

# MIZORAM PUBLIC SERVICE COMMISSION

## TECHNICAL COMPETITIVE EXAMINATIONS FOR RECRUITMENT TO THE POST OF JUNIOR ENGINEER UNDER AGRICULTURE DEPARTMENT (CROP HUSBANDRY), GOVERNMENT OF MIZORAM. MARCH-2020

### TECHNICAL PAPER - II

Time Allowed : 2 hours

Full Marks : 150

*Attempt all questions.*

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

- Which of the following is the form of precipitation?  
(a) Rain (b) Hail  
(c) Glaze (d) All of these
- Intensity of rainfall is classified under Medium intensity when the amount of rainfall is  
(a) 0.0 - 1.5 mm/h (b) 1.5 - 2.5 mm/h  
(c) 2.5 - 7.5 mm/h (d) 7.5 - 9.5 mm/h
- As long as the rate at which rainfall reaches the soil surface is \_\_\_\_\_ than the infiltration capacity, all the water is absorbed in to the \_\_\_\_\_.  
(a) More, soil (b) Less, atmosphere  
(c) Less, soil (d) More, atmosphere
- The time of concentration of a watershed is the time required for the runoff water to flow from the most remote point of the area to the  
(a) Inlet (b) Outlet  
(c) storage (d) stream
- \_\_\_\_\_ is also called \_\_\_\_\_.  
(a) Isohyetal method, arithmetic average method  
(b) Isohyetal method, weighted average method  
(c) Thiessen polygon method, Arithmetic average method  
(d) Thiessen polygon method, Weighted mean method
- If  $T_c$  is time of concentration (in m), L is the maximum length of the flow (in m) & S is the average slope of the area (in m/m) then, Empirical formula for estimating the time of concentration is  
(a)  $T_c = 0.0195 L^{0.77} S^{-0.385}$  (b)  $T_c = 0.0190 L^{0.77} S^{-0.385}$   
(c)  $T_c = 0.0195 L^{0.77} S^{-0.380}$  (d)  $T_c = 0.0195 L^{0.70} S^{-0.385}$
- Basic permanent soil conservation structures are-  
(a) Drop spillways (b) Chute spillways  
(c) Drop inlet spillways (d) All of these
- Primary causes of failure for permanent soil conservation structures are –  
(a) Insufficient hydraulic capacity (b) Insufficient provision for energy dissipation.  
(c) Both (a) & (b) (d) None of these

9. Soil conservation structures are design to perform –
- (a) Soil erosion control (b) Sediment control  
(c) Flood control (d) All of these
10. Design procedure of a permanent soil conservation structure should include-
- (a) Hydraulic design (b) Hydrologic design  
(c) Structural design (d) All of these
11. Hydrologic design involves the determination of the \_\_\_\_\_ which the structure is expected to handle.
- (a) Dimension of structure and peak runoff (b) Design runoff rates and flood volumes  
(c) Required strength and stability (d) Amount and intensity of rainfall
12. Drop spillway is one of the most commonly used
- (a) Flood control structure (b) Runoff control structure  
(c) Gully control structure (d) Vegetative control structure
13. The straight drop spillway is an efficient structure for controlling relatively low heads, normally up to
- (a) 3 - 4 m (b) 4 - 6 m  
(c) 6 - 8 m (d) 8 - 10 m
14. Runoff rate is calculated using the rational method \_\_\_\_\_, where  $Q_{\text{peak}}$  is the peak runoff rate ( $\text{m}^3/\text{s}$ ); C is the runoff coefficient; I is the rainfall intensity (cm/h) and A is the watershed area (ha).
- (a)  $Q_{\text{peak}} = \frac{1}{32} CIA$  (b)  $Q_{\text{peak}} = \frac{1}{35} CIA$   
(c)  $Q_{\text{peak}} = \frac{1}{36} CIA$  (d)  $Q_{\text{peak}} = \frac{1}{38} CIA$
15. Froude Number is defined as the effect of gravity upon the state of flow is represented by the ratio of
- (a) The inertial forces to gravitational forces (b) The depth of water to gravitational forces  
(c) The discharge of water to depth of water (d) The inlet water to outlet water
16. The outlets of soil conservation structures are designed so that a \_\_\_\_\_ forms within the downstream portion of the structure and the flow velocity downstream of the structure is reduced to a \_\_\_\_\_ in the sub-critical range.
- (a) Hydraulic jump, erosive level (b) Hydraulic jump, non-erosive level  
(c) Eddy current, less than critical depth (d) Kinetic energy, potential energy
17. In the Rational method, the runoff coefficient is-
- (a) More than one (b) One  
(c) Less than one (d) None of these
18. The Dickens formula is used for determination of –
- (a) Peak discharge (b) Periodic runoff  
(c) Monthly runoff (d) Annual runoff

