MIZORAM PUBLIC SERVICE COMMISSION

DEPARTMENTAL EXAMINATIONS FOR JUNIOR GRADE OF M.E.S. (AE/SDO) UNDER IRRIGATION & WATER RESOURCES DEPARTMENT, GOVERNMENT OF MIZORAM, DECEMBER, 2019.

ENGINEERING PAPER – I

Time Allowed : 3 hours   FM : 100   PM : 40

The figures in the margin indicate full marks for the questions.

Attempt all questions.

1. Calculate the discharge from a confined well of 100mm diameter, if the draw down measured at radial distance of 20m and 50m from the centre of the well are 0.60m and 0.20m respectively. Aquifer thickness is 15m, hydraulic conductivity is 2.5×10^{-4} *m/s* and radius of influence is 500 m. And also determine the specific capacity of the well. Take radius of the well r_w as 50×10^{-3} *m*. **(10)**

2. Describe the operating principle of centrifugal pump with suitable schematic diagram. Further describe the different classifications of centrifugal pump. **(10)**

3. Water flows through a contracted rectangular weir 120cm long to a depth of 30 cm, it then flows along a rectangular channel 150 cm wide and over a second weir which has its length equal to the channel. Determine the depth of water over the second weir. **(10)**

4. A stream of 135 litres/s was diverted from a canal and 100 litres/s were delivered to the field. An area of 1.6 ha was irrigated in eight hrs. The effective depth of root zone was 1.8m. The runoff loss in the field was 432 m^3/s. The depth of water penetration varied linearly from 1.8m at the head end of the field to 1.2m at the tail end. Available moisture holding capacity of the soil is 20 cm/m depth of the soil. Irrigation was started at a moisture extraction level of 50% of the available moisture. Determine the water conveyance efficiency, water application efficiency, water storage efficiency and the water distribution efficiency. **(10)**

5. Briefly describe the steps involved in planning and designing a sprinkler irrigation system. **(10)**

6. Adopting Lacey's Theory design a channel section for the following data, Discharge: 30cumec, silt factor: 1.00 and side slope: ½:1. Further also find out the longitudinal slope of the same. **(10)**

7. Describe the characteristics of good building stones. **(5)**

8. Describe the composition of a good brick earth. **(5)**

9. Explain the essential field test required for cement. **(5)**

10. Distinguish with the help of sketch between English bond and Flemish bond of brick work. **(10)**

11. Explain the different Types of Estimates. **(5)**

12. Calculate the quantity of earthwork for 200 meter length for a portion of a road in a uniform ground. The height of banks at the two ends being 1.00 m and 1.6 m. the formation width is 10 m and side slope is 2:1 (Horizontal: Vertical). Assume that there is no transverse slope? **(10)**

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