MIZORAM PUBLIC SERVICE COMMISSION

COMPETITIVE EXAMINATIONS FOR RECRUITMENT TO LECTURER (CIVIL ENGINEERING) (CONTRACT) UNDER HIGHER & TECHNICAL EDUCATION DEPARTMENT, MARCH, 2017

PAPER - II

Time Allowed : 2 hours Full Marks : 200

Attempt all questions.

All questions carry equal marks of 2 each.

1. Rainfall mass curve shows the variation of

(a) rainfall excess with time (b) accumulated penetration against time

(c) rainfall intensity against time (d) none of these

2. Discharge per unit of drawdown of a well is known as

(a) yield (b) specific gravity

(c) well losses (d) transmissivity

3. Aquiclude can be described as a formation which

(a) not only stores water but also yields it in sufficient quantity

(b) allows only seepage and insignificant yield

(c) is impermeable to flow of water but may be porous

(d) is neither porous nor preamble like unfractured rock

4. The water bearing strata, that is, layers of sand, ground, etc., is called

(a) an aquifer (b) an aquiclude

(c) an aquifuge (d) zone of saturation

5. A Mean annual runoff ($1 m^3/s$) from a catchment area of 32 km^2 represents an effective rainfall of

(a) 0.95 cm (b) 0.99 cm

(c) 0.85 cm (d) 1.05 cm

6. A hydrograph is a plot of

(a) rainfall intensity against time (b) stream discharge against time

(c) cumulative rainfall against time (d) cumulative runoff against time

7. The Muskingum equation is S =

(a) $k\left[xI+(1-x)Q\right]$ (b) $k\left[xI+(1-x)I\right]$

(c) $k\left[xI+(1+x)Q\right]$ (d) $k\left[xI-(1-x)Q\right]$

8. Which of the following statements is wrong?

(a) The quality of tube well water is better than that of surface sources

(b) The discharge of tube well water is more than that of an open well

(c) The tube well should not derive water from the first pervious strata

(d) None of these

9. The average domestic consumption under normal conditions in an Indian city per day per person, is

(a) 105 litres (b) 115 litres

(c) 125 litres (d) 150 litres

10. For determining the velocity of flow of underground water, the most commonly used non empirical formula is

(a) Darcy's formula (b) Slichter's formula

(c) Hazen's formula (d) Lacy's formula

11. Specific capacity or yield of wells, is generally expressed as

(a) m^3/s (b) $m^3/hour$

(c) $m^3/hour/m^2$ (d) $m^3/hour/m^2/m$

12. Ground water from artesian wells

(a) contains no suspended materials (b) contains dissolved salts

(c) may be saltish and hard (d) all of these

13. In pumping stations, the type of joint generally used, is

(a) socket and spigot joint (b) flanged joint

(c) expansion joint (d) flexible joint

14. Sluice valves in main water supplies

(a) are used to regulate the flow of water in pipes

(b) are spaced about 5 km apart

(c) are usually placed at the summits

(d) all of these

15. Pressure relief valves are provided in water mains

(a) to reduce the pressure (b) at low points

(c) upstream of sluice (d) all of these

16. Check valves are installed

(a) on the delivery side of the pumping set

(b) at the interconnections between pollutedwater system and a potable water system

(c) both (a) & (b)

(d) neither (a) nor (b)