19. Contour farming is recommended for lands with the slope range of –
- (a) 0-1% (b) 2-7%  
(c) 7-12% (d) 12-24%
20. Adapted land use and soil conservation measures of Contour farming, contour strip cropping and cover cropping, contour bunding or terracing as per 'standard land capability classification based on land slope' is
- (a) Class-IV with 5-8 per cent slope (b) Class-I with 0-1 per cent slope  
(c) Class-III with 3-5 per cent slope (d) Class-II with 1-3 per cent slope
21. \_\_\_\_\_ is an impermeable formation which neither contains water nor transmits any water.
- (a) Aquifuge (b) Aquiclude  
(c) Aquifer (d) Mota layer
22. Tube well may be of the following types-
- (a) Strainer well (b) Cavity well  
(c) Slotted well (d) All of these
23. \_\_\_\_\_ is the most common and widely used tube well.
- (a) Open Dug well (b) Strainer well  
(c) Slotted well (d) Cavity well
24. A cavity type tube wells draws water from the –
- (a) Side of well (b) Surface of well  
(c) Bottom of well (d) None of these
25. According to \_\_\_\_\_ percolation of water through soil for laminar flow conditions in a saturated soil, the rate of flow, or the discharge per unit time is proportional to the hydraulic gradient.
- (a) Kenedy's theory (b) Darcy's law  
(c) Dupuit's theory (d) None of these
26. Central Board of Irrigation & Power has suggested that Pack Aquifer ratio (PA ratio) should be between \_\_\_\_\_ for uniform aquifers having  $C_u \leq 2.0$ .
- (a) 9 and 12.5 (b) 12 and 15.5  
(c) 14 and 16.5 (d) 15 and 18.5
27. A permeable stratum or a geological formation of permeable material, which is capable of yielding significant quantities of ground water under gravity, is known as-
- (a) Aquiclude (b) Specific yield  
(c) Aquifer (d) Open well
28. Specific capacity of a well is not constant, but
- (a) Increases as discharge increases (b) Decreases as discharge increases  
(c) Decreases as discharge decreases (d) Remain same as discharge increases
29. Bored tube wells in rocky consolidated formations are usually drilled by –
- (a) Cable method of drilling (b) Rotary drilling rigs  
(c) Percussion drilling rigs (d) Down the hole hammer (DTH) rigs

