

MIZORAM PUBLIC SERVICE COMMISSION
DEPARTMENTAL EXAMINATION FOR JUNIOR GRADE OF M.E.S. (AE/SDO)
UNDER POWER & ELECTRICITY DEPARTMENT,
GOVERNMENT OF MIZORAM.
(JULY-2025).

ENGINEERING PAPER – I
(CIVIL WING)

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. The difference in Elevation between the water levels behind the Forebay/Dam and the water level in Tailrace.
(a) Net head (b) **Gross head**
(c) Rated head (d) Design head
2. What type of Dam you will propose where you could not find hard/rock foundation :-
(a) Arch Dam (b) **Earthen Dam**
(c) Concrete Gravity Dam (d) Masonry Dam
3. For selection of river gauging sites, we should select site where :-
(a) There is a sharp bend in the river (b) There is exposure of direct wind blow.
(c) The site is not easily accessible (d) **The river banks and bed are straight**
4. Silt samples are collected to analyse the
(a) Velocity of water along the river
(b) Quantity of sand available for construction
(c) **Grain size distribution and chemical properties**
(d) Rugosity of the river
5. The head at which peak efficiency is desired
(a) Gross head (b) **Design head**
(c) Net head (d) Rated head
6. Unit Hydrograph is used to estimate
(a) Rainfall (b) **Flood discharge**
(c) Snowfall (d) Evaporation

7. Manning's formula is used to calculate
- (a) **Velocity in open channel flow**
 - (b) Run-off in catchment area
 - (c) Design flood
 - (d) Sedimentation in a reservoir
8. For computation of energy generation, the losses considered for auxiliary consumption is
- (a) **0.50 %**
 - (b) 1 %
 - (c) 1.50 %
 - (d) 2 %
9. Full form of CWC under Ministry of Jal Shakti
- (a) Central Water Committee
 - (b) **Central Water Commission**
 - (c) Community Water Committee
 - (d) Commission for Water Conservation
10. The area of land draining into a stream or a water course at a given location
- (a) **Catchment area**
 - (b) Drainage
 - (c) Command area
 - (d) Cultivable area
11. Slope – area method
- (a) **Indirect determination of streamflow**
 - (b) Direct determination of streamflow
 - (c) Catchment area calculation
 - (d) Measurement of slope of stream
12. Isohyet is the line joining all places having
- (a) Same atmospheric pressure
 - (b) **Same rainfall**
 - (c) Same temperature
 - (d) Same depth of ground water table
13. The most commonly used instrument to measure the velocity at a point in the flow cross section is the
- (a) Bubble gauge
 - (b) Piezometer
 - (c) **Current meter**
 - (d) Venturiflume
14. Mass inflow curve is a graph between the cumulative inflow in the reservoir with
- (a) Time
 - (b) Velocity
 - (c) Area
 - (d) Volume
15. As per guidelines issued by CEA for planning of small hydro projects, flow available considered in percentage dependable year is
- (a) 50%
 - (b) 60%
 - (c) **75%**
 - (d) 80%
16. The total capacity of all the turbine –generator units installed in the power house is called
- (a) Load capacity
 - (b) **Installed capacity**
 - (c) Dependable capacity
 - (d) Turbine capacity
17. The net amount of power which is continuously available from the plant without break on a firm or guaranteed basis is known as
- (a) **Firm Power**
 - (b) Secondary power
 - (c) Power demand
 - (d) Instantaneous power
18. In Power potential studies, Power factor can never be greater than
- (a) **1**
 - (b) 1.50
 - (c) 2
 - (d) 2.50

19. The elevation of water level which produces minimum net head on the power units is known as
(a) Normal Water level (b) **Minimum Water level**
(c) Weighted Average level (d) Full Reservoir level
20. It is the gross head less all hydraulic losses except those chargeable to the turbine.
(a) Gross head (b) Design head
(c) **Net head** (d) Rated head
21. Friction loss is the hydraulic loss considered in
(a) Power Channel (b) Forebay
(c) **Penstock** (d) Intake gate
22. Ultrasonic method of discharge measurement
(a) **Direct determination** (b) Indirect determination
(c) Laboratory method (d) None of the above
23. V-notch are recommended for measurement of discharge upto
(a) 1.00 cumecs (b) **1.25 cumecs**
(c) 1.50 cumecs (d) 1.75 cumecs
24. This velocity measurement with current meter requires less time and funds for observation
(a) **One-point method** (b) Two-point method
(c) Three -point method (d) 0.20 depth method
25. In river gauging, the width of the river is divided into a number of segments for fixing the number and position of segments, this is called
(a) Gauge Division (b) **Segmentation**
(c) Area division (d) Gauge fixation
26. Radial gates are Hydro mechanical equipment usually installed in
(a) Sluice Opening (b) **Spillway**
(c) Draft Tube (d) Penstock
27. Main Inlet Valve (MIV) are installed
(a) **Just before Turbine** (b) Near the Forebay
(c) Near the Intake Gate (d) Near the Draft Tube.
28. In Reaction turbines, the turbine blades are set at a depth below the minimum tail water to prevent
(a) Leakage (b) **Cavitation**
(c) Rusting (d) Water hammer
29. For a good stone, percentage absorption by weight after 24 hours should not exceed
(a) 0.50 (b) **0.60**
(c) 0.70 (d) 0.80
30. For a good building stone, its specific gravity should be more than
(a) 2.50 (b) **2.70**
(c) 3.0 (d) 2.50

