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MES

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Civil Engineering - II
Jan, 2015

MIZORAM PUBLIC SERVICE COMMISSION

TECHNICAL COMPETITIVE EXAMINATIONS FOR RECRUITMENT TO JUNIOR GRADE OF MIZORAM ENGINEERING SERVICE (CIVIL) CONTRACT UNDER DISASTER MANAGEMENT & REHABILITATION DEPARTMENT, JANUARY 2015.

CIVIL ENGINEERING
PAPER - II

Time Allowed : 2 hours   Full Marks : 200

All questions carry equal marks of 2 each.

Attempt all questions.

1. The continuity equation of fluid flow is the mathematical statement of
   (a) The Principle of Conservation of Mass
   (b) The Principle of Conservation of Energy
   (c) The Principle of Conservation of Momentum
   (d) The Principle of Conservation of Impulse Momentum

2. Which of the following plays significant role for fluid to flow in laminar type?
   (a) Pressure   (b) Temperature
   (c) Viscosity   (d) Quantity

3. Superflous variables in dimensional analysis are
   (a) Variables that govern the flow phenomenon
   (b) Variables that gives characteristic fluid property
   (c) Variables of fundamental quantities
   (d) Variables included that do not affect the phenomenon

4. The change of physical property in isothermal process is governed by
   (a) Reynold's number   (b) Bernoulli's equation
   (c) Boyle's Law   (d) Navier-Stokes equation

5. If Mach Number is slightly less than or slightly greater than 1, then the flow is termed as
   (a) Sonic   (b) Hypersonic
   (c) Transonic   (d) Supersonic

6. Hydrostatic pressure on a dam depends upon its
   (a) Length   (b) Depth
   (c) Shape   (d) Material

7. Since stream line is everywhere tangent to the velocity vector
   (a) There is a velocity component at right angle to the stream line
   (b) Velocity of flow is maximum across the stream line
   (c) There can be no flow of fluid across the stream line
   (d) Flow across the stream line is identical

8. The frictional resistance in the laminar flow is
   (a) Not affected by the variation of temperature
   (b) Dependant of pressure
   (c) Proportional to the velocity of flow
   (d) All of these

9. The velocity of fluid flow within the boundary layer
   (a) Increases from zero at the boundary surface
   (b) Decreases to zero from the boundary surface
   (c) Remains the same with the main stream
   (d) Is maximum at the boundary

10. In hydraulic jump, passage of water is
    (a) From a super critical state to sub-critical state
    (b) From sub-critical state to super critical state
    (c) From critical state to super critical state
    (d) From sub-critical state to critical state

11. Specific weight of liquid
    (a) Remains constant at every place
    (b) Does not remain constant at every place
    (c) Varies from place to place on earth
    (d) Does not vary on any other planet

12. Any independent mass of fluid does not possess
    (a) Elevation energy
    (b) Kinetic energy
    (c) Pressure energy
    (d) None of these

13. Bernoulli's equation assumes that
    (a) Fluid is non-viscous
    (b) Fluid is homogeneous
    (c) Flow is steady
    (d) All of these

14. A piezometer opening in pipe measures
    (a) Velocity head
    (b) Static pressure
    (c) Total pressure
    (d) Double static pressure

15. Hydraulic ram is a device used
    (a) To lift water without electric motor
    (b) To accelerate water flow
    (c) For lifting heavy load
    (d) None of these

16. An ideal fluid is
    (a) One which obeys Newton's law of viscosity
    (b) One which satisfies continuity equation
    (c) One which flows through pipes with least friction
    (d) Frictionless and incompressible

17. Which of the following fluids can be classified as non-Newtonian?
    (a) Kerosene oil
    (b) Diesel oil
    (c) Human blood
    (d) Toothpaste

18. Mercury is used in barometers because
   (a) It is perfect fluid
   (b) Its volume changes with temperature
   (c) It is a liquid metal
   (d) It gives less height of column for high pressure

