MIZORAM PUBLIC SERVICE COMMISSION

COMMON COMPETITIVE EXAMINATION FOR GROUP 'B' NON-GAZETTED (TECHNICAL)

JUNIOR ENGINEER (CIVIL) UNDER HORTICULTURE DEPARTMENT, GOVERNMENT OF MIZORAM, NOVEMBER-2024

PAPER-III (TECHNICAL SUBJECT)

Time Allowed : 2 hours FM : 200

All questions carry equal mark of 2 each.
Attempt all questions.

1. A good brick, when immersed in water bath for 24 hours, should not absorb more than -
   (a) 20% of its dry weight (b) 30% of its saturated weight
   (c) 10% of its dry weight (d) 20% of its saturated weight
2. As per I.S classification, the minimum compressive strength of a first class brick should be -
   (a) 75 kg/cm ^{2} (b) 100 kg/cm ^{2}
   (c) 125 kg/cm ^{2} (d) 150 kg/cm ^{2}
3. Efflorescence of bricks is due to -
   (a) Excessive burning of bricks (b) High silt content in brick clay
   (c) High porosity of bricks (d) Soluble salts present in parent clay
4. The most important purpose of frog in a brick is to -
   (a) Emboss manufacturer's name (b) Reduce the weight of brick
   (c) Form keyed joint between brick and mortar (d) Improve insulation by providing hollows
5. If 'P' is the standard consistency of cement, the amount of water used in conducting the initial setting time test on cement is -
   (a) 0.65P (b) 0.85P
   (c) 0.6P (d) 0.8P
6. A cement of average composition requires about _____ of water by mass for chemical reaction.
   (a) 35% (b) 45%
   (c) 15% (d) 25%
7. Gypsum is used as an admixture in cement grouts for -
   (a) Accelerating the setting time (b) Retarding the setting time
   (c) Increasing the plasticity (d) Reducing the grout shrinkage
8. A quick setting cement has an initial setting time of about -
   (a) 50 minutes (b) 40 minutes
   (c) 15 minutes (d) 5 minutes
9. Chemical reaction of the cement when it is mix with water is called as _____.
   (a) Setting time (b) Hydration of cement
   (c) Water cement ratio (d) Final setting time

10. Air permeability method is used to determine -

(a) Soundness of cement (b) Setting time

(c) Fineness of cement (d) Resistance of cement

11. For chemical resistance, proportion of which one of the following compounds in cement clinker shall it be increased?

(a) Tricalcium Silicate (b) Dicalcium Silicate

(c) Tetracalcium Aluminate (d) Tetracalcium Aluminoferrite

12. The toughness of aggregate is tested by -

(a) Impact test (b) Crushing strength test

(c) Abrasion test (d) Soundness test

13. What is the range of fineness modulus of sand which is least suitable for making a good concrete?

(a) 3.5 - 4.5 (b) 2.9 - 3.2

(c) 2.6 - 2.9 (d) 2.2 - 2.6

14. On which one of the following factors, does the strength of concrete depend primarily?

(a) Quality of coarse aggregate (b) Quality of fine aggregate

(c) Fineness of cement (d) Water - cement ratio

15. Aggregates occupy around _____ percent of the volume of concrete.

(a) 70 - 80 (b) 60 - 70

(c) 80 - 90 (d) 50 - 60

16. The aggregate with rounded particles (river or seashore gravel) has minimum voids ranging from -

(a) 42 - 43 (b) 31 - 34

(c) 30 - 33 (d) 32 - 33

17. Cement mortar :

(a) Sets slowly (b) Sets quickly

(c) Has high workability (d) Gains the strength at later stages.

