



10CV667

Sixth Semester B.E. Degree Examination, Aug./Sept.2020

Traffic Engineering

Time: 3 hrs.

Max. Marks:100

- Note:** 1. Answer any FIVE full questions, selecting at least TWO questions from each part.
2. Assume any missing data suitably.

PART – A

- 1 a. Explain the scope of traffic engineering. (06 Marks)
b. Explain the physical characteristics of road users. (06 Marks)
c. A vehicle of weight 2000 kg has to accelerate at 3 m/sec^2 in the first gear from 10 kmph to 20 kmph. The gradient is +1% and the rolling resistance is 0.02. The frontal area is 2.0 m^2 and coefficient of air resistance is 0.39. The radius of tyres is 33 cm with a deformation factor of 0.935. The transmission gear ratio and rear-axle gear ratio are 2.78:1 and 3.82:1 respectively. Determine the engine horse power needed and the speed of the engine of transmission efficiency is 0.9. (08 Marks)
- 2 a. Enumerate the objectives and uses of traffic volume studies. (06 Marks)
b. Enumerate the applications of O and D studies. (06 Marks)
c. Explain the floating car method of conducting speed and delay studies. (08 Marks)
- 3 a. The speed data obtained is presented below:
- | Speed Range (kmph) | 0 to 10 | 10 to 20 | 20 to 30 | 30 to 40 | 40 to 50 | 50 to 60 | 60 to 70 | 70 to 80 | 80 to 90 | 90 to 100 |
|--------------------|---------|----------|----------|----------|----------|----------|----------|----------|----------|-----------|
| No. of Vehicles | 12 | 18 | 68 | 89 | 204 | 255 | 119 | 43 | 33 | 9 |
- Analyse the data and determine the salient speeds for design and regulation. (06 Marks)
- b. Enumerate the factors that affect the PCU values of different vehicle classes. (06 Marks)
c. Enumerate the various causes of accidents. (08 Marks)
- 4 a. One lane of a 2-lane one-way roadway is closed for repairs. The maximum free speed under low flow condition is 60 kmph both on the 2-lane portion and the bottleneck. The average headway under stationary conditions is 8m. When the volume is 2500 vehicles/hour, find:
(i) Mean speed through bottleneck
(ii) Mean speed at approach to the bottleneck
(iii) Mean speed beyond the influence of the bottleneck
(iv) Rate at which the queue entering the bottleneck grows. (12 Marks)
b. List the assumptions made in queueing theory. (08 Marks)

PART – B

- 5 a. The speed and concentration values of a traffic stream are as follows:
- | Speed, kmph | 72 | 68 | 61 | 52 | 47 | 39 | 32 | 27 | 20 | 13 |
|-----------------------|----|----|----|----|----|----|----|----|----|----|
| Concentration, veh/km | 5 | 10 | 15 | 20 | 25 | 30 | 35 | 40 | 45 | 50 |
- Find the regression equation for determining the speed from the concentration. (12 Marks)
b. Enumerate the advantages of simulation techniques in traffic engineering. (08 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg, $42+8=50$, will be treated as malpractice.

- 6 a. The number of vehicles arriving in successive 10 second intervals is as follows. Find the mean rate of arrival:

Number of vehicles	0	1	2	3	4	5	6	7 and more
Frequency	11	28	30	18	8	4	1	0

Assuming a Poissonian distribution, compare the observed frequency with the theoretical distribution and comment on the results. (12 Marks)

- b. Explain the various methods/models of traffic forecasting. (08 Marks)
- 7 a. The average normal traffic on cross roads A and B for design are 400 and 250 PCU/hour. The corresponding saturation flows are 1250 and 1000 PCU/hr. The all red time required for pedestrian crossing is 12 seconds. Design the traffic signal by Wabster's method. (08 Marks)
- b. Illustrate with neat sketches the reduction in conflicts due to imposition of one-way regulation at an intersection between cross roads. List the advantages of one-way regulation. (12 Marks)
- 8 a. Enumerate the applications of ITS. (08 Marks)
- b. Enumerate the advantages and limitations of traffic rotary. (12 Marks)
