

MIZORAM PUBLIC SERVICE COMMISSION
DEPARTMENTAL EXAMINATION FOR JUNIOR GRADE OF M.E.S. (AE/SDO)
UNDER PUBLIC HEALTH ENGINEERING DEPARTMENT,
GOVERNMENT OF MIZORAM, DECEMBER, 2024.

ENGINEERING PAPER – I

(Common for Civil, Electrical and Mechanical Engineers)

Time Allowed : 3 hours

FM : 100 PM : 40

SECTION - A (Multiple Choice questions) (50 Marks)

All questions carry equal mark of 1 each. Attempt all questions.

*This Section should be answered only on the **OMR Response Sheet** provided.*

1. When electric current is passed, electrons move from-
(a) high potential to low potential. (b) low potential to high potential.
(c) in the direction of the current. (d) against the direction of the current.
2. The height of a column in a pump is called as-
(a) vertical head (b) horizontal head
(c) static head (d) multi head
3. What is the current transformer?
(a) transformer used with an A.C. voltmeter (b) transformer used with an A.C. ammeter
(c) transformer used with an D.C. voltmeter (d) transformer used with an D.C. ammeter
4. What is the single most effective way to prevent the transmission of disease?
(a) Antibiotics (b) Hand washing with best quality of water
(c) Hand washing with soap and water (d) Environmental cleanliness.
5. Pump efficiency is defined as the ratio of-
(a) Pressure to temperature (b) Temperature to pressure
(c) Water horsepower to pump horsepower (d) Pump horse power to water horse power
6. Which process is used to remove dirt and sand from wastewater?
(a) Aeration (b) Chlorination
(c) Sedimentation (d) Flocculation
7. The difference in the total head of the pump is called-
(a) Manometric head (b) Euler head
(c) Pressure head (d) Shaft head
8. The electrical resistance of insulators is-
(a) high (b) low
(c) zero (d) infinitely high
9. The velocity imparted by the impeller is converted into-
(a) Pressure energy (b) Kinetic energy
(c) Momentum (d) Potential energy

10. Which of the following is not a type of waste water?
 - (a) Sullage
 - (b) Sewage
 - (c) Grey water
 - (d) Black water
11. Common indicator of water pollution is-
 - (a) Entamoeba Histolytica
 - (b) E. Coli
 - (c) Eichhornia Crassipes
 - (d) Lemna Paucicostata
12. What is a major advantage of centrifugal pump?
 - (a) Cost
 - (b) Simple in construction
 - (c) Efficiency
 - (d) Pump parameters
13. What is the working principle of a Transformer?
 - (a) Transformer works on the principle of self-induction
 - (b) Transformer works on the principle of mutual induction
 - (c) Transformer works on the principle of ampere law
 - (d) Transformer works on the principle of coulomb law
14. The inlet passage of centrifugal pump is controlled by-
 - (a) Gate
 - (b) Head race
 - (c) Turbine
 - (d) Pump
15. The strength of well compacted concrete with good workability is depended only on the-
 - (a) Water content
 - (b) Cement content
 - (c) Water-cement ratio
 - (d) Water-soaked ratio
16. In which method of disposal of municipal solid waste, the waste is dumped in the soil?
 - (a) Incineration
 - (b) Land filing
 - (c) Composting
 - (d) Shredding
17. The overall efficiency of a centrifugal pump is:
 - (a) Product of manometric and mechanical efficiencies
 - (b) Ratio of manometric efficient to mechanical efficiency
 - (c) Product of manometric and hydraulic efficiencies
 - (d) Ratio of mechanical efficiency to manometric efficiency
18. In DC motor, the speed of the motor is directly proportional to-
 - (a) Rotor length
 - (b) Input power
 - (c) Back e.m.f.
 - (d) Conductor
19. What is the approx. mix proportion for M10?
 - (a) 1:3:6
 - (b) 1:2:4
 - (c) 1:1.5:3
 - (d) 1:1:2
20. Critical path method is good for-
 - (a) Small project only
 - (b) Large project only
 - (c) Both small and large projects equally
 - (d) Medium project only
21. The process of passing the water through the beds of granular material is known as-
 - (a) Infiltration
 - (b) Deep percolation
 - (c) Filtration
 - (d) disinfection

