

**MIZORAM PUBLIC SERVICE COMMISSION**

**DEPARTMENTAL EXAMINATIONS FOR JUNIOR GRADE OF M.E.S. (AE/SDO)  
UNDER IRRIGATION & WATER RESOURCES DEPARTMENT,  
GOVERNMENT OF MIZORAM, DECEMBER, 2023.**

**ENGINEERING PAPER – II  
(CIVIL ENGINEERS)**

Time Allowed : 3 hours

FM : 100 PM : 40

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

**PART – A (50 MARKS)**

1. Explain hydrological cycle with detail diagram. (5)
2. How is consistency of rainfall record at a station tested? How does inconsistency in record arise? (5)
3. Discuss the different forms of precipitation and write brief note about them. (5)
4. Write the factors affecting evaporation. (5)
5. Define the following terms:- (5×1=5)
  - (a) Delta ( $\Delta$ )
  - (b) Duty of water
  - (c) Crop period
  - (d) Base period
  - (e) Gross Command Area (GCA)
6. Write the different types of soil (at least five types). (5)
7. What is 'index properties of soil'? List the properties under different categories. (5)
8. Write the assumptions made in deriving equation for discharge in aquifer (five points). (5)
9. A deposit of fine sand has porosity of 45%. Estimate the hydraulic gradient to develop quicksand condition if the specific gravity of grain is 2.7. (5)
10. A flow net is plotted for a homogeneous earthen dam of 30.0 m height with a free board of 5.0 m. If  $k = 6 \times 10^{-4}$  cm/sec, Number of flow channels = 4, Number of potential drops = 10, calculate the discharge per meter run of dam. (5)

**PART – B (50 MARKS)**

11. Define Geodetic Survey and Plane Survey. (5)
12. Write the Principle of surveying. (5)
13. Describe the characteristics of contours (five points). (5)
14. Define the following terms:- (5×1=5)
  - (a) Bench Mark
  - (b) Reduced Level (RL)
  - (c) Back sight
  - (d) Far sight
  - (e) Intermediate sight
15. Explain remote sensing method of surveying. List the various uses of remote sensing data (three points). (5)
16. Write the difference between CPM and PERT in network analysis (five points). (5)
17. A project is expected to take 20 months along the critical path having a standard deviation of 2.5 months. What is the probability of completing the project within (a) 20 months, (b) 25 months and (c) 17.5 months? The probability percentages for different values of probability factor are: 15.87% for -1; 50% for 0; 97.72% for +2. (5)
18. Define 'optimistic time estimate', 'pessimistic time estimate' and 'most likely time estimate'. (5)
19. Define Earliest Start Time (EST), Latest Finish Time (LFT) and Latest Start Time (LST). (5)
20. Define Total Float, Free Float, Independent Float and Interfering Float. (5)

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