MIZORAM PUBLIC SERVICE COMMISSION

TECHNICAL COMPETITIVE EXAMINATIONS FOR RECRUITMENT TO THE POST OF

ASSISTANT SOIL CONSERVATION ENGINEER (ASCE)

UNDER LAND RESOURCES, SOIL & WATER CONSERVATION DEPARTMENT

GOVERNMENT OF MIZORAM. APRIL, 2021

AGRICULTURAL ENGINEERING PAPER - I

Time Allowed : 2 hours Full Marks : 200

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

1. Correct method of irrigation is determined by
(a) The water supply & type of soil
(b) Topography and the crop to be irrigated
(c) Soil moisture content and crop type
(d) Both (a) & (b)

2. In an irrigation channel the critical depth can be produced by
(a) Lowering the bottom and reducing the width
(b) Raising the bottom and reducing the width
(c) Raising the bottom and increasing the width
(d) Lowering the bottom and increasing the width

3. Sub-irrigation is useful in a situation where
(a) Saline water is used for irrigation
(b) Soil is heavy clay to permit high capillary rise
(c) Capillary movement in the root zone is rapid
(d) No hard pan is present below the root zone

4. The field water efficiency of trickle irrigation is
(a) 50% - 60%
(b) 60% - 80%
(c) 80% - 90 %
(d) Both (b) & (c)

5. In designing regime channel using Lacey's theory the velocity depends on several factors except
(a) Depth of water
(b) Hydraulic mean depth
(c) Slope of channel
(d) Lacey's silt factor

6. The bed of an alluvial channel along the flow will always be
(a) Flat
(b) Wavy
(c) Duned & rippled
(d) All of the above

7. Sub-irrigation is used in areas with
(a) Low water table
(b) High water table
(c) Sloping terrain
(d) Flat terrain

8. Determine the total capacity of sprinkler system which has 12 sprinklers spaced at 10m interval on each of the two lateral spaced at 15m apart. Application rate of water is 1.5cm/hr
(a) 15ltr/s
(b) 20ltr/s
(c) 25ltr/s
(d) 30ltr/s

9. Borrow pits should preferably be located in
(a) Field on the left side of the canal
(b) Field on the right side of the canal
(c) Field on both side of the canal
(d) Central half width of the section of the canal

10. The measure to remove water logging of land, is
(a) To reduce percolation from canals and water courses
(b) To increase outflow from ground water reservoir
(c) Both (a) & (b)
(d) None of the above

11. The difference in level between the top of a bank and supply level in a canal, is called
(a) Berm (b) Free board
(c) Height of bank (d) Finch height

12. Reciprocating pumps may be
(a) Single acting (b) Double acting
(c) Both (a) & (b) (d) Reversal in nature.

13. Centrifugal pump is a
(a) Positive displacement pump (b) Non-positive displacement pump
(c) Pressured cased (d) Both (a) & (b)

14. The main cause of silting up a channel is
(a) Non-regime section (b) Inadequate slope
(c) Defected head regulator (d) All of the above

15. The main function of diversion head work of a canal from a river is
(a) To remove silt (b) To control flood
(c) To store water (d) To raise water level

16. For smooth entry of water in a canal, the angle between head regulator and water is generally kept as
(a) 80^0 (b) 90^0
(c) 110^0 (d) 120^0

17. The field capacity of a soil depends upon
(a) Capillary tension in soil (b) Porosity of soil
(c) Moisture content (d) Both (a) & (b)

18. Readily available moisture is the portion of the available moisture that is most easily extracted by plants and is approximately
(a) 65% of the available moisture (b) 45% of the available moisture
(c) 75% of the available moisture (d) 70% of the available moisture

19. When dry soil sample is kept open in the atmosphere, it absorbs some amount of water from the atmosphere, the moisture thus absorbed is the
(a) Hygroscopic water (b) Water of adhesion
(c) Water of hydration (d) All of the above

20. Soil moisture tension, expressed in terms of atmosphere is also known as
(a) Capillary potential (b) Force of suction
(c) Capillary tension (d) All of the above

21. The hygroscopic coefficient is about _____ of the permanent wilting point
(a) 2/3 (b) 3/5
(c) 2/5 (d) 3/7

22. The Delta for a crop if the duty for a base period of 110 days is 1400 ha/m^3 will be
(a) 68cm (b) 58cm
(c) 78cm (d) 88cm

23. In a variable displacement pump, as the pumping head increases
(a) The rate of pumping decreases (b) The rate of pumping becomes ideal
(c) The rate of pumping increases (d) Both (a) & (c)

24. A centrifugal pump operates at 1800 rpm and discharges 0.72m^3/min of water at 6m head. If the pump operates at 2100 rpm, then the discharge will be
(a) 0.61m^3/min (b) 0.77m^3/min
(c) 0.84m^3/min (d) 0.98m^3/min

25. A small head pump operates for 5hrs/day with an average discharge of 2.0 ltr/s. find the area that can be irrigated in one day if the depth of application is 5cm and application efficiency is 75%.

