TECHNICAL COMPETITIVE EXAMINATIONS FOR RECRUITMENT TO THE POST OF
ASSISTANT SOIL CONSERVATION ENGINEER (ASCE)
UNDER LAND RESOURCES, SOIL & WATER CONSERVATION DEPARTMENT
GOVERNMENT OF MIZORAM. FEBRUARY, 2021

AGRICULTURAL ENGINEERING PAPER - II

Time Allowed : 2 hours   Full Marks : 200

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

1. In splash erosion the raindrop energy acts in the form of:
    (a) Kinetic energy
    (b) Chemical energy
    (c) Potential energy
    (d) None of these

2. Detachment of soil particles is maximum, when the depth of overland flow is between:
    (a) 1/5 and 1/3 of drop diameter
    (b) 1/5 and 1/3 of soil's particle's diameter
    (c) Both (a) & (b)
    (d) 0.15 to 0.20mm

3. Wind erosion is very common in:
    (a) Arid zones
    (b) Arid and semi-arid zones
    (c) Humid zones
    (d) All of these

4. For a storm by which 1.33, 2.50, 4.08, 5.00 and 0.05 mm rainfall depth have been occurred during 8 hr duration. If the total runoff depth produced by the storm is 7.50mm, the runoff coefficient for the storm is:
    (a) 0.87
    (b) 0.78
    (c) 0.58
    (d) 0.68

5. Moderate rainfall intensity ranges as:
    (a) 2.5 to 7.5 mm/hr
    (b) 1.5 to 6.5 mm/hr
    (c) 2.0 to 7.0mm/hr
    (d) More than 7.5mm/hr

6. Manning's roughness coefficient (n) value for Forest area with dense grass cover is:
    (a) 0.40
    (b) 0.60
    (c) 0.20
    (d) 0.80

7. _____ is defined as the average rate of infiltration during the time, when rainfall intensity exceeds the infiltration capacity.
    (a) Infiltration Index
    (b) W - Index
    (c) ϕ - Index
    (d) Threshold Index

8. The unit of drainage density is:
    (a) Sq. m
    (b) m^2/s
    (c) m/sqm
    (d) m^3/s

9. The upper limit of runoff coefficient is:
    (a) 1
    (b) 10
    (c) 1.5
    (d) 15

10. Which of the following method computes storm-wise runoff depth?
    (a) SCS method
    (b) Cook's method
    (c) Rational method
    (d) Morton's method

11. Area of unit hydrograph divided by the catchment area gives:
    (a) Direct runoff
    (b) Peak runoff
    (c) Effective rainfall depth
    (d) Total runoff

12. Which of the following phase of hydrograph does not involves splash erosion?
    (a) Recession phase
    (b) Rising phase
    (c) Peak phase
    (d) Both (b) & (c)

13. Which of the following structure is used for stream bank erosion control?
    (a) Spur
    (b) Rubble dam
    (c) Check dam
    (d) Netting dam

14. The diameter of brushwood rollers used for stream bank erosion control varies from:
    (a) 5 to 10 cm
    (b) 10 to 15 cm
    (c) 20 to 30 cm
    (d) 15 to 20 cm

15. In stream bank protection the Gabion is used for:
    (a) bank stabilization
    (b) sloughing
    (c) controlling undermining
    (d) sediment deposition

16. The typical average depth of farm pond in semi-arid climate varies from:
    (a) 4.8-5.2m
    (b) 2.8-3.15m
    (c) 4.0-4.8m
    (d) 2.4-2.8m

17. In farm pond the function of mechanical spillway is to:
    (a) release water
    (b) control soil erosion
    (c) allow water into pond
    (d) prevent pond damage

18. The capacity of farm pond is computed by using the formula:
    (a) Trapezoidal rule
    (b) Clark's formula
    (c) Rational formula
    (d) Khosla formula

19. The thickness of plastic sheet used for lining of pond storage surface varies from:
    (a) 100-150 micron
    (b) 75-100 micron
    (c) 450-500 micron
    (d) 100-200 micron

20. The side slope of contour trench ranges as:
    (a) 1:1 – 0.5:1 depending on the nature of the soil.
    (b) 1:1 – 0.5: 1 depending on the slope of the terrain.
    (c) 1:1 – 1: 1.5 depending on the nature of the soil.
    (d) 1:1 – 1: 1.5 depending on the slope of the terrain.

