



**Sixth Semester B.E. Degree Examination, Jan./Feb. 2021**  
**Traffic Engineering**

Time: 3 hrs.

Max. Marks:100

**Note: Answer any FIVE full questions, selecting atleast TWO questions from each part.**

**PART - A**

- 1
  - a. Mention the various factors that affect road user characteristics explain briefly any two of them. (10 Marks)
  - b. A vehicle moving at 40 kmph was stopped by applying brake and the length of skid mark was 12.2 m. If the average skid resistance of the pavement is known to be 0.70, determine the brake efficiency of the test vehicle. (10 Marks)
- 2
  - a. Describe the different static characteristics of vehicles that affect road design and traffic performance. (08 Marks)
  - b. A passenger car weighing 10 kN is required to accelerate at a rate of  $2 \text{ m/s}^2$  in the first gear from a speed of 10 kmph to 20 kmph. The gradient is +2 percent and the road has a WBM surface in good condition. Frontal projection of the area of car is  $2.15 \text{ m}^2$ . Car tyres have radius of 0.33m. The rear gear axle ratio is 3.82 : 1 and the first gear ratio is 2.78 : 1. Calculate the engine horse power needed and the speed of the engine. Make suitable assumptions. Coefficient of air resistance = 0.39, coefficient of rolling resistance 0.025. Tyre deformation factor = 0.945 ; transmission efficiency = 0.9. (08 Marks)
  - c. Explain PIEV theory and its significance. (04 Marks)
- 3
  - a. With usual notations, explain the power performance of vehicle. (10 Marks)
  - b. Explain the different forms of presentation of traffic volume data. (10 Marks)
- 4
  - a. With a neat sketch, explain collision diagram related to accident studies. (06 Marks)
  - b. Two vehicles A and B approaching at right angles, A from west and B from south, collide with each other. After collision vehicle A skids in a direction  $50^\circ$  north of west and vehicle B, east of north. The initial skid distances of vehicles A and B are 38 m and 20 m respectively before collision. The skid distance after collision are 15 m and 36 m respectively. If the weights of vehicles A and B are 4.4 tonne and 6.0 tonnes respectively. Calculate original speed of vehicles. Average skid resistance of pavement is found to be 0.55. (14 Marks)

**PART - B**

- 5
  - a. Explain the principle of i) Car following theory ii) Queuing theory. (06 Marks)
  - b. From Greenshield's theory derive the relationship between speed, flow and density. (07 Marks)
  - c. The speed and concentration of vehicles in a traffic stream were observed and the following data are obtained. Find the linear regression equation for determining the speed and concentration. (07 Marks)

|         |    |    |    |    |    |    |    |    |    |    |
|---------|----|----|----|----|----|----|----|----|----|----|
| K(vph)  | 5  | 10 | 15 | 20 | 25 | 30 | 35 | 40 | 45 | 50 |
| V(kmph) | 72 | 68 | 61 | 52 | 47 | 39 | 32 | 27 | 20 | 13 |

- 6 a. A toll booth at the entrance to a bridge can handle 120 Veh/hour, the time to process a vehicle being exponentially distributed. The flow is 90 Veh/hour with a Poisson arrival pattern. Determine :
- The average number of vehicle in the system.
  - The length of the queue.
  - The average time spent by the vehicle in the system.
  - The average time spent by the vehicle in the queue.
- (10 Marks)
- b. Briefly explain the steps involved in simulation model. (10 Marks)
- 7 a. Explain the application of intelligent transport system in the present traffic scenario. (10 Marks)
- b. Explain the advantages of queuing theory on traffic control. (10 Marks)
- 8 Write short notes on the following :
- Vehicle actuated and synchronized signals.
  - Chi-Square test.
  - Street lighting.
  - Roadside Furniture's.
- (20 Marks)



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