17. Reciprocating pumps

(a) are not suitable for variable heads

(b) are four times costlier than centrifugal pumps

(c) are not suitable for pumping water containing sediments

(d) single stroke produce pulsating flow

18. Fluids change the volume under external pressure due to

(a) plasticity (b) viscosity

(c) compressibility (d) none of these

19. Aeration of water is done to remove

(a) odour (b) colour

(c) bacterias (d) hardness

20. The chloride content of treated water for public supplies should not exceed

(a) 100 ppm (b) 150 ppm

(c) 200 ppm (d) 250 ppm

21. B.O.D of treated water should be

(a) 10 ppm (b) 25 ppm

(c) 0 ppm (d) 30 ppm

22. The maximum depth of sedimentation tanks is limited to

(a) 6m (b) 3m

(c) 4m (d) 5m

23. The best process of disinfection of public water supply is by

(a) boiling (b) chlorination

(c) adding lime (d) adding zone

24. Chlorination of water does not remove

(a) ammonia content (b) B.O.D

(c) organic matter content (d) dissolved oxygen

25. The efficiency of sedimentation tank does not depend upon

(a) depth of tank (b) length of tank

(c) detention period (d) velocity of water

26. The detention period for plain sedimentation water tanks, is usually

(a) 4 to 8 hours (b) 8 to 16 hours

(c) 16 to 24 hours (d) 24 to 36 hours

27. For controlling algae, the most commonly used chemical is

(a) copper sulphate (b) alum

(c) lime (d) bleaching powder

28. The rate of silting in a reservoir

(a) is less in the beginning

(b) remains constant throughout

(c) is more in the beginning

(d) is more in the beginning and reduces in the end

29. A centrifugal pump is required to be primed before starting if it is located

(a) at higher level than water level of reservoir

(b) at lower level than water level of reservoir

(c) both (a) & (b)

(d) neither (a) nor (b)

30. If w is the weight of water per cubic metre, Q is the discharge in cubic metres per sec and H is the total head, the required water horse power of the pump, is

(a) $\frac{wQH}{15}$ (b) $\frac{wQH}{360}$

(c) $\frac{wQH}{220}$ (d) $\frac{wQH}{550}$

31. A piezometer is not used for pressure measurement in pipe when

(a) the pressure is very low (b) velocity of fluid is high

(c) velocity of fluid is low (d) the fluid in the pipe is high

32. Hydrostatic pressure variation is related to

(a) pressure variation in water only (b) constancy of $\left[\left(P/\gamma\right) + Z\right]$

(c) pressure variation in atmosphere only (d) variation of $\left[\left(P/\gamma\right) + Z\right]$

33. E coli bacteria die in water having pH greater than

(a) 5.5 (b) 6.5

(c) 9.5 (d) 8.5

34. The most ideal disinfectant used for drinking water throughout the world, is

(a) alum (b) lime

(c) chlorine (d) nitrogen, ammonia

35. In distribution pipes, drain valves are provided at

(a) lower joint (b) higher point

(c) junction points (d) anywhere

36. In distribution pipes, air valves are provided at

(a) lower joint (b) higher point

(c) junction points (d) anywhere

37. In a well planned city, the layout of distribution pipes generally adopted, is

(a) grid iron system (b) interlaced system

(c) reticulation system (d) all of these

38. For a city developed haphazardly, the layout of distribution preferred to, is

(a) ring system (b) radial system

(c) grid iron system (d) dead end system

39. After which of the following treatment, turbidity is maximum

(a) Chlorination (b) Flocculation basin

(c) Primary sedimentation (d) Secondary sedimentation

40. Sewage sickness occurs when

(a) sewage contains pathogenic organisms

(b) sewage enters the water supply sysytem

(c) sewage get clogged due to accumulation of solids

(d) voids of soil clogged due to continues application of sewage on a piece of land

41. Which one of the following statements: (The time of BOD assimilation in a stream can be affected by)

(a) reproduction of microorganism

(b) observation of microorganisms under microscope

(c) ability of microorganism to form zoological film

(d) concentration of toxic materials in the food chain

42. In a high rate trickling filter the problem of ponding can be solved by

(a) flooding and raking
(b) chlorination and supply of air
(c) Raking and chlorination
(d) flooding and supply of air

43. Which one of the following solid waste disposal methods is ecologically most acceptable?

(a) Sanitary landfill
(b) Incineration
(c) Composting
(d) Pyrolysis

44. Which method may be opted for plastic and rubber waste disposal?

(a) Sanitary landfill
(b) Incineration
(c) Composting
(d) Pyrolysis

45. Which of the following comprehensive classification is used for different types of solid wastes?

(a) residential, commercial, treatment of plant wastes
(b) food, demolition and construction wastes
(c) municipal, industrial and hazardous wastes
(d) rubbish, special wastes and wastes from open areas

