U.S.N.										

B.M.S. College of Engineering, Bengaluru-560019

Autonomous Institute Affiliated to VTU

January / February 2025 Semester End Main Examinations

Programme: B.E. **Semester: V**
Branch: Civil Engineering **Duration: 3 hrs.**
Course Code: 20CV5PCTRE **Max Marks: 100**
Course: Transportation Engineering - I

Instructions:

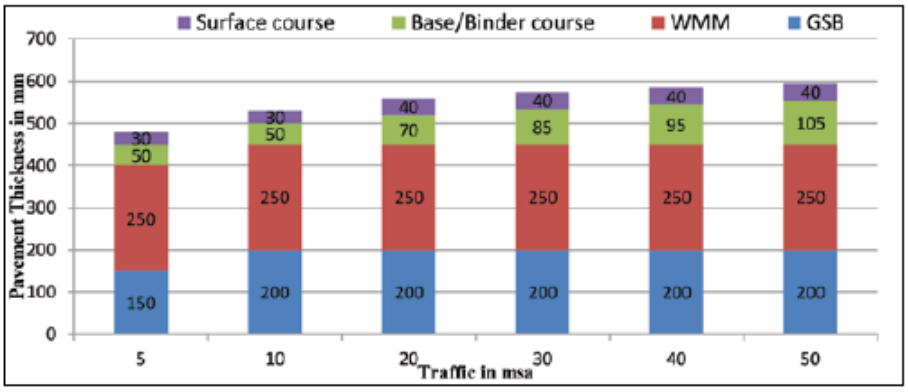
1. Answer Any FIVE Full Questions choosing ONE question from each Unit
2. Missing data may be assumed suitably.
3. Draw neat sketches wherever required.

Important Note: Completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages. Revealing of identification, appeal to evaluator will be treated as malpractice.

			UNIT - I	CO	PO	Marks
1	a)		Discuss the characteristics of road transport in comparison with other systems.	CO1	PO1, 2	**06**
	b)		Discuss the necessity and objectives of highway planning.	CO1	PO1, 2	**06**
	c)		List the requirements of an ideal alignment and discuss the factors controlling alignment.	CO1	PO1, 2	**08**
			OR			
2	a)		List the classification of roads based on Lucknow Road development Plan and define them.	CO1	PO1, 2	**06**
	b)		Lis the fact finding surveys and discuss briefly.	CO1	PO1, 2	**06**
	c)		Discuss the surveys conducted for aligning a road as per IRC standards.	CO1	PO1, 2	**08**
			UNIT - II			
3	a)		Define SSD and Calculate the safe overtaking sight distance for a design speed of 96 kmph. The average acceleration during overtaking may be assumed as 2.5kmph/sec. Assume all other data suitably.	CO2	PO1, 2	**08**
	b)		Discuss the various gradients that can be provided in vertical curves for a highway.	CO2	PO1, 2	**04**
	c)		A National Highway passing through a rolling terrain has a horizontal curve of radius equal to the ruling minimum radius. If the design speed is 80 kmph, calculate absolute minimum sight distance, superelevation, extra widening and length of transition curve. Assume necessary data suitably.	CO2	PO1, 2	**08**
			OR			
4	a)		While aligning a highway in a built-up area, it is necessary to provide a horizontal circular curve of radius 215m. The design speed is 65 kmph, length of wheel base of largest truck = 6.0m and width of pavement is 10.5m. Design the following geometric features:	CO2	PO1, 2	**08**

			i) Superelevation ii) Extra widening of pavement iii) Length of transition curve.			
		b)	A vertical summit curve is formed at the intersection of two gradients, +3.0 and -4.0 percent. Design the length of summit curve to provide a stopping sight distance for a design speed of 80 kmph. Assume other data.	CO2	PO1, 2	**08**
		c)	Discuss the design controls and criteria of geometric design.	CO2	PO1, 2	**04**
			UNIT - III			
	5	a)	Enumerate the different laboratory tests conducted on bitumen and discuss any one.	CO3	PO1, 2,6	**04**
		b)	Using the data, calculate the wheel load stresses at interior, edge and corner regions of a CC pavement using Westergaard's stress equations. Wheel load P = 6000kg, Modulus of elasticity of CC, E = $3.0x10^5$ kg/cm^2, Pavement thickness, h = 18cm, Poisson's ratio, μ = 0.15, Modulus of subgrade reaction, K = 6.5 kg/cm^3, Radius of contact area, a = 16cm	CO4	PO1, 2,4	**08**
		c)	The load-penetration values of CBR tests conducted on soil specimen of a particular soil are given below. Determine the average CBR value of the soil if 10 divisions of the load dial represents 20kg load in the calibration chart of the proving ring.	CO4	PO1, 2	**08**

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	0	10	18	26	34	40	50	62	70	87	95	109

			OR			
	6	a)	Distinguish between flexible pavement and rigid pavement with the help of a neat sketch.	CO4	PO1	**06**
		b)	Design the flexible pavement for construction of new highway for the following data, as IRC: 37. No. of commercial vehicles as per last count= 1350 CVPD, Period of construction = 2 years, Annual growth rate = 6.5 %, Design CBR of soil = 10%, Category of road =NH, two lane single carriage way, Design life =15 years, VDF= 4.0 and LDF=0.75. Calculate the individual and overall thickness of pavement. 	CO4	PO1, 2,4	**08**

		c)	Discuss characteristics, uses and types of Bitumen Emulsion.	CO3	PO1	**06**
			UNIT - IV			
	7	a)	Enumerate the construction steps involved in the construction of Dense Bituminous Macadam as per MoRT&H specifications.	CO4	PO1, 8	**10**
		b)	Discuss the steps involved in the construction of Pavement Quality Concrete layer as per MoRT&H specifications.	CO4	PO1, 8	**10**
			OR			
	8	a)	Enumerate the construction steps involved in the construction of Bituminous Concrete pavement as per MoRT&H specifications.	CO4	PO1, 8	**10**
		b)	List the types of joints used in CC pavement construction and define them with neat sketches.	CO4	PO1, 8	**10**
			UNIT - V			
	9	a)	List the different types of distress in rigid pavement. Discuss any one cause of distress and its remedial measures.	CO5	PO1	**06**
		b)	The maximum quantity of water expected in one of the open longitudinal drains on clayey soil is 1.0 m^3/sec. Design the cross section and longitudinal slope of trapezoidal drain assuming the bottom width of the trapezoidal section to be 1.0m and cross slope to be 1.0 vertical to 1.5 horizontal. The allowable velocity of flow in the drain is 1.3 m/sec and Manning's roughness coefficient is 0.02.	CO4	PO1, 4	**08**
		c)	Elaborate different methods of economic analysis of highway project.	CO1	PO1	**06**
			OR			
	10	a)	List the different types of distress in flexible pavement. Discuss any one cause of distress and its remedial measures.	CO5	PO1	**06**
		b)	Discuss the steps involved in the design of surface drainage system for a highway.	CO4	PO1, 4	**08**
		c)	Differentiate between tangible and intangible benefits in pavement construction.	CO1	PO1	**06**

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