

MIZORAM PUBLIC SERVICE COMMISSION
DEPARTMENTAL EXAMINATION FOR JUNIOR GRADE OF M.E.S. (AE/SDO)
UNDER IRRIGATION & WATER RESOURCES DEPARTMENT
GOVERNMENT OF MIZORAM.
(DECEMBER - 2025)

ENGINEERING PAPER – II
(CIVIL ENGINEERS)

Time Allowed : 3 hours

FM : 100 PM : 40

PART - 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. What is 'Hydrological Cycle'?
 - (a) Process involved in the transfer of moisture from sea to land.
 - (b) Process involved in the transfer of moisture from sea back to sea again.
 - (c) Process involved in the transfer of moisture from snowmelt in mountains to sea.
 - (d) Process involved in the transfer of moisture from sea to land and back to sea again.
2. Humidity is measured by:
 - (a) Hygrometer
 - (b) Hyetometer
 - (c) Hydrometer
 - (d) Pyrheliometer
3. Wind speed is measured by:
 - (a) Current meters
 - (b) Anemometers
 - (c) Weather socks
 - (d) Velocity meters
4. In installing a rain gauge network, the relevant Indian standard (IS:4986 & IS: 4987) recommend that:
 - (a) The density of gauges should be more in plains than in hills
 - (b) In regions having average elevations of 1000m, at least one station in 130km² is desired
 - (c) At least 50% of rain-gauge stations should be of recording type
 - (d) At least 10% of station should be of recording type
5. For which of the following purposes is the double mass curve used?
 - (a) Checking on the consistency of precipitation records.
 - (b) Prediction of annual precipitation.
 - (c) Defining which periods of storm should be analyzed to obtain the maximum useful information from storm rainfall records.
 - (d) For estimating the capacity of a reservoir.

6. The chemical suitable for use as a water evaporation inhibitor:
- (a) Cetyl alcohol
 - (b) Butyl alcohol
 - (c) Methyl alcohol
 - (d) Ethyl alcohol
7. A Lysimeter is an instrument to measure:
- (a) Infiltration rates
 - (b) Evaporation
 - (c) Evapotranspiration
 - (d) Transpiration
8. A rainfall of 1.2cm occurred in a 6h storm. If the phi index was 0.25cm/h, the rainfall excess of this storm was:
- (a) 0.3 cm
 - (b) 0.0
 - (c) 1.5 cm
 - (d) 1.2 cm
9. A unit-hydrograph has:
- (a) One unit of peak discharge
 - (b) One unit of time-base of direct runoff
 - (c) One unit of rainfall duration
 - (d) One unit of direct runoff
10. Viewing watershed as a system, which one of the following assumption is made in the unit graph theory?
- (a) Non-linearity
 - (b) Both linearity and time variance
 - (c) Both time invariance and non-linearity
 - (d) Both linearity and time invariance
11. The probability of a flood, equal to or greater than 1000 years flood, occurring next year is:
- (a) 0.0001
 - (b) 0.001
 - (c) 0.386
 - (d) 0.632
12. The design flood commonly adopted in India for barrage and minor dams is:
- (a) Probable maximum flood
 - (b) A flood of 50 -100 years return period
 - (c) Peak flood
 - (d) Standard project flood or a 100-year flood, whichever is higher
13. Which of the following best defines erosion?
- (a) The breakdown of rocks in place
 - (b) The movement of weathered material by natural agents
 - (c) The formation of soil from rocks
 - (d) The compaction of sediments into rock
14. Which of the following is *not* an agent of erosion?
- (a) Wind
 - (b) Water
 - (c) Ice
 - (d) Temperature
15. Sheet erosion typically occurs when—
- (a) Strong winds lift large rocks
 - (b) Thin layers of topsoil are washed away uniformly by rainfall
 - (c) Water forms deep channels in soil
 - (d) Glaciers melt rapidly

16. Gully erosion is characterized by—
(a) Small rills forming on farmland (b) Deep channels carved by running water
(c) Wind removing loose topsoil (d) Ice dragging rocks along valley floors
17. What is the main principle behind biological methods of soil erosion control?
(a) Use of mechanical barriers (b) Reducing slope steepness
(c) Using vegetation to protect soil (d) Diverting surface water
18. Contour farming is effective because it—
(a) Increases slope gradient (b) Reduces soil fertility
(c) Slows runoff and increases infiltration (d) Encourages rill formation
19. Which vegetative measure helps protect the soil surface from raindrop impact?
(a) Mulching (b) Deep ploughing
(c) Contour trenching (d) Subsoiling
20. Which plant type is most effective in binding soil particles together?
(a) Annual herbs (b) Deep-rooted grasses
(c) Leafy vegetables (d) Shallow-rooted cereals
21. Which of the following biological practices helps in controlling gully erosion?
(a) Grassing gullies (b) Building retaining walls
(c) Constructing contour bunds (d) Check dams
22. The object of surveying is to determine:
(a) Volume of materials
(b) Relative positions of points on the earth's surface
(c) Type of soil
(d) Direction of wind
23. The process of verifying measurements in surveying is known as:
(a) Orientation (b) Calibration
(c) Checking (d) Adjustment
24. Plane surveying assumes that:
(a) Earth is a perfect sphere (b) Earth is flat for small areas
(c) Earth is elliptical (d) Curvature is always considered
25. The branch of surveying that deals with large areas on the earth's surface considering curvature is:
(a) Plane surveying (b) Hydrographic surveying
(c) Geodetic surveying (d) Cadastral surveying
26. The main principle of a chain is based on:
(a) Optical levelling (b) Linear measurement
(c) Angular measurement (d) Magnetic bearing

