

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

CIVIL ENGINEERING

***Note :** (i) Normal/Scientific calculator is allowed/needed.
(ii) Indian Standard Code (I.S. Code) is not needed.*

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. In preliminary survey of a road project in hilly region, cross sections are taken generally at:-
(a) 30 m (b) 40 m
(c) 50 m (d) 60 m
2. A first class brick when immersed in cold water for 24 hours should not absorb water more than:-
(a) 15% (b) 20%
(c) 22% (d) 25%
3. In geodetic surveys, higher accuracy is achieved, if:-
(a) Curvature of the earth surface is ignored
(b) Curvature of the earth surface is taken into account
(c) Angles between the curved lines are treated as plane angles
(d) Satellite signal is taken into account
4. Concrete cover is provided to protect the steel reinforcement against:-
(a) Corrosion (b) Shrinkage
(c) Buckling (d) Dust
5. Main ingredient in the cement composition is:-
(a) Silica (b) Lime
(c) Clay (d) Alumina
6. The minimum diameter of steel in Column is:-
(a) 12 mm (b) 10 mm
(c) 16 mm (d) 20 mm
7. The characteristic used to define the grade of concrete is:-
(a) Tensile strength (b) Compressive strength
(c) Density (d) Neutral axis

8. The timber floor not spanning on the masonry wall but properly anchored to the wall gives:-
- (a) Lateral restraint but not rotational restraint
 - (b) Rotational restraint but not lateral restraint
 - (c) Both lateral and rotational restraint
 - (d) Neither lateral nor rotational restraint
9. The minimum compressive strength of 1st class bricks should be:-
- (a) 75 kg/cm²
 - (b) 90 kg/cm²
 - (c) 100 kg/cm²
 - (d) 120 kg/cm²
10. An imaginary line joining the points of equal elevation on the surface of the earth represents:-
- (a) Contour surface
 - (b) Contour line
 - (c) Level line
 - (d) Contour gradient
11. First class timber has an average life of:-
- (a) More than 10 years
 - (b) 5 to 10 years
 - (c) Less than one year
 - (d) 1 to 5 years
12. Strength of cement concrete primarily depends upon:-
- (a) Quality of water
 - (b) Quantity of aggregate
 - (c) Quantity of cement
 - (d) Water-cement ratio
13. When a vehicle traces a horizontal curve, it is subjected to centrifugal force in a direction of:-
- (a) Inward
 - (b) Outward
 - (c) Forward
 - (d) Upward
14. In a mortar, the binding material is:-
- (a) Cement
 - (b) Sand
 - (c) Surkhi (Brick dust)
 - (d) Cinder
15. Where does the neutral axis by Working Stress Method of the reinforced beam pass through?
- (a) Centre of gravity of the concrete section
 - (b) Centroid of the transformed section
 - (c) Centroid of the concrete section
 - (d) Centroid of the structure
16. The least cover provided in beam is:-
- (a) 20 mm
 - (b) 25 mm
 - (c) 30 mm
 - (d) 15 mm
17. The unit weight per running meter of 12 mm dia. steel bar is:-
- (a) 0.89 kg
 - (b) 0.62 kg
 - (c) 0.78 kg
 - (d) 0.65 kg
18. The bond strength of concrete increases with:-
- (a) The quality of steel
 - (b) The tensile strength of the steel
 - (c) The grade of concrete
 - (d) The quality of sand

- 19.** The stone suitable for rubble masonry should be:-
- (a) Hard
 - (b) Tough
 - (c) Heavy
 - (d) Light
- 20.** The common feature in hill road is:-
- (a) U turn
 - (b) Hair pin bend
 - (c) Speed limit
 - (d) Landslide
- 21.** After storage, the strength of cement:-
- (a) Decreases
 - (b) Increases
 - (c) Remains same
 - (d) May increase or decrease
- 22.** The mix ratio for M-20 grade of concrete is:-
- (a) 1:1.5:3
 - (b) 1:2:4
 - (c) 1:3:6
 - (d) 1:2:6
- 23.** The standard thickness of ceiling plaster is:-
- (a) 6 mm
 - (b) 10 mm
 - (c) 12 mm
 - (d) 15 mm
- 24.** The slope of stair should not exceed:-
- (a) 30^0
 - (b) 40^0
 - (c) 35^0
 - (d) 45^0
- 25.** Number of standard bricks required for 1 m^3 is:-
- (a) 700
 - (b) 600
 - (c) 500
 - (d) 550
- 26.** A key consideration when selecting a site for a Small Hydel Project is:-
- (a) Distance from major cities
 - (b) Availability of suitable land for construction of weir
 - (c) Proximity to existing transmission lines
 - (d) Availability of skilled labor
- 27.** The key factor in determining the power output of a Small Hydel Project is:-
- (a) The size of the penstock
 - (b) The type of turbine used
 - (c) The head and flow rate of water
 - (d) The material of the dam
- 28.** The “Head” in a Small Hydel Project is:-
- (a) The depth of the river
 - (b) The depth of the reservoir
 - (c) The difference in elevation between the water surface at the intake and the turbine
 - (d) The length of the penstock
- 29.** The excess power available over the firm power during the off peak hours is:-
- (a) Firm power
 - (b) Secondary power
 - (c) Installed capacity
 - (d) Peak load

