

MIZORAM PUBLIC SERVICE COMMISSION
DEPARTMENTAL EXAMINATION FOR JUNIOR ENGINEER
UNDER IRRIGATION AND WATER RESOURCES DEPARTMENT,
GOVERNMENT OF MIZORAM.
(JULY-2025)

ENGINEERING PAPER

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 is the first principle of surveying?
 - (a) Whole to whole
 - (b) Part to part
 - (c) Whole to part
 - (d) Part to whole
2. In which of the following types of surveying are only linear measurements made?
 - (a) Dumpy level
 - (b) Chain surveying
 - (c) Theodolite surveying
 - (d) Contouring
3. Which of the following classifications in surveying is based on the instrument used?
 - (a) Traverse surveying
 - (b) Cadastral surveying
 - (c) Topographic surveying
 - (d) Hydrographic surveying
4. In surveying, levelling deals with measurements in a _____
 - (a) Horizontal plane
 - (b) Inclined plane
 - (c) Vertical plane
 - (d) Both vertical and horizontal plane
5. Type of surveying in which the mean surface of the earth is considered as a plane and the spheroidal shape is neglected called as _____
 - (a) Topographic Surveying
 - (b) Hydrographic Surveying
 - (c) Geodetic Surveying
 - (d) Plane Surveying
6. Number of links in 20 m metric chain is:
 - (a) 80
 - (b) 100
 - (c) 120
 - (d) 150
7. A staff reading taken on a point of known elevation is known as:
 - (a) Fore sight
 - (b) Back Sight
 - (c) Intermediate Sight
 - (d) Turning point

8. Which term is used for the surface to which elevations are referred?
- (a) Benchmark (b) Level line
(c) Horizontal plane (d) Datum
9. Remote sensing uses which of the following waves in its procedure?
- (a) Electro-magnetic waves (b) Electric field
(c) Sonar waves (d) Gamma- rays
10. If r is the radius of the sphere, then the surface area of the sphere is given by;
- (a) $4 \pi r^2$ (b) $2 \pi r^2$
(c) πr^2 (d) $4/3 \pi r^2$
11. A rectangular plot of land is to be excavated 20 m long, 10 m wide and 3m deep. What is the volume of earth to be excavated?
- (a) 500 m^3 (b) 600 m^3
(c) 700 m^3 (d) 800 m^3
12. What is the initial setting time of cement?
- (a) 1 hour (b) 30 minutes
(c) 15 minutes (d) 30 hours
13. What does grade 33 cement indicate?
- (a) Tensile strength of 33 kN/m^2 (b) Tensile strength of 33 N/mm^2
(c) Compressive strength of 33 kN/m^2 (d) Compressive strength of 33 N/mm^2
14. What is the approx. mix proportion for M25?
- (a) 1:3:6 (b) 1:2:4
(c) 1:1.5:3 (d) 1:1:2
15. Concrete placed in cold weather will take _____ time to gain strength.
- (a) No (b) Less
(c) More (d) Equal to hot weather
16. Alumina in excess causes _____.
- (a) Reduces the strength of the cement
(b) Increases the strength of the cement
(c) No change
(d) Sometimes increase or decrease the strength of the cement
17. What is the recommended size of a brick?
- (a) $20 \times 10 \times 10 \text{ cm}$ (b) $20 \times 9 \times 9 \text{ cm}$
(c) $19 \times 9 \times 9 \text{ cm}$ (d) $19 \times 8 \times 8 \text{ cm}$
18. If the slump value of the concrete mix is 60mm, what is the workability level?
- (a) Low (b) Medium
(c) High (d) Very High

19. The approximate cost of a building of cubic content of 400 cu m @ Rs.180/- per cu m is _____
- (a) Rs. 92000/- (b) Rs. 12000/-
(c) Rs. 72000/- (d) Rs. 42000/-
20. To make out an estimate for a work, the following data are necessary-Drawing, Specification and _____
- (a) Materials (b) Rates
(c) Labours (d) Transportation
21. How does the strength of concrete differ with the age of concrete?
- (a) Increases (b) Decreases
(c) No effect (d) Increases, then decreases
22. What is the most accurate method of estimation from the following?
- (a) Building cost index estimate (b) Detailed estimate
(c) Plinth area estimate (d) Cube rate estimate
23. Pick up the item of work not included in the plinth area estimate from the following :
- (a) Wall thickness (b) Verandah area
(c) Room area (d) Courtyard area
24. Seasoning of timber is done to
- (a) Make it waterproof (b) Expel moisture from timber
(c) Increase its strength (d) Heat the timber
25. In an analysis of rates, contractors' profit is calculated at
- (a) 20% (b) 15%
(c) 5% (d) 10%
26. The hydrological cycle
- (a) has a beginning but does not end
(b) has both beginning and end
(c) occurs continuously in nature
(d) has three phases- precipitation, evaporation and runoff
27. Which is not a form of precipitation?
- (a) Water vapour (b) Hail
(c) Drizzle (d) Snow
28. Which factors govern the shape of a hydrograph?
- (a) Climatic factors (b) River characteristics
(c) Climatic and physiographic factors (d) Physiographic factors
29. Irrigation canals are generally aligned along :
- (a) Ridgeline (b) Contour line
(c) Valley line (d) Straight line

