

**Qualification tests for Master's program "Water Supply, Water Discharge and Rational Use and Protection of Water Resources"**

**1. The process of purification of water by evaporation and condensation called:**

- A. Filtration
- B. Transpiration
- C. Distillation
- D. Adsorption

**2. Which of them cannot classified as centrifugal pumps?**

- A. Axial flow pumps
- B. Rotary flow pumps
- C. Radial flow pumps
- D. Mixed flow pumps

**3. Conversion the small colloidal particles into larger particles called:**

- A. Sediments
- B. Coagulants
- C. Floes
- D. Precipitates

**4. Bacteria that grow best at temperatures below 20°C are called:**

- A. Hyperthermophiles
- B. Psychrophiles
- C. Thermophiles
- D. Mesophylls

**5. The inflows that result in an increase of flow in the sewer almost immediately after the beginning of rainfall called:**

- A. Direct inflows
- B. Steady inflows
- C. Delayed inflows
- D. Infiltration-inflow

**6. The process of purification of water by absorption called:**

- A. Filtration
- B. Transpiration
- C. Distillation
- D. Sedimentation

**7. The ratio of the density of the liquid to the density of water called:**

- A. Specific gravity
- B. Specific volume
- C. Specific rate
- D. Specific flow

**8. Ion exchange is:**

- A. A reversible reaction in which a colloidal particle is exchanged for a similarly particle

- B. A reversible reaction in which a molecule is exchanged for a another molecule
- C. A reversible reaction in which a suspended mater is exchanged for a similarly mater
- D. A reversible reaction in which a charged ion in solution is exchanged for a similarly charged ion electrostatically attached to an immobile solid particle

**9. Bacteria that grow best at temperatures between 25°C and 40°C are called:**

- A. Hyperthermophiles
- B. Psychrophiles.
- C. Thermophiles
- D. Mesophylls

**10. Infiltration-inflow comes from:**

- A. Residential area
- B. Commercial area
- C. Rainfall and groundwater
- D. Institutional area

**11. The Darcy's law is expressed as:**

- A.  $Q = \frac{KA(h_1 - h_2)}{\Delta\rho}$
- B.  $Q = \frac{KA(h_1 - h_2)}{\Delta q}$
- C.  $Q = \frac{KA(h_1 - h_2)}{\Delta h}$
- D.  $Q = \frac{KA(h_1 - h_2)}{\Delta r}$

**12. The viscosity of a liquid is:**

- A. Measure of the liquid's density
- B. Measure of the liquid's rate
- C. Measure of the liquid's gravity
- D. Measure of the liquid's resistance to the flow

**13. The microorganisms which use organic material as a supply of carbon called:**

- A. Heterotrophic organisms
- B. Autotrophic organisms
- C. Chemotrophic organisms
- D. Lithotrophic organisms

**14. Bacteria that grow best at temperatures 45°C and 60°C are called:**

- A. Hyperthermophiles
- B. Psychrophiles.
- C. Thermophiles
- D. Mesophylls

**15. The smallest accumulation of flow in an hour during a particular day as obtained from an exhaustive length of flow record is:**

- A. Maximum daily flow rate

- B. Minimum hourly flow rate
- C. Maximum hourly flow rate
- D. Minimum daily flow rate

**16. The relative average length of a flow path called:**

- A. Heterogeneity
- B. Permeability
- C. Tortuosity
- D. Homogeneity

**17. The pressure of the liquid at a certain temperature when the liquid and its vapor are in equilibrium called:**

- A. Gravity pressure
- B. Kinematic pressure
- C. Vapor pressure
- D. Dynamic pressure

**18. The microorganisms which require only CO<sub>2</sub> to supply their carbon needs called:**

- A. Heterotrophic organisms
- B. Autotrophic organisms
- C. Chemotrophic organisms
- D. Lithotrophic organisms