30. When a well is penetrated into an extensive homogeneous aquifer, the water table initially (before pumping) remains horizontal in the well which is called
- (a) Static water level
  - (b) Drawdown curve
  - (c) Surface water level
  - (d) Pumping water level
31. Horse Power of the motor for irrigation pumps is given by –
- (a)  $HP = \frac{wH}{75\eta Q}$  where; w=unit weight of water, Q=discharge, H=total lift & h=efficiency of pump set.
  - (b)  $HP = \frac{wH\eta}{75Q}$  where; w=unit weight of water, Q=discharge, H=total lift & h=efficiency of pump set.
  - (c)  $HP = \frac{wQH}{75\eta}$  where; w=unit weight of water, Q=discharge, H=total lift & h=efficiency of pump set.
  - (d)  $HP = \frac{QH}{75\eta w}$  where; w=unit weight of water, Q=discharge, H=total lift & h=efficiency of pump set.
32. A single-stage centrifugal pump can effectively lift water under the maximum suction head of –
- (a) 4-6 meter
  - (b) 6-8 meter
  - (c) 8-10 meter
  - (d) 10-12 meter
33. Well development is the process of removing fine material from the aquifer formation surrounding the strainer pipe, and is aimed at
- (a) Increasing yield by strengthening the wall by strainer of good quality.
  - (b) Increasing static level of water and enhancing economic well life.
  - (c) Increasing specific capacity of well and preventing sand flowing in.
  - (d) Increasing yield of well by packing the hole with gravel of specified size.
34. Centrifugal pumps are also classified according to-
- (a) Impeller types
  - (b) Number of stages
  - (c) Both (a) & (b)
  - (d) None of these
35. Water horsepower (WHP) is 6.55 and pump efficiency is assumed to be 65 %, if pump and drive were 100% efficient, what size of electric motor (BHP) will be suitable?
- (a) 6.50 BHP will be suitable
  - (b) 8.60 BHP will be suitable
  - (c) 10.10 BHP will be suitable
  - (d) 10.50 BHP will be suitable
36. A hydraulic ram uses the water hammer effect to develop -
- (a) Velocity
  - (b) Pressure
  - (c) Acceleration
  - (d) Static head
37. In surface float method, if the distance travelled by the float is 15m, depth of the water is 1.50 m and the time taken by the float is 2 minute, then velocity of float will be
- (a) 7.5 m/sec
  - (b) 10 m/sec
  - (c) 5 m/sec
  - (d) 0.125 m/sec
38. A Parshall flume has three principal section-
- (a) Converging section; throat section; expanding section
  - (b) Converging section; parallel section; diverging section
  - (c) Converging section; throat section; lowering section
  - (d) Divergence section; throat section; expanding section

39. In order to avoid confusion in international trade and to introduce uniformity over the entire world S.I (System International) was adopted during the
- (a) 9<sup>th</sup> General Conference on Weight & Measures held in Paris - 1955.
  - (b) 10<sup>th</sup> General Conference on Weight & Measures held in Paris - 1958.
  - (c) 11<sup>th</sup> General Conference on Weight & Measures held in Paris - 1960.
  - (d) 12<sup>th</sup> General Conference on Weight & Measures held in Paris - 1965.
40. The basic difference between m.k.s units and S.I units is in the unit of
- (a) Mass
  - (b) Length
  - (c) Time
  - (d) Force
41. The length of a line was found to be 150 m when measured with a 20 metre chain. If the 20 m chain was 70 mm longer, the correct length of the line will be
- (a) 150.70 m
  - (b) 150.525 m
  - (c) 675.000 m
  - (d) 675.550 m
42. In a plane table survey \_\_\_\_\_ is not taken into account, as the surveys only extends over the small scale surveying.
- (a) Curvature of the earth
  - (b) Depression of the earth
  - (c) Hill or buildings
  - (d) Streams and lakes
43. Which of the following is not a means of linear surveying methods?
- (a) EDM
  - (b) Chain
  - (c) Theodolite
  - (d) Tape
44. Chains used in chain surveying are
- (a) Metric chain
  - (b) Gunter's chain
  - (c) Engineer's chain
  - (d) All of these
45. Bench mark are fixed reference point of known elevation. There are \_\_\_\_\_ types of bench mark.
- (a) 3
  - (b) 2
  - (c) 4
  - (d) 5
46. A contour map is in the scale of 1/50000, which means
- (a) 1 cm = 50 m
  - (b) 1 cm = 500 m
  - (c) 1 cm = 5000 m
  - (d) 1 cm = 50000 m
47. In a survey, every line has fore bearing and back bearing. The back bearing of a line may be obtained from the fore bearing by the following rule:
- (a) Back bearing = Fore bearing  $\pm 180^\circ$
  - (b) Back bearing = Fore bearing  $\pm 45^\circ$
  - (c) Back bearing = Fore bearing  $\pm 90^\circ$
  - (d) Back bearing = Fore bearing  $\pm 360^\circ$
48. In \_\_\_\_\_ operation, determination is made merely of how much one point is below or above another.
- (a) Cross-section levelling
  - (b) Off set levelling
  - (c) Check levelling
  - (d) Fly levels
49. The three basic raw materials of cement are
- (a) Lime, Silica & Magnesia
  - (b) Lime, Silica & Alumina
  - (c) Lime, Magnesia & Iron oxide
  - (d) Lime, Alumina & Sulphur trioxide