19. The pressure intensity in kg/cm^2 at any point in a liquid is
   (a) w
   (b) wh
   (c) w/h
   (d) h/w

20. Gauge pressure is the same as
   (a) Atmospheric pressure - absolute pressure
   (b) Atmospheric pressure - vacuum
   (c) Absolute pressure - atmospheric pressure
   (d) Absolute pressure + atmospheric pressure

21. A body in neutral equilibrium will rotate about
   (a) Centre of gravity and metacenter
   (b) Centre of pressure and metacenter
   (c) Centre of gravity and centre of buoyancy
   (d) Centre of gravity, centre of buoyancy and metacenter

22. A flow in which the velocities of liquid particles at all sections of the pipe or channel are equal, is called as
   (a) Uniform flow
   (b) Laminar flow
   (c) Turbulent flow
   (d) Unsteady flow

23. The ratio between inertia force and viscous force is called
   (a) Reynold's number
   (b) Froude's number
   (c) Weber's number
   (d) Euler's number

24. A flow in which each liquid particle has definite path, and the path of individual particles do not cross each other is called
   (a) Steady flow
   (b) Uniform flow
   (c) Streamline flow
   (d) Turbulent flow

25. Which of the following phenomenon in a pipe flow is termed as water hammer ?
   (a) The sudden rise of pressure in a long pipe due to sudden closure of valve
   (b) The rise of a pressure in a pipe flow due to gradual closure of a valve
   (c) The rise of negative pressure
   (d) The zero pressure in a pipe flow

26. The intensity-duration-frequency curves for precipitation indicate
   (a) that the greater the intensity of rainfall the shorter length of time it continues
   (b) the days on which rainfall occurs at a location
   (c) that cumulative rainfall over a period with frequency of periodic peaks is ultimately constant
   (d) that the intensity of rainfall increases as the duration increases

27. The difference between the total rainfall and that which is intercepted is called
   (a) Rainfall interception
   (b) Residual rain
   (c) Net rainfall
   (d) Ground rainfall

28. Intensity of rainfall is
    (a) Total rainfall in a period
    (b) Rainfall per unit area
    (c) Volume of water collected per unit time
    (d) Depth of rainfall per unit time during which it fell

29. The infiltration capacity is
    (a) Maximum rate of accumulation of water in an area
    (b) (Precipitation - evaporation loss) per unit time
    (c) Maximum rate at which water enters the soil
    (d) Rainfall water entering sub-soil

30. An aquifer that is confined at the bottom but not at the top is known as
    (a) Partially confined aquifer   (b) Aquiclude
    (c) Semi-confined aquifer   (d) Unconfined aquifer

31. Rainfall records are maintained on
    (a) Daily basis   (b) Monthly basis
    (c) Yearly basis   (d) None of these

32. All the water flowing in the stream channel at any given section expressed for long period of time is
    (a) Run off   (b) Surface run off
    (c) Yield of draining basin   (d) Depression storage

33. The fundamental equation for the computation of run off is
    (a) Precipitation + basin recharge – ground water accretion
    (b) Precipitation – basin recharge + ground water accretion
    (c) Precipitation – basin recharge – ground water accretion
    (d) Precipitation + basin recharge + ground water accretion

34. Water supply system means
    (a) Digging of well for water
    (b) Construction of dams
    (c) Construction of canals
    (d) Entire arrangement from the source of supply to distribution

35. A flood of a certain magnitude has a return period of 25 years. The probability of exceedance would be
    (a) 0   (b) 0.04
    (c) 50   (d) 1

36. Estimation technique of discharges from catchment for an area over 5000 sq km is
    (a) Rational method   (b) Unit hydrograph
    (c) Over land flow hydrograph   (d) Flood routing

37. A time-intensity graph of a rain storm is assumed to be made up of
    (a) Straight line   (b) Curves
    (c) Irregular shaped line   (d) Mixture of straight line and curves

