USN | | | | | | | | | |

10CV56

Fifth Semester B.E. Degree Examination, Aug./Sept.2020
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. Briefly summarize the characteristics of Road Transport and compare Roadways with Railways. **(08 Marks)**

b. What are the requirements of Ideal Road? **(06 Marks)**

c. What are the different modes of Transportation and explain the specific function of each of them? **(06 Marks)**

2 a. From the following data , calculate the road length of Metalled and unmetalled roads as per Nagpur Road plan.
Total area of District = 14400 km^2 ; Agricultural area = 4800 km^2 ;
Existing length of Railway Track = 219 kms. Number of Towns and villages with population range as given below :

Population	Over 5000	2001-5000	1001-2000	501-1000	Less than 500
Number of Towns and Villages	10	50	200	300	500

Also calculate i) If the existing length of Metalled road is 469 km, what is the additional length of such roads required?
ii) If the length of unmetalled road is 412 kms, what is the additional length of road required?
iii) What is the road length per 100km^2 of area? **(10 Marks)**

b. What are the Road Patterns commonly in use? Explain with neat sketch, Rectangular and Star patterns. **(10 Marks)**

3 a. Define Highway alignment. Explain the four guiding factors to be applied for ideal highway alignment. **(08 Marks)**

b. Explain with neat sketch, width of carriage way for i) Single Lane Pavement ii) Two Lane Pavement with width of carriage by IRC recommendations. **(12 Marks)**

4 a. A highway is aligned in a built up area, a horizontal circular curve is provided with a radius of 325m. The design speed is 65km p.h, Length of wheel base of largest truck is 6.0m and width of pavement is 10.5m. Design the Super elevation , Extra widening of pavement and Length of Transition curve. **(12 Marks)**

b. What are the factors on which stopping sight distance depends? Explain briefly. **(08 Marks)**

PART - B

5 a. Explain with neat sketch CBR and Test procedure in the laboratory. How are the results of the test obtained and interpreted? **(10 Marks)**

b. What are the various test carried out on bitumen? Briefly explain Penetration Test and Viscosity Test. **(10 Marks)**

6 a. Determine the Warping stresses at Interior , Edge and Corner Region in a 25cm thick concrete pavement with Transverse Joints at 5.0m Interval and Longitudinal Joints at 3.6m interval. The modulus of sub grade reaction K is 6.9 kg/cm^3 and Radius of loaded area is 15cms. Assume maximum temperature differential during day to be 0.6^{0}C per cm. Slab thickness and minimum temperature differential of 0.4^{0}C per cm. Slab thickness during the night, Additional datas are $e = 10 \times 10^{-6}$ per ^{0}C , $E = 3 \times 10^5$ kg/cm^2 , $\mu = 0.5$. Use the chart in fig.Q6(a).

Bradury chart for Warping Stresses

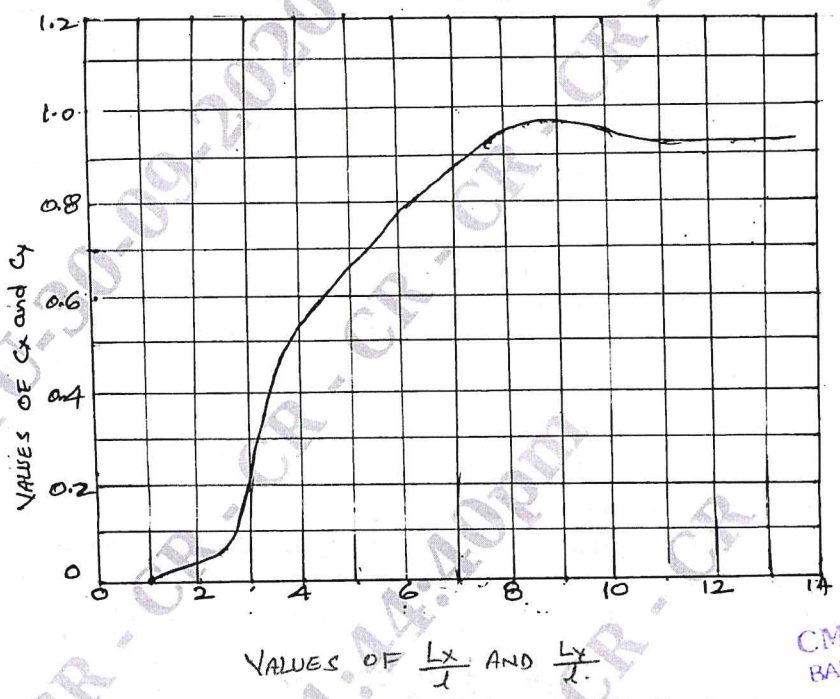

Fig.Q6(a) Warping Stress coefficient chart (By Bradury) **(12 Marks)**

b. Explain briefly the factors affecting design of Flexible Pavement. **(08 Marks)**

7 a. Draw a Typical Cross section of highway in cutting and show the various component layers and mention the construction steps. **(10 Marks)**

b. Mention the Specifications of Material and Construction steps for Wet Mix Macadam (WMM) Base Course. **(10 Marks)**

8 Write short notes on any Four :

a. Method of Control Seepage Flow.
b. Requirements of good highway drainage system.
c. Benefit Cost Ratio (BCR).
d. Failure of CC pavement due to mud pumping.
e. Alligator or Map cracking. **(20 Marks)**

*****