MANIPAL INSTITUTE OF TECHNOLOGY
MANIPAL
(A constituent unit of MAHE, Manipal)

VI SEMESTER B.TECH (CIVIL ENGINEERING)
END SEMESTER EXAMINATIONS, MAY/JUNE 2022
SUBJECT: **TRAFFIC SYSTEMS & ENGINEERING [CIE 4070]**
REVISED CREDIT SYSTEM
(_ /   / 2022)

Time: 3 Hours   Max. Marks: **50**

Instructions to Candidates:

❖ Answer ALL the questions
❖ Missing data may be suitably assumed

Q.No		Marks	CO
1A.	Define spot speed. Calculate the time mean speed and space mean speed if the spot speeds are 50, 40, 60, 54 and 45 respectively.	3	1
1B.	Describe the objectives of speed and delay studies and list out the various methods of carrying out the speed and delay survey.	4	1
1C.	Consider a road segment of 6 lanes with a capacity of 2400 veh/hr/lane. It is observed that the storage density is 75 veh/meter and the segment demand is found to be 2800 veh/hr/lane. Given that the duration of analysis sub period is 2 hours, calculate the queue length that is formed due to congestion.	3	2
2A.	A road consists of 4 lanes, 2 in each direction. The maximum capacity of 2 lanes in one direction is 2000 vehicle/hour. When vehicles are stationary in a jamming condition, the average length occupied by a vehicle is 6.25 m. During a period of observation, the actual volume of traffic in one direction is steady at the rate of 1200 vehicles/hour. This flow is brought to a halt when a traffic signal turns red and a queue forms. Find the time in seconds which elapses from the moment the signal turns red until the stationary queue reaches another intersection 75 m from the signal. Assume a linear relationship between speed and concentration.	3	2
2B.	Draw the conflict point diagram of a four-legged intersection.	4	2
2C.	Draw a neat sketch showing the "provision of a gap" in median at a 3 legged intersection.	3	5
3A.	Explain the Poisson distribution method used in accident analysis.	3	5
3B.	It has been found that on an average 1 in 100 drivers in a bus company are involved in an accident every year. If there are 500 drivers in the company, what is the probability that there are exactly 4 drivers who are involved in an accident during a year?	3	5
3C.	The accident data pertaining to a metropolitan city for the year 1965 and 1970 are given below: | Year	1965	1970
------	------	------
Accidents	300	400
Vehicle-kilometer of travel	250 million	300 million | Test whether there is any significant increase in the accident rates in two years by applying Chi-squared distribution method.	4	3
4A.	Discuss with a neat sketch the importance of directional arrows on road surface.	3	5
4B.	Describe with a phase diagram the U.K. practice of signal design.	3	3

4C.	An intersection controlled by traffic signals is formed by two roads running North to South and East to West. There is a heavy turning movement of 500 vehicles per hour from South to East. The flow from North to South is 800 vehicles per hour through an approach width at stop line of 8 m. The cycle time is 70 seconds and the effective green time for the flow from North is 32 seconds. The effective right turning saturation flow is 450 vehicles per hour for an opposing flow of 800 vehicles per hour, related to a minimum head-way of 2.5 seconds for the right turning stream. Calculate the early cut-off period required to allow for the right-turning movement.	4	3

5A.	Define the following terms:
	   i. Luminous flux
	  ii. Illumination
	 iii. Discomfort glare
	  iv. Disability glare
		2	5

5B.	Discuss with a neat sketch the placement of lanterns in a rotary intersection	5	5
5C.	Describe the following lighting zones provided in tunnels: 3 s i) Access zone ii) Transition zone iii) Interior zone	3	5