38. Underground water is obtained from
    - (a) Rains
    - (b) Rivers
    - (c) Lakes
    - (d) Springs

39. Surface water should never be used before treatment because it
    - (a) Contains large amount of impurities
    - (b) Is contaminated by impurities while travelling
    - (c) Contains disease producing bacteria
    - (d) All of these

40. Higher yield may be expected from
    - (a) Gravity spring
    - (b) Surface spring
    - (c) Artesian spring
    - (d) All of these

41. The maximum pressure to which a pipe is subjected during its operation is known as
    - (a) Working pressure
    - (b) Design pressure
    - (c) Pipe pressure
    - (d) Test pressure

42. Air valves are generally provided in water supply pressure mains
    - (a) At pipe junctions
    - (b) At summits
    - (c) At low points
    - (d) Near service pipes

43. Disinfection of drinking water is done to remove
    - (a) Colour
    - (b) Turbidity
    - (c) Bacterias
    - (d) Acidity

44. Raw water treated with only chlorine is known as
    - (a) Plain chlorination
    - (b) First chlorination
    - (c) Pre-chlorination
    - (d) De-chlorination

45. If the pressure surface of Aquifer lies above the ground surface, the well will be
    - (a) Artesian well
    - (b) Non-artesian well
    - (c) Flowing artesian well
    - (d) Non-flowing artesian well

46. Gravel packing in underground water well
    - (a) Recharges the water level
    - (b) Reduces the percolation considerably
    - (c) Increases the specific capacity
    - (d) Reduces the effective diameter of well

47. The retention time of septic tank at average daily flow is
    - (a) 8 hours
    - (b) 12 hours
    - (c) 24 hours
    - (d) 48 hours

48. As a general rule, new sewer systems must be designed
    - (a) To combine sanitary and storm flows
    - (b) To separate sanitary and storm flows
    - (c) To care for storm water first and then sanitary sewage
    - (d) To treat storm sewage contamination

49. The most suitable material for house sewer is
    - (a) Bituminized fibre
    - (b) Ductile iron
    - (c) Corrugated metal
    - (d) Solid wall plastic

50. In order to prevent settlement of the sewage solid in sanitary sewers, velocity required to be maintained is not less than
    - (a) 0.4 m/s
    - (b) 0.6 m/s
    - (c) 0.75 m/s
    - (d) 0.8 m/s

51. Waste water disposal in soil, major activity both biological and chemical occurs
    - (a) At deeper levels
    - (b) At the surface of the earth
    - (c) Within a few millimeters of the soil
    - (d) In the upper 300 mm of the soil

52. Sewage sickness in land disposal means
    - (a) When the disposal site is full
    - (b) When the over burden load exceeds the bearing capacity of soil at disposal site
    - (c) When aerobic condition can no longer continue and anaerobic condition starts
    - (d) When pathogens start to grow due to lack of treatment

53. Primary sewage treatment has traditionally implied
    - (a) Removal of bigger biodegradable substances
    - (b) Removal of suspended organic solids
    - (c) Removal of inorganic substances
    - (d) Removal of radioactive materials from others

54. Trickling filter in treating domestic and industrial waste use
    - (a) Physico-chemical treatment
    - (b) Biological treatment
    - (c) Chemical treatment
    - (d) Combination of biological and chemical treatment

55. The minimum diameter of an opening of a manhole should be
    - (a) 50 cm
    - (b) 100 cm
    - (c) 25 cm
    - (d) 150 cm

56. In normal conditions, the period for sludge digestion is
    - (a) 10 days
    - (b) 20 days
    - (c) 30 days
    - (d) 60 days

57. In septic tank, decomposition of organic bacteria is done by
    - (a) Aerobic bacteria
    - (b) Anaerobic bacteria
    - (c) Both bacterias
    - (d) None of these

58. For providing an Indian type W.C, the RCC slabs in the toilet portion
    - (a) Should be sunk by 20 cm
    - (b) Should be sunk by 50 cm
    - (c) Should be kept 20 cm above the adjacent portion
    - (d) Need not be sunk