21. Contour bunding are technically feasible on land slopes:
    (a) Greater than 4%
    (b) Greater than 6 %
    (c) Greater than 8 %
    (d) Greater than 10%

22. The land use affects the gully erosion by affecting the:
    (a) Rate of runoff
    (b) Soil scouring
    (c) Soil deposition
    (d) All of these

23. Which of the following is not the type of check dam?
    (a) Spur
    (b) Gabion
    (c) Netting dam
    (d) Both (a) & (b)

24. The drop height of chute spillway should be:
    (a) Upto 3.0 m
    (b) 5 to 6 m
    (c) 4 to 6 m
    (d) 6 to 10 m

25. Which of the following drop structure can also be used for water storage along with gully control?
    (a) Straight drop structure   (b) Oogee spillway
    (c) Drop inlet spillway   (d) Chute spillway

26. The inlet design of drop spillway is done using:
    (a) Weir formula   (b) Rational formula
    (c) Khosla formula   (d) Both (a) & (c)

27. In which condition of Froude number, a strong hydraulic jump takes place:
    (a) $F \geq 9.0$ (b) $F \geq 7.0$
    (c) $F = 4.5 - 9.0$ (d) $F = 1.7 - 2.5$

28. The value of factor of safety against sliding of drop structures should:
    (a) Not exceed 0.8 (concrete structure)   (b) Not exceed 0.75 (concrete structure)
    (c) Be 1.5   (d) Both (a) & (b)

29. In the case of pipe spillway design, the discharge capacity is computed by using:
    (a) Orifice formula   (b) Weir formula
    (c) Rankine formula   (d) Both (a) & (b)

30. In drop inlet spillway or pipe spillway the toe drain is used for:
    (a) Drainage purpose   (b) Stability
    (c) Soil erosion control   (d) All of these

31. Most common type of self recording gauge is:
    (a) Weighing bucket   (b) Symon's rain-gauge
    (c) Tipping bucket type   (d) Float type automatic rain gauge.

32. Maximum size of raindrop varies from:
    (a) 0.5mm-7.0mm   (b) 0.5mm-6.0mm
    (c) 0.6mm-7.0mm   (d) 0.5mm-8.0mm

33. Precipitation is said to be drizzle when the water droplets and its intensity is:
    (a) <0.5mm & <0.01 mm/hr respectively   (b) >0.5mm & >0.01 mm/hr respectively
    (c) <0.5mm & >0.01 mm/hr respectively   (d) <0.05mm & <0.1 mm/hr respectively

34. Bucket capacity of tipping rain gauge is:
    (a) 2.5cm of rainfall   (b) 0.25mm of rainfall
    (c) 12.7mm of rainfall   (d) 5.0mm of rainfall

35. Symon's rain-gauge has a receiving bottle capacity of about:
    (a) 75-150 mm of rainfall   (b) 70-100 mm of rainfall
    (c) 70-150 mm of rainfall   (d) 75-100 mm of rainfall

36. A rainfall is called as light rainfall when its intensity is:
    (a) Less than 2.5 mm/hr   (b) 2.5 mm/hr
    (c) More than 2.4 mm/hr   (d) 2.4 mm/hr

37. Average rainfall over a basin may be computed using:
    (a) Arithmetic average method   (b) Thiessen polygon method
    (c) Isohyetal method   (d) All of these

38. Precipitation caused by natural rising of warmer lighter air in colder, denser surrounding is called:
    (a) Orographic precipitation   (b) Convective precipitation
    (c) Frontal precipitation   (d) Both (a) & (c)

39. For estimation of peak rate of flood for design purpose of structure in absence of any data, the value of ϕ-index is taken as:

(a) 0.2cm/hr
(b) 0.3cm/hr
(c) 0.1cm/hr
(d) 0.4cm/hr

40. The hydrologic flood routing methods are:

(a) Equation of continuity only
(b) Equation of motion only
(c) Both momentum and continuity equations
(d) Energy equation.

