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**Presidency University**

**Bengaluru**

 **SCHOOL OF ENGINEERING**

**SUMMER TERM END TERM EXAMINATION AUGUST -2024**

**Date**: 07-08-2024

**Time**: 9:30 AM – 12:30 PM

**Max Marks**: 100

**Weightage**: 50%

**Semester:**  SUMMER TERM

**Course Code**: CIV2024

**Course Name**: Pavement Materials and Construction

**Program & Sem**: B.Tech (VIII Sem)

 **Instructions:**

1. *Read all the questions carefully and answer accordingly.*
2. *Question paper consists of 3 parts.*

**Part A [Memory Recall Questions]**

**Answer any five Questions. Each Question carries 6 marks. (5Qx 6M= 30M)**

1. Explain the characteristics of a good quality subgrade. (C.O.1.) [Knowledge]

2. List the various applications of bitumen. (C.O.2.) [Knowledge]

3. Outline the modes of failure of flexible pavement. (C.O.2.) [Knowledge]

4. Indicate any six types of recycled materials used in road construction. (C.O.3.) [Knowledge]

5. Mention the types of Geosynthetic materials used in road construction. (C.O.3.) [Knowledge]

6. Mention any six advantages of using geosynthetics in road construction. (C.O.3.) [Knowledge]

7. Soil stabilization is required to upgrade the low-cost roads to higher specification without involving appreciable wastage & the construction cost. Describe any four soil stabilization methods.

(C.O.4.) [Knowledge]

**Part B [Thought Provoking Questions]**

**Answer any four Questions. Each Question carries 10 marks. (4Qx10M=40M)**

1. Due to the movement of vehicles on the road, the aggregates are subjected to crushing and impact, resulting in their breaking down into smaller pieces. Discuss the necessity of determining aggregate crushing and impact values in pavement construction.

(C.O.1.) [Comprehension]

1. Various laboratory tests on bitumen is conducted to check quality and different properties of bitumen for pavement construction. Briefly explain the laboratory test conducted for grading of bitumen.

(C.O.2.) [Comprehension]

1. Bitumen is the residue or by-product when the crude petroleum is refined. A wide variety of refinery processes, such as the straight distillation process, solvent extraction process etc. may be used to produce bitumen of different consistency and other desirable properties. Outline the requirements of bitumen in the pavement construction.

(C.O.2.) [Comprehension]

1. Several experimental and research studies have been dedicated to investigating potential incorporating of waste materials in road construction field. Many pieces of research have proven a success in reusing and recycling of some compositions of these waste materials in pavement structures and others are still undergoing comprehensive research studies to further shed the light on what can be gained from their recycling into pavement constructions. Briefly explain the use of plastics in road construction.

(C.O.3.) [Comprehension]

1. A proper construction technique help enhance subgrade properties when stabilized using geosynthetics. Poor construction process results in poor quality subgrade. Outline the steps followed in the construction of road using geosynthetics.

(C.O.3.) [Comprehension]

1. Correctly proportional materials when adequately compacted to get a mechanically stable layer, the method is called mechanical stabilization. Explain the construction procedure involved in mechanical stabilization of soil subgrade.

(C.O.4.) [Comprehension]

**Part C [Problem Solving Questions]**

**Answer any three Questions. Each Question carries 10 marks. (3Qx10M=30M)**

1. Laboratory tests on soil play a crucial role in determining the properties of soil. These tests help to determine the physical, mechanical, and hydraulic properties of soil samples. Describe briefly the experimental procedure of direct shear test to determine the shear strength of soil.

(C.O.1.) [Application]

1. 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 aggregates is zero, calculate air voids percent (Vv), percentage volume of bitumen (Vb), voids in mineral aggregate (VMA) and voids filled with bitumen (VFB).



(C.O.2.) [Application]

1. Several experimental and research studies have been dedicated to investigating potential incorporating of waste materials in road construction field. Many pieces of research have proven a success in reusing and recycling of some compositions of these waste materials in pavement structures and others are still undergoing comprehensive research studies to further shed the light on what can be gained from their recycling into pavement constructions. Describe the use of recycled asphalt shingles in road construction.

(C.O.3.) [Application]

1. Correctly proportional materials when adequately compacted to get a mechanically stable layer, the method is called mechanical stabilization. Explain the following aspects related to mechanical stabilization of soil subgrade (a) Principle and applications (b) Factors affecting mechanical stability (c) Mix design and (d) Construction steps.

(C.O.4.) [Application]