(b) Write a short note on cement concrete mix design for rural roads according to IRC: SP:62-2004. 10

8. (a) Explain the requirements of cement concrete pavement mix. 10

(b) What are the materials used as joint fillers and sealers ? Explain their uses and characteristics. 10

Roll No. .....

23231

M. Tech. 1st Sem. Civil Engg. (Transportation Engg.) Examination – January, 2023

HIGHWAY & AIRPORT PAVEMENT MATERIALS

Paper : CE-643

Time : Three Hours] *[Maximum Marks : 100*

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

Note : Attempt any ***five*** questions. All questions carry equal marks.

1. (a) What is meant by bitumen emulsions ? State their merits and demerits in pavement construction. What are the different types of bitumen emulsions used for road construction ? 10

(b) Explain with a figure the bonding phenomenon of emulsion with aggregates. Distinguish between cutback and emulsion. Explain the basic properties of cutback and uses of it. 10

2. (a) Explain any two soil classification systems in use in the field of highway engineering. Give the limits of the soil grain size as per Indian Standard Classification system. 10

(b) State the test principle of CBR test? Write the standard specifications followed for preparation of soil sample and for testing . 10

3. (a) State and explain the desirable properties of bituminous mixes. 10

(b) Write the salient features of the Marshall method for designing bituminous mix. 10

4. (a) What are the factors affecting bituminous mix design ? 10

(b) What are the mechanical properties of bituminous mixes ? How will you determine them ? 10

5. (a) Explain the Superpave method of mix design with a typical gradation chart. 10

(b) Explain the steps followed for a rational design of a bituminous mix. 10

6. (a) The specific gravities and weight proportions for aggregate and bitumen are as under for the preparation of Marshall mix design. The volume and weight of one Marshall specimen was found to be 475 cc and 1100 gm. Assuming absorption of bitumen in aggregate is zero, find Vv, Vb, VMA and V FB : 12

Item	A-1	A-2	A-3	A-4	Bitumen
Wt(gm)	825	1200	325	150	100
Sp. Gr.	2.63	2.51	2.46	2.43	1.05

(b) Compare Indian method and superpave system of design of hot bituminous mix design. 8

7. (a) State the different methods for the design of cement concrete mix. What are the features of the design method of cement concrete mix according to IRC:44- 2008 ? 10