

# MIZORAM PUBLIC SERVICE COMMISSION

## GENERAL COMPETITIVE EXAMINATIONS FOR RECRUITMENT TO THE POST OF JUNIOR ENGINEER UNDER PUBLIC WORKS DEPARTMENT NOVEMBER, 2018

### CIVIL ENGINEERING PAPER-I

Time Allowed : 2 hours

Full Marks : 150

*All questions carry equal marks of two (2) each. Attempt all questions.*

- The water year in India is between:-
  - 1<sup>st</sup> April to 31<sup>st</sup> March of the following calendar year
  - 1<sup>st</sup> January to 31<sup>st</sup> December of the calendar year
  - 1<sup>st</sup> June to 31<sup>st</sup> May of the following calendar year
  - 1<sup>st</sup> May to 31<sup>st</sup> April of the following calendar year
- Which of the following is not a form of precipitation:-
  - Drizzle
  - Sleet
  - Snow
  - None of these
- The Raingauges utmost use in mountainous and inaccessible places is:-
  - Weighing Bucket type
  - Telemetering Raingauges
  - Natural Syphon type
  - Tipping Bucket
- The method to convert the point rainfall at various locations into an average value over the catchment area in which the rainfall recorded at each station is given a weightage on the basis of an area closest to the station is:-
  - Isohyetal Method
  - Arithmetical-Mean method
  - Thiessen-Mean method
  - Double-mass curve technique
- The initial loss of precipitation for runoff consists of:-
  - Interception process and Depression storage
  - Infiltration and Transpiration
  - Interception and Infiltration
  - Transpiration and Depression storage
- Lysimeter is used to measure:-
  - Infiltration
  - Evapotranspiration
  - Evaporation
  - Vapor pressure
- The convenient starting point to describe the hydrologic cycle is:-
  - Surface runoff
  - Clouds
  - Ocean
  - Underground water
- which one of the following formations has the highest specific yield for ground water harvesting:-
  - Clay
  - Shale
  - Sand
  - Gravel

9. The method for reduction of reservoir evaporation limited to small water bodies such as ponds etc. Is:-
- (a) Reduction of surface area
  - (b) Mechanical covers
  - (c) Chemical films application
  - (d) None of these
10. The intercepted precipitation that drips off the plant leaves to join the ground surface or the surface flow is known as:-
- (a) throughfall
  - (b) stemflow
  - (c) Mass-transfer
  - (d) None of the above
11. One of the purposes of Rain water harvesting and conservation is to:-
- (a) Enhance the quantity of surface run-off to Rivers or Streams
  - (b) Help maximize the evaporation loss for hydrologic cycle
  - (c) Augment the sustainable yield of Ground water
  - (d) Prevent excessive waste of water supply by the consumers
12. The kind of precipitation not considered in the calculation of rain water harvesting potential over an area from the following is:-
- (a) Drizzle
  - (b) First flush of rain
  - (c) Glaze
  - (d) None of these
13. Generally, rainfall should be stored for drinking with a small domestic sized water tank in a region where:-
- (a) the period between rainy season and dry season is short
  - (b) there is a very high rainfall intensity occurs only during a short rainy season in a year
  - (c) there is no considerable rainfall through out the year
  - (d) the total annual rainfall occurs only during 3 to 4 months and a long period of dry season
14. Which among the followings is not a type of recharge structure of ground water:-
- (a) Abandoned dug well
  - (b) Hand pump
  - (c) Trench
  - (d) Downspouts
15. Any man made scheme or facility that adds water to an aquifer is referred to as:-
- (a) Percolation
  - (b) Recharge
  - (c) Precipitation
  - (d) Sedimentation
16. Choose one of the Sub-Classifications of serviceability limit state in a limit state design method of RCC members from the followings: -
- (a) Cracking
  - (b) Flexure
  - (c) Shear
  - (d) Torsion
17. Choose the incorrect statement with reference to working stress method of RCC design:-
- (a) It gives higher percentage of compression steels in comparison with Limit state method
  - (b) It deals with the elastic behaviour of the member, thus giving the real strength of the member
  - (c) The modular ratio utilised in the design is an imaginary quantity
  - (d) It results to uneconomical sections while designing a compression member
18. The limit state of durability of RCC structure is achieved by:-
- (a) designing a member to allow over loading
  - (b) strictly following the empirical bar detailing rules as specified in the codes
  - (c) providing cover for steel, following the limits of cement content and water-cement ratio as provided in the code
  - (d) limiting the span-depth ratio as specified by the code