30. An irrigation project is classified as a major project when the CCA involved in the project is more than _____
- (a) 2500 hectares (b) 10000 hectares
(c) 2000 hectares (d) 5000 hectares
31. The total area that can be irrigated from a project on its full utilization in a design agricultural area is:
- (a) Ultimate Irrigation Potential (b) Gross Irrigated Area
(c) Irrigation Potential Utilized (d) Irrigation Potential Created
32. The growing of two or more crops on the same piece of land within one calendar year is known as:
- (a) Multiple cropping (b) Inter-cropping
(c) Mono-cropping (d) Sequential
33. Which of the following is a Rabi crop?
- (a) Rice (b) Wheat
(c) Jowar (d) Maize
34. Which method is widely used in India for the computation of consumptive use?
- (a) Penman's equation (b) Hargreaves – Christiansen equation
(c) Blaney-Criddle equation (d) Tanks and lysimeter
35. Which zone is the most important from an irrigation point of view?
- (a) Soil Zone (b) Intermediate Zone
(c) Capillary Zone (d) Saturation Zone
36. How can we improve the duty of water?
- (a) Construction of Weir (b) Construction of Dam
(c) Check Dams (d) Lining of Canals
37. At which point in the entire canal system the duty of water will be more?
- (a) Head of the Minor (b) Head of the Distributary
(c) Head of the Water-course (d) Head of the Branch
38. Which type of irrigation method uses supply ditch, borders, ridges?
- (a) Border Flooding (b) Check Flooding
(c) Basin Flooding (d) Drip Irrigation Method
39. With what type of mounting does a sprinkler irrigation network give the best results?
- (a) Nozzles (b) Open Pipes
(c) Pipes with holes near the crop (d) Revolving Sprinkler Heads
40. In which type of irrigation method, the entire land is not wetted?
- (a) Contour Farming (b) Free Flooding
(c) Furrow Method (d) Basin Flooding
41. What is the main difference between a dam and weir?
- (a) Material used for Construction (b) Height and Duration of Storage
(c) Capacity of Water (d) Location of the Structure

42. When the weight of the weir balances the uplift pressure caused by the head of water seeping below the weir, it is called as _____
- (a) gravity weir (b) non-gravity weir
(c) vertical drop masonry weir (d) concrete glacis weir
43. Gravity dam is most suitable when the foundation is _____
- (a) weak (b) strong
(c) with heavy burden (d) rocky but cracked
44. When an irrigation canal is taken over a drainage channel, the crossing is called:
- (a) An aqueduct (b) Super passage
(c) Level crossing (d) Canal Siphon
45. What is the main advantage of drip irrigation?
- (a) Low initial cost (b) Suitable for all soil type
(c) Easy to install and maintain (d) High water application efficiency
46. Which irrigation method is best suited for orchards and vineyards?
- (a) Flood irrigation (b) Sprinkler irrigation
(c) Drip irrigation (d) Check flooding
47. What is the permissible velocity of water in cement concrete line canal as per IS10430-2000?
- (a) 2.7 m/s (b) 1.6 m/s
(c) 2.6 m/s (d) 1.8 m/s
48. Manning's formula is used for:
- (a) Head loss due to friction in pipes (b) Head loss due to friction in open channel
(c) Flow in open channel (d) Flow in pipes
49. Calculate the hydraulic radius for a channel having a cross-sectional area of 20 m^2 and a wetted perimeter of 50 m.
- (a) 0.4 m (b) 0.8 m
(c) 2.5 m (d) 0.6 m
50. What is the primary function of a head regulator in an irrigation canal system?
- (a) To control the flow of water into the canal.
(b) To measure the velocity of water flow.
(c) To prevent sediment deposition in the canal.
(d) To increase the water level in the canal.

Section - B (50Marks)

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

Marks for each question is indicated against it.

Direction (Questions No. 1 - 10) : Answer the following questions:

(10×3=30)

1. What are the characteristics of contour lines?
2. What do you mean by Representative Fraction (R.F)? When 1 centimetre on a map represents 10 metres on the ground, calculate the Representative Fraction.
3. What are the properties of a good stone to be used for construction?
4. Write short notes on water-cement ratio and its effect on the strength of concrete.
5. Calculate the quantity of Cement, Sand & Aggregate in 6 x 5 m and 80 mm thick and concrete slab in 1:2:4 mix?
6. Define hydrology and explain its importance in water resources management.
7. What is meant by 'Duty' and 'Delta' in irrigation?
8. Differentiate between weirs and barrages.
9. Give an expression for Discharge over a rectangular notch or weir clearly indicating the meaning of all the terms involved in the expression.
10. Define:
 - (a) Aqueduct
 - (b) Super passage
 - (c) Siphon

Direction (Questions No. 11 - 14) : Answer the following questions:

(4×5=20)

11. What is an Estimate? Discuss the different types of estimates.
12. What the methods are commonly used for estimating cut and fill volumes?
13. Describe in detail the methodology for measuring discharge in an open channel flow using the surface float technique.
14. What are the design considerations for the construction of an irrigation channel in hilly terrain?