46. Eutrophication of lakes primarily due to

(a) multiplication of bacteria
(b) excessive flow of nutrients
(c) increase in benthic system
(d) thermal and density current

47. Shallow ponds in which dissolved oxygen is present at all depths are called

(a) aerobic lagoon
(b) aerobic ponds
(c) facultative lagoon
(d) facultative ponds

48. Aerosol is

(a) carbon particle of microscopic size
(b) dispersion of small liquid or solid particle in gaseous media
(c) finely divided particles of ash
(d) diffused liquid particles

49. In urban air pollution the most poisonous gas is supposed to be carbon monoxide. It is hazardous because

(a) affects our sense of smell
(b) is carcinogenic in nature
(c) combines with haemoglobin
(d) causes blindness

50. The amount of bleaching powder containing 20% available chlorine needed to chlorinate a rural water supply covering a population of 50000 at 50L/cd at a rate of 2 ppm is

(a) 1 kg
(b) 5 kg
(c) 20 kg
(d) 25 kg

51. The total volume of a primary settling tank is 2500 m^3 and the wastewater flow is 25×10^6 litres/day. The detention time in settling tank is

(a) $\frac{10}{24}h$ (b) $\frac{24}{10}h$

(c) $24h$ (d) $\frac{1}{24}h$

52. Zero hardness of water is achieved by

(a) lime soda process (b) excess lime treatment

(c) ion exchange method (d) excess alum and lime treatment

53. Total hardness in mg/L as $CaCO_3$ is

(a) 1500 (b) 2000

(c) 3000 (d) 5000

54. Match List I and List II and select the correct answer using the codes given below the lists:

	COLUMN I		COLUMN II
A	Grit Chamber	1	Zone settling
B	Secondary settling tank	2	Stoke's law
C	Activated sludge process	3	Aerobic
D	Trickling filter	4	Contact stabilisation

Codes

(a) A B C D
1 2 3 4

(b) A B C D
2 1 3 4

(c) A B C D
1 3 4 2

(d) A B C D
4 2 1 3

55. Two primary air pollutants are

(a) sulphur oxide and ozone (b) nitrogen oxide and peroxyacetylnitrate

(c) sulphur oxide and hydrocarbon (d) ozone and peroxyacetylnitrate

56. A crop requires a total depth of 95 cm of water for a base period of 110 days. The duty of the water will be

(a) 1000 hectares/cumec (b) 975 hectares/cumec

(c) 1100 hectares/cumec (d) 1200 hectares/cumec

57. The amount of irrigation water required to meet the evapo-transpiration needs as well as other needs such as leaching is called

(a) Gross irrigation requirement
(b) Consumptive irrigation requirement
(c) Field irrigation requirement
(d) Net irrigation requirement

58. Sprinkler irrigation system is suitable when

(a) the land gradient is steep and the soil is easily erodible
(b) the soil is having low permeability
(c) the water table is low
(d) the crops to be grown have deep roots

59. The culturable command area for a distributary channel is 20,000 hectares. Wheat is grown in the entire area and the intensity of irrigation is 50%.The kor period for wheat is 30 days, water depth is 120 mm. The outlet discharge for distributary should be