18. Seasoning of timber is required to -

(a) Soften the timber (b) Harden the timber

(c) Straighten the timber (d) Remove sap from the timber

19. The moisture content in a properly seasoned timber will be in the range of -

(a) 5% to 8 % (b) 8 % to 10%

(c) 10% to 12 % (d) 12 % to 15 %

20. What treatment is adopted for making timber fire - resistant?

(a) ASCU treatment (b) Abel's process

(c) Creosoting (d) Tarring

21. The modulus of elasticity of timber is about -

(a) 0.5 to 1.0 $\times 10^4$ N/mm^2 (b) 1.0 to 1.5 $\times 10^4$ N/mm^2

(c) 1.5 to 2.0 $\times 10^4$ N/mm^2 (d) 2.0 to 2.5 $\times 10^4$ N/mm^2

22. Timber can be made reasonably fire-resistant by -

(a) Soaking it in ammonium sulphate

(b) Coating with tar paint

(c) Pumping creosote oil into timber under high pressure

(d) Seasoning process

23. The plies in plywood are so placed that the grains of each ply are -

(a) Parallel to each other

(b) At right angles to one another

(c) 45° oblique to adjacent grain

(d) Not constrained by any consideration

24. In coursed rubble masonry, the wall is built in courses varying from -

(a) 300 - 450 mm (b) 350 - 450 mm

(c) 400 - 500 mm (d) 450 - 500 mm

25. Thermal conductivity of plastics is _____ compared with wood.

(a) High (b) Relatively low

(c) Low (d) Relatively high

26. The maximum water content at which a reduction in water content will not cause a decrease in the volume of a soil mass is called -

(a) Plasticity index (b) Consistency index

(c) Liquid limit (d) Shrinkage limit

27. The decrease in the volume of a soil mass, expressed as a percentage of the dry volume of the soil mass, when water content is reduced from a given percentage to the shrinkage limit is called -

(a) Linear shrinkage (b) Volumetric shrinkage

(c) Plastic limit (d) Shrinkage limit

28. In Oven - Drying Method, the water content of the sample is calculated as:

(a) $w = \frac{M2 - M3}{M3 - M1} \times 100$ (b) $w = \frac{M2 - M3}{M2 - M1} \times 100$

(c) $w = \frac{M3 - M1}{M2 - M3} \times 100$ (d) $w = \frac{M1 - M2}{M3 - M1} \times 100$

29. A clay sample has a void ratio of 0.50 in the dry condition. The grain specific gravity has been Determined as 2.70. What is the shrinkage limit of this clay?

(a) 18.51 % (b) 17.5 %

(c) 19.51 % (d) 16.51 %

30. Sedimentation analysis is based on -

(a) Atterberg's limit (b) Laboratory tests

(c) Stoke's Law (d) Hydrometer analysis

31. Soil classification is done on the basis of -

(a) Plasticity of soil (b) Grain size distribution

(c) Soil type (d) Both (a) & (b)

32. _____ is the property of the soil which allows passage of fluid through it.

(a) Capillarity (b) Permeability

(c) Laminar flow (d) Shrinkage

33. The soil within a soil mass bounded by an isobar of given vertical pressure intensity is called :

(a) Isotropic (b) Contact pressure

(c) Pressure bulb (d) Pressure intensity

34. Poisson's ratio for a saturated clay is -
(a) 0 (b) 0.25
(c) 0.5 (d) 0.15

35. Darcy's law of linear dependency between velocity of flow 'v' and hydraulic gradient 'i' is valid only for -
(a) Laminar flow (b) Turbulent flow
(c) Fluid (d) Both (a) & (b)

36. The shear test that is more suitable in the field is -
(a) Direct shear (b) Triaxial shear
(c) Unconfined compression (d) Vane shear

37. The strength envelope of a pure cohesive soil is -
(a) Vertical (b) Horizontal
(c) Inclined (d) Curvilinear

38. Unconfined compression test is generally performed on -
(a) Sandy soils (b) Silty soils
(c) Intact saturated clay (d) Fissured clay

39. The angle of inclination of the Coulomb's failure envelope with the horizontal is called -
(a) Angle of internal friction (b) Angle of repose
(c) Angle of friction (d) Frictional resistance

40. The basement walls are generally designed for -
(a) Active pressure (b) Passive pressure
(c) At rest pressure (d) None of these

41. Weep holes are provided in the retaining walls for the following reason -
(a) To avoid friction behind the wall (b) To improve the appearance
(c) To avoid cracks due to shrinkage (d) To provide drainage of backfill

42. Gravity type retaining wall primarily mobilise active earth pressure by -
(a) The free deflection at the top (b) The free deflection at the base
(c) Uniform translation (d) Sudden overturning

43. The state of shear failure accompanying a minimum earth pressure is called -
(a) At rest state (b) Active state
(c) Passive state (d) None of these

44. In passive case, the wall moves -
(a) Towards the backfill (b) Away from backfill
(c) No movement at all (d) Downwards

45. Which of the following will have a finite slope -
(a) Embankment (b) Earth Dam
(c) Canals (d) All of these

46. The minimum depth for all foundations below the natural ground level is -
(a) 500 mm (b) 400 mm
(c) 600 mm (d) 550 mm

