Name : .....

Roll No. : .....

Invigilator's Signature : .....

CS/B.TECH(CE)/SEP. SUPPLE/SEM-8/CE-801/1/2012

2012

ADVANCED TRANSPORTATION ENGINEERING

Time Allotted : 3 Hours Full Marks : 70

The figures in the margin indicate full marks.

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

GROUP – A

(Multiple Choice Type Questions)

1. Choose the correct alternatives for any *ten* of the following :

10 × 1 = 10

i) Which of the following pavement design method is recommended by IRC ?

a) Group Index method

b) Westergaard Method

c) Burmister method

d) CBR method

iii) Benkelman beam deflection method is used for design of

a) rigid overlay on rigid pavement

b) flexible overlay on rigid pavement

c) flexible overlay on flexible pavement

d) rigid overlay on flexible pavement.

iv) The maximum design gradient for vertical profile of a road is

a) ruling gradient b) limiting gradient

c) exceptional gradient d) minimum gradient.

v) Warping of concrete pavement causes

a) reversal of stresses

b) frictional stress

c) direct compressive stress

d) direct tensile stress.

vi) Steel in concrete pavement is provided at

a) about 50 mm from top surface

b) about 50 mm from bottom surface

c) at mid depth

d) at 1/3 depth of concrete.

vii) The term 'Vehicle Damage Factor' is

a) damage of vehicle due to bad road surface condition

viii) Rigidity factor for a tyre pressure greater than 7 kg/cm^2 is

a) equal to 1 b) less than 1

c) greater than 1 d) zero.

ix) Which one of the following is useful in functional evaluation of pavement ?

a) PCU b) PSI

c) PIEV d) Benkelman beam.

x) A journey from work to home made by walking to the bus, travelling by bus to the station and completing the journey by train is regarded as

a) 4 trips b) 3 trips

c) 2 trips d) 1 trip.

xi) For smooth flow of traffic in a rotary around central island the weaving angle should be

a) $< 10°$ b) $> 10°$

c) $< 15°$ d) $> 15°$.

xii) Driveways

a) are the roads connecting highways with commercial establishments like fuel stations

b) are provided near public convenience with guide

xiii) Which one of the following traffic studies is required for deciding the speed limit for traffic regulation and control ?

a) Spot speed

b) Speed and delay

c) Origin and destination

d) Classified traffic volume.

xiv) Name the traffic survey data which is plotted by means of 'Desire lines'.

a) Accident

b) Classified volume

c) Origin and Destination

d) Speed and Delay.

GROUP – B

(Short Answer Type Questions)

Answer any *three* of the following. 3 × 5 = 15

2. Write a short note on California bearing ratio test.

3. Why are joints needed in Rigid Pavements ? What are the

6. Explain the Level of Service concept while deciding the design capacity of a road.

7. Explain the various types of traffic signals and their functions.

8. Explain traffic capacity, basic capacity, possible capacity and practical capacity.

GROUP – C

(Long Answer Type Questions)

Answer any *three* of the following. 3 × 15 = 45

9. a) What criteria should be kept in view for fixing the horizontal alignment of a road ? 4

   b) Explain with sketches why is extra widening on curves necessary. 3

   c) Determine the length of a summit curve at the junction of + 2% and – 1% for

      i) Stopping sight distance of 160 m

      ii) Overtaking sight distance of 450 m. 8

10. a) What are transition curves provided ? 3

    b) State the various considerations in deciding the ruling

11. a) What is the basic difference between Rigid and Flexible pavements ? What are desirable properties of pavements ? 5

b) Explain ESWL and the concept in the determination of the equivalent wheel load. 5

c) The loaded weight on the rear dual wheel of a truck is 5500 kg. The centre to centre spacing and the clear space in the dual wheels are 30 cm and 10 cm respectively. Calculate the ESWL for pavement thickness 40 cm. 5

12. a) Explain the following terms : 6

i) Modulus of subgrade reaction

ii) Radius of relative stiffness

iii) Radius of resisting section.

b) Plate bearing test conducted with 30 cm diameter plate on a subgrade sustained a load of 1500 kg at 0·25 cm deflection. The test when carried out on a base course of thickness 18 cm sustained a load of 5500 kg at 0·25 cm deflection. Design the pavement section for a wheel load of 5500 kg with tyre pressure of 7·5 kg/cm^2 using Burmister approach. 9

13. a) Explain the design considerations for spacing of expansion joints. 4

14. a) Enumerate the various types of intersections and the basic principles involved. 5

b) Show the conflict points at the intersection of the following types : 6

i) Cross roads, both two way

ii) *T*-intersection, both two way.

c) Estimate the basic capacity of traffic lane at a speed of 60 kmph. Assume that all the vehicles are of average length 6 m. 4

15. a) Explain the relationship between speed, travel time, volume, density and capacity. 5

b) Write a short note on Level of Service. 4

c) Design the timings of an isolated signal to be installed at a right angled intersection when roads *P* and *Q* cross. The data available are

	Road P	*Road Q*
Width, m	14·0	10·5
Peak hour traffic volume, vehicles/hour/lane	200	120
Approach speed, kmph	50	35

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