22. Which part is rotated by self-starter while starting a diesel engine?
- (a) Crankshaft (b) Flywheel
(c) Camshaft (d) Vibration damper
23. Which type of motor provides the highest starting torque?
- (a) DC series motor (b) DC shunt motor
(c) AC induction motor (d) Brushless DC motor
24. At lower pH, the contact period required for chlorination is-
- (a) Lower (b) Higher
(c) Moderate high (d) Not acceptable
25. Electrical resistivity of any given metallic wire depends upon-
- (a) its thickness (b) its shape
(c) nature of the material (d) its length
26. Which of the following is a positive displacement pump?
- (a) Reciprocating pump (b) Propeller pump
(c) Centrifugal pump (d) Jet pump
27. To control growth of algae in reservoir-
- (a) Bleaching powder is added (b) Lime is added
(c) Copper sulphate is added (d) Alum is added
28. Centrifugal pumps transport fluids by converting-
- (a) Kinetic energy to hydrodynamic energy
(b) Hydrodynamic energy to kinetic energy
(c) Mechanical energy to kinetic energy
(d) Mechanical energy to Hydrodynamic energy
29. Why are the baffle walls provided?
- (a) Prevent short circuit (b) Abstract flow
(c) Reduce velocity (d) Collect sediment
30. In which of the following sedimentation tanks, the flow may be either horizontal or vertical?
- (a) Circular (b) Rectangular
(c) Fill and draw type (d) Continuous flow
31. The different types of pipes which one is commonly used in Mizoram for water supply is?
- (a) DI (b) GI
(c) ERW (d) HDPE/PVC
32. What is the function of a surge tank?
- (a) It causes water hammer (b) Produces surge in the pipeline
(c) Relieves water hammer (d) Supplies water at constant pressure
33. The conduct of examination for license plumber was introduced in the following Rules or Acts-
- (a) The Mizoram Water Supply (Control) Rules 1994
(b) The Mizoram Water Supply (Control) Acts 2004
(c) The Mizoram Water Supply (Control) Rules 2023
(d) The Mizoram Water Supply (Control) Rules 2024.

34. The advantage of twin pit in toilet construction than septic tank is-
- (a) Suitable for large users
 - (b) Environmentally safe
 - (c) Easy construction
 - (d) Alternate use of pit long-lasting
35. The Bureau of Indian Standards (BIS) has established Indian standard for drinking water quality is-
- (a) IS 11500 : 2013
 - (b) IS 10500 : 2012
 - (c) IS 11500 : 2022
 - (d) IS 13500 : 2015
36. The Public Health Engineering Department has prepared Rules and recently passed by the Council of Minister, Government of Mizoram is-
- (a) The Mizoram Water Resource (Control and Regulation) Rules 2023.
 - (b) The Drinking Water Supply (Control) Rules 2024.
 - (c) The Mizoram Ground Water (Control and Regulation) Rules 2024.
 - (d) The Water Tariff (Control and Regulation) Rules 2024.
37. Which one is most appropriate rainwater harvesting system in Mizoram?
- (a) Gully plug
 - (b) Artificial technique
 - (c) Rooftop
 - (d) Water source conservation
38. Windings of star-delta starter while starting and during running are connected in-
- (a) Star, delta
 - (b) Delta, delta
 - (c) Star, star
 - (d) Delta, star
39. Burning solid waste is not recommended because-
- (a) it's very expensive
 - (b) It requires a lot of space
 - (c) This requires modern technologies
 - (d) It causes many environmental issues
40. On which date the Swachh Bharat Mission was launched?
- (a) 15 August 2014
 - (b) 26 January 2015
 - (c) 2 October 2014
 - (d) 2 January 2015
41. What does CPM stand for?
- (a) Control Path Method
 - (b) Critical Path Method
 - (c) Critical Plan Method
 - (d) Control Path Management
42. Who introduced bar chart in CPM?
- (a) Jane Gantt
 - (b) Joseph Henry
 - (c) Henry Gantt
 - (d) Williams Henry
43. PERT technique of network analysis is mainly useful for-
- (a) Small projects
 - (b) Deterministic activity
 - (c) Large and complex project
 - (d) Research and development projects
44. The full form of PERT is-
- (a) Program Evaluation and Robot Technique.
 - (b) Program Evaluation and Rate Technology.
 - (c) Program Evaluation and Review Technique.
 - (d) Program Evaluation and Robot Technology.
45. In PERT/CPM, the merge event represents _____ of two or more events.
- (a) beginning
 - (b) splitting
 - (c) completion
 - (d) None of these.