41. A plot of rainfall intensity versus time is called:

(a) Hydrograph
(b) Man curve
(c) Hyetograph
(d) Isohyet

42. A hydrometric curve is a plot of:

(a) Time of concentration and elevation curve of catchment.
(b) Area elevation curve.
(c) Spot rainfall values and isohyets on a basin map.
(d) Depth of rainfall & elevation of a catchment.

43. Kirpich formula estimates the time of concentration (T_c) as:

(a) $T_C = 0.02((L^3 / H)^{1/2})^{0.77}$
(b) $T_C = 0.02L^{0.77}S^{-0.385}$
(c) $T_C = 0.02(LS)^{-0.385}$
(d) $T_C = 0.02(LS)^{0.77}$

44. The peak of a flood hydrograph due to a 6-hr storm is 470m³/s. The mean depth of rainfall is 8.0cm. Assuming an average infiltration loss of 0.25cm/hr and a constant base flow of 15m³/s, estimate the peak discharge of 6-hr Unit hydrograph for this catchment.

(a) 65m³/s
(b) 70m³/s
(c) 80m³/s
(d) 75m³/s

45. Most commonly used non-recording type rain-gauge is:

(a) Weighting bucket
(b) Symon's rain-gauge
(c) Tipping bucket rain-gauge
(d) Floating type rain-gauge.

46. Line on a rainfall map of the basin joining places of equal rainfall reading is called:

(a) Isohyets
(b) Isoline
(c) Isocontour
(d) Isohyetals

47. The main components of hydrologic cycle are:

(a) Precipitation, evapotranspiration and evaporation
(b) Rainfall, evaporation and runoff
(c) Rainfall and snow fall
(d) None of these

48. Bucket capacity of tipping rain gauge is:

(a) 2.5cm of rainfall
(b) 0.25mm of rainfall
(c) 12.7mm of rainfall
(d) 5.0mm of rainfall

49. Straight line method for base flow separation is given as:

(a) N=0.89A$^{0.2}$, days
(b) N=0.88A$^{0.2}$, days
(c) N=0.88A$^{0.4}$, days
(d) N=0.89A$^{0.4}$, days

50. Symon's rain-gauge has a receiving bottle capacity of about:

(a) 75-150 mm of rainfall
(b) 70-100 mm of rainfall
(c) 70-150 mm of rainfall
(d) 75-100 mm of rainfall

51. Peak of a flood hydrograph due to 4-hr effective storm is 400m^3/s. The mean depth of the rainfall is 5.9 cm. Assuming an average infiltration loss of 0.35cm/hr and a constant base flow of 25m^3/s, estimate the peak of a 4-hr unit hydrograph.
   (a) 80.23m^3/s
   (b) 83.33m^3/s
   (c) 93.23m^3/s
   (d) 90.33m^3/s

52. The magnetic bearing of the sun at noon is 160º, then the variation is:
   (a) 20 North
   (b) 20 East
   (c) 70 East
   (d) 70 North

53. In a levelling between two points A and B on opposite banks of a river, the level was set up near A and the staff reading on A and B were 1.570 and 2.875 respectively. The level was then moved and set up near B and respective staff readings on B and A were 2.055 and 0.850, then the difference of level between A and B is:
   (a) 1.255 m
   (b) 2.152 m
   (c) 1.525 m
   (d) 1.725 m

54. True bearing of a line is 275º45', then the azimuth of the line is:
   (a) 30º45'
   (b) 90º45'
   (c) 45º15'
   (d) 84º15'

55. The bearing of the line with reference to an arbitrary meridian is 85º30'. At a later date, it was established that the angle between the arbitrary meridian and the true meridian is 15º10' W. Then the true bearing of the line is:
   (a) 100º40'
   (b) 70º20'
   (c) 79º20'
   (d) 280º40'

56. A survey line BAC crosses a river, A and C being the near and opposite banks respectively. A perpendicular AD, 40 m long is set out at A. if the bearing of AD and DC are 38º45' and 278º45' respectively, then the wide of the river is:
   (a) 60.23 m
   (b) 65.28 m
   (c) 69.28 m
   (d) 79.20 m

