

APJ ABDULKALAM TECHNOLOGICAL UNIVERSITY
08 PALAKKAD CLUSTER



Q. P. Code : TE0819201-I

(Pages: 5)

Name:

Reg. No:

FIRST SEMESTER M.TECH. DEGREE EXAMINATION DECEMBER 2019

Branch: Civil Engineering

Specialization: Transportation Engineering

08CE6201 FUNDAMENTALS OF TRAFFIC ENGINEERING

(Common to TE)

Time: 3 hours

Max. marks: 60

Answer all six questions.

Modules 1 to 6: Part 'a' of each question is compulsory and answer either part 'b' or part 'c' of each question.

(Use of statistical tables permitted)

- | Q.no. | Module 1 | Marks |
|----------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------|-------|
| 1.a | Define the concept of design vehicle. What are the characteristics of a design vehicle? | 3 |
| Answer b or c | | |
| b | Determine the braking distance for the following situations. | 6 |
| | (i) A vehicle moving on a positive 3% gradient at an initial speed of 50 kmph; final speed of 20 kmph; | |
| | (ii) A vehicle moving on a positive 3% downhill gradient at an initial speed of 50 kmph; final speed of 20 kmph; | |
| | (iii) A vehicle moving on a level road at an initial speed of 50 kmph; final speed of 0 kmph. Assume the coefficient of rolling friction to be 0.5. | |
| c | With the following data find (i) AADT (ii) AAWT | 6 |

Month	No. of days in a month	Total monthly volume (1000 vehs)	Total weekday volume (in 1000 vehicles)
Jan	22	425	208
Feb	20	410	220
Mar	22	385	185
April	22	400	200
May	21	450	215
June	22	500	230
July	23	580	260

Month	No. of days in a month	Total monthly volume (1000 vehs)	Total weekday volume (in 1000 vehicles)
August	21	570	260
September	22	490	205
October	22	420	190
November	21	415	200
December	22	400	210

Q.no.

Module 2

Marks

2.a Define spacing and headway in a traffic stream.

3

Traffic in a congested multilane highway lane is observed to have an average spacing of 200 ft. and an average headway of 3.8 sec. Estimate the rate of flow, density and speed of traffic in this lane.

Answer b or c

b Spot speed studies were carried out at a certain stretch of a highway and the consolidated data collected are given below:

6

Determine (i) the upper and lower values or speed limits for regulation of mixed traffic flow and (ii) the design speed for checking the geometric design elements of the highway

Speed Range (Kmph)	No of Vehicles	Speed Range (Kmph)	No. of Vehicles
0 to 10	12	50to 60	255
10 to 20	18	60 to 70	119
20 to 30	68	70 to 80	43
30 to 40	89	80 to 90	33
40 to 50	204	90 to 100	9

c A test car was used on a north-south road 0.75km long and the following data, for the moving car was collected.

6

North trips Number (N)	Travel time travelling North (minutes)	Number of Vehicles met against stream (x)	Number of overtaking Vehicles test car	Number of Vehicles overtaken by test car
1	2.65	85	1	0
2	2.70	83	3	2
3	2.35	77	0	2
4	3.00	85	2	0
5	2.42	90	1	1
6	2.54	84	2	1
South trips Number (S)	Travel time travelling North (minutes)	Number of Vehicles met against stream (x)	Number of overtaking Vehicles test car	Number of Vehicles overtaken by test car
1	2.33	112	2	0
2	2.30	113	0	2
3	2.71	119	0	0
4	2.16	120	1	1
5	2.48	105	0	2
6	2.54	100	0	1

Calculate traffic volume, average travel time and space mean speeds in both directions.

Q.no.

Module 3

Marks

3.a Explain the use of probability distributions in the analysis of accident data.

3

Answer b or c

- b** Ten samples of speed data are taken both before and after a change in the speed limit is implemented. The mean and standard deviations found were: **6**

Parameter	Before	After
Mean \bar{x}	3.5	32
s	4	5
N	10	10

Conduct a suitable statistical test to comment on the significant difference in means.

- c** A new radar speed gun was bought by the traffic department and a set of 10 observations of speeds were taken. The mean speed observed was 87.3 kmph and the population mean was 80 kmph. Is there any evidence to show that the new speedometer might have been faulty? The sample variance was 15 kmph. **6**

Q.no.	Module 4	Marks
4.a	Explain the 3E's of any road safety programme.	3
Answer b or c		
b	What are the design factors to be considered for highway lighting?	6
c	What are the Regulations concerning a Driver.	6

Q.no.	Module 5	Marks
5.a	Define the terms (i) Cycle (ii) Cycle Length (iii) Interval and (iv) Phase in Signal Design	4
Answer b or c		
b	With neat sketches to show a few typical patterns of channelized and unchannelized intersections with the traffic flow directions. List out the advantages of channelized intersections.	8

- c The average normal flow of traffic on cross roads A and B during design period are 400 and 250 pcu per hour; the saturation flow values on these roads are estimated as 1250 and 1000 pcu per hour respectively. The all-red time required for pedestrian crossing is 12 secs. Design two phase traffic signal by Webster's Method. **8**

Q.no. **Module 6** **Marks**

- 6.a** Describe moving observer method with its advantages. **4**

Answer b or c

- b** Assume a linear relationship between speed and density on a length of highway having the free flow speed of 80 kilometre per hour and the jam density of 72 vehicles per kilometre. **8**
- i. Determine the speed a maximum flow and the maximum flow expected on this section of the road
 - ii. Suppose the observed flow is 75% of the capacity what are the possible flow speed?
- c** The maximum flow rate of vehicles 1000 per hour and flow speed is 18 kilometre per hour at any instant the traffic is flowing at 70% of the maximum flow rate. **8**
- i. Develop the traffic parameters to draw basic curves of flow and calculate the values.
 - ii. Compute the average space and average time headways for the given flow conditions