(a) 2.85 m^3/s
(b) 3.25 m^3/s
(c) 4.63 m^3/s
(d) 5.85 m^3/s

60. Salinity in irrigation water is measured by

(a) pH value
(b) Electrical conductivity value
(c) SAR value
(d) Jar value

61. According to Lacey's theory, the wetted perimeter 'P' is related to the discharge 'Q' as

(a) $P = 4.75Q$
(b) $P = 4.75\sqrt{Q}$
(c) $P = 4.75Q^{5/2}$
(d) None of these

62. In an earth dam, the phreatic line is

(a) elliptical
(b) parabolic
(c) a straight line
(d) circular

63. The energy dissipation in straight glaces fall in affected by

(a) cavitation
(b) friction blocks
(c) fluming action
(d) hydraulic jumps

64. Vertical drop fall is satisfactory for a height up to

(a) 1.5 m
(b) 2.5 m
(c) 4.5 m
(d) 5.5 m

65. The "safety valve" of a dam is its

(a) outlet sluice
(b) spillway
(c) inspection gallery
(d) drainage gallery

66. The minimum recommended free board for lined canals carrying discharge of more than 10 cumecs is

(a) 0.3 m (b) 0.6 m

(c) 0.75 m (d) 1.2m

67. For an area of 1000 square km, the number of rain guage stations will be

(a) 2 (b) 10

(c) 40 (d) 6

68. In a concrete lined canal, the permissible velocity of water is

(a) 5 m/s (b) 4 m/s

(c) 2 m/s (d) 0.5 m/s

69. The stabilizing force in gravity dam is

(a) a wind force (b) water force

(c) uplift (d) weight of dam

70. The horizontal to vertical slope in the case of a cippoleti weir is

(a) 1:1 (b) 1:4

(c) 3:1 (d) 1:1

71. Match List I and List II and select the correct answer using the codes given below the lists:

	COLUMN I		COLUMN II
A	Minor irrigation works	1	Saddle spillway
B	Medium irrigation project in interior area	2	Syphon spillway
C	Earth dam across main river	3	Ogee spillway
D	Masonry dam on good rock	4	Surplus weir

Codes

(a) A B C D
1 2 3 4

(b) A B C D
4 2 1 3

(c) A B C D
3 4 2 1

(d) A B C D
2 4 1 3

72. Match List I and List II and select the correct answer using the codes given below the lists:

	COLUMN I		COLUMN II
A	Wetted perimeter	1	$0.47\ (g/f)^{1/3}$
B	Regime scour depth	2	$0.55D^{0.64}$
C	Velocity by Kennedy equation	3	$4.75\sqrt{Q}$
D	Scour depth	4	$1.35\ (q^2/f)^{1/3}$

Codes

(a) A B C D
3 4 2 1

(b) A B C D
4 2 1 3

(c) A B C D
4 3 1 2

(d) A B C D
2 4 1 3

73. Viscosity of fluid is measured in

(a) Ns/m^2 (b) N/m^2

(c) m^2/s (d) m/s

74. Compressibility is defined as

(a) ratio of increase in pressure to volumetric strain

(b) ratio of volumetric strain to increase in pressure

(c) ratio of change in volume to original volume

(d) ratio of lateral strain to axial strain

75. Absolute pressure can be mathematically expressed as,

(a) Absolute pressure = Atmospheric pressure + Gauge pressure

(b) Absolute pressure = Atmospheric pressure - Gauge pressure

(c) Absolute pressure = Vacuum pressure + Gauge pressure

(d) all of these

76. Equipotential lines and streamlines are

(a) parallel to each other (b) perpendicular to each other

(c) inclined at 45^o (d) none of these

77. The head of water over an orifice is 8 m and the coefficient of velocity is 0.97, theoretical velocity of water would be

(a) 12.15 m/s (b) 12.52 m/s

(c) 12.90 m/s (d) 12.99 m/s

78. Co-efficient of discharge can be expressed as,

(a) $C_c . C_v$ (b) C_v / C_c

(c) C_c / C_v (d) $\sqrt{C_c . C_v}$

79. For glass tube dipped in mercury, depression in tube compared to outside level of liquid can be expressed as

(a) $\frac{4\sigma}{\rho g d}$ (b) $\frac{4\sigma \cos\theta}{\rho g d}$

(c) $\frac{4\sigma \sin\theta}{\rho g d}$ (d) $\frac{4\sigma \tan\theta}{\rho g d}$

80. Barometric pressure at sea level is 720 mm of mercury while at the top of the mountain it is 680mm. Assuming air density 1.5kg/m3, height of the mountain top would be (specific gravity of mercury =13.6)

(a) 94.44 mm (b) 1269.33 mm

(c) 141.26 mm (d) 362.67 mm

81. In the most general form of Bernoulli's equation, $\frac{P}{W} + \frac{V^2}{2g} + Z$ = constant, each term represents

