Tutorial – 3

1. Estimate the theoretical capacity of a traffic lane with one-way traffic flow at a stream speed of 40 kmph. Assume the average space gap between vehicles to follow the relation $S_g = 0.278$ Vt, where V is stream speed in kmph, t is the average reaction time = 0.7 secs. Assume average length of vehicles = 5.0m.
2. What is the theoretical capacity of a traffic lane with one-way traffic flow at a stream speed of 50 kmph if the average reaction time is 0.9 secs and average length of vehicles is 7.0 m.
3. Calculate the theoretical maximum traffic capacity for a traffic lane at the speed of 80 kmph. Assume the coefficient of friction (f) as 0.4, total reaction time (t) as 0.75 secs and average length of the vehicle as 6.0m. Assume the average space gap between vehicles to follow the relation, $S_g = 0.278$ Vt + $(V^2/254f)$.
4. The free mean speed on a roadway is found to be 80 kmph. Under the stopped condition the average spacing between vehicles is 6.9m. Determine the maximum capacity of flow.
5. Calculate the spacing between lighting units to produce average lux of 6.0 in a street lighting system for the following conditions:
    a. Street width = 15m
    b. Mounting height = 7.5m
    c. Lamp size = 6000 lumen
    d. Luminary type = II
6. In the design of street lighting in the road of Biratnagar of 18m width, the mounting height of 8.0m and lamp size of 7000 lumen is selected. What is the spacing between lighting units to produce average lux of 5.5?
7. The 15 minutes traffic counts on the cross roads A and B during peak hour are observed as 178 and 142 vehicles per lane respectively approaching the intersection in the direction of heavier traffic flow. If the amber times required are 3 and 2 seconds respectively for two roads based on approach speeds, design the signal timings by trial cycle method. Assume an average time headway of 2.5 seconds during green phase.
8. 15 minutes traffic counts of intersection roads A and B are observed as 150 and 120 vehicles per lane respectively approaching the intersection in the direction of heavier traffic flow. If the amber times required are 4 and 3 seconds respectively for two roads based on approach speeds, design the signal timings by trial cycle method. Assume an average time headway of 2.5 seconds during green phase.
9. An isolated signal with pedestrian's indication is to b installed on a right-angled intersection with road A 18 m wide and road B 12 m wide. The heaviest volume per hour for each lane of road A and road B are 275 and 225 respectively. The approach speeds are 55 and 40 kmph for A and road B respectively. Design the timings of traffic and pedestrian signals.
10. Road A is 13.5 m wide and road B is 10.5 m wide. An isolated singal with pedestrian's indication are to be installed on a right-angled intersection. The peak volumes per hour for the road A and road B are 250 and 200 respectively. The approaching speeds for Road A and Road B are respectively 60 kmph and 45 kmph. Design traffic and pedestrian signals timings.

11. Road A is 18m wide and Road B is 12 m. An isolated signal with pedestrian's indication is to be installed on a right-angled intersection. The heaviest volume per hour for each lane of road A and road B are 300 and 250 respectively. The approaching speeds for Road A and Road B are respectively 60 kmph and 45 kmph. Design traffic and pedestrian signals the timings. Take amber periods 2-4 secs and pedestrian walking speed of 1.2 m/secs.
12. The average normal flow of traffic on cross roads A and B during design period are 400 and 250 PCU per hour, the saturations flow values on these roads are estimated as 1250 and 1000 PCU per hour respectively. The all red time required for pedestrians crossing is 12 secs. Design two phase traffic signal by Webster's Method.
13. The average normal flow of traffic on cross roads A and B during design period are 500 and 300 PCU per hour, the saturations flow values on these roads are estimated as 1500 and 1000 PCU per hour respectively. The all red time required for pedestrians crossing is 15 sec. Design two phase traffic signal by Webster's method.
14. A simple four leg intersection needs a fixed time signal. The critical flows in the N-S and E-W directions are 600 and 400 vehicle/hr. Saturation flow is 1800 vehicle/hr and the lost time per phase is observed to be 5.2 secs. Determine the cycle length and distribution of green.