19. The design load to be used in the designing with limit state method for RCC members is :
- (a) Elastic load
  - (b) Working load
  - (c) Mean ultimate load
  - (d) Factored load
20. The presence of which of the following substances in water or aggregate beyond permissible limit can cause corrosion of steel in an RCC members:-
- (a) Chlorides
  - (b) Sulphates
  - (c) Nitrates
  - (d) Phosphates
21. According to IS:456 (2000), the pH value of water for cement concrete works should not fall below:-
- (a) 4
  - (b) 5
  - (c) 6
  - (d) 9
22. In the theory of Limit state design of singly re-inforced members in bending, the ultimate failure strain of the concrete is assumed as:-
- (a) 0.02
  - (b) 0.002
  - (c) 0.035
  - (d) 0.0035
23. The side re-inforcement in a beam are provided along the two faces if the total depth of beam is:-
- (a) equal to 750 mm
  - (b) greater than 750 mm
  - (c) between 750 mm to 900 mm
  - (d) None of these
24. Shear re-inforcement in RCC slabs are generally avoided because:-
- (a) re-inforcement in slabs are more compare to other members
  - (b) There is no shear force acting in the slab member
  - (c) the thickness of slab normally choosen renders the slab not in need of an extra shear re-inforcement.
  - (d) None of these
25. Columns when axially loaded, failed in one of the three general modes depending on the:-
- (a) Slenderness ratio
  - (b) Intensity of load
  - (c) Location of columns
  - (d) Combination of loads
26. Among the various methods of controlling of crack in RCC water tank is/are:-
- (a) the cement concrete mix should have the largest practical coarse aggregate as this will reduce the cement content
  - (b) Slowly filling up the Tank the first time
  - (c) Both (a) and (b) are correct
  - (d) Both (a) and (b) are incorrect
27. The dead storage in water tank is meant mainly to:-
- (a) reserve water for emergency situation
  - (b) keep the floor of the tank wet at all time for curing purpose
  - (c) regulate pressure due to water level fluctuation
  - (d) assist settling of silt
28. An arrangement in an underground water tank for cleaning purpose is:-
- (a) Phinial
  - (b) Sump
  - (c) Puddle piece
  - (d) Bellmouth

29. Top dome in elevated water tank is provided in stead of roof slab because:-  
(a) it is more economical comparatively  
(b) it is stronger given the same cross section  
(c) it is easier to construct  
(d) it provides higher capacity with the same dimensions
30. The minimum concrete grade for members in contact with liquids as recommended by IS : 3370 is:-  
(a) M-20  
(b) M-25  
(c) M-30  
(d) M-35
31. If the active earth pressure co-efficient  $K_A$  in the Coulomb's earth pressure theory is  $1/3$ , then passive earth pressure co-efficient  $K_p$  will be:-  
(a) 3  
(b)  $2/3$   
(c)  $1/\sqrt{3}$   
(d)  $\sqrt{2}/3$
32. For the horizontal backfill of cohesive soil on smooth vertical walls under active earth pressure condition, a height or depth of vertical section less than critical depth:-  
(a) the backfill soil will be very unstable  
(b) the state of stress in the backfill is maximum and critical  
(c) is the depth upto which lateral support may be provided  
(d) is the depth upto which the backfill can stand without lateral support
33. The maximum height beyond which Random Rubble Dry masonry Retaining wall should be avoided unless it is unavoidable is:-  
(a) 5m  
(b) 6m  
(c) 8m  
(d) 10m
34. Given the foundation on firm ground, the depth of Retaining wall / Breast wall below ground level or side drain or terrace level shall be at least:-  
(a) 300mm  
(b) 500mm  
(c) 600mm  
(d) 900mm
35. The minimum distance below the toe wall of Retaining wall that the stone pitching may be provided to control possible erosion as recommended by relevant IS-code is:-  
(a) 1m  
(b) 1.5m  
(c) 2m  
(d) 2.5m
36. The usual front batter kept in Breast wall is:-  
(a) 1:2  
(b) 1:2.5  
(c) 1:3  
(d) 1:3.5
37. Choose the load considered in the design of Rivetment walls from the followings:-  
(a) Lateral earth pressure  
(b) Pore water pressure  
(c) Traffic wheel load  
(d) None of these
38. Choose the odd one out from the following structures in terms of their intended function :  
(a) Retaining wall  
(b) Breast wall  
(c) Crip wall  
(d) Rivetment wall
39. The safety against sliding of Retaining wall can be increased by:-  
(a) increasing base area  
(b) additional concrete key  
(c) Dipping the base towards hill side  
(d) All of these