59. The greatest mass constituent of any air pollutant is
    - (a) Sulphur dioxide
    - (b) Hydro carbons
    - (c) Carbon monoxide
    - (d) Nitrogen oxide

60. The most promising method of disposal of radio active wastes seems to be
    (a) Mixed with cement or other immobilizing agents
    (b) Sealed in a steel drum for burial
    (c) Vitrification
    (d) Burial at great depth

61. The most common surface water supply source is
    (a) Sea
    (b) River
    (c) Pond
    (d) Lake

62. Which of the following is the standard treatment of rapid sand filter plants?
    (a) Plain chlorination
    (b) Pre chlorination
    (c) Post chlorination
    (d) Super chlorination

63. The most widely used tube well in India is
    (a) Strainer well
    (b) Cavity well
    (c) Slotted well
    (d) Perforated well

64. The distribution mains in water supply system are designed for
    (a) Maximum daily demand
    (b) Peak hourly demand
    (c) Average daily demand
    (d) Maximum hourly demand on maximum consumption day

65. The best coagulant for removing the colour of water is
    (a) Alum
    (b) Lime
    (c) Iron sulphate
    (d) Copper sulphate

66. During epidemics the best and economic method of disinfection of water treatment is
    (a) By potassium permanganate
    (b) By ozone
    (c) By boiling water
    (d) By chlorination

67. The suitable layout of a distribution system for haphazardly developing city is
    (a) Dead end system
    (b) Grid iron system
    (c) Ring system
    (d) Radial system

68. For centrifugal pumps
    (a) Limited space is required
    (b) Initial cost is low
    (c) Steady discharge is obtained
    (d) All of these

69. A G.I pipe has coating of
    (a) Zinc
    (b) Lead
    (c) Silver
    (d) Aluminium

70. A multipurpose reservoir is the one which is
    (a) Designed for one purpose but serves more than one purpose
    (b) Planned and constructed to serve various purposes
    (c) Both (a) and (b)
    (d) None of these

71. Concentration of baron which will be harmful to most of the crop is
    (a) More than 2 ppm
    (b) More than 2.8 ppm
    (c) More than 3 ppm
    (d) More than 3.8 ppm

72. For standing crops in undulating sandy fields, the best method of irrigation is
    (a) Sprinkler irrigation
    (b) Free flooding
    (c) Check method
    (d) Furrow method

73. Irrigation canals are generally aligned along
    (a) Ridge line
    (b) Contour line
    (c) Valley line
    (d) Straight line

74. The difference of the top of a bank and the full supply level in a canal is called
    (a) Berm
    (b) Free board
    (c) Height of bank
    (d) None of these

75. The most suitable section of a lined canal is
    (a) Triangular section with circular bottom for small canals
    (b) Trapezoidal section with rounded corners for large canals
    (c) Rectangular section with rounded corners for large canals
    (d) Both (a) and (b)

76. Cross regulators in main canals are provided
    (a) To regulate water supply in the distributaries
    (b) To increase water head upstream when a main canal is running with low supply
    (c) To overflow excessive flood water
    (d) None of these

77. The structure constructed to allow drainage water to flow under pressure through an inverted syphon below a canal is
    (a) Syphon
    (b) Aqueduct
    (c) Super passage
    (d) Syphon-aqueduct

78. A river training works required is generally required when the river is
    (a) Meandering
    (b) Aggrading
    (c) Degrading
    (d) All of these

79. Balancing depth in irrigation canal section is
    (a) Depth in which flow of water is optimum
    (b) Depth in which cutting and filling will be equal
    (c) Depth in which required side slope will be maintained
    (d) Depth in which length of canal will be minimum

80. The process of distribution of water in irrigation is called
    (a) Canal breaches
    (b) Control system
    (c) Regulation
    (d) Rotation

81. The losses in canal are usually measured by a simple method known as
    (a) Absorption
    (b) Inflow and outflow
    (c) Percolation
    (d) Shallow pumping