27. The working principle of a prismatic compass is based on:
- (a) Reflection
 - (b) Refraction
 - (c) Magnetic bearing
 - (d) Optical axis
28. The least count of a theodolite is usually:
- (a) 1°
 - (b) $10'$
 - (c) $20''$
 - (d) $13'$
29. An instrument used to measure horizontal and vertical angles is:
- (a) Dumpy level
 - (b) Theodolite
 - (c) Compass
 - (d) Clinometer
30. The principle of an optical square is based on:
- (a) Law of reflection
 - (b) Law of refraction
 - (c) Trigonometric principle
 - (d) Law of sines
31. The most accurate method of measuring distances is:
- (a) Chain survey
 - (b) Taping
 - (c) EDM (Electronic Distance Measurement)
 - (d) Pacing
32. An error due to incorrect tension in chain is a:
- (a) Cumulative error
 - (b) Compensating error
 - (c) Gross error
 - (d) Random error
33. The correction for slope in chaining is:
- (a) Always positive
 - (b) Always negative
 - (c) Zero
 - (d) Depends on temperature
34. Ranging rods are used for:
- (a) Taking bearings
 - (b) Marking intermediate points on a line
 - (c) Measuring distances directly
 - (d) Leveling operations
35. The length of a standard chain in metric system is:
- (a) 10 m
 - (b) 20 m
 - (c) 30 m
 - (d) 50 m
36. The fundamental principle of levelling is:
- (a) Measurement of horizontal angles
 - (b) Determination of horizontal distances
 - (c) Determining elevation differences by line of sight being horizontal
 - (d) Measurement of vertical angles
37. The main objective of levelling is to determine:
- (a) Bearing of survey lines
 - (b) Relative heights or elevations of points
 - (c) Curvature of the earth
 - (d) Area of a plot

- 38.** The line of collimation must be:
- (a) Vertical to the line of sight
 - (b) Parallel to the axis of the telescope
 - (c) Perpendicular to the vertical axis of the instrument
 - (d) Both (b) and (c)
- 39.** The level line is:
- (a) Tangent to the earth's surface
 - (b) Parallel to the line of sight
 - (c) A curved line equidistant from the earth's center
 - (d) A straight line joining two points
- 40.** The horizontal line of sight in levelling is tangent to:
- (a) The level line at the instrument
 - (b) The vertical line
 - (c) The staff
 - (d) The horizontal plane at the point of observation
- 41.** The Double Mass Curve is adopted to
- (a) estimate the missing data
 - (b) obtain intensities of rainfall at various durations
 - (c) To obtain the amount of storage needed to maintain a demand pattern
 - (d) To check the consistency of data
- 42.** Remote sensing primarily involves the acquisition of information about an object or phenomenon:
- (a) By physical contact
 - (b) Without physical contact
 - (c) Through underground surveys
 - (d) By manual field inspection
- 43.** The satellite sensors used in remote sensing detect:
- (a) Gravitational energy
 - (b) Electromagnetic radiation
 - (c) Sound waves
 - (d) Thermal convection currents
- 44.** The main advantage of remote sensing in water resources planning is:
- (a) It reduces rainfall
 - (b) It provides large-area and repetitive data coverage
 - (c) It requires no technical expertise
 - (d) It replaces all ground surveys
- 45.** Which of the following is a major application of remote sensing in hydrology?
- (a) Measuring soil fertility
 - (b) Monitoring snow cover and glacier melt
 - (c) Measuring air quality
 - (d) Forecasting earthquakes

- 46.** The use of satellite imagery helps in identifying:
- (a) Groundwater recharge zones and drainage patterns
 - (b) Underground oil reservoirs
 - (c) Atmospheric ozone concentration
 - (d) Forest tree height only
- 47.** GPS works on the principle of:
- (a) Triangulation using satellite signals
 - (b) Optical reflection
 - (c) Magnetic north orientation
 - (d) Sound wave propagation
- 48.** The minimum number of satellites required to determine a 3D position (latitude, longitude, elevation) is:
- (a) 2
 - (b) 3
 - (c) 4
 - (d) 5
- 49.** GPS data is widely used in water resources for:
- (a) Mapping river networks and reservoir boundaries
 - (b) Detecting soil minerals
 - (c) Measuring wind direction
 - (d) Determining rainfall intensity directly
- 50.** Integration of Remote Sensing and GPS helps in:
- (a) Producing real-time spatial maps for watershed and irrigation planning
 - (b) Reducing satellite communication speed
 - (c) Controlling dam gates automatically
 - (d) Filtering atmospheric noise

PART- B (Conventional Type) (50 Marks)

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

Marks for each question is indicated against it.

Attempt all questions.

1. Explain the terms 'percolation', 'interception', 'transpiration', 'runoff', 'residence time'. (5)
2. What are the conditions for occurrence of precipitation? (5)
3. Explain the term 'Convective precipitation', 'orographic precipitation', 'cyclonic precipitation' and 'frontal precipitation'. (5)
4. Write brief note on watershed management. (5)
5. How much an effective rainfall of a mean annual runoff of $1\text{m}^3/\text{s}$ from a catchment of area of 10km^2 represents? (5)
6. Describe the information which can be obtained from contour line. (5)
7. Write the different classification of survey based on instrument used. (5)
8. Describe the characteristics of contours (five points). (5)
9. Write the factor to keep in mind during preparation of maps. (5)
10. What is well-conditioned triangle with figure or diagram? (5)

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