(a) $560m^2$ (b) $540m^2$

(c) $640m^2$ (d) $660m^2$

26. The properties of the aquifer may be expressed in terms of its

(a) Hydraulic conductivity (b) Storage co-efficient

(c) Transmissibility (d) All of the above

27. The level at which the water stands in a well before pumping starts, generally expressed as the distance from the ground surface to the water level in the well

(a) Static water level (b) Drawdown

(c) Piezometric surface (d) Pumping water level

28. A centrifugal pump is required to lift water to a total head of 40m at the rate of 50ltr/s. If its overall efficiency is 62%, the power required for the pump will be

(a) 31.6kW (b) 41.6kW

(c) 51.6kW (d) 21.6kW

29. In the casing of a centrifugal pump, the kinetic energy of the water is converted into

(a) Potential energy (b) Pressure energy

(c) Heat energy (d) Centrifugal moment.

30. If water table is competitively high, the irrigation canal becomes useless due to

(a) Large amount of seepage (b) Water logging of the cultivated area

(c) Uncertain water demand (d) All of the above

31. A land will be water logged when the water table is within

(a) 1.50m – 2.1m below the ground surface (b) 0.50m – 2.1m below the ground surface

(c) 1.00m – 2.5m below the ground surface (d) 1.00m – 2.0m below the ground surface

32. Depth of water table which adversely affects the growth of rice crop is

(a) 0.5m (b) 0.6m

(c) 0.7m (d) 0.4m

33. In a saline soil, the soil pH of saturated paste is

(a) Less than 8.5 (b) 7.0

(c) 4.0 (d) Both (a) & (b)

34. The growth rate of most plants reduces when the soil water solution has a salt concentration exceeding about

(a) 2000ppm (b) 3000ppm

(c) 4000ppm (d) 5000ppm

35. The most hazardous element in irrigation water in relation to crop growth and production is

(a) Potassium (b) Magnesium

(c) Sodium (d) Calcium

36. Capillary rise is a function of

(a) Soil texture (b) Porosity

(c) Both (a) & (b) (d) Atmospheric pressure.

37. Most crop will grow & respire normally if the oxygen diffuse rate exceeds

(a) 4×10^{-7} g/cm^2 (b) 5×10^{-7} g/cm^2

(c) 6×10^{-7} g/cm (d) 8×10^{-7} g/cm

38. Management of soil salinity problem can be done by
(a) Provision of adequate drainage
(b) Replacement of Na^+ ions from the soil exchange complex
(c) Leaching out of soluble salts below root zone.
(d) All of the above

39. Most common amendment used in amelioration of alkali/ sodic soil is
(a) Lime
(b) Gypsum
(c) Both (a) & (b)
(d) Potash

40. Which crop is preferred most during reclamation of alkali soil owing to its high tolerance to soil acidity
(a) Sugarcane
(b) Rice
(c) Mustard
(d) Soybean

41. Sodium absorption ratio (SAR) is calculated by
(a) $SAR = \frac{[Na^+]}{\frac{\sqrt{Ca^{+2} + Mg^{+2}}}{2}}$
(b) $SAR = \frac{[Ca^+]}{\frac{\sqrt{Na^+ + Mg^{2+}}}{2}}$
(c) $SAR = \frac{[Mg^{2+}]}{\frac{\sqrt{Ca^{+2} + Mg^{2+}}}{2}}$
(d) $SAR = \frac{\sqrt{Ca^{+2} + Na^+}}{\frac{Mg^{2+}}{2}}$

42. Saline soils are characterised by
(a) pH<8.5, ESP<15, EC>4 ds/m
(b) pH>8.5, ESP>15, EC<4 ds/m
(c) pH=8.5, ESP>15, EC<4 ds/m
(d) pH>8.5, ESP<15, EC<4 ds/m

43. Alkali soil are characterized by
(a) pH>8.5, ESP<15, EC>4ds/m
(b) pH<8.5, ESP<15, EC>4ds/m
(c) pH>8.5, ESP>15, EC<4ds/m
(d) pH>8.5, ESP>15, EC>4ds/m

44. In a mono cropping, the cropping intensity or cropping index is always
(a) 100%
(b) 50%
(c) 25%
(d) 40%

45. Growing two or more crops simultaneously on the same piece of land with a definite row pattern is called
(a) Multiple cropping
(b) Intercropping
(c) Mono-cropping
(d) Sequential or sequence cropping

46. Growing two or more crops on the same piece of land in one calendar year is known as
(a) Multiple cropping
(b) Intercropping
(c) Mono-cropping
(d) Sequential or sequence cropping

