MIZORAM PUBLIC SERVICE COMMISSION

DEPARTMENTAL EXAMINATIONS FOR JUNIOR GRADE OF M.E.S. (AE/SDO) UNDER PUBLIC WORKS DEPARTMENT, GOVERNMENT OF MIZORAM, DECEMBER, 2023.

CIVIL ENGINEERING PAPER – I

Time Allowed : 3 hours   FM : 100 PM : 40

Marks for each question is indicated against it.
Attempt all questions.

PART – A (50 MARKS)

1. (a) (i) List out the products of hydration and their influence on the properties of Cement. **(10)**

    (ii) What are the properties governing the quality of bricks? Discuss the importance of water absorption and strength under compression. **(10)**

    OR

    (b) (i) Explain the preservatives treatment of timber indicating the types, characteristics and method of application of preservatives **(10)**

    (ii) What is non-destructive testing of concrete? What are its relative merits ? Name the method of non- destructive and explain briefly any one method. **(10)**

2. (a) (i) Explain general objectives of design of R.C Buildings for ductility. **(10)**

    (ii) Explain with sketches form work for a beam slab floor. **(10)**

    OR

    (b) (i) Differentiate between pile foundation and pier foundation. How does pier foundation differ from caisson foundation. **(10)**

    (ii) Explain various principles that should be kept in mind while designing a house drainage system. **(10)**

3. Write note on the following
    (a) Explain the mechanism of maintaining the equilibrium of a loaded beam ? **(3)**
    (b) What are the advantages of shearing force and bending moment diagrams? **(3)**
    (c) Write the assumption in Theory of Bending. **(4)**

PART – B (50 MARKS)

4. (a) (i) Define void ratio and porosity ? Derive the relation between e and n where e is the void ratio and n is the porosity. **(5)**

    (ii) What is stoke law? Under what condition is this law valid? **(5)**

    (iii) Explain and discuss the use of plasticity index to understand the nature of soil **(5)**

OR

    (b) (i) What is negative skin friction ? What is the effect of time on Negative Skin Friction? **(5)**

    (ii) Derive Rankine's formula for determining the ultimate bearing capacity. How do you use this formula for determining the minimum depth of foundation? **(10)**

5. (a) (i) What is bond stress? Explain how strength of bond stress increased. **(10)**

    (ii) Explain why steel is used as reinforcing material?

    (5)

    (iii) What is Doubly reinforced section? Explain the situation in which it is preferred . **(5)**

OR

    (b) (i) Enumerate the steps involved in the Indian Standard method of Mix design. **(10)**

    (ii) What are the advantages and disadvantages of providing large clear cover to reinforcement in flexural member? **(5)**

    (iii) What is meant by slenderness ratio of compression member and what are its implication?
    (5)

6. Write note on *any three (3)* of the followings: **(3×5= 15)**
    (a) What is the basis for safety of compression members? Why do we say that design of compression member is not a direct method ?
    (b) Difference between combined sewerage system and separate sewerage system.
    (c) What are the factor that affect the per capita demand of water?
    (d) Types of construction machineries.

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