

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

ENGINEERING PAPER
(Civil 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. A cement bag of 50 kg in litre is approximately-
(a) 30 litre (b) 35 litre
(c) 40 litre (d) 42 litre
2. In 1 cum of 1:1.5:3 cement concrete, cement quantity is-
(a) 350 kgs (b) 476 kgs
(c) 500 kgs (d) 400kgs
3. The cost of form work estimated for concrete structure is-
(a) $\frac{1}{2}$ to $\frac{1}{3}$ of total cost of concrete structure
(b) $\frac{1}{3}$ to $\frac{1}{4}$ of total cost of concrete structure.
(c) $\frac{1}{4}$ to $\frac{1}{5}$ of total cost of concrete structure.
(d) $\frac{1}{5}$ to $\frac{1}{6}$ of total cost of concrete structure.
4. The standard weight of 1m length 16mm dia reinforcing bar is-
(a) 1.59 kg (b) 1.58kg
(c) 0.89 kgs (d) 1.5 kgs
5. What is the number of bricks taken in analysis of cost for 1sqm half brick wall?
(a) 49.5 nos (b) 52 nos
(c) 52.5 nos (d) 56.5nos
6. What is the unit weight of RCC and PCC in kN/cum?
(a) 24 and 25 respectively (b) 25 and 24 respectively
(c) 23 and 22 respectively (d) 20 and 19 respectively

7. What is quantity of cement in 1cum of Cement mortar 1:3?
- (a) 495 kgs (b) 525kgs
(c) 400kgs (d) 510kgs
8. Which has the highest Coefficient of steel for estimation, Beam, Column, slab or footing?
- (a) Slab (b) Column
(c) Beam (d) Footing
9. Formation width of NH Standard Double lane road is-
- (a) 12m (b) 10m
(c) 10.5m (d) 13m
10. What is the ruling gradient on steep terrain?
- (a) 1:16 (b) 1:16.5
(c) 1:16.7 (d) 1:20
11. Water absorption when kept immersed in water for 24hrs for 1st class bricks should not be more than-
- (a) 15% (b) 20%
(c) 25% (d) 22%
12. The main three constituents of cement are-
- (a) Aluminium, lime and Sulphur (b) Lime, alumina and magnesium
(c) Lime, magnesium and manganese (d) Lime, silica and alumina
13. Vicat's apparatus is used for testing-
- (a) Initial and Final Setting time of cement (b) Specific gravity of cement
(c) Fineness of Cement (d) Soundness of Cement
14. The function of base in paint is-
- (a) To provide film on surface (b) To hide imperfections of surface
(c) To reduce shrinkage cracks in paint film (d) To bring down the overall cost
15. What is the recommended side slope of road cutting in ordinary soils including moorum and hard clay? (in vertical to horizontal)
- (a) 1:1 to 1:1.5 (b) 1:2
(c) 1:2 to 1:2.5 (d) 1:1.5 to 1:2
16. What is the recommended side slope of road cutting in soft rock and shale? (in vertical to horizontal)
- (a) 1:1 to 1:1.5 (b) 1:1/5 to 1:1/9
(c) 1:1/4 to 1:1/8 (d) 1:1.5 to 1:2
17. California Bearing Ratio (CBR) test is used-
- (a) to evaluate the stability of soil subgrade (b) to evaluate thickness of soil subgrade
(c) to measure moisture content of soil (d) to evaluate bearing capacity of soil

- 18.** The aggregate impact value of aggregate to be used in wearing course of pavement is-
- (a) less than or equal to 30%
 - (b) less than or equal to 40%
 - (c) less than 35%
 - (d) more than 25%
- 19.** The aggregate impact value of aggregate to be used in water bound macadam base course is-
- (a) less than or equal to 35%
 - (b) less than or equal to 40%
 - (c) less than 45%
 - (d) more than 30%
- 20.** Which of the following is not the desirable property of soil as highway material?
- (a) Stability
 - (b) Good drainage
 - (c) Ease of compaction
 - (d) Compressibility
- 21.** Based on structural behavior, pavements are generally classified into two categories.
- (a) Bituminous & Concrete
 - (b) Flexible and rigid
 - (c) WBM & WMM
 - (d) All weather and fair weather
- 22.** Dry lean concrete is used in concrete pavement as-
- (a) wearing course
 - (b) base course
 - (c) subgrade
 - (d) sub-surface drainage
- 23.** Joints in cement concrete pavement are provided.
- (a) to take care of wheel load.
 - (b) to reduce temperature stresses
 - (c) to allow drainage
 - (d) for ease of construction
- 24.** Dowel Bars are provided in concrete pavement-
- (a) to tie the different block of concrete
 - (b) to transfer load from one block to other
 - (c) to act as reinforcing steel
 - (d) to prevent cracks in the pavement
- 25.** The Flexible pavement consist the following components-
- (a) Subgrade, GSB, BM & surface course
 - (b) Subgrade, Sub-base, Base & Surface course
 - (c) Subgrade, Dry Lean concrete, WBM, Wearing course
 - (d) Subgrade, WBM, WMM & Concrete
- 26.** The desired temperature range of Bitumen when mixing is-
- (a) 120 degree centigrade – 130 degree centigrade
 - (b) 110 degree centigrade – 140 degree centigrade
 - (c) 150 degree centigrade – 177 degree centigrade
 - (d) 160 degree centigrade – 187 degree centigrade
- 27.** The desired temperature range of Bitumen when spreading at the location of laying is-
- (a) 121 degree centigrade – 163 degree centigrade
 - (b) 110 degree centigrade – 140 degree centigrade
 - (c) 150 degree centigrade – 177 degree centigrade
 - (d) 160 degree centigrade – 187 degree centigrade

28. Rolling of bituminous layer is done-

- (a) from centre to edge
- (b) from edge to centre
- (c) in anyway the operator like but at required speed
- (d) start on the two edges and then to centre

29. The rolling speed for rolling bituminous concrete is-

- (a) not more than 10km/hr
- (b) between 5 – 10 km/hr
- (c) not more than 5km/hr
- (d) bot more than 7km/hr

30. What is the function of Catch water drain?

- (a) To drain water from pavement surface
- (b) It is another form of subsurface drainage
- (c) To prevent water from hillside falling to road pavement
- (d) To drain water coming from weep hole.