(a) energy per unit mass (b) energy per unit weight

(c) energy per unit volume (d) none of these

82. The power transmitted through pipe is given

(a) $\frac{PQxgH}{1000}$ (b) $\frac{P_g Q h_f}{1000}$

(c) $\frac{PgQ\left(H - h_f\right)}{4500}$ (d) $\frac{PgQ\left(H - h_f\right)}{1000}$

83. The specific speed of a turbine is expressed as

(a) $n.\frac{\sqrt{P}}{H^{5/4}}$ (b) $n.\frac{H^{5/4}}{\sqrt{P}}$

(c) $n.\frac{\sqrt{P}}{pH^{5/4}}$ (d) $n.\frac{\sqrt{P}}{gH^{5/4}}$

84. To generate 10000 HP under a head of 81 m while working at a speed of 500 rpm, the turbine of choice would be

(a) Pelton (b) Kaplan

(c) Bulb (d) Francis

85. Pumps may be put in the increasing order of specific speeds as

(a) centrifugal pumps, mixed flow pumps, axial flow pumps

(b) centrifugal pumps, axial flow pumps, mixed flow pumps

(c) mixed flow pumps, axial flow pumps, centrifugal pumps

(d) mixed flow pumps, centrifugal pumps, axial flow pumps

86. The flow in a river during the period of heavy rainfall is

(a) steady, uniform, two-dimensional

(b) unsteady, uniform, three dimensional

(c) unsteady, non uniform, three dimensional

(d) none of these

87. The relation between hydraulic efficiency (η_h), mechanical efficiency (η_m) and overall efficiency (η_0) is

(a) $\eta_h = \eta_0$ x η_m (b) $\eta_0 = \eta_h$ x η_m

(c) $\eta_0 = \frac{\eta_m}{\eta_u}$ (d) none of these

88. A turbine is called reaction turbine , if at the inlet of the turbine the total energy is

(a) kinetic energy only

(b) kinetic energy and pressure energy

(c) pressure energy only

(d) none of these

89. The cavitation occurs in a pipe when the pressure is

(a) equal to vapour pressure (b) very high

(c) negative (d) positive

90. If the Froude's number in open channel is less than 1.0, the flow is called

(a) critical (b) super-critical

(c) sub-critical (d) none of these

91. Match List I and List II and select the correct answer using the codes given below the lists:

	COLUMN I		COLUMN II
A	Release valve	1	Reduce high inlet pressure to lower outlet pressure
B	Check valve	2	Limit the flow of water to single direction
C	Gate valve	3	Remove air from the pipeline
D	Pilot valve	4	Stopping the flow of water in the pipeline

Codes

(a) A B C D
3 2 4 1

(b) A B C D
4 2 1 3

(c) A B C D
3 4 2 1

(d) A B C D
1 2 3 4

92. Centre of buoyancy is

(a) centroid of the floating body

(b) centroid of the fluid displaced

(c) centre of pressure of the displaced liquid

(d) none of these

93. If the total head of the nozzle of a pipe is 37.5 m and discharge is 1 cumec, the power generated is

(a) 400 H.P (b) 450 H.P

(c) 500 H.P (d) 550 H.P

94. Back water curve is caused by

(a) friction head loss is more than the bed slope

(b) pressure is due to weir in the channel

(c) there is an increase in width of the channel

(d) none of these

95. The efficiency of sprinkler irrigation is the highest in

(a) arid regions (b) semi arid regions

(c) humid regions (d) none of these

96. The formula for estimating run of $R = 0.85 P - 30.5$ is known as

(a) parker formula (b) khosla formula

(c) lacey formula (d) inglis formula

97. Boson concentration in irrigation water is restricted to

(a) 0.5 ppm (b) 2 ppm

(c) 200 ppm (d) 500 ppm

98. Atmospheric pressure varies with

(a) altitude (b) temperature

(c) weather conditions (d) none of these

99. The most prominent force, acting on the underground sewers pipe is

(a) compressive force (b) bending force

(c) tensile force (d) all of these

100. "Economic height of a dam" is that height, for which the

(a) cost per unit of storage is minimum

(b) benefit cost ratio is maximum

(c) net benefits are maximum

(d) none of these

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