**19. Bacteria that grow best at temperatures from about 80°C to near boiling are called:**

- A. Hyperthermophiles
- B. Psychrophiles.
- C. Thermophiles
- D. Mesophylls

**20. The largest total flow that accumulates over a day as obtained from an exhaustive length of flow record is:**

- A. Maximum daily flow rate
- B. Minimum hourly flow rate
- C. Maximum hourly flow rate
- D. Minimum daily flow rate

**21. The high molecular weight organic chains with ionic or other functional groups incorporated at intervals along the chains called:**

- A. Ionomeric flocculants
- B. Isomeric flocculants
- C. Heterogenic flocculants
- D. Polymeric flocculants

**22.  $P_A/\gamma$  – one of the three components of liquid energy at A is:**

- A. Pressure energy due to the liquid flow or pressure
- B. Kinetic energy due to the flow velocity
- C. Potential energy due to the elevation
- D. Static energy due to the flow velocity

**23. The microorganisms which extract energy from organic or inorganic oxidation/reduction reactions called:**

- A. Heterotrophic organisms
- B. Autotrophic organisms
- C. Chemotrophic organisms
- D. Lithotrophic organisms

**24. The spent water after homes, commercial establishments, industries, Public institutions, and similar entities defined as:**

- A. Clearwater
- B. Blackwater
- C. Wastewater
- D. Bluewater

**25. Infiltration and inflows are collectively called**

- A. Direct inflows
- B. Steady inflows
- C. Delayed inflows
- D. Infiltration-inflow

**26. The gently stirring the water to cause more small particles to bump into each other and stick together, forming larger particles called:**

- A. Flocculation
- B. Absorption
- C. Sedimentation
- D. Adsorption

**27.  $V_A^2/2g$  - one of the three components of liquid energy at A is:**

- A. Static energy due to the flow velocity
- B. Kinetic energy due to the flow velocity
- C. Potential energy due to the elevation
- D. Pressure energy due to the liquid flow or pressure

**28. The microorganisms which rely only on light for energy are called:**

- A. Heterotrophic organisms
- B. Autotrophic organisms
- C. Phototrophic organisms
- D. Lithotrophic organisms

**29. The branch of science that deals with the composition, structure, and properties of substances and the transformation that they undergo defined as:**

- A. Geology
- B. Physics
- C. Biology
- D. Chemistry

**30. The largest accumulation of flow in an hour during a particular day as obtained from an exhaustive length of flow record is:**

- A. Maximum daily flow rate

- B. Minimum hourly flow rate
- C. Maximum hourly flow rate
- D. Peak hourly flow rate

**31. Aerobic digestion requires:**

- A. Carbon
- B. Nitrogen
- C. Hydrogen
- D. Oxygen

**32.  $Z_A$ - one of the three components of liquid energy at A is:**

- A. Potential energy due to the elevation
- B. Kinetic energy due to the flow velocity
- C. Static energy due to the flow velocity
- D. Pressure energy due to the liquid flow or pressure

**33. The microorganisms which use organic materials called:**

- A. Heterotrophic organisms
- B. Autotrophic organisms
- C. Organotrophic organisms
- D. Lithotrophic organisms

**34. Inflows that enter the sewer system continuously called:**

- A. Direct inflows
- B. Steady inflows
- C. Delayed inflows
- D. Infiltration-inflow

**35. The flow rate that is sustained or exceeded for a specified number of consecutive time periods as obtained from an exhaustive length of flow record is:**

- A. Peak hourly flow rate
- B. Minimum hourly flow rate
- C. Maximum hourly flow rate
- D. Sustained peak flow rate

**36. The most common primary coagulant is:**

- A. Aluminum nitrite
- B. Aluminum chloride
- C. Aluminum sulfate
- D. Aluminum nitrate

**37. The pump efficiency is:**

- A. A function of the pump internal geometry and flow rate
- B. A function of the flow rate and impeller diameter
- C. A function of the pump internal geometry and impeller diameter
- D. A function of the pressure and flow rate

**38. The microorganisms which use inorganic materials called:**

- A. Heterotrophic organisms

- B. Autotrophic organisms
- C. Phototrophic organisms
- D. Lithotrophic organisms