82. Based on Silt theories for design of bed slope of irrigation canal
    (a) The natural slope is much flatter than designed bed slope
    (b) The natural slope and designed bed slope are always more or less the same
    (c) The natural slope is much deeper than designed bed slope
    (d) None of these

83. Which of the following spillway types is having a profile of 'S' Shaped?
    (a) Siphon spillway
    (b) Side channel spillway
    (c) Over flow spillway
    (d) Tunnel spillway

84. The spillway suitable for situation where direct overflow is not permissible is
    (a) Chute
    (b) Shaft spillway
    (c) Side channel spillway
    (d) Conduit

85. A solid obstruction put across the river to raise its water level and direct the water into the canal is
    (a) Weir
    (b) Barrage
    (c) Headwork
    (d) Dam

86. River training works in which the river is trained to provide sufficient depth for navigation during low stage of river is
    (a) High water training
    (b) Low water training
    (c) Mean water training
    (d) Training for discharge

87. A process by which an alluvial river flowing allowing curves of bends abandons particular bank and establishing its main flow along a comparatively straight and shorter channel is
    (a) Bend erosion
    (b) Cut-off
    (c) Bell's bend
    (d) Bandalling

88. Specific speed of pump is a type characteristic and can be used
    (a) To rate the pump capacity
    (b) To identify different types of pumps
    (c) To predict the behaviour of one pump based on test of similar but different size pump
    (d) To calculate the likely output of a particular pump

89. Pumps in parallel arrangement is used for
    (a) A relatively small quantity of liquid against very high head
    (b) A large quantity of liquid against a relatively small head
    (c) A large quantity of liquid against very high head
    (d) A large quantity of liquid within a short period of time irrespective of the head

90. Air vessels in single acting pump is to
    (a) Ensure uniform rate of flow of liquid
    (b) Prevent entry of air bubbles into the system
    (c) Collect air bubbles that has entered into the system
    (d) None of these

91. Hydraulic efficiency of hydraulic turbine is equal to
    (a) Power developed by runner / net power supplied at the turbine entrance
    (b) Net power supplied at the turbine entrance / power developed by runner
    (c) Power available at the turbine shaft / power developed by the runner
    (d) Power developed by the runner / power available at the turbine shaft

92. In Pelton Wheel, jet ratio is
    (a) Pitch diameter of the wheel / jet diameter
    (b) Jet diameter / Pitch diameter of the wheel
    (c) Pitch diameter of the wheel – Jet diameter
    (d) Jet diameter – Pitch diameter of the wheel

93. Which of the following is impulse type of hydraulic turbine?
    (a) Kaplan turbine
    (b) Francis turbine
    (c) Deriaz turbine
    (d) Pelton wheel

94. The most common example of positive displacement type of pumps are
    (a) Centrifugal pumps
    (b) Reciprocating pumps
    (c) Dynamic pressure pumps
    (d) Rotodynamic pumps

95. Operative characteristics curves of reciprocating pump is a plot of
    (a) Speed, power input, overall efficiency
    (b) Discharge, power input, overall efficiency
    (c) Discharge, speed, power input
    (d) Discharge, power input, speed

96. A storage reservoir at the head of the penstock is
    (a) Forebay
    (b) Head race
    (c) High head
    (d) Runner

97. In a vertical single runner, water wheel unit of reaction turbine the most economical and convenient arrangement is
    (a) To place the units parallel to the length of power house
    (b) To place the units as close as possible to power house
    (c) To place the units all around the power house
    (d) To place the units where best view is possible from power house

98. The total capacity of the turbine generator working in the power station is
    (a) Dependable capacity
    (b) Net capacity
    (c) Installed capacity
    (d) Available capacity

99. The capacity factor will be identical with load factor in hydro electric scheme, when
    (a) The average capacity equal to unity
    (b) The average capacity equal to zero
    (c) The average capacity is maximum
    (d) None of these

100. Pondage is provided in hydro electric plant
    (a) To increase storage capacity of water
    (b) To minimize the length of penstock
    (c) To tide over early fluctuation of load
    (d) To store during the period of excess supply

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