47. The ultimate bearing capacity of cohesionless soil depends upon -

(a) Width of footing (b) Depth of footing

(c) Relative density (d) All of these

48. Well foundations are commonly used as foundation for the following structures -

(a) Water tanks (b) Bridges

(c) Buildings (d) Reciprocating machines

49. As per IS code, maximum permissible differential settlement on clayey soil is -

(a) 35 (b) 40

(c) 60 (d) 50

50. The failure of a pile foundation is due to -

(a) General shear (b) Local shear

(c) Mixed shear (d) Punching shear

51. When specific information about the density of snowfall is not available, the water equivalent of snowfall is taken as -

(a) 50% (b) 30%

(c) 10% (d) 90%

52. An isonif is a line joining points having equal -

(a) Rainfall (b) Sunshine

(c) Wind velocity (d) Snowfall

53. As per Indian standards the number of rain gauges that should be installed in aplain area of 1000 km^2 is -

(a) 1 (b) 2

(c) 3 (d) 4

54. The instrument used to measure the wind velocity in the atmosphere is -

(a) Current meter (b) Atmometer

(c) Pycnometer (d) Anemometer

55. In the following, identify the one which is different from the rest -

(a) Rain (b) Drizzle

(c) Hail (d) Fog

56. The standard Symon's type rain gauge has a collecting area of diameter -

(a) 12.7 cm (b) 10 cm

(c) 5.08 cm (d) 25.4 cm

57. The accurate method for calculating average rainfall of a catchment area is -

(a) Arithmetic mean (b) Theissen polygon

(c) Isohyetal (d) Both (a) & (b)

58. Direct runoff is made up of -

(a) Overland flow only

(b) Surface runoff, infiltration and evaporation

(c) Surface runoff only

(d) Surface runoff, prompt interflow and channel precipitation

59. When an accumulated mass of snow melts, the resulting flow entering a stream is classified as -

(a) Direct runoff (b) Base flow

(c) Subsurface flow (d) Inter flow

60. The surface runoff is due to -

(a) Initial rain (b) Residual rain

(c) Residual rain in the net supply interval (d) All of these

61. Hydrograph is a graphical representation of -

(a) Surface runoff (b) Groundwater flow

(c) Rainfall (d) None of these

62. The upper limit on the area of the basin for the applicability of unit hydrograph is generally taken as -

(a) 100 km^2 (b) 2500 km^2

(c) 5000 km^2 (d) 10000 km^2

63. The concept of unit hydrograph was first introduced by -

(a) Dalton (b) Sherman

(c) Horton (d) Thiessen

64. The time required by rain water to reach the outlet of drainage basin is generally called -

(a) Time of overland flow (b) Concentration time and overland flow

(c) Time of concentration (d) Duration of the rainfall

65. Quantity of water extracted by gravity-drainage from a saturated water bearing stratum is called -

(a) Groundwater yield (b) Permeability

(c) Groundwater velocity (d) Groundwater flow

66. Flexural collapse in over reinforced beams is due to -

(a) Primary compression failure (b) Secondary compression failure

(c) Primary tension failure (d) Bond failure

67. As compared to working stress method of design, limit state method takes concrete to -

(a) A higher stress level

(b) A lower stress level

(c) The same stress level

(d) Sometimes higher but generally lower stress level

68. Working stress method of design for reinforced concrete is -

(a) Not a limit state design (b) A serviceability limit state design

(c) A limit state for crack width (d) A collapse limit state

69. Why is the design of RC section as over reinforced undesirable?

(a) It consumes more concrete (b) It undergoes high strains

(c) It fails suddenly (d) Its appearance is not good

70. Doubly reinforced beams are recommended when -

(a) The depth of the beam is restricted (b) The breadth of the beam is restricted

(c) Both depth and breadth are restricted (d) The shear is high

71. Given that d = Effective depth, b = width and D= overall depth, the maximum area of compression reinforcement in a beam is -

(a) 0.4 bd (b) 0.04 bD

(c) 0.12 bd (d) 0.12 bD

72. When HYSD bars are used in place of mild steel bars in a beam, the bond strength -

(a) Does not change (b) Increases

(c) Decreases (d) Becomes zero

73. For shorter storey height, cheaper formwork and better lighting facilities, what is the recommended slab floor?

(a) T beam and slab (b) Two way slab

(c) Flat slab (d) Framed structure

74. In a combined footing, in the zones where the shear stress are less than 5 kg/cm^2, stirrups to be provided are generally -

(a) 2 - legged (b) 4 - legged

(c) 8 - legged (d) 12 - legged

75. For the purpose of designs per IS : 456 deflection of RC slab or beam is limited to -

(a) 0.2 % of span (b) 0.25 % of span

(c) 0.4 % of span (d) 0.45 % of span

76 . Which of the following is the weight added above retaining walls?