47. Growing of only one crop on a piece of land year after year is called as
(a) Multiple cropping
(b) Intercropping
(c) Mono-cropping
(d) Sequential or sequence cropping

48. Growing of two or more crops in sequence on the same piece of land in a farming year is known as
(a) Multiple cropping
(b) Intercropping
(c) Mono-cropping
(d) Sequence cropping

49. In low rainfall region (<750mm/annum) which type of cropping system is followed
(a) Mono-cropping
(b) Intercropping
(c) Multiple cropping
(d) Sequence cropping

50. Among the crops listed below which crop is grown in Rabi season
(a) Wheat (b) Rice
(c) Chilli (d) Cotton

51. Among the crops listed below which crop is grown in Kharif season
(a) Tomato (b) Potato
(c) Onion (d) Paddy

52. Growing of two or more crops simultaneously during the part of the life cycle of each is known as
(a) Mixed cropping (b) Multistorey cropping
(c) Relay cropping (d) Intercropping

53. Sugarcane + Mustard + onion/ Potato plantation is an example of
(a) Multistoreyed cropping (b) Mixed cropping
(c) Relay cropping (d) Intercropping

54. Pillar's of scientific cropping system has
(a) Genotype only.
(b) Geometry of planting and genotype.
(c) Management practices and geometry of plating.
(d) Genotype, geometry of planting and management practices.

55. The main objective of growing intercropping with the main fruit crop is to
(a) Help fruit crops to grow better (b) Improve the soil fertility
(c) Check soil erosion (d) Get additional income

56. The two important principle of extension education are
(a) Participation and leadership (b) Participation and classroom teaching
(c) Leadership and classroom teaching (d) Leadership and subject matter knowledge

57. Which one of the following extension programmes link farm plan with credit for farmers
(a) Etawah pilot project (b) Intensive Agricultural Development programme
(c) Integrated Rural Development programme (d) Community Development programme

58. Which one of the following type of crop cultivation will be most appropriate and effective in forest
(a) Extensive cropping (b) Intensive cropping
(c) Mixed cropping (d) Inter cropping

59. The total number of agro-climatic zones in which India is divided are
(a) Ten (b) Fifteen
(c) Twelve (d) Six

60. The intensity of following one year crop rotation "maize-potato-onion" is
(a) 100% (b) 150%
(c) 200% (d) 300%

61. Water use efficiency is the highest in case of
(a) Flood irrigation (b) Border irrigation
(c) Sprinkler irrigation (d) Drip irrigation

62. Water use efficiency is defined as
(a) Economic yield per unit of irrigation water applied.
(b) Ratio of water used by the crop to the irrigation water supplied.
(c) Dry matter produced per unit of water used by the crop.
(d) Ratio of net irrigation to gross irrigation including other losses.

63. Surface tension is a phenomenon due to
(a) Cohesion only
(b) Viscous force only
(c) Adhesion between liquid & solid
(d) Difference in magnitude between the force due to adhesion & cohesion

64. An ideal fluid is one which
(a) Is compressible
(b) Has negligible surface tension
(c) Is incompressible
(d) Is non-viscous & incompressible

65. Viscosity of liquids
(a) Decreases with decrease in fluid temperature
(b) Increases with increase in fluid temperature
(c) Does not change with fluid temperature
(d) Is dependent of pressure

66. A steady flow is one in which
(a) The velocity does not change from place to place
(b) Velocity may change its direction but the magnitude remains unchanged
(c) Velocity at a given point does not change with time
(d) Both (a) & (c)

67. The concept of stream function which is based on the principle of continuity is applicable to
(a) Three dimension flow
(b) Two dimensional flow
(c) Uniform flow cases only
(d) Irrotational flow

68. The causes of turbulence in fluid flow may be due to
(a) High Reynolds number
(b) Abrupt discontinuity in velocity distribution
(c) Existence of velocity gradient without disrupt discontinuity
(d) Both (b) & (c)

69. The parameter which determine the friction factor for turbulent flow in a rough pipe are
(a) Froude number & relative roughness
(b) Froude number & Mach number
(c) Reynolds number & relative roughness
(d) Mach number & relative roughness

70. The rate of flow through a 3m wide concrete lined rectangular channel having a slope 1 in 10,000 when the depth of flow is 1m with Manning's n 0.012 is
(a) $Q=1.78m^3/s$
(b) $Q=2.78m^3/s$
(c) $Q=0.78m^3/s$
(d) $Q=3.78m^3/s$

71. Uniform flow in open channel is characterized by
(a) Changing depth of flow
(b) Constant discharge passing down the channel
(c) Constant depth of flow
(d) Constant slope of channel

72. The maximum velocity in open channels occurs
(a) At the mid depth
(b) At the free surface
(c) A little below the free surface
(d) Near the channel bottom

73. The specific energy in open channel is
(a) The total energy measured above a horizontal datum
(b) The total energy measured with respect to the channel bottom which is taken as the datum
(c) The kinetic energy plotted above the free surface
(d) The total energy of a specified weight of liquid

74. In an open channel flow, the critical depth is the depth of flow at which
(a) The specific energy is maximum
(b) The unit discharge is minimum
(c) The specific energy is minimum
(d) The Froude number is greater than unity.