50. Cement Concrete acquires almost \_\_\_\_\_ of its potential strength and hardness within first 30 days after mixing water.
- (a) 50 – 60 % (b) 60 – 70 %  
(c) 70 – 80 % (d) 80 – 90 %
51. Strength acquired by concrete during the first 7 days is mostly due to hydration of
- (a)  $C_3A$  (b)  $C_3AF$   
(c)  $C_3S$  (d)  $C_2S$
52. If  $D$ =max. size of coarse aggregate,  $d$ =max. size of fine aggregate and  $M$ =% by wt. of material finer than dia ( $d$ ), the expression for obtaining the grading of materials which will give highest density by Fuller is
- (a)  $M = 100 \left[ \frac{D}{d} \right]^{\frac{1}{2}}$  (b)  $M = 100 \left[ \frac{D}{d} \right]^{\frac{1}{3}}$   
(c)  $M = 100 \left[ \frac{d}{D} \right]^{\frac{1}{2}}$  (d)  $M = 100 \left[ \frac{d}{D} \right]^{\frac{1}{3}}$
53. To accelerate the process of hydration of cement, Calcium chloride upto \_\_\_\_\_ by weight of cement is generally used as an accelerator.
- (a) 1.00 % (b) 1.50 %  
(c) 2.00 % (d) 2.50 %
54. \_\_\_\_\_ has a very good interlocking effect and hence, most suitable for high strength concrete.
- (a) Rounded aggregate (b) Irregular aggregate  
(c) Angular aggregate (d) Flat, elongated or flaky aggregate
55. According to the \_\_\_\_\_ law given by Abraham as a result of many experiments, the strength of well compacted concrete with good workability is dependent only on the water cement ratio.
- (a) Water – cement ratio (b) Water – sand ratio  
(c) Water content (d) Cement content
56. IS 456 : 2000 recommends that exposed surfaces of concrete shall be kept wet for at least \_\_\_\_\_ from the date of placing concrete in case of OPC.
- (a) 5 days (b) 6 days  
(c) 7 days (d) 14 days
57. In \_\_\_\_\_ method of volumetric proportions, the proportions of cement, sand and coarse aggregate are fixed or beta really such as 1:2:4 or 1:3:6 etc.
- (a) Water – cement ratio method (b) Arbitrary method.  
(c) Minimum void method. (d) Maximum void method.
58. While \_\_\_\_\_ tend to accelerate the setting of cement, \_\_\_\_\_ tend to retard the setting of cement in the early stages of concrete.
- (a) Sulphates, Chlorides (b) Potassium, Sulphates  
(c) Chlorides, Potassium (d) Chlorides, Sulphates
59. If Load of force acting on the body is denoted by ( $P$ ), cross sectional area of the body by ( $A$ ),  $l$ =Original length of the body &  $\delta l$  = change of length of the body, then Mathematically stress ( $p$ ) and Strain ( $e$ ) may be define as
- (a)  $p = \frac{P}{A}$ ,  $e = \frac{\delta l}{l}$  (b)  $p = \frac{P}{A}$ ,  $e = \frac{l}{\delta l}$   
(c)  $p = \frac{A}{P}$ ,  $e = \frac{\delta l}{l}$  (d)  $p = \frac{l}{A}$ ,  $e = \frac{\delta l}{P}$