31. The length of Cross drainage structure considered as culvert is-

- (a) Upto 6m
- (b) 1.2m to 5m
- (c) Upto 5m
- (d) 1m to 1.5m

32. While choosing ideal bridge site, which of the following below is not a desirable characteristic of the bridge site?

- (a) Straight reach of the river
- (b) A slow current portion having wide channel.
- (c) Suitable high banks above HFL on each side
- (d) Rock or other hard inerodible strata close to the river bed level.

33. What is the first step for selecting suitable bridge site for major bridge?

- (a) Preliminary Survey
- (b) Detailed Survey
- (c) Hydrological survey
- (d) Reconnaissance survey

34. Causeway is one type of-

- (a) Bridge
- (b) Subsurface drainage
- (c) Cross drainage
- (d) Culvert

35. Type of foundation appropriate when a column is to be placed right on the edge of boundary.

- (a) Combined footing
- (b) Isolated footing
- (c) Raft foundation
- (d) Pile foundation

36. Which of the following is deep foundation?

- (a) Open foundation
- (b) Mat foundation
- (c) Pile foundation
- (d) Isolated footing

37. What is the code of practice for Design loads (other than earthquake) for buildings and structures, Dead loads-unit weights of building material and stored material?
- (a) IS 456 2000 (b) IS 456 1987
(c) IS 875 1987 Part 1 (d) IS 1950-1962
38. What is basic function of steel in RCC?
- (a) To take compressive force (b) To take tensile force
(c) To improve bonding (d) To improve durability
39. The bond between steel and surrounding concrete ensures-
- (a) Stress compatibility (b) Linear distribution of load
(c) Strain compatibility (d) Less cracking in concrete
40. The bond strength of steel and concrete is enhanced by various measures. Which of the following do not enhance bond strength?
- (a) Deformed bars are used instead of Plain bars (b) Bigger bar diameters are used
(c) Higher grade of concrete is used (d) Increased cover is provided.
41. When bars of two different diameters are to be spliced, the lap length should be calculated on the basis of-
- (a) Larger diameter bars (b) Both the diameters together
(c) Smaller diameter bars (d) Diameter of standard bar
42. Codes specifies lower bond resistance for the top reinforcement in beam because-
- (a) Top reinforcement in a beam is more important and hence lower bond resistance is given for having longer development length.
(b) There is a possibility of air trapped beneath the upper reinforcement and thereby weakening the bond.
(c) The higher part of concrete in a beam have lower strength.
(d) The top part is exposed to air after casting so the concrete on the upper part is weaker.
43. As per Hookes law, stress is directly proportional to strain upto-
- (a) Plastic limit (b) Yield point
(c) Elastic limit (d) Ultimate strength
44. Proper grading of aggregates in concrete improves-
- (a) Workability (b) Slump
(c) Density (d) Setting time of concrete
45. The unit of strain is-
- (a) mm (b) N/sqmm
(c) Mpa (d) Dimensionless
46. Finer the cement, the need for water for hydration and workability-
- (a) Reduces (b) Same for all size of cement
(c) Reduces to great extent (d) Increases

47. What is quantity of cement in 1cum of Cement mortar 1:4?
(a) 400kgs (b) 340kgs
(c) 380kgs (Building SOR 19 analysis) (d) 420kgs
48. For complete hydration of cement the water cement ratio required is about-
(a) 0.25 (b) 0.35
(c) 0.15 (d) 0.40
49. Curing is of particular importance in situation where-
(a) The water-Cement ratio is high
(b) The water-Cement ratio is low
(c) Temperature of surrounding environment is low
(d) There is high humidity
50. The maximum stress of concrete is reached at a strain approximately equal to-
(a) 0.003 (b) 0.03
(c) 0.002 (d) 0.02

Section - B (50Marks)

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

Marks for each question is indicated against it.

1. What are the various headings in preparing project estimate? (3)
2. Name the different categories of road classification based on location and function. (4)
3. What is camber? Why is it provided in road construction? (3)
4. What is summit curve? (2)
5. What is right of way? (2)
6. What are characteristic of Good Brick? (4)
7. What are the different types of cement? Write down their applications? (4)
8. What are the different stages of road survey? Please elaborate. (5)
9. Name at least 5(five) tests to decide the suitability of road stones (aggregates) for use in road construction. (5)
10. What is the importance and merits of providing road side drain? (4)
11. What is the difference between shuttering and staging? (3)
12. What will be the strain value when 16mm dia bar of 1m length is subjected to 100kN force? Take E Value of rod (steel) as 2,00,000. Please show the procedure of the solution. (4)
13. What is water cement ratio? What is its effect on strength of concrete? (3)
14. Write down 2 points each on dos and dongs of survey instrument. (4)