

B.E. CIVIL ENGINEERING FOURTH YEAR SECOND SEMESTER EXAM 2022**ADVANCED TRAFFIC ENGINEERING**

Time: 4 Hours

Full Marks: 70

Answer ALL Questions

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

1. What is bottleneck effect? Name different types of bottleneck with one example each (4)
2. Draw a proper labelled diagram to show the effect of positive and negative shockwave (4)
3. With neat sketches explain the effect of closure of one-lane of a two-lane road on the velocity, density and shockwave when –
 - a. The approach flow is less than bottleneck capacity
 - b. The approach flow is more than bottleneck capacity (4+6)
4. For a 6-lane 2-way divided highway with mean free speed of 80Kmph and average car length of 5.0m, draw the bottleneck problem that will be created in an average flow of 10,000 vehicles per hour each way if 1-lane is closed for vehicular traffic in each way. Determine the velocity of traffic in the partially closed section and at the approach to it and the corresponding shockwave velocity. (8)
5. Deduce the standard queuing model for Probability of 'n' no of vehicles in the system given by $P_n = \rho^n(1 - \rho)$ Where all symbols carry usual meaning (10)
6. Discuss about different parameters associated with queuing (10)
7. In a toll plaza with 4 service channels, the average service time is 30secs per vehicle per channel Consider the average arrival flow rate of 400 veh/hr, determine the following –
 - a. The average number of vehicles in the system
 - b. The average time spent by a vehicle in the system
 - c. The probability of no queue in the system (12)
8. Write Schull's equation explaining all the terms involved in it. State the limitations of the same for use in a traffic flow problem. (4+2)
9. 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 (6)