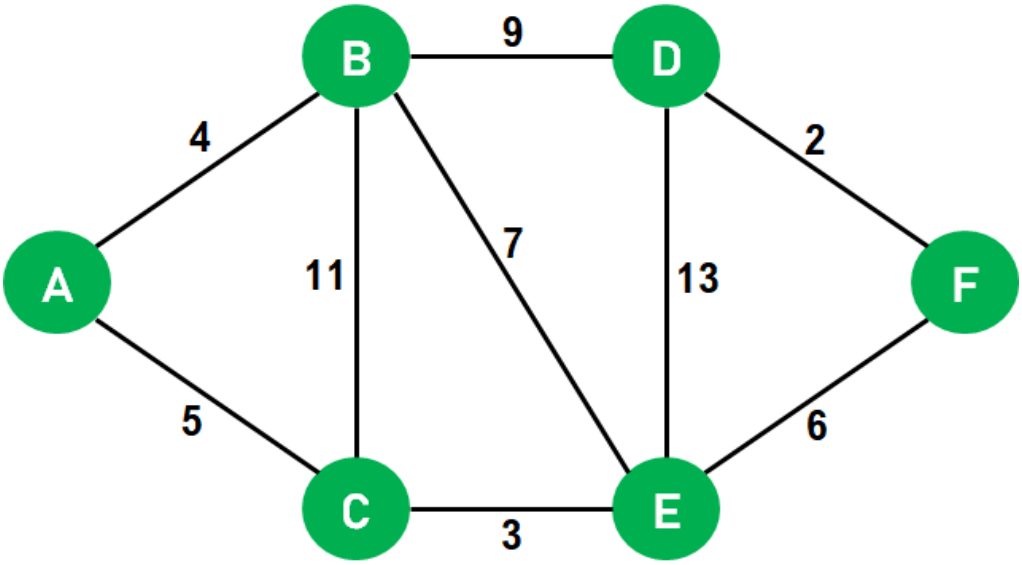
6) The headways observed are as follows: 1.8, 1.2, 1.0, 1.1, 2.0, 2.1, 2.5, 4.6, 1.1, 5.7, 2.1, 2.3, 3.5, 0.9, 5.6, 0.8, 0.9, 2.1, 2.5, 3.8, 1.4, 1.1, 2.9, 1.7, and 1.4. Drive the Erlang distribution function. What is the probability that headways are greater than 3.5 seconds? K5(10)

7) A transportation agency wants to predict the travel time (in minutes) on a certain highway segment based on the distance traveled (in kilometers). They collected data for 10 different trips and obtained the following results: K4(12)

Distance (km)	10203040506070809010
Travel Time (Minutes)	15253545556575859510

Find the regression equation to predict travel time based on distance travelled. Also, give the value of coefficient of determination for the regression equation found.

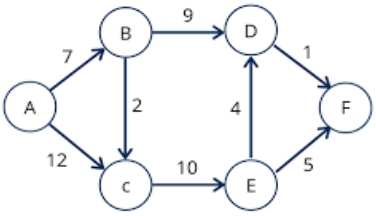
8) Consider the following road network. K5(15)



Calculate the shortest paths from A to F using A* search algorithm. Assume the following heuristic information.

State	A	B	C	D	E	F
H(n)	2	4	1	3	2	1

9) Consider the following road network. K5(15)



Calculate the shortest paths from A to F using A* search algorithm. Assume the following heuristic information.

State	A	B	C	D	E	F
H(n)	2	4	1	3	2	1

10) A transportation agency conducted a speed study on a certain road segment and recorded the speeds of passing vehicles. The recorded speeds (in km/h) are as follows: 59, 56, 54, 58, 66, 35, 46, 62, 39, 41, 63, 36, 47, 40, 70, 50, 53,47, 42, 48, 65, 50, 44, 59, 37, 39, 47, 52, 36,69. (a) Plot a histogram to represent the distribution of speeds; (b) Draw a cumulative frequency diagram for the speed data; (c) Determine the average speed and variance of the speed data; (d) Determine the speed limits and design speed for the road segment. K6(18)