

MIZORAM PUBLIC SERVICE COMMISSION
DEPARTMENTAL EXAMINATION FOR JUNIOR ENGINEER
UNDER PUBLIC HEALTH ENGINEERING DEPARTMENT,
GOVERNMENT OF MIZORAM.
(JULY-2025)

ENGINEERING PAPER
(ELECTRICAL ENGINEERING)

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. Which of the following materials is commonly used in hand pump tube wells?
 - (a) PVC
 - (b) GI
 - (c) RCC
 - (d) Copper
2. The main purpose of a soak pit in rural sanitation is to:
 - (a) Allow percolation of wastewater
 - (b) Store drinking water
 - (c) Trap solid waste
 - (d) Collect rainwater
3. Which one of the following is a reinforced material?
 - (a) Plain Cement Concrete
 - (b) Brick
 - (c) Reinforced Cement Concrete
 - (d) Stone
4. HDPE pipes are mostly preferred for:
 - (a) Electrical wiring
 - (b) Portable water supply due to flexibility
 - (c) Sewer lines only
 - (d) Road construction
5. The Mizoram Water Supply (Control) Act mainly regulates:
 - (a) Use and supply of drinking water
 - (b) Construction of dams
 - (c) Water quality testing
 - (d) River water disputes
6. Which one of the following is an advantage of GI pipes?
 - (a) High tensile strength
 - (b) Prone to rust
 - (c) Heavy maintenance
 - (d) Cannot withstand pressure
7. Assam-type buildings are primarily made of:
 - (a) Stone and RCC
 - (b) Timber and corrugated roofing
 - (c) GI sheets
 - (d) Glass and steel

8. Which one of these is not a component of rural sanitation?
- (a) Soak pit
 - (b) Night soil disposal
 - (c) Septic tank
 - (d) Storm water drain
9. The term “characterization” in solid waste management refers to:
- (a) Identifying components and types of waste
 - (b) Incinerating solid waste
 - (c) Burying waste
 - (d) Burning waste
10. Rainwater harvesting does not include:
- (a) Roof catchment
 - (b) Ground recharge pit
 - (c) Desalination plant
 - (d) Storage tank
11. Which type of intake is commonly used in rivers?
- (a) Wet intake
 - (b) Direct pumping intake
 - (c) Ground intake
 - (d) Infiltration intake
12. A septic tank system is mainly used in:
- (a) Rural and semi-urban areas
 - (b) Industrial treatment plants
 - (c) Desalination
 - (d) Water distribution
13. What is the unit of measurement for earthwork volume?
- (a) Square meters
 - (b) Liters
 - (c) Cubic meters
 - (d) Tons
14. The pipe appurtenance that releases trapped air in pipelines is:
- (a) Check valve
 - (b) Non-return valve
 - (c) Sluice valve
 - (d) Air valve
15. RCC stands for:
- (a) Rolled Cement Concrete
 - (b) Reinforced Cement Concrete
 - (c) Ready Cement Concrete
 - (d) Rapid Cast Cement
16. Which of the following pipe materials is corrosion-resistant?
- (a) DI
 - (b) CI
 - (c) HDPE
 - (d) ERW
17. The most economical channel section for open flow is:
- (a) Semi-circular
 - (b) Circular
 - (c) Rectangular
 - (d) Trapezoidal
18. The process of separating biodegradable and non-biodegradable waste is called:
- (a) Disposal
 - (b) Segregation
 - (c) Collection
 - (d) Treatment
19. Which of the following is not a type of masonry work?
- (a) Brick
 - (b) Stone
 - (c) RCC
 - (d) Laterite

- 20.** What is the main purpose of trenching in rural sanitation?
- (a) Laying pipelines
 - (b) Disposal of night soil
 - (c) Foundation laying
 - (d) Water harvesting
- 21.** Which structure is built for retaining soil?
- (a) Septic tank
 - (b) Soak pit
 - (c) Infiltration gallery
 - (d) Retaining wall
- 22.** What is the major advantage of ERW pipes?
- (a) High flexibility
 - (b) Corrosion resistance
 - (c) Smooth surface and economical
 - (d) Fire resistance
- 23.** Night soil collection refers to:
- (a) Manual collection of human waste
 - (b) Storage of rainwater
 - (c) Collection of grey water
 - (d) Water sample testing
- 24.** The slope of an open channel affects:
- (a) Width of pipe
 - (b) Flow velocity
 - (c) Temperature
 - (d) Odour level
- 25.** The key reason for conducting a water supply survey is to:
- (a) Increase groundwater level
 - (b) Assess rainfall patterns
 - (c) Improve road network
 - (d) Plan intake and reservoir location
- 26.** During lightning, what is the role of proper earthing in a pump house?
- (a) Directs surge to ground safely
 - (b) Starts the motor automatically
 - (c) Reduces wire length
 - (d) Raises system voltage
- 27.** If the earth resistance at a pump control panel is measured to be 67 ohms, which is higher than the recommended value, what action should be taken?
- (a) Increase voltage supply
 - (b) Change relay settings in the control panel
 - (c) No action needed
 - (d) Add salt and charcoal to the pit
- 28.** Which instrument is commonly used to test insulation resistance of an induction motor?
- (a) Ammeter
 - (b) Megger
 - (c) Voltmeter
 - (d) Multimeter
- 29.** What does the breakdown voltage test of transformer oil measure?
- (a) The oil level inside the transformer
 - (b) The cooling efficiency of the oil
 - (c) The insulation strength of the oil
 - (d) The temperature rise of the winding
- 30.** Which material is commonly used for conductors in machine windings?
- (a) Rubber
 - (b) Copper
 - (c) Lead
 - (d) Brass
- 31.** What is the main function of a magnetic core in transformers and motors?
- (a) Concentrate magnetic flux
 - (b) Increase the winding resistance
 - (c) Provide insulation to windings
 - (d) Increase current

