U.S.N.										

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

Autonomous Institute Affiliated to VTU

September / October 2023 Supplementary Examinations

Programme: B.E. **Semester: V**
Branch: CIVIL ENGINEERING **Duration: 3 hrs.**
Course Code: 20CV5PCTRE **Max Marks: 100**
Course: Transportation Engineering - I **Date: 27.09.2023**

Instructions: 1. Answer any FIVE full questions, choosing one full question from each unit.
2. Missing data if any, may be suitably assumed.

UNIT - I

1 a) Discuss the characteristics of road transport in comparison with other systems. **05**

b) Explain the necessity and objects of highway planning. **05**

c) Four new road links A, B, C & D are to be constructed during a five year plan period. Suggest the order of priority for phasing the road construction program based on maximum utility approach. Assume utility units of 0.25, 0.5, 1 & 2 for the four population range and 2, 2 & 5 units per 1000t of agricultural, raw materials & industrial products from the following data. **10**

Road Link	Length km	Number of villages served with population range				Productivity served, t		
		<500	501-1000	1001-2000	>2000	Agricultural (x1000)	Raw material (x1000)	Industrial Product (x1000)
A	75	25	15	10	3	8	3	1
B	35	20	8	6	3	5	1	1.6
C	40	15	6	5	5	6	2	3
D	50	40	4	5	2	3	7	0.5

UNIT - II

2 a) Design the following geometrics for a road. **10**

i. Ruling minimum Radius
ii. Super elevation
iii. Extra widening of pavement

Use the following data : Design Speed =80 kmph, coeff of transverse friction = 0.15, Width of the pavement :- 7.0m, No. of lanes = 2, length of wheel base = 6m.

b) Discuss the following :

i. Camber **05**
ii. width of a carriage way. **05**

OR

3 a) Discuss PIEV theory with a neat sketch. **06**

b) Define Limiting gradient and Exceptional gradient provided in vertical alignment. **04**

c) An ascending gradient of 1 in 100 meets a descending gradient of 1 in 120. A summit curve is to be designed for a speed of 80 kmph so as to have an overtaking sight distance of 470m. **10**

UNIT - III

4 a) Differentiate between Bitumen and Emulsion. **05**

b) Compare the components of Flexible pavement and Rigid Pavement. **05**

c) Calculate the stresses at different regions of a Cement Concrete pavement using Westergaad stress equations for the given data : Wheel load : 5250 kg ; E value of concrete = 3.1 x 10^5 kg/cm^2 ; Pavement thickness =17 cm; Poisson Ratio = 0.15; Modulus of subgrade reaction= 6 kg/cm^3; and radius of the contact area = 0.15 m **10**

OR

5 a) Discuss Plate Load test with a neat sketch. **10**

b) The CBR test results conducted on a specimen of a soil sample are given below. Determine the CBR value of the soil graphically. **10**

Penetration (mm)	0	0.5	1	1.5	2	2.5	3	4	5	7.5	10	12.5
Load ,Kg	0	8	15	23	29	34	37	43	48	57	63	67

UNIT - IV

6 a) Discuss the steps of constructing a cement concrete pavement as per IRC standards. **10**

b) List and explain steps involved in the construction of Bituminous concrete mix as per MoRTH specification. **10**

UNIT - V

7 a) List the distresses in Rigid pavement with neat sketches. **06**

b) Discuss the steps of designing a surface drainage system. **10**

c) Differentiate between Rate of Return method and Benefit Cost ratio method of evaluating highway pavement **04**

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