31. First class brick should not absorb water more than
(a) 10 % (b) **20 %**
(c) 30 % (d) 40 %
32. As per BIS : 1077-1957 , the minimum crushing strength of bricks is
(a) **3.50 N/mm²** (b) 4.50 N/mm²
(c) 5.50 N/mm² (d) 6.00 N/mm²
33. In India the recommended size of brick by BIS is
(a) 20 cm x 10 cm x 10 cm (b) **19 cm x 9 cm x 9 cm**
(c) 18 cm x 10 cm x 10 cm (d) 19 cm x 10cm x 10 cm
34. Name of structure constructed provided along the water conductor for facility of emptying the water conductor for maintenance or when in distress
(a) Canal fall (b) **Surplus Escape**
(c) Spillway (d) Sluice gate
35. Energy dissipating structure below the Spillway
(a) **Stilling basin** (b) Chute basin
(c) Canal fall (d) Trench Weir
36. The most economical section of a rectangular channel is one which has hydraulic radius equal to
(a) **Half the depth** (b) Half the breadth
(c) Depth is thrice the breadth (d) Twice the breadth
37. Highest efficiency is obtained when a channel has a section which is
(a) Circular (b) Rectangular
(c) **Trapezoidal** (d) Triangular
38. The recommended design flood for Spillways of Major project is
(a) Standard project flood (b) Flood having frequency of 100 years
(c) **Maximum probable flood** (d) Flood having frequency of 50 years
39. Hydraulic turbine develops 1600 KW while running at 375 rpm under 8.00m head. The Turbine should be
(a) **Kaplan turbine** (b) Francis turbine
(c) Pelton turbine (d) Turgo Impulse turbine
40. In Gravity Dam, the major external force acting on the Dam is
(a) Uplift pressure (b) **Water pressure**
(c) Wave pressure (d) Pressure due to earthquake forces
41. Pelton turbine is a
(a) **Velocity turbine** (b) Reaction turbine
(c) Pressure turbine (d) None of the above
42. In a Francis turbine, the water
(a) Flows out openly (b) **Flows out through a closed draft tube**
(c) Both of the above (d) None of the above

43. Shear key is usually provided at the bottom of a Gravity Dam to increase frictional resistance. It is usually provided
- (a) Near the toe
 - (b) **Near the heel**
 - (c) At the middle base
 - (d) None of the above
44. The most preferred soil for the central impervious core of a zoned embankment type of earthen dam is
- (a) Highly impervious clay
 - (b) Highly pervious gravel
 - (c) Coarse sand
 - (d) **Clay mixed with fine sand**
45. The process of laying and compacting earth in layers by Power roller under Optimum Moisture content (OMC) for construction of earthen dam is known as
- (a) **Rolled fill method**
 - (b) Hydraulic fill method
 - (c) OMC method
 - (d) Compaction method
46. The safety valve of a dam is its
- (a) Drainage gallery
 - (b) Inspection gallery
 - (c) **Spillway**
 - (d) Under Sluice
47. The outlet provided in a dam body, to release water for downstream water demand is known as
- (a) Spillway
 - (b) **Sluiceway**
 - (c) Under Sluice
 - (d) Waterway
48. A channel is said to be most economical cross-section, if
- (a) It gives maximum discharge for a given cross-sectional area
 - (b) **It has minimum wetted perimeter**
 - (c) It involves less excavation for the channel
 - (d) It has maximum wetted perimeter
49. The process of filling and finishing exposed mortar joints between bricks, stones or other masonry unit is
- (a) Plastering
 - (b) **Pointing**
 - (c) Scaling
 - (d) Raking
50. The method of preventing moisture from entering building structure, particularly through foundation and walls
- (a) **Damp proofing**
 - (b) Painting
 - (c) Distempering
 - (d) White washing

SECTION- B (Conventional Type) (50 Marks)

*This Section should be answered only on the **Answer Sheet** provided.
Marks for each question is indicated against it.*

Answer all the Questions (Scientific calculator may be used if required)

1. A river gauging station at Tlawng river has the following readings at the time taken by a float at the gauging site. The distance between the Initial and final point of velocity measurement was 30 m. If the area of flow was 27 sqm, find the discharge at the river. (10)
t₁ = 24 secs
t₂ = 27 secs
t₃ = 21 secs
2. Calculate the discharge required to generate a Power of 2000kW if the net head of the hydro power plant is 180 m. Consider the overall efficiency to be 80%. (10)
3. What are the three type of Notches for measuring discharge ? (3)
4. Mention any two different topographical survey to be conducted for a water conductor system in a Hydro Electric Project? (2)
5. Calculate the size required for a torebay tank having a design discharge of 4 cumecs having a detention period of 5 minutes. (8)
6. Mention the type of turbines and mention the ranges of its utilization ? (2×3=6)
7. Name one each of Run-of river scheme and Storage scheme Hydro Electric Project in Mizoram? (4)
8. Give the two differences between a Gravity Dam and an Earthen Dam ? (4)
9. Explain why expansion joint are installed in a steel penstock pipe? (3)

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