



# MAULANA ABUL KALAM AZAD UNIVERSITY OF TECHNOLOGY, WEST BENGAL

Paper Code : CE(PE)801D Pavement Materials and Design

UPID : 008358

Time Allotted : 3 Hours

Full Marks : 70

*The Figures in the margin indicate full marks.*

*Candidate are required to give their answers in their own words as far as practicable*

## Group-A (Very Short Answer Type Question)

1. Answer any ten of the following :

[ 1 x 10 = 10 ]

- (I) What is the importance of aggregate grading in road construction?
- (II) What are the properties of bitumen binders?
- (III) What are joint filler and sealer materials used in concrete pavement construction?
- (IV) What is the importance of using sustainable and environment-friendly materials in road construction?
- (V) What is the minimum grade of concrete to be used in pavements?
- (VI) What is the AASHTO Soil Classification System?
- (VII) What is the critical sieve method in aggregate grading?
- (VIII) What are the pavement performance related properties of bitumen binders?
- (IX) What is the applicability of polymer-based waste products in different layers of pavement?
- (X) What is polymer modified bitumen and how does it differ from conventional bitumen?
- (XI) What are the common additives used in concrete pavement mix design?
- (XII) What is the maximum dry density of soil?

## Group-B (Short Answer Type Question)

Answer any three of the following :

[ 5 x 3 = 15 ]

2. Define the term "Sub-grade". [5]
3. What is aggregate in road construction? [5]
4. Define the term "life cycle analysis" and explain its significance in the design of road infrastructure. [5]
5. Analyze the suitability of different types of soil stabilizers used in road construction, such as lime, cement, and fly ash, based on their chemical and geotechnical properties. [5]
6. What are the specifications and tests required for concrete pavements as per IRC? Explain the importance of joint filler and sealer materials in concrete pavements. [5]

## Group-C (Long Answer Type Question)

Answer any three of the following :

[ 15 x 3 = 45 ]

7. Describe the different laboratory and in-situ procedures used for evaluating the mechanical properties of soils stabilized with admixtures such as cement, lime, calcium chloride, fly ash, and bitumen. Discuss the advantages and limitations of the CBR, Plate Load test, Resilient Modulus, and DCPT methods for evaluating the strength and deformation characteristics of stabilized soils. [ 15 ]
8. Explain in detail the process of aggregate characterization and the importance of aggregate properties, tests, and specifications in the design of road pavements. Discuss the significance of aggregate gradation problems and the use of Rothfutch's and Critical sieve methods and the shape factor in mix design for flexible and rigid pavements. [ 15 ]
9. Describe the process of selecting and testing materials for use in road construction. What factors should be considered in the decision-making process, and how can the suitability of materials be determined? [ 15 ]
10. What is stabilization with admixtures in soil engineering, and what are some common admixtures used for soil stabilization? Discuss different laboratory and in-situ procedures used to evaluate the mechanical properties of soils, such as CBR, Plate Load test, resilient modulus, and DCPT. [ 15 ]
11. Explain the applicability of polymer-based waste products in different layers of pavement. [ 15 ]

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