USN | | | | | LB | | | | | 10CV56

Fifth Se ines'ter 1552E. Degree Examination, Dec.2018/Jan.2019

Transportation Engineering –

Time: 3 hrs. Max. Marks:100

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

PART — A

1 a. Explain various characteristics of road transport. (06 Marks)

b. Explain briefly the contribution of the following in road development in India:
i) Indian road congress ii) Central road fund (08 Marks)

c. The area of a state is 3,08,000 sq.km . The number of towns as per 1981 census was 276. The number of villages was 41,833. Calculate the length of various categories of roads as per 3rd 20 year road development play. (06 Marks)

2 a. Define "Master plan" and "Saturation system". Explain the following with neat sketches:
i) Rectangular or block pattern
ii) Star and grid pattern (08 Marks)

b. List the salient features of PMGSY. (04 Marks)

c. There are three alternate proposals for a back word district shown below, suggest the order of priority for phasing based on the utility units of 0.5, 1, 2, 4 and 8 for the five population rang

Road Link	Length km	No. of Villages Served with Population range			Productivity served in 1000 tonnes	
		<500	501-1000	1001-2000	Agricultural	Industrial
A	500	100	150	40	250	20
13	600	200	250	68	320	25
C	700	270	350	82	500	35

(08 Marks)

3 a. What is an ideal alignment? Explain with neat sketches how you will align through
(i) Hill pass (ii) A bridge site (iii) Marshy land. (08 Marks)

h. Describe the terms: Carriage way and right of way. Give typical cross section of NH/SH in rural section, in embankment and in cutting, with dimensions. (06 Marks)

c. What is SSD? Calculate the minimum SSD required to avoid a head on collision, when two cars are approaching from opposite directions on 2.5% gradient stretch, with speeds of 90 kmph and 70 kmph. Assume reaction time as 2.5 sec and coefficient of friction as 0.35. (06 Marks)

4 a. Explain the factors influencing the geometric elements. (06 Marksj

b. List the object providing extra widening of pavement at horizontal curves and super elevation. (06 Marks)

c. Design a valley curve at the junction of downward gradient of 1 in 30 and a level stretch from head light sight distance considerations. SSD is 180 m. Treating the curve as a square parabola, calculate the RLS at an interval of 25 m to set out the curve. RL of starting point at level stretch is 10.00 m. (08 Marks)

PART — B

5 a. List the desirable properties of bitumen. What are the various tests carries out on bitumen? (07 Marks)

b. Describe how the quality of toughness and hardness of aggregates is evaluated in the lab. (06 Marks)

c. The following test data pertains to a soil sub grade specimen.

Penetration (mm)	0	0.5	1.0	1.50	2.0	2.5	3.0	4.0	5.0	7.5	**10.00**	12.50
Load (kg)	0	5	16.2	28.1	40	48.5	56.5	67.5	75.2	89.0	99.5	106.5

Plot the data and determine the CBR value (07 Marks)

6 a. Distinguish between flexible pavement and rigid pavement. (06 Marks)

b. Explain the meaning of ESWL. How is it determined for a dual wheel assembly and what are its applications? (06 Marks)

c. Design the flexible pavement for the construction of a new highway (NH/two lane/single carriage way) with the following data, as per IRC 37-2001.

i) Number of commercial vehicles as per last count 1000 CVPD.

ii) Period of construction = 3 yrs, annual growth rate = 08%. Design CBR of sub of sub-grade soil 6%.

Pavement Design Catalogue

Recommended design for Traffic Rang. 10-150 ruse

CBR 6%

Cumulative Traffic (msa)	Total Pavement Thickness (mm)	Pavement Composition: *Bituminous Surfacing* BC (mm)	DBM (mm)	Granular Base and Sub Base (mm)
10	615	40	65	
20	640	40	90	Base = 250
30	655	40	105	
50	675	40	125	Sub-base = 260
100	700	50	140	
150	720	50	160	

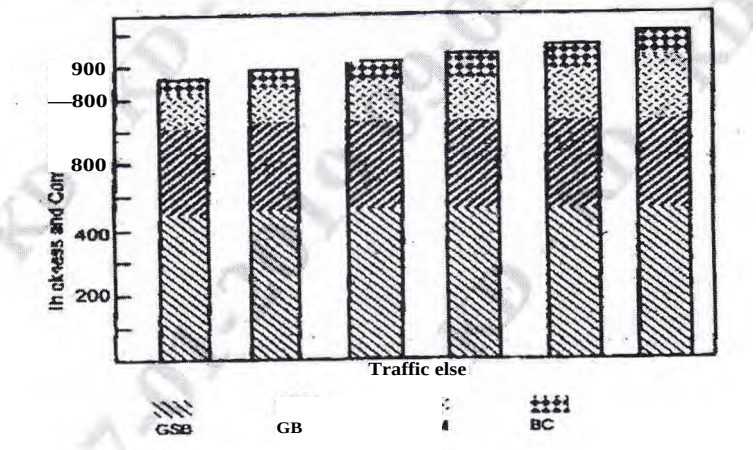

Fig.Q6(c) (08 Marks)

7 a. Explain the construction steps for cement concrete roads. (06 Marks)

b. Indicate the different methods of subsurface drainage, with neat ske tches. (08 Marks)

c. What do you understand by wet mix macadam? What are materials used and its requirements? (06 Marks)

8 a. Write short notes on: (i) Annual cost method (ii) Benefit cost ratio method (06 Marks)

b. Explain the concept of BOT and BOOT, in financing high way proj ect. (06 Marks)

c. Explain the following with neat sketches:(i) Alligator cracking (ii) Mud pumping. (08 Marks)