ADVANCED HIGHWAY AND TRAFFIC ENGINEERING
(CIVL 4146)

Time Allotted : 3 hrs   **Full Marks : 70**

Figures out of the right margin indicate full marks.

Candidates are required to answer Group A and
<u>any 5 (five)</u> from Group B to E, taking <u>at least one</u> from each group.

Candidates are required to give answer in their own words as far as practicable.

Group – A
(Multiple Choice Type Questions)

1. Choose the correct alternative for the following: **10 × 1 = 10**

(i)   The type of camber which is best suited for concrete pavement is
(a) straight line   (b) elliptical   (c) composite   (d) parabolic.

(ii)   The length of Transition Curve depends on the rate of change of
(a) speed   (b) centrifugal acceleration
(c) tangential acceleration   (d) distance.

(iii) Maximum number of vehicles can be parked with
(a) parallel parking   (b) perpendicular parking
(c) 45 degree angular parking   (d) 75 degree angular parking.

(iv) The shape of "Give Way" sign in the traffic signal is
(a) rectangle   (b) octagonal   (c) circle   (d) inverted triangle.

(v)   Transition curve is introduced in
(a) horizontal curve   (b) circular curve
(c) between horizontal curve and circular curve   (d) vertical curve.

(vi) The duration of green time in a traffic signal depends on
(a) traffic density   (b) traffic volume
(c) traffic speed   (d) all the above.

(vii) Which of the following is a Regulatory Sign?
(a) Facility Information Signs   (b) Steep Ascent/Descent
(c) Direction Signs   (d) No Parking.

(viii) Type of transition curve provided on hill road is
(a) circular   (b) cubic parabola
(c) spiral   (d) lemniscate.

(ix) Increase in traffic volume, due to increase in transport vehicle is known as
(a) normal traffic growth   (b) development traffic
(c) generated traffic growth   (d) current traffic.

(x) The value of ruling gradient as per IRC is
    (a) 1 in 10   (b) 1 in 15   (c) 1 in 30   (d) 1 in 40.

Group – B

2. (a) Calculate the stopping sight distance for a design speed of 65 km/hr assuming the co-efficient of friction as 0.36 and total reaction time of drivers as 2.5 seconds.
    [(CO2)(Evaluate/HOCQ)]
   (b) What do you mean by Overtaking Sight Distance?   [(CO2)(Remember/LOCQ)]
   (c) Write a short note on Camber.   [(CO1)(Remember/LOCQ)]
    6 + 3 + 3 = 12

3. (a) What are the advantages of providing curve in highways? What are the factors that affect the   design of curves?   [(CO3)(Understand/LOCQ)]
   (b) Write a short note on Valley Curve.   [(CO3)(Remembering/LOCQ)]
   (c) What do you mean by Overtaking Sight Distance?   [(CO3)(Remembering/LOCQ)]
    (4 + 3) + 3 + 2 = 12

Group – C

4. (a) Develop a neat sketch of Rotary Intersection showing all its details.
    [(CO3)(Creating/HOCQ)]
   (b) What are the design elements that are taken into consideration for the design of a Rotary Intersection?   [(CO3)(Remember/LOCQ)]
    6 + 6 = 12

5. (a) Explain the following: (i) Origin and Destination survey (ii) Spot Speed Study.
    [(CO4)(Understand/LOCQ)]
   (b)   What do you mean by Intersection at Grade and Grade Separated Intersection?
    [(CO3)(Remember/LOCQ)]
    (3 + 3) + 6 = 12

Group – D

6. (a) Explain the terms: (i) Headway, (ii) Spacing and (iii) Delay.
    [(CO1)(Evaluate/HOCQ)]
   (b) What are the vehicular characteristics that are taken into consideration in traffic engineering?   [(CO4)(Remembering/IOCQ)]
    6 + 6 = 12

7. (a) What do you mean by Passenger Car Unit? What are the factors that affect the PCU?
    [(CO5)(Understand/LOCQ)]
   (b) What are the advantages and disadvantages of traffic signal?
    [(CO4)(Remember/LOCQ)]
    (3 + 3) + 6 = 12

Group – E

8. (a) Write a short note on road safety principles.   [(CO6)(Remember/LOCQ)]
    (b) What are the advantages and disadvantages of parking?   [(CO5)(Remember/LOCQ)]
                                                                      6 + 6 = 12

9. (a) Explain the working process of Intelligent Transport System.
                                                                      [(CO6)(Remember/LOCQ)]
    (b) Write a short note on traffic management strategies.   [(CO6)(Remember/HOCQ)]
                                                                      6 + 6 = 12

Cognition Level	LOCQ	IOCQ	HOCQ
Percentage distribution	68.75	6.25	25

Course Outcomes (CO):

After the completion of the course students will be able to

4146.1. Understand the geometric design policies, design control and factors affecting it.
4146.2. Design the geometric elements of highway.
4146.3. Understand highway location, alignment design, project preparation and design principles of intersection.
4146.4. Conduct traffic studies, analyze traffic data and design traffic signals.
4146.5. Analyze parking & accidents; understand traffic impacts, traffic management techniques.
4146.6. Understand traffic management and intelligent transportation system.

*LOCQ: Lower Order Cognitive Question; IOCQ: Intermediate Order Cognitive Question; HOCQ: Higher Order Cognitive Question