- 30.** Penstocks are opened or closed conduits that carry water to the:-
- (a) Forebay
 - (b) Power channel
 - (c) Turbines
 - (d) Reservoir
- 31.** The primary function of a trash rack in a Small Hydel Project is to:-
- (a) Regulate water flow
 - (b) Prevent debris from entering the turbine
 - (c) Increase water pressure
 - (d) Generate electricity
- 32.** The amount of electrical energy that can be generated at Small Hydel Project depends upon:-
- (a) Head of water
 - (b) Quantity of water
 - (c) Efficiency of Alternator
 - (d) Diameter of Penstock
- 33.** The most common type of turbine used in low-head, high-flow in Small Hydel Project is:-
- (a) Pelton
 - (b) Francis
 - (c) Kaplan
 - (d) Turgo
- 34.** The term “Gross Head” in a Small Hydel Project refers to:-
- (a) The difference in water level between the forebay and the tailrace
 - (b) The pressure of water at the turbine inlet
 - (c) The height of the dam
 - (d) The total capacity of the reservoir
- 35.** The type of turbine used in Small Hydel Project for a water head range of 70 meter – 500 meter is:-
- (a) Pelton
 - (b) Kaplan
 - (c) Francis
 - (d) Propeller
- 36.** The capacity range of a Small Hydel Project in India is:-
- (a) Up to 1 MW
 - (b) Up to 10 MW
 - (c) Up to 25 MW
 - (d) Above 25 MW
- 37.** Small Hydel Projects are generally considered as:-
- (a) Renewable and sustainable
 - (b) High maintenance
 - (c) Environmentally damaging
 - (d) Expensive to operate
- 38.** The structure that allows overflow of water to the downstream side when the reservoir is full is called:-
- (a) Power channel
 - (b) Penstock
 - (c) Spillway
 - (d) Forebay
- 39.** To ensure maximum overall plant efficiency, the rated head should be equal to:-
- (a) Design head
 - (b) Gross head
 - (c) Operating head
 - (d) Net head

- 40.** The Small Hydel Project without reservoirs where water is used at the rate at which it runs in the river is called:-
- (a) Diversion weir
 - (b) Pump storage pump
 - (c) Run-of-the-river
 - (d) Head loss
- 41.** The difference in height of the water level between the level in storage and tailrace is called:-
- (a) Net head
 - (b) Gross head
 - (c) Rated head
 - (d) Design head
- 42.** The switching station which is the main link between the generating plant and the transmission system is called:-
- (a) Switchyard
 - (b) Power House
 - (c) Turbine
 - (d) Generator
- 43.** The net amount of power which is continuously available from a plant is:-
- (a) Firm power
 - (b) Secondary power
 - (c) Installed capacity
 - (d) Primary power
- 44.** The opened or closed conduits that carry water to the turbines is:-
- (a) Power channel
 - (b) Penstock
 - (c) Desilting Tank
 - (d) Forebay
- 45.** The fuel for Small Hydel Project is:-
- (a) Water
 - (b) Petrol
 - (c) Hydrogen
 - (d) Diesel
- 46.** The volume of water level stored between the full reservoir level and minimum pool level is:-
- (a) Live storage
 - (b) Dead storage
 - (c) Reservoir
 - (d) Spillway
- 47.** The maximum power which can be developed by generators at normal head with full flow is:-
- (a) Load factor
 - (b) Installed capacity
 - (c) Peak load
 - (d) Average load
- 48.** Which of the following is not a typical component of a Small Hydel Project?
- (a) Intake structure
 - (b) Penstock
 - (c) Surge tank
 - (d) Nuclear reactor
- 49.** Which of the following is not a requirement for site selection of Small Hydel Project?
- (a) Availability of water
 - (b) Large catchment area
 - (c) Sedimentation
 - (d) Rocky land
- 50.** In a Small Hydel Project, which part is responsible for generating electricity?
- (a) Power House
 - (b) Reservoir
 - (c) Dam
 - (d) Penstock

Section - B (50 Marks)

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

Marks for each question is indicated against it.

1. Prepare the estimate for Half brick masonry with first class brick in superstructure above plinth level in cement mortar 1:3 (1 cement : 3 coarse sand) from the following given data. **(10)**
 - (a) Length of wall = 5.00 m.
 - (b) Height of the building = 4.00 m.
 - (c) Rate of half brick masonry = ₹1,600.00/m².
 - (d) Cement paint = ₹100/ m².
 - (e) Rate of 12 mm cement plaster 1:3 = ₹300/m².
 - (f) Cost Index = 20%.
2. Explain the meaning of any three of the following terms: **(3×5=15)**
 - (a) Water Cement Ratio
 - (b) Super elevation
 - (c) Camber
 - (d) Gradient
 - (e) Curing of concrete
3. Sketch the general layout of Small Hydel Project (SHP) from the following given components: **(10)**
 - (a) Diversion Weir
 - (b) Power House
 - (c) Forebay
 - (d) Penstock
 - (e) Switchyard
 - (f) Power Channel
 - (g) Desilting Tank.
4. Write down the four methods for measuring water discharge of a river and explain any two in details. **(4+5½+5½=15)**

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