40. Stepped foundation in Retaining wall / Breast wall may be provided in the case of:-
- (a) Weak foundation soil
  - (b) Rock slope
  - (c) Soil prone to erosion
  - (d) None of these
41. What should be the recommended control measures for Earth flow type of land slide from the followings:-
- (a) Spot bolting
  - (b) Bio-technical measure
  - (c) Series of check dams
  - (d) Re-inforced earth
42. In benching of slop technique to prevent sliding of hill slope, the minimum width of bench to be functional is:-
- (a) 3m
  - (b) 6m
  - (c) 8m
  - (d) 10m
43. Which of the is not among the erosion control measures in the stabilisation of slope method:-
- (a) Micro-piles
  - (b) Asphalt mulch technique
  - (c) Jute/Coir netting
  - (d) Bally benching
44. Alteration of slope geometry for remedial measure taken in landslide control means:-
- (a) complete removal of unstable material
  - (b) either remove some of the material near the top of unstable zone or to add material at the toe
  - (c) proper slope design by adoption of flatter uniform slope followed by proper surface drainage
  - (d) improving the soil slopes near vertical cuts by the inclusion of elements which are resistant to tensile, compressive, shear and/or bending forces
45. The economical height for the construction of re-inforced earth wall generally considered is:-
- (a) less than 4m
  - (b) 4m to 5m
  - (c) less than 5m
  - (d) more than 5m
46. Choose the most important force from the following causes of failure of slopes:-
- (a) Seepage water
  - (b) Earthquakes
  - (c) Gravity
  - (d) Flowing water
47. Pertaining to methods of stability analysis of slopes of finite height, the name W.Fellenius is associated with:-
- (a) Method of slices
  - (b) Modified method of slices
  - (c) Friction circle method
  - (d) Simplified Bishop's method of slices
48. The punching shear mode of failure of soil under foundation occurs in:-
- (a) Very dense sand
  - (b) Dense sand
  - (c) Relatively loose sand
  - (d) Very loose sand
49. Choose the live load from the followings in the design of foundation of buildings:-
- (a) Plumbing stacks
  - (b) Human occupancy
  - (c) Floor finishes
  - (d) Earth directly supported by the elements of the foundation