- 32.** What happens to the conductivity of a semiconductor when temperature increases?
- (a) It decreases
 - (b) It remains constant
 - (c) It increases
 - (d) It becomes zero
- 33.** What is the purpose of a circuit diagram?
- (a) To show cable lengths
 - (b) To reduce power cost
 - (c) To show electrical layout
 - (d) To increase circuit load
- 34.** Which of the following values indicates the best power factor?
- (a) 0.8
 - (b) 0.5
 - (c) 0
 - (d) 1
- 35.** Which device is commonly used to improve power factor in a pump house?
- (a) Inductor
 - (b) Capacitor
 - (c) Transformer
 - (d) Resistor
- 36.** Which routine task is essential for maintaining an Induction Motor?
- (a) Changing rotor size
 - (b) Removing stator
 - (c) Replacing shaft
 - (d) Lubricating bearings
- 37.** A transformer's breather shows pink silica gel during inspection. What does this indicate?
- (a) Silica gel is functioning normally
 - (b) Oil level is higher than normal
 - (c) Silica gel has absorbed moisture
 - (d) Transformer is running at full load
- 38.** What is the purpose of lightning arrester in a transmission line?
- (a) To divert surge voltage to earth
 - (b) To block power theft
 - (c) To filter harmonics
 - (d) To increase voltage
- 39.** Which device is used to measure the current in transmission lines?
- (a) Energy meter
 - (b) Potential Transformer
 - (c) Wattmeter
 - (d) Current Transformer
- 40.** Which protective device melts to disconnect the circuit in case of overload?
- (a) Relay
 - (b) Circuit Breaker
 - (c) Fuse
 - (d) Contactor
- 41.** Which device is used to automatically break the circuit under fault conditions?
- (a) Circuit Breaker
 - (b) Isolator
 - (c) Relay
 - (d) Capacitor
- 42.** Which tool helps in identifying continuity in cables and connections?
- (a) Earthing rod
 - (b) Test lamp
 - (c) Hydrometer
 - (d) Clamp Meter
- 43.** A submersible motor is suspected to have insulation failure. Which tool should be used to verify it before dismantling?
- (a) Clamp Meter
 - (b) Megger
 - (c) Spanner set
 - (d) Slogging wrench

- 44.** What is the main purpose of using a starter for motors in a pumping station?
- (a) To reduce water flow
 - (b) To cool the motor
 - (c) To limit starting current
 - (d) To increase voltage
- 45.** The starter which primarily uses power electronics to control voltage during motor start is
- (a) Soft starter
 - (b) DOL
 - (c) Star – Delta starter
 - (d) Auto-transformer
- 46.** In internal wiring, what determines the size of wire to be used?
- (a) Room size
 - (b) Load Current
 - (c) Number of lights
 - (d) Wall thickness
- 47.** What should be checked regularly to maintain lead-acid batteries in good condition?
- (a) Cable colour
 - (b) Charger fan speed
 - (c) Size of terminals
 - (d) Electrolyte level
- 48.** During inspection, a large motor is found running with a power factor of 0.65 lagging. What is the likely effect on the electrical system?
- (a) Lower water pressure
 - (b) Higher energy losses
 - (c) Reduced cable length
 - (d) Faster motor speed
- 49.** The device used to isolate a section of a transmission line during maintenance is
- (a) Circuit Breaker
 - (b) Isolator
 - (c) Contactor
 - (d) Current Transformer
- 50.** A pump set draws more current than rated during operation. The most likely electrical cause is
- (a) High voltage supply
 - (b) Proper earthing
 - (c) Motor overloading
 - (d) Low winding temperature

Section - B (25 Marks)

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

Marks for each question is indicated against it.

1. Explain the different types of pipes used in water conveyance along with their advantages and disadvantages. (5)
2. Describe the process of survey and site selection for a water supply reservoir. What are the important factors to be considered? (5)
3. What are the types of Hand Pump Tube Wells (HPTW)? Explain their importance in rural water supply. (5)
4. Write short notes on the following: (5×1=5)
 - (a) Two-pit latrines
 - (b) Septic tanks
 - (c) Soak pits
 - (d) Trenching and composting methods
 - (e) Public latrines

OR

Explain the differences between RCC buildings and Assam-type buildings. Mention their suitability and advantages in different geographical areas. (5)

5. Define solid waste management and explain its characterization and segregation processes. (5)

OR

Discuss the design and advantages of trapezoidal and rectangular sections in open channel flow. Which one is considered more economical and why?

Section - C (25 Marks)

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

Marks for each question is indicated against it.

Attempt all questions

6. What material is commonly used as an earth electrode in electrical systems? (2)
7. What is power factor in an electrical system? (2)
8. What is the role of the rotor in an induction motor? (2)
9. Is a power transformer rated in kW or kVA? What is the relationship between kW and kVA? (2)
10. What electrical quantity is measured using a clamp meter? (2)
11. Why is a Star-Delta starter preferred over a DOL starter for large pump motors? (3)
12. What is the role of a relay in a protection system? (3)
13. Why must a 33kV line be earthed before maintenance? (3)
14. What is the purpose of tightening connections during switchgear maintenance? (3)
15. Calculate the total connected load of a room with 2 lights (40 W each), 1 fan (60 W), and 1 socket outlet (100 W). Also, apply a 20% safety margin. (3)

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