75. In case of uniform flow in the channel, the water surface slope dy/dx is equal to
(a) 1 (b) ∞
(c) 0 (d) 100

76. Absolute pressure in a flow system
(a) Is always above local atmospheric pressure
(b) Is a vacuum pressure
(c) May be above, below or equal to the local atmospheric pressure
(d) Is also called as negative pressure

77. Local atmospheric pressure is measured by
(a) A mercury barometer (b) A vacuum gauge
(c) A bourdon gauge (d) A manometer

78. Absolute pressure is measured by
(a) Bourdon gauge (b) Aneroid barometer
(c) Differential barometer (d) Hook gauge

79. Standard atmospheric pressure in terms of water column is
(a) 9.81m (b) 10.33m
(c) 8.75m (d) 12.35m

80. The point through which the resultant hydrostatic force acts is called
(a) Meta centre (b) Centre of buoyancy
(c) Centre of pressure (d) Centre of gravity

81. A pilot tube is an instrument for measuring
(a) Pressure flow (b) Discharge of fluid
(c) Velocity of flow (d) Total energy

82. A venture meter is a device based on Bernoulli's principle and is used for measuring
(a) Piezometric head (b) Velocity head
(c) Flow rate (d) Total energy

83. Cavitation in fluid flow occurs when
(a) The total energy suddenly increases
(b) The total energy decreases suddenly
(c) The pressure of flow decreases to a value close to its vapour pressure
(d) The velocity head reduces to zero

84. The prandtl type pilot tube is used to measure
(a) Stagnation head (b) Velocity head
(c) Static pressure head (d) Discharge

85. A Cipolletti weir is
(a) A rectangular weir with sharp edges (b) A high triangular notch
(c) A trapezoidal notch with side sloping at 45^0 (d) A trapezoidal notch with side inclined at 1H: 4V

86. A submerged weir is one in which
(a) The water on the downstream side is below the crest level
(b) The water level downstream just touches the crest
(c) The water level downstream is above the crest level
(d) The water level downstream stands at the same level as that on the upstream side.

87. Flood irrigation method of irrigating fields, works best on
(a) Level or gently rolling terrain (b) Steeply rolling terrain
(c) Both (a) & (b) (d) Furrow land

88. Salinity in irrigation water is measured by
(a) SAR value (b) pH value
(c) Electrical-conductivity value (d) Soil porosity

89. Kor watering is the irrigation water supplied to a crop
(a) At the time of sowing (b) About 3 weeks after sowing
(c) About 3 weeks before harvesting (d) Just before harvesting

90. The Duty of irrigation water for a given crop is maximum
(a) On the field (b) At the head of the main canal
(c) At the head of the water course (d) Both (b) & (c)

91. The first important watering of crop is usually called
(a) Paleo watering (b) Crop watering
(c) Kor watering (d) Delta

92. The optimum depth of Kor water for rice is about
(a) 25cm (b) 19cm
(c) 13.5cm (d) 9cm

93. Consumptive use of water for a crop represents
(a) The transpiration needs of the crops
(b) Evaporation needs of the cropped area
(c) Evapotranspiration needs of the cropped area plus the minor quantity required in plant metabolism
(d) Both (a) & (b)

94. The ratio of the water stored in the root zone of a crop, to the water actually delivered to the crop in the field is known as
(a) Water conveyance efficiency (b) Water application efficiency
(c) Water use efficiency (d) Water storage efficiency

95. The water which can be utilized by the crops from the soil is called
(a) Field capacity water (b) Capillary water
(c) Hygroscopic water (d) Duty of the crop

96. Permanent wilting point moisture content for a crop represents the
(a) Hygroscopic water (b) Capillary water
(c) Field capacity water (d) Delta of the crop.

97. The canal which may frequently encounter cross drainage works will be
(a) Watershed canal (b) Contour canal
(c) Side slope canal (d) Both (a) & (c)

98. A ridge canal is also called as
(a) Watershed canal (b) Contour canal
(c) Side slope canal (d) Both (a) & (c)

99. The ratio of the water stored in the root zone during irrigation, to the water needed in the root zone prior to irrigation is called
(a) Efficiency of water use (b) Efficiency of water stored
(c) Efficiency of water application (d) Efficiency of water conveyance

100. Duty on capacity is also called as
(a) Outlet duty (b) Capacity factor
(c) Full supply coefficient (d) Quantity duty

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