

Time: (3 Hours)

[Total Marks : 80]

N.B:

1. Question No ONE is Compulsory.
2. Attempt any Three from remaining five questions
3. Assume suitable data wherever required.
4. Figures to the right indicate full marks.

1. Attempt any four of the following [20]

- a) Explain the relationship between moisture content and dry density in stabilized soil mixtures. 05
- b) What is pavement roughness and how it is measured. 05
- c) What are the key differences between QC and QA activities during pavement construction? 05
- d) Describe the stress distribution in subgrade soil and the various ground improvement methods 05
- e) Write short note on: basic principles of mix design of cement concrete and bituminous mixes 05

2. a) What is FHWA .45 power gradation curve. Explain its significance for gradation of aggregates for bituminous mix 10

- b) What are the typical QC tests conducted during the construction of: 10
- a) Flexible pavements
 - b) Rigid pavements?

3. a) Cyclic Tri axial tests were conducted on subgrade soil. The specimen of granular soil was conditioned and failed after 192 repetitions of the deviator stress. Determine resilient modulus and Bulk stress. 10

Pore water Pressure (kPa)	Deviator stress (kPa)	Elastic deformation ($\times 10^{-3}$ mm)	Pore water Pressure (kPa)	Deviator stress (kPa)	Elastic deformation ($\times 10^{-3}$ mm)
137.89	13.79	12.959	68.95	6.89	9.95
	34.47	30.53		13.79	18.08
	68.95	62.306		34.47	59.182

- b) Discuss the suitability of soil as subgrade materials with reference to stability volume changes, drainage and frost action at subgrade materials A-1-A, A-2-7, A-3, A-7-2, A-5-11, A6-4 10

4. a) A road construction team is evaluating the binder content for an asphalt mix. They are conducting a Marshall Stability test using different binder and the following data is obtained after testing: 20
1. Analyze the results and use them to determine the Optimum Binder Content (OBC) based on the Marshall Stability test.
 2. Ensure your analysis includes a detailed examination of the stability, flow, air voids, VMA, and VFB values.
 3. Conclude your remarks by explaining why you chose the specific binder content as the optimum.

Binder Content (%)	Stability (kN)	Flow (mm)	Bulk Density (g/cm ³)	Theoretical Maximum Specific Gravity (G _{mm})
4.0	8.5	2.2	2.340	2.480
4.5	9.0	2.4	2.355	2.480
5.0	9.5	2.6	2.365	2.480
5.5	9.2	2.8	2.360	2.480
6.0	8.6	3.0	2.350	2.480

5. a) With the help of neat diagram, explain plate load test? State the standard specifications of plate load test? 10
- b) What is the significance of the Unconfined Compressive Strength (UCS) test in soil stabilization? 10
6. a) How low cost roads are classified as per IRC -SP-20-2002. Also briefly explain its construction methods. 10
- b) How is the Present Serviceability Index (PSI) calculated, and what factors contribute to its determination? Discuss its significance in evaluating pavement performance. 10