

# MIZORAM PUBLIC SERVICE COMMISSION

## DEPARTMENTAL EXAMINATIONS FOR AE/SDO UNDER MINOR IRRIGATION DEPARTMENT, MAY, 2016.

### ENGINEERING PAPER – I

Time Allowed : 3 hours

FM : 100 PM : 40

*All questions carry equal marks of 5 each..*

*Attempt all questions.*

1. State Darcy's Law for flow of water through soil and discuss its validity.
2. What is Total Static Head of a Pump? Explain with a neat diagram a negative static suction.
3. Define the terms :
  - (a) Vena-Contracta
  - (b) Nappe
  - (c) Crest
  - (d) Crest height
  - (e) Orifice
4. What are the basic requirements for adoption of irrigation or any mode of application of water?
5. Discuss readily available moisture in the soil in connection with permanent wilting, optimum water and field capacity. Suitable illustration may be given.
6. The gross commanded area of an irrigation canal is 6500 hectares out of which 90% is culturable. The intensity of irrigation for kharif season is 20%. If the duty at the head of the canal is 150 hectares/cumec and 380 hectares/cumec for kharif and rabi season respectively. Find the discharge required at the head of the canal. (Take crop ratio as 2)
7. Calculate the hydraulic mean depth for a concrete lined channel to carry a discharge of 100 cumecs at a slope of 25 cm/km. Use Manning's equation. Rigidity coefficient is 0.016 and the limiting velocity is 1.5 m/sec.
8. Explain Crop rotation with its necessity by giving a suitable example.
9. Define failure by piping of weir on permeable foundation. Discuss how it can be taken care of with the application of Khosla's theory.
10. What is a regime channel? Explain initial regime, final regime and permanent regime in connection with Lacey's regime theory.
11. Discuss the suitable anti-waterlogging systems in an agricultural land.
12. Write short note on weed control in the maintenance of canal and open drains.
13. Explain with appropriate formulae how main reinforcement is computed for beams or slab using working stress method.
14. What are the major drawbacks of Modular ratio or working stress method of designing RCC members?
15. Draw a typical sectional elevation of RCC circular water tank having top spherical dome showing detail of reinforcement arrangement.
16. Explain Acid test with its significance for building stones.

**17.** State the functions and effects of

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|--|-----------------------|
| (a) Alumina                                | (b) Silica            |
| (c) Lime                                   | (d) Oxide of Iron and |
| (e) Magnesia, in the manufacture of Bricks |                       |

**18.** Discuss Schedule of Rates and Cost Index pertaining to construction activity.

**19.** Explain the procedure for measurement of earthwork mixed with soil, ordinary rocks and hard rocks in surface excavation where the ground is not uniform or where the site is required to be levelled.

**20.** If the quantity of earthwork in excavation in foundation is 4.725 cum, the depth of excavation is 2100 mm and the concrete thickness is 60 cm. Estimate the quantity of foundation concrete.

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