46. Surge tanks are used-
- (a) to guard against water hammer
 - (b) for storage water
 - (c) to increase the velocity in a pipeline.
 - (d) as overflow valves
47. How much Earth is covered with water?
- (a) $\frac{1}{3}$
 - (b) $\frac{2}{3}$
 - (c) $\frac{1}{2}$
 - (d) $\frac{2}{4}$
48. Which of the following are not causes of water scarcity?
- (a) Growing population
 - (b) Expansion of irrigation facilities
 - (c) Water harvesting technique
 - (d) Industries
49. Temporary hardness in water is due to the presence of-
- (a) Nitrates
 - (b) Carbonates
 - (c) Sulphates
 - (c) Chlorides
50. Temporary hardness of water may be removed by-
- (a) Boiling
 - (b) Lime soda process
 - (c) Zeolite
 - (c) De-ionization method

SECTION - B (50 Marks)

This Section should be answered only on the Answer Sheet provided.

Direction (Questions No.51-55) : Short Answers(Answer ANY FOUR).

(4×5= 20)

51. Explain the developmental process of toilet in Mizoram. Define the most appropriate technology for toilet construction in Mizoram?
52. What are the type of pumps? Define which one is commonly used for pumping water in Mizoram.
53. Name the various types of pipes being used for water supply in Mizoram. Shortlist the most suitable pipe and give your comments to justify your view?
54. Name the different funding sources for urban water supply and explain in brief the success story of Jal Jeevan Mission (JJM) in Mizoram.
55. Elaborate how to improve exploration and management of ground water in Mizoram.

Direction (Questions No.56-60) : Long Answers (Answer Any Three).

(3×10= 30)

56. What is the difference between AC and DC motors? What is the working principle of DC motors?
57. What do you mean by intake works ? How do you select the site for intake with respect to both urban and rural water supply scheme in Mizoram?

58. What do you mean by solid waste management? The plastics wastes has tarnished visual cleanliness of village as well as urban community. Explain your views on remedial action to be taken for plastics wastes management in Mizoram.
59. Excessive high turbidity of water impairs the efficiency of water treatment plant. Give your comments to prevent drinking water supply from high turbidity. How to improve existing system of water treatment plant to cope up with the increasing contamination of water sources?
60. Design six slow sand filter beds from the following data:
- | | | |
|-------------------------|---|--------------------------|
| Population to be served | : | 50,000 persons. |
| Per capita demand | : | 150 liters/head/day |
| Rate of filtration | : | 180 litres/hour/Sq.metre |
| Length of each bed | : | Twice the breath |

Assume max. demand as 1.8 times the average daily demand. Also assume that one unit, out of six, will be kept as stand-by.

OR

What do you mean by solar pumping water supply scheme? What do you suggest the precise operation and maintenance for solar pumping water supply schemes in Mizoram?

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