

Roll No.																			
----------	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

**PRESIDENCY
UNIVERSITY**
BENGALURU
School of Engineering

Mid - Term Examinations - November 2024

Semester: III	Date: 06-11-2024
Course Code: CIV2016	Time: 11.45am to 01.15pm
Course Name: Transportation Engineering	Max Marks: 50
Program: B-Tech	Weightage: 25%

Instructions:

- (i) Read all questions carefully and answer accordingly.
- (ii) Do not write anything on the question paper other than roll number.
- (iii) Scientific and Non-programmable calculators are permitted

Part A

Answer ALL the Questions. Each question carries 2marks. 5Qx2M=10M

1	Define Highway alignment and list any two disadvantageous of improper highway alignment	2 Marks	L1	C01
2	List the four different modes of transportation	2 Marks	L1	C01
3	What are the requirements of highway alignment	2 Marks	L1	C01
4	Define the following a) Flakiness index b) Elongation index	2 Marks	L1	C01
5	List the constituents of a bituminous mix	2 Marks	L1	C01

Part B

Answer ALL Questions. Each question carries 10 marks. 4QX10M=40M

6	6a Define obligatory points in highway alignment	2Marks	L1	C01
	6b With the help of a neat sketch, Illustrate how obligatory points control the alignment	3Marks	L2	C01
	6c Explain the following stages of engineering surveys required for finalizing highway alignment a) Map study b) Reconnaissance survey	5Marks	L2	C01

Or

7	7a	What are the desirable properties of aggregates used in road construction	2Marks	L1	C01
	7b	Explain the penetration test procedure, which is used to determine the hardness or softness of a bitumen.	3Marks	L2	C01
	7c	Explain the test procedure, which is used to determine the soundness of an aggregates in laboratory.	5Marks	L2	C01
8	8a	List any two objectives of preliminary survey to be conducted before finalizing highway alignment	2Marks	L1	C01
	8b	Explain how geometric design will control the highway alignment	3Marks	L2	C01
	8c	Explain the steps involved in final location and detailed surveys which is required for finalizing highway alignment	5Marks	L2	C01
Or					
9	9a	List any four test to be conducted to assess the properties of bitumen in laboratory	2Marks	L1	C01
	9b	Explain the ductility test procedure, which is used to determine the deformation or elongation of a bitumen.	3Marks	L2	C01
	9c	Explain the test procedure, which is used to determine the aggregate crushing value in laboratory.	5Marks	L2	C01
10	10a	List any two desirable properties of a bituminous mix	2Marks	L1	C01
	10b	A Marshall specimen is prepared for bituminous concrete with a bitumen content of 5 percent by weight of total mix. The theoretical and measured unit weights of mix are 2.442 g/cm ³ and 2.345 g/cm ³ , respectively. The bitumen has a specific gravity of 1.02. Compute the following data related to marshal mix design a) Air voids percent V _v b) Percent volume of bitumen V _b c) Voids in mineral aggregate VMA d) Voids filled with bitumen VFB	8Marks	L3	C01
Or					
11	11a	Define theoretical specific gravity and Bulk specific gravity used in marshal mix design	2Marks	L1	C01
	11b	In the Marshall method of mix design, the coarse aggregates, fine aggregates, filler and bitumen, having respective specific gravities of 2.62, 2.72, 2.70 and 1.02 are mixed in the ratio of 55, 34.6, 4.8 and 5.6 percent respectively. The measured unit weights of mix is 2.345 g/cm ³ . The bitumen has a specific gravity of 1.02. Compute the following data related to marshal mix design a) Theoretical specific gravity b) Air voids percent V _v c) Percent volume of bitumen V _b d) Voids filled with bitumen VFB	8Marks	L3	C01

12 12a List any two factors which are taken for obtaining the utility per unit length of road **2Marks L2 C01**

12b Identify the project would you give more preference among the road projects listed below **8Marks L3 C01**

Road	Length (km)	No. of villages served with population of			Productivity (in 1000 tonnes)	
		<1000	1000-3000	>3000	Agricultural	Industrial
A	20	40	10	5	25	0.8
B	35	50	20	8	15	0.6
C	30	20	10	3	30	1.2

Make your choice using the maximum utility value principle. Adopt a utility unit of 1.0 for serving a village with population <1000, a utility unit of 2.0 for serving a village with population range 1000 to 3000 and a utility unit of 5.0 for serving a village with population >3000. Also, adopt a utility unit of 1.0 for catering 1000t of agricultural products/100t of industrial products.

Or

13 13a Define Maximum utility system in transportation engineering **2Marks L1 C01**

13b Identify the best route among the options listed based on the principle of maximum utility **8Marks L2 C01**

Route	Length (km)	No. of villages served with population of			Productivity (in 1000 tonnes)	
		<1000	1000-2000	>2000	Agricultural	Industrial
Route 1	20	20	12	15	15	1.0
Route 2	23	14	18	10	18	1.7
Route 3	19	10	15	20	20	2.0

Adopt a utility unit of 1.0 for serving a village with population <1000, a utility unit of 1.5 for serving a village with population range 1000 to 2000 and a utility unit of 2.0 for serving a village with population >2000. Also, adopt a utility unit of 2.5 for catering 1000t of agricultural products/ 1 for 100t of industrial products