USN ☐☐☐☐☐☐☐☐☐☐

10CV56

Fifth Semester B.E. Degree Examination, Dec.2015/Jan.2016
Transportation Engineering - I

Time: 3 hrs.

Max. Marks:100

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

PART – A

1 a. Explain the role of Transportation in Rural Development in India. **(04 Marks)**
   b. Outline the scope of Highway Engineering Studies. **(08 Marks)**
   c. Enumerate the characteristics of Road Transportation. **(08 Marks)**

2 a. The following Data were collected for planning the Road Development Programme of a backward district : i) Total Area = 9800 km^2 ii) Agricultural and developed area = 4200 km^2 iii) Existing Railway track length = 165 kms iv) Existing length of Metalled roads = 360 kms v) Existing length of un – metalled roads = 456 kms vi) Number of towns or villages in different ranges are as below :

Population	> 5000	2001-5000	1001-2000	501-1000	< 500
No. of villages and towns	18	80	150	300	600

Calculate the additional length of metalled and unmetalled roads for the roads system based on Nagpur road plan formulae for this district. **(10 Marks)**
   b. What are the methods of classifying roads? Briefly outline classification of Urban roads. **(10 Marks)**

3 a. Draw the typical cross section of following roads indicating the width of pavement roadway and land : i) National highway in embankment in rural areas ii) A divided highway in urban areas. **(06 Marks)**
   b. Explain the various Elements of Road margins in embankment and in cuttings, with neat sketch. **(08 Marks)**
   c. Explain Camber. What are the objects of camber and shapes of camber? **(06 Marks)**

4 a. Explain with neat sketch, width of carriage way for single lane and two lane pavement and specify the IRC recommendations. **(10 Marks)**
   b. The speed of the overtaking and overtaken vehicles are 80 and 50 kmph respectively on a two way traffic road. If the acceleration of overtaking vehicle is 0.98 m/sec^2 :
   i) Calculate safe overtaking sight distance.
   ii) Mention the minimum length of overtaking zone.
   iii) Draw a neat sketch of overtaking zone and show the positions of sign posts. **(10 Marks)**

PART – B

5 a. A load penetration values of CBR tests conducted on a specimen of a soil sample are given below. Determine the CBR value of soil, if 100 divisions of load represents 190 kg and in the calibration chart of proving ring. **(06 Marks)**

Penetration of Plunger, mm	0.0	0.5	1.0	1.5	2.0	2.5	3.0	4.0	5.0	7.5	10.0	12.5
Load dial readings divisions for soil specimens	0	8	16	24	30	36	42	48	58	58	65	70

b. Explain the desirable properties of aggregates to be used in different types of pavement construction. (06 Marks)

c. Distinguish between : i) Tar & bitumen ii) Cut back and Emulsion and list the tests on Bitumen. (08 Marks)

6 a. Draw a sketch of Flexible Pavement Cross section and show the component parts. Enumerate the functions and importance of each component of pavement. (08 Marks)

b. Write the commonly used equations for theoretical computation of wheel load stresses by Westergaards for analysis of Interior, edge and corner loadings. (04 Marks)

c. Calculate the stresses at Interior, Edge and Corner regions of a cement concrete pavement using Westergaards stress equation. Use the following data Wheel load, P = 5100 kgs, Modulus of Elasticity $E = 3.0 \times 10^5$ kg/cm^2 , Pavement thickness h = 18 cms , Poisson's Ratio of concrete $\mu = 0.15$,   Modulus of subgrade reaction K = 6.0 kg/cm^3 , Radius of contact area a = 15cm. (08 Marks)

7 a. Enumerate the steps for preparation of WBM course with checking of surface eveness and rectification of defects. (12 Marks)

b. Enumerate specifications (IRC) of materials for
   i) Coarse aggregates used in WBM pavements.
   ii) Size and grading required of coarse aggregates in WBM pavements.
   iii) Grading required for screening in WBM pavements. (08 Marks)

8 Write short notes with neat sketches wherever required on :
   a. Sub – Surface Drainage System with longitudinal and Transverse drains.
   b. Surface Drainage System in Urban roads.
   c. KRDCL and KSHIP, present scenario in Karnataka.
   d. Jayakar Committee recommendations. (20 Marks)

*****