60. Hooke's law states that when a material is loaded, within its elastic limit, the stress is \_\_\_\_\_ to the strain.
- (a) Equal (b) Negatively equal  
(c) Inversely proportional (d) Proportional
61. The Bending Stress is
- (a) Inversely proportional to the distance of layer from the neutral layer.  
(b) Directly proportional to the distance of layer from the neutral layer.  
(c) Directly proportional to the neutral layer.  
(d) Does not depend on the distance of layer from the neutral layer.
62. A good brick should not absorb more than \_\_\_\_\_ of water when soaked.
- (a) 10% (b) 15%  
(c) 25% (d) 30%
63. The bending stress of a layer is
- (a) Directly proportional to its distance from the neutral axis.  
(b) Inversely Proportional to its distance from the neutral axis.  
(c) Directly proportional to the neutral layer.  
(d) Does not depend on the distance of layer from the neutral layer.
64. The poissons ratio of a material is 0.20. What will be the ratio of Youngs modulus to bulk modulus?
- (a) 0.90 (b) 1.00  
(c) 1.40 (d) 1.80
65. According to IS 456-2000 code, to get a mix proportion for M15, quantity required for aggregate will be \_\_\_\_\_ times of cement.
- (a) 6 (b) 4  
(c) 3 (d) 2
66. Look at this series: 3, 1, (1/3), (1/9), ... What number should come next?
- (a) 1/4 (b) 1/32  
(c) 1/27 (d) 1/128
67. Look carefully for the pattern, and then choose which pair of numbers comes next.  
44, 37, 5, 41, 34, 5, 38, 31,
- (a) 11, 5 (b) 10, 42  
(c) 5, 38 (d) 5, 35

**Directions :** Questions No. 68 & 69 consist of two words which have a certain relationship to each other followed by four pairs of related words, Select the pair which has the same relationship.

68. PALAEOLOGY : FOSSIL

- (a) Phrenology : Skull (b) Behavior : Accounting  
(c) Neurology : Blood (d) Theology : play

69. SMOKE : POLLUTION

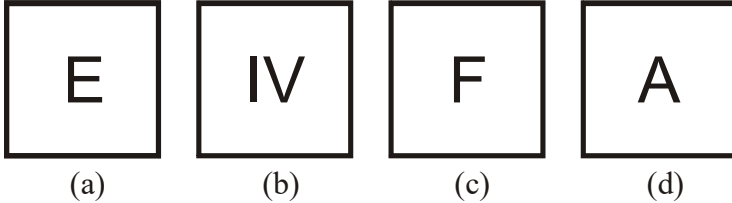
- (a) War : Destruction (b) Language : Country  
(c) Wood : Carpenter (d) Teacher : Student

70. Which of the following words is the odd one out?

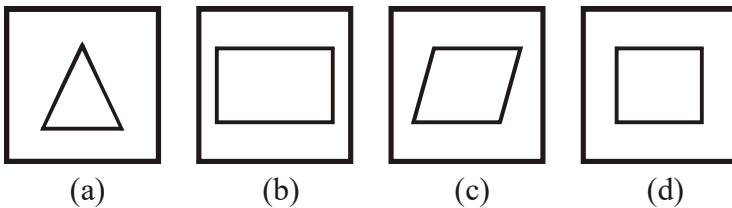
- (a) Apple
- (b) Orange
- (c) Pear
- (d) Guava

**Directions (Questions No. 71 & 72) : Select the odd one.**

71.



72.



73. Lalropuii drives 10 km. towards South, takes a right turn and drives 6 km. She then takes another right turn, drives 10 km. and stops. How far is she from the starting point?

- (a) 16 km.
- (b) 6 km.
- (c) 4 km.
- (d) None of these

74. A woman going with a boy is asked by another woman about the relationship between them. The woman replied, "My maternal uncle and the uncle of his maternal uncle is the same." How is the lady related to that boy?

- (a) Grandmother and grandson
- (b) Mother and son
- (c) Aunt and nephew
- (d) Cannot be determined

75. It was Saturday on December 17, 1899, and then what will be the day on December 22, 1901?

- (a) Friday
- (b) Saturday
- (c) Sunday
- (d) Monday

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