U.S.N.										

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

Autonomous Institute Affiliated to VTU

September / October 2024 Supplementary 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 full question from each unit.
2. Missing data, if any, may be suitably assumed.

SUPPLEMENTARY EXAMS 2024

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

1	a)	List the road patterns and explain any two of them.	**06**
	b)	Explain the factors controlling the alignment of roads.	**06**
	c)	The area of certain district in India is 13400 sq.km and there are 12 towns as per 1981 census. Determine the length of different categories of roads to be provided in the district by the year 2001 plan.	**08**

UNIT - II

2	a)	Explain briefly the restrictions to sight distance.	**06**
	b)	List and explain the different types of gradients.	**06**
	c)	Calculate the maximum sight distance required to avoid head on collision on two cars approaching from opposite directions at 90 kmph and 60 kmph. Assume reaction time of 2.5 sec and f = 0.7. Also brake efficiency of 50% in either case.	**08**

OR

3	a)	Define camber and illustrate different types of camber.	**06**
	b)	Calculate overtaking sight distance as per IRC practice for a design speed of 100 kmph. Take a = 0.52 m/s^2.	**04**
	c)	While aligning a highway in a built up area, it was necessary to provide a horizontal circular curve of radius 325 m. The design speed is 65 kmph, length of wheel base of largest truck is 6 m and width of pavement is 10.5 m. Design the following geometric features. i) Superelevation ii) Extra widening of pavement iii) Length of transition curve	**10**

UNIT - III

4	a)	Explain the desirable properties of highway materials.	**06**
	b)	What are factors affecting the design of pavements.	**06**
	c)	Explain the procedure of construction of flexible pavement.	**08**

OR

5	a)	Differentiate between flexible and rigid pavements.	**06**
	b)	With a neat sketch explain the components of flexible pavement.	**06**
	c)	Determine the warping stress at interior, edge and corner regions in 25 cm thick C.C. pavement with transverse joint at 11 m interval and longitudinal joints at 3.6 m intervals. The modulus of subgrade reaction is 6.9 kg/cm^3. Assume temperature differential for day conditions to be 0.6°C per cm thickness. Assume a = 15 cm, e = $10x10^{-6}$ /°C, E = $3x10^5$ kg/cm^2 and μ = 0.15.	**08**

UNIT - IV

6	a)	Explain the procedure for the construction of bituminous concrete layer and the quality control tests carried out during construction.	**08**
	b)	Explain the procedure for the construction of GSB layer.	**06**
	c)	Explain the different types of joints in cement concrete roads.	**06**

UNIT - V

7	a)	Explain the types and causes of distress in flexible pavement.	**06**
	b)	What are the significance of highway drainage system?	**06**
	c)	The distance between the farthest point in the turf covered drainage area (with an average slope of 1.5% towards the drain) and the point of entry to side drain is 200 m. The weighted average value of the run-off co-efficient is 0.25. The length of the longitudinal open drain in a sandy clay soil from the inlet point to the cross drainage is 540 m. The velocity of flow in the side drain may be assumed as 0.6m/s, so that silting and erosion are prevented. Estimate the design quantity of flow on the side drain for a ten years period of frequency of occurrence of the storm.	**08**

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SUPPLEMENTARY EXAMS 2024