PRESIDENCY UNIVERSITY
BENGALURU

SCHOOL OF ENGINEERING
MID TERM EXAMINATION - APR 2023

Semester : Semester IV - 2021   **Date :** 15-APR-2023
Course Code : CIV2016   **Time :** 9:30AM - 11AM
Course Name : Sem IV - CIV2016 - Transportation Engineering   **Max Marks :** 50
Program : CIV   **Weightage :** 25%

Instructions:
(i) Read all questions carefully and answer accordingly.
(ii) Question paper consists of 3 parts.
(iii) Scientific and non-programmable calculator are permitted.
(iv) Do not write any information on the question paper other than Roll Number.

PART A

ANSWER ALL THE QUESTIONS   (3 X 5 = 15M)

1. a) What is Cutback Bitumen. Describe the same in brief (02 Marks)
    b) Match the following lab tests to the aggregate properties determined from them   (03 Marks)

Name of the Test	Aggregate Properties
Los Angeles abrasion test	Toughness
Aggregate impact test	Durability
Soundness test	Hardness

                                                                (CO1) [Knowledge]

2. Bring out the major differences between Flexible Pavement and Rigid Pavement

                                                                (CO1) [Knowledge]

3. a) List the purpose of the follwoing cross-sectional elements:
        (i) Shoulder
        (ii) Median
       (iii) Camber
       (iv) Carriageway
        (v) Kerb

                                                                (CO2) [Knowledge]

4. Three new road projects are sanctioned to be completed in a district during a five year plan period. The length of the roads along with the villages served by the roads and the agricultural/ industrial productivity is presented below for all the three road projects:

Road	Length (km)	No. of villages served with population of			Productivity (in 1000 tonnes)	
		<2000	2000-5000	> 5000	Agricultural	Industrial
A	25	30	15	10	15	1.5
B	20	40	10	5	25	0.8
C	15	20	20	15	18	0.5

Which project would you give the first preference for budget allocation and which would receive the last preference for budget allocation. Justify your answer.

Adopt a utility unit of 0.5 for serving a village with population <2000, a utility unit of 1.0 for serving a village with population range 2000 to 5000 and a utility unit of 1.5 for serving a village with population >5000. Also, adopt a utility unit of 1.0 for catering 1000t of agricultural products/100t of industrial products.

(CO1) [Comprehension]

5. A new 2 lane arterial road is to be designed for a design speed of 50kmph. Determine the absolute minimum sight distance to be provided for this road in the following circumstances:
a) Flat terrain
b) Road on a slope of 1 in 450

What will be the Stopping Sight Distance (SSD) to be provided for a sub-arterial load on a flat terrain if the design speed remains the same as arterial road. What will be the change in the SSD if the breaking efficiency is 80%.

Note that the arterial road has two way traffic on two lane road while the sub-arterial road has two way traffic on single lane road. Longintudinal coefficient of friction for a design speed of 50kmph is 0.37.

(CO2) [Comprehension]

6. a) A mix design is to be carried out for a stretch of bituminous pavement. The Marshall mix design method was adopted for arriving at the optimum amount of bitumen. The specific gravities as well as the weight proportions of aggregate and bitumen used for preparing the Marshall Stability Test Specimen are given below.

Item	Coarse Aggregate - 1	Coarse Aggregate - 2	Fine Aggregate	Filler	Bitumen
Weight (gm)	800	1200	300	180	150
Specific Gravity	2.60	2.56	2.45	2.40	1.05

The volume and weight of one Marshall specimen was found to be 450 cc and 1000 gm. Assuming the absorption of bitumen in aggregate is zero, Determine the requisite properties of the Marshall stability test. (10 Marks)

b) Explain in brief the Test procedure for the Marshall stability test. (05 Marks)

(CO1) [Application]