57. A chain line ABC crosses a stream, B and C being the near and far off banks respectively. A line BE of length 60 m is set out at right angles to the chain line B. If the bearings of BE and EC are 282º45' and 42º45' respectively, then the width of the stream is:
   (a) 103.92 m
   (b) 100.10 m
   (c) 92.57 m
   (d) 105.06 m

58. What will the height of a satellite if its angle of view is 80º and radius of earth is 6380 km?
   (a) 3545 km
   (b) 4257 km
   (c) 2754 km
   (d) 5215 km

59. Which of the scale is the smallest respectively?
   (a) 1 cm = 10 m
   (b) 1 cm = 1000 km
   (c) RF = 1/100000
   (d) 1 : 10000

60. The length of a survey line was measured with a tape having nominal length 20 m and was found to be 236.4 m. As a check the length was again measured with 30 m tape and was found to be 240.5 m. On testing it is found that the 20 m tape is 60 cm too short, then the true length of 30 m tape is:
   (a) 60 cm too long
   (b) 20 cm too short
   (c) 60 cm too short
   (d) 20 cm to long

61. What will be the maximum length of an offset so that displacement of a point on plan on scale 1 cm = 10 m should not exceed 0.025 cm, if the offset was laid out 5º from its true perpendicular direction?
   (a) 3.284 m
   (b) 2.868 m
   (c) 2.688 m
   (d) 3.482 m

62. The length of a survey line measured with a 30 cm chain was found to be 631.5 m. When the chain was compared with a standard chain, it was found to be 0.10 m too long. Then the true length of survey line is:

(a) 603.033 m   (b) 631.241 m

(c) 630.346 m   (d) 633.603 m

63. The area of a certain field was measured with a 30 m chain and found to be 5000 m^2. It was after wards detected that the chain used was 10 cm too short, then the true area of the field

(a) 4696.28 m^2 (b) 4966.72 m^2

(c) 496.67 m^2 (d) 469.28 m^2

64. The magnetic bearing of a line AB is S 30º E. If the declination is 6º west, then the true bearing is:

(a) S 36º E   (b) N 36º W

(c) N 36º E   (d) S 24º E

65. The true bearing of a line is 34º20'40" and the magnetic declination at the place of observation is 2º00'20" on the date of observation, then the magnetic bearing of the line is:

(a) 36º 21' 00"   (b) 32º 00' 20"

(c) 32º 20' 20"   (d) 34º 20' 20"

66. The relief displacement on a vertical photograph:

(a) increases as the distance from the principal point increases

(b) increases as ground elevation increases

(c) decreases with increase in flying height

(d) all of these

67. The relief displacement is:

(a) negative below datum   (b) positive above datum

(c) zero for point vertically below exposure station   (d) all of these

68. Offsets are:

(a) chain lines out of alignment   (b) measurements taken in chain survey

(c) small measurements from chain line   (d) none of these

69. Method used for chaining on sloping ground is:

(a) By stepping method   (b) By Clinometor method

(c) By Hypotenusal allowance method   (d) Both (a) & (c)

70. Compensating errors in chaining are:

(a) proportional to the length of the line

(b) proportional to the square root of the length of the time

(c) inversely proportional to the square root of the length of the line

(d) inversely proportional to the length of the line

71. Negative errors are caused in chain, when its length is:

(a) equal to the standard length   (b) less than the standard length

(c) more than the standard length   (d) any of these

72. Number of links in a 30 m metric chain is:

(a) 180   (b) 100

(c) 200   (d) 150

73. The value of magnetic declination if the magnetic bearing of sun at noon is 350º.

(a) 80º E   (b) 10º E

(c) 80º W   (d) 10º W

74. The angle between the prolongation of the preceding line and the forward line traverse, is called:

    (a) included angle   (b) deflection angle

    (c) direct angle   (d) none of these

75. In a levelling across a river, two pegs A and B were fixed on opposite banks. The following readings were taken

Position of level	Staff reading at	
	A	B
Level at A	1.871	1.469
Level at B	1.664	0.706

If R.L of A is 50.865 m, then the R.L of the point B is:

    (a) 51.545 m   (b) 62.255 m

    (c) 63.940 m   (d) 56.270 m

76. The rise and fall method of the levelling provides a complete check on:

    (a) intermediate sight   (b) back sight

    (c) foresight   (d) all of these

77. Natural error in levelling is caused due to:

    (a) wind vibration   (b) temperature variation

    (c) atmospheric refraction   (d) all of these

78. An ideal vertical curve to join two gradients, is:

    (a) Circular   (b) Parabolic

    (c) Elliptical   (d) Hyperbolic

79. The line of collimation should be parallel to:

    (a) vertical axis   (b) bubbles axis

    (c) both (a) & (b)   (d) none of these

80. Which is an odd instrument with regards to levelling?

    (a) Altimeter   (b) Planimeter

    (c) Abney hand level   (d) Clinometer

81. For a dumpy level in perfect adjustment, the horizontal cross hair should be in a plane

    (a) parallel to vertical axis   (b) parallel to axis of bubble tube

    (c) perpendicular to vertical axis   (d) none of these

82. In levelling, a station is a point where:

    (a) bench mark is mark   (b) staff is placed

    (c) instrument is set up   (d) none of these

83. The contour interval is depends upon:

    (a) purpose and extent of survey   (b) scale of the map

    (c) nature of the ground   (d) all of these

84. Contour interval is proportional to:

    (a) directly to the flatness of the ground   (b) directly to the scale of map

    (c) inversely to the scale of map   (d) none of these

85. In direct method of contouring, the process of locating points lying on the contour is known as:

    (a) ranging   (b) horizontal control

    (c) vertical control   (d) none of these

86. In farm pond embankment the function of core wall is to:

    (a) Check the seepage flow   (b) Prevent dam damage

    (c) Cause sediment deposition   (d) All of these

87. The type of surveying in which the curvature of earth is taken into account is called:
  (a) geodetic surveying
  (b) plan surveying
  (c) preliminary survey
  (d) topographical survey

88. Unit Hydrograph theory was enunciated by:
  (a) Merril Bernard
  (b) W.W. Horner
  (c) LeRoy K. Sherman
  (d) Robert E. Horten

89. The surface Run-off is the quantity of water:
  (a) Absorbed by soil
  (b) Intercepted by building and vegetative covers
  (c) Required to filled surface depression
  (d) That reaches the stream channels

90. In remote sensing the sensors are used to detect:
  (a) EMR
  (b) IR
  (c) Sound energy
  (d) Visible light

91. The first operational remote sensing satellite is:
  (a) TRIOS
  (b) NOAA
  (c) GMS
  (d) SPOT

92. The function of levelling head is:
  (a) to provide a bearing for outer hollow spindle
  (b) to attach the Theodolite to the tripod
  (c) to provide a mean of levelling the instrument
  (d) all of these

93. The instrument used for measuring area on a contour map is:
  (a) Clinometer
  (b) Planimeter
  (c) Tensiometer
  (d) Graphometer

94. For construction of grassed waterways the land slope should be:
  (a) Less than 20%
  (b) 5-10%
  (c) 10-15%
  (d) 20-30%

95. The most suitable shape of grassed waterways is:
  (a) Triangular
  (b) Trapezoidal
  (c) Rectangular
  (d) Parabolic

96. The most optimum flow velocity for the ballasted waterway is:
  (a) 3 m/s
  (b) 10 m/s
  (c) 1.8 m/s
  (d) 5 m/s

97. Which of the following is associated in computation of flow velocity in grassed waterway design?
  (a) Manning's Formula
  (b) Rational Formula
  (c) Inglis Formula
  (d) Muskingum Equation

98. The most optimum flow velocity of runoff for the grassed waterway with drop structure is:
  (a) 6 m/s
  (b) 3 m/s
  (c) 10 m/s
  (d) 1.8 m/s

99. The contour bunds spacing varies between:
  (a) 5-10 m
  (b) 5-15 m
  (c) 5- 20 m
  (d) Both (a) & (b)

100. In bench terrace the inward slope varies from:
  (a) 2 – 10 %
  (b) 1 – 5 %
  (c) 2 – 8.5 %
  (d) 5 – 10 %

* * * * * * *