

B.E. CIVIL ENGINEERING FOURTH YEAR SECOND SEMESTER EXAM 2023**ADVANCED TRAFFIC ENGINEERING**

Time: 3 Hours

Full Marks: 100

Answer ALL Questions**Answer brief & to the point. Assume standard value for any parameter, if required**

Qn No	Question	CO	Marks
1.	Name the four major traffic projection factors and explain them in context to traffic forecasting	1	14
2.	An existing road with AADT as 2500 veh/hour is developed along with the adjacent area so as to produce a developmental traffic of 500 veh/hr and additional current traffic of 200 veh/hr. Considering compound normal growth @ 5.5% per annum, estimate the traffic demand after 10 years from completion of development	1	6
3.	Explain shockwave through a neatly drawn parabolic Flow-Density curve for a highway section labeling all relevant points on the curve.	2	5
4.	If a bottleneck is created due to closure of half the number of lanes of a highway section which follows a parabolic flow density pattern, explain its impact on speed, density and shockwave of the traffic flow at bottleneck and approach to bottleneck if original flow is – i. less than bottleneck capacity and ii. more than bottleneck capacity	2	10
5.	The mean free speed and jam density on a lane of a highway are observed as 60 Kmph and 200 pcu/Km respectively. The average traffic flow on the lane is observed as 1000 pcu/Hr. A slow moving vehicle travelling at 15 Kmph enters the lane, forcing the vehicles behind to queue up and move in a platoon. Using the information, find - i. The speed of the stream under the average flow condition. ii. The flow in the queued up platoon of vehicles iii. The speed of the resultant shockwave. iv. The length of the queue if the slow moving vehicles remain in the stream for 1.5Km	2	15
6.	Briefly write on the major causes of road accidents. State major accident control measures with at least two examples of each	3	5+5
7.	The Motor vehicle consumption in a city is 5,000 million litres, there were 3200 fatal motor vehicle accidents and 255,800 non-fatal motor vehicle accidents involving 250,000 drivers; 6,720,000 motor vehicle registrations and an estimated population of 18,200,000. Travel per litre of fuel is 12 km. Calculate registration death rate, population death rate, accident involvement rate, and accident rate per vehicle km.		10

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Qn No	Question	CO	Marks
8.	Deduce the standard queuing model for Probability of 'n' no of vehicles in the system given by $P_n = \frac{\rho^n}{1-\rho}$, Where all symbols carry usual meaning	4	10
9.	In a gas station with 1 service channels, the average service time is 2 mins per vehicle per channel Considering the average arrival rate of 20 veh/hr, and both arrival and service to follow poissonian distribution, determine the following – i. The average number of vehicles in the system ii. The average time spent by a vehicle in the system iii. The probability of no queue in the system	4	10
10.	Write Schull's equation explaining all the terms involved in it. Considering flow gets retarded for headway less than 6 secs, find the probability of having headway of more than 8secs from the following headway observation noted in secs. – 9.8; 3.6; 4.9; 13.5; 5.0; 10.8; 1.6; 5.3; 7.2; 18.1; 5.4; 6.8; 1.2; 12.1; 2.4; 5.0; 2.9; 7.6; 9.9; and 7.1	4	4+6