(a) Top loads (b) Surcharge

(c) Superimposed loads (d) Earth pressure

77. Which of the following is the cheapest material for retaining walls?

(a) Brick (b) Wood

(c) Treated pine (d) Dry stones or boulders

78. Breast walls are constructed on the _____.

(a) Hillside (b) Valley

(c) Slope (d) Both (a) & (b)

79. The design of retaining wall assumes that the retained earth -

(a) Is dry (b) Is free from moisture

(c) Consists of granular particles (d) All of these

80. The thickness of base slab of a retaining wall generally provided, is -

(a) width of the stem at the bottom

(b) one-third of the width of the stem at the bottom

(c) one-fourth of the width of the steam at the bottom

(d) twice the width of the steam at the bottom.

81. _____ are one of the oldest gravity wall systems.

(a) Revetment walls (b) Breast walls

(c) Crib walls (d) Toe walls

82. A _____ is a passive structure, which protects against erosion caused by wave action, storm surge and currents.

(a) Revetment walls (b) Breast walls

(c) Crib walls (d) Toe walls

83. Slope movements are classified in a number of ways by -

(a) The type of movement (b) The nature of the material

(c) The causes of the movement (d) All of these

84. The transition from debris slide to debris flow depends on the _____.

(a) Water content (b) Size of rock

(c) Depth of soil (d) Hardness of rock

85. Slope failure may take place due to -

(a) Gravitational forces (b) Seepage forces

(c) Earthquake (d) All of these

86. _____ occurs along a long surface parallel to the slope, at some depth.

(a) Rotational failure (b) Translation failure

(c) Wedge failure (d) Combined failure

87. A wedge failure of soil mass will slide along an inclined plane.

(a) Wedge failure (b) Rotational failure

(c) Translation failure (d) Combined failure

88. In stability analysis, the term mobilised shear strength is referred to as -

(a) Shear strength (b) Maximum shear strength

(c) Applied shear stress (d) None of these

89. An infinite slope represents the inclined face of -

(a) An earth dam (b) An embankment

(c) An excavation (d) A natural high hill

90. _____ is the force that acts everywhere on the Earth's surface.

(a) Gravity (b) Frictional force

(c) Magnetic force (d) All of these

91. Which of the following statements in respect of landslide are correct?

1. These occur only on gentle slopes during rain.
2. They generally occur in clay - rich soil.
3. Earthquakes trigger landslides.

Select the correct answer using the code given below.

(a) 1 & 2 only (b) 1 & 3 only

(c) 2 & 3 only (d) 1, 2 & 3

92. When a boulder tumbles down a hillside, it's a good example of what type of landslide?

(a) A translational slide (b) A lateral spread landslide

(c) A lahar (d) A fall or topple slide

93. Earthquake shaking and other factors can also induce landslides underwater. These landslides are called -

(a) Major landslide (b) Post slide

(c) Submarine landslide (d) Minor landslide

94. The parameter that determine the landslides is -

(a) Increase of shear stress and decrease of material strength.

(b) Decrease of shear stress and increase of material strength.

(c) Increase of shear stress only.

(d) Decrease of material strength only.

95. Which of the following is the remedial step for landslides?

(a) Modification of slope geometry
(b) Planting more trees
(c) Compacting the earth
(d) Cutting the trees

96. Identify the man-made factor responsible for landslide among the following:

(a) Steep slopes
(b) Land use pattern
(c) Poor drainage
(d) Stiffness of slope

97. What is the characteristic of the mass above and below a landslide respectively?

(a) Both stable
(b) Both unstable
(c) Unstable and stable
(d) Stable and unstable

98. Sinking or settling of the ground in almost vertical direction naturally is called _____.

(a) Flowage
(b) Sliding
(c) Avalanche
(d) Subsidence

99. In which type of slide, weather conditions play a very important role?

(a) Translational sliding
(b) Rotational sliding
(c) Rock toppling and falls
(d) Subsidence

100. Translational sliding is quite common in slopes made up of _____.

(a) Rocks
(b) Cohesive soils
(c) Rocks and non-cohesive soils
(d) Rocks and cohesive soils

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