GANPAT UNIVERSITY

B. Tech. Semester: VII Civil Engineering

Regular Examination November – December 2015

2CI 703 Highway and Traffic Engineering.

Time: 3 Hours

Total Marks: 70

Instruction: 1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

Section - I

Que. – 1   A.   Give Comparison between Nagpur Plan and Bombay Road Plan.   6
          B.   Draw a cross-section of road structure showing its components and functions of each.   6

OR

Que. – 1   A.   Briefly describe the scope of Highway Engineering.   6
          B.   Calculate the values of ruling minimum and absolute minimum radius of horizontal curve of a National Highway in plain terrain. Assume ruling design speed and minimum design values as 100 and 70 kmph respectively.   6

Que. – 2   A.   Explain the design considerations for spacing of :
               (a) Expansion joints.
               (b) Contraction joints with and without reinforcement.   6

          B.   As cement concrete pavement has a thickness of 18 cm and has two lanes of 7.2 m with a longitudinal joint along the centre. Design the dimensions and spacing of the tie bar. Use the following data: 6
               Allowable working stress in tension, $S_s = 1400$ kg/cm^2
               Unit weight of concrete, $W = 2400$ kg/m^3
               Coefficient of friction, $f = 1.5$
               Allowable bond stress in deformed bars in concrete, $S_b = 24.6$ kg/cm^2

OR

Que. – 2   A.   What are the various factors to be considered in pavement design? Discuss the significance of each.   6

          B.   Calculate the stresses at interior, edge and corner of a cement concrete pavement by: Westergaard's stress equations.   6
               Modulus of elasticity of concrete = 3×10^5 kg/cm^2
               Poisson's ratio of concrete = 0.15
               Thickness of concrete pavement = 18 cm
               Modulus of subgrade reaction = 8.5 kg/cm^2
               Wheel load = 5100 kg
               Radius of loaded area = 15 cm

Que. – 3   A.   Describe the construction of premixed bituminous carpet.   6
          B.   Explain the principle and uses of Benkelman Beam test.   5

Que. – 4 **A.** Explain all the types of road signs in detail. 6

B. Data collected from speed and delay studies by floating car method on a stretch of urban road of length 3.5 km running north south are given below. Determine average value of volume, journey speed and running speed of traffic stream along North-South (only one) direction. 6

Trip No.	Direction of Trip	Journey time Min-sec	Total Stopped delay Min-sec	No of veh. overtaking	No of veh. overtaken	No of veh. from opposite direction
1	N-S	6-32	1-40	4	7	268
2	S-N	7-14	1-50	5	3	186
3	N-S	6-50	1-30	5	3	280
4	S-N	7-40	2-00	2	1	200
5	N-S	6-10	1-10	3	5	250
6	S-N	8-00	2-22	2	2	170
7	N-S	6-28	1-40	2	5	290
8	S-N	7-30	1-40	3	2	160

OR

Que. – 4 **A.** Explain Level of Service in detail also show its behavior with capacity of road. 6

B. Using the spot speed data given in the following table, collected from a freeway site operating under free-flow conditions: 6

    i. Plot the frequency and cumulative frequency curves for these data

    ii. Obtain modal speed, Upper and lower speed and design speed

Speed Range (Kmph)	Frequency	Speed Range (Kmph)	Frequency
21-25	2	51-55	17
26-30	6	56-60	12
31-35	18	61-65	7
36-40	25	66-70	4
41-45	19	71-75	3
46-50	16	76-80	1

Que. – 5 **A.** Explain how the final location and detailed survey of a highway are carried out. 5

B. How would you set the alignment of a road on a sand dune ridge? 4

C. Write the necessity of Re-alignment of highway. 3

OR

Que. – 5 **A.** Explain briefly the various stages of work in a new Highway Project. 5

B. Write the governing criteria for hill road design as per Indian standards. 4

C. Discuss how obligatory points control the new alignment of a road. 3

Que. – 6 **A.** Explain the water bound macadam (WBM) road 6

B. With the help of neat sketches. Show the different types of joints and their positions 5

END OF PAPER