50. The intensity of loading at the base of the foundation which would cause shear failure of the soil support is:-
- (a) Ultimate bearing capacity (b) Safe bearing capacity  
(c) Allowable bearing capacity (d) None of these
51. For foundation on a ground surface sloping downward, the horizontal distance from the lower edge of the footing to the sloping surface, for soil shall be at least:-
- (a) 50cm (b) 60cm  
(c) 90cm (d) 100cm
52. In which type of the following soils, settlement of foundation may continue almost indefinitely after the construction of structure is completed:-
- (a) Organic soil (b) Silts & Clays  
(c) Sand & Gravels (d) None of these
53. The maximum thickness recommended to be maintained in a single operation for proper compaction while refilling the excavation of foundation is:-
- (a) 10cm (b) 15cm  
(c) 20cm (d) 30cm
54. Which one of the followings is not a type of deep foundation:-
- (a) Driven pile cast in-situ (b) Caissons  
(c) Well foundation (d) Raft foundation
55. According to classification of soil as per grain size (IS: 1498-1970), silts and clays would be:-
- (a) Less than 0.075mm (b) 0.075mm to 4.75mm  
(c) 0.075mm to 2.00mm (d) 0.475mm to 2.00mm
56. The load which is held constant during Box shear test on a soil sample is:-
- (a) Horizontal load (b) Vertical load  
(c) Both Horizontal and Vertical loads (d) None of these
57. Which of the followings would be an example of compaction:-
- (a) A clay strata gets compressed under the pressure of a structure built on it  
(b) A fill gets compressed under its own weight  
(c) Reduction of voids produced during the construction of an earth dam  
(d) Both (a) & (c) are correct
58. The unit weight of water at reference temperature of 4° is:-
- (a) 1 KN/m<sup>3</sup> (b) 1 N/m<sup>3</sup>  
(c) 1 Kg/cc (d) 1 gm/cc
59. There will be constant volume of a soil sample with further decrease in water content at:-
- (a) Liquid limit  
(b) Plastic limit  
(c) Shrinkage limit  
(d) Volume keeps decreasing with increase in water content
60. Which one of the following is a field method for testing of permeability of soil?
- (a) Constant head method (b) Pumping method  
(c) SPT method (d) Vane shear test

61. Moisture in timber, for any combination of vapour pressure and temperature, the corresponding moisture content such that there will be no inward or outward diffusion of water vapour, is called:-  
(a) Average moisture content (b) Equivalent moisture content  
(c) Critical moisture content (d) Equilibrium moisture content
62. The chemical formula of 'Gypsum' is:-  
(a)  $MgSO_4 \cdot 4H_2O$  (b)  $CaSO_4 \cdot 2H_2O$   
(c)  $CaSO_4 \cdot 4H_2O$  (d)  $MgSO_4 \cdot 2H_2O$
63. The minimum  $72 \pm 1$  hour strength of 1:3 mortar cubes (area of face 50 sqcm) of Portland-pozzolana cement is:-  
(a) 16 Mpa (b) 22 Mpa  
(c) 33 Mpa (d) 35 Mpa
64. Reducing the carbon content of pig iron gives rise to:-  
(a) reduced unit weight (b) reduced ductility  
(c) increased unit weight (d) increased ductility
65. Choose the Thermoplastic type of polymers from the followings:-  
(a) Epoxies (b) Polypropylene  
(c) Polyesters (d) Vinylester
66. Le Chatelier apparatus is used to test cement for:-  
(a) Colour (b) Consistency  
(c) Soundness (d) Fineness
67. 'Granite' is an example of:-  
(a) Plutonic rocks (b) Hypobysal rocks  
(c) Volcanic rocks (d) None of these
68. A hollow tapered burnt clay tiles having a conical shape are called:-  
(a) Pot tiles (b) Guna tiles  
(c) Flemish tiles (d) Pan tiles
69. If the Brick sample is yellowish in colour, it indicates:-  
(a) Excess lime (b) Excess alumina  
(c) Less magnesia (d) Less Iron oxide
70. A thin sheets or slices of wood of superior quality with the thickness varies from 0.40mm to 6mm or more, obtained by rotating a log of wood against a sharp knife of rotary cutter or saw are called:-  
(a) Ply woods (b) Fibre boards  
(c) Compreg timber (d) Veneers
71. The presence of organic impurities in sand can be detected if the solution of sodium hydroxide or caustic soda, when added to sand and stirred turns:-  
(a) Brown (b) Blue  
(c) Red (d) Green
72. The ingredient of paint to make it thin so that it can be easily applied on the surface are:-  
(a) Vehicles (b) Solvents  
(c) Bases (d) Driers

73. The varnishes used for varnishing maps, pictures, covering wall papers etc are:-

- (a) Spirit varnishes
- (b) Oil varnishes
- (c) Water varnishes
- (d) Turpentine varnishes

74. If the viscosity of a liquid lubricants is low:-

- (a) it will result in more frictional resistance
- (b) the film of liquid lubricant will not last
- (c) it will become a semi-solid lubricant
- (d) None of these

75. The resistance to corrosion in stainless steel is mainly contributed by the ingredient:-

- (a) Nickel
- (b) Molybdenum
- (c) Chromium
- (d) None of these

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