**39. The portions of the rainfall that do not enter the sewer immediately but take some days to drain completely called:**

- A. Direct inflows
- B. Steady inflows
- C. Delayed inflows
- D. Infiltration-inflow

**40. Wastewaters contaminated with human wastes called:**

- A. Sanitary wastewater
- B. Residential wastewater
- C. Industrial wastewater
- D. Commercial wastewater

**41. A single-cell organism in one step above the bacteria in the trophic level is:**

- A. Virus
- B. Worm
- C. Protozoa
- D. Crustacea

**42. A rectangular weirs are:**

- A. Weirs in which the cross-sectional area where the flow passes through is in the form of a triangle
- B. Weirs in which the cross-sectional area where the flow passes through is in the form of a trapezoid
- C. Weirs in which the cross-sectional area where the flow passes through is in the form of a circle
- D. A thin plate where the plate is being cut such that a rectangular opening is formed in which the flow in the channel that is being measured passes through

**43. Which of them is not chemical characterisation of water?**

- A. Biochemical oxygen demand
- B. Turbidity
- C. Total organic carbon
- D. Alkalinity

**44. The portion in a venturi meter, Parshall flume, or Palmer–Bowlus flume where the cross section is progressively reduced is:**

- A. Cipolletti zone
- B. Converging zone
- C. Control zone
- D. Diverging zone

**45. A state of flow where the pressure in the liquid becomes equal to its vapor pressure called:**

- A. Displacement
- B. Cavitation
- C. Friction
- D. A head loss

**46. Fittings losses is:**

- A. Head losses incurred outside the pump casing
- B. A head loss due to loss of internal energy
- C. Head losses incurred inside the pump casing
- D. Head losses in valves and fittings

**47. The amount of oxygen consumed by the organism in the process of stabilizing waste is:**

- A. Biochemical oxygen demand
- B. Chemical oxygen demand
- C. Biophysical oxygen demand
- D. Physical oxygen demand

**48. Outlet manometric head is:**

- A. The sum of the inlet velocity head and inlet manometric head of a pump.
- B. Outlet dynamic head
- C. The manometric level at the inlet to a pump
- D. Outlet manometric head

**49. Static discharge head is:**

- A. The vertical distance from the elevation of the inflow liquid level above the pump centerline to the centerline of the pump
- B. The vertical distance from the elevation of the inflow liquid level below the pump centerline to the centerline of the pump
- C. the relationship of discharge and the associated head requirement that excludes the pump assembly
- D. The vertical distance from the pump centerline to the elevation of the discharge liquid level

**50. In a settling process, the zone where the water is clarified called:**

- A. Compression zone
- B. Critical section
- C. Compression settling
- D. Clarification zone

**51. A unit operation that separates materials into different sizes is:**

- A. Flotation
- B. Screening
- C. Retenting
- D. Settling

**52. In a sedimentation basin, the part where solids are deposited called:**

- A. Sludge zone
- B. Inlet zone
- C. Settling zone
- D. Outlet zone

**53. Gravity filter normally operated at a rate of 100 to 200 m<sup>3</sup>/d·m<sup>2</sup>.**

- A. Slow-sand filter
- B. Leaf filter
- C. Rapid-sand filter
- D. Perforated filter

**54. Friction head losses is:**

- A. Head losses incurred outside the pump casing
- B. A head loss due to loss of internal energy
- C. Head losses incurred inside the pump casing
- D. Head losses in valves and fittings

**55. The adsorbate is:**

- A. The solute adsorbed onto the surface of a solid
- B. Carbon with enhanced adsorption characteristic
- C. The solid that adsorbs the adsorbate
- D. Carbon with decreasing adsorption characteristic

**56. Membrane in which the nonpolar regions exceed the polar regions called:**

- A. Cation membrane
- B. Electrodialysis membrane
- C. Anion membrane
- D. Apolar membrane

**57. Preliminary treatment is:**

- A. Treatment is brought about by physical processes such as screening and sedimentation
- B. Removing debris and coarse materials that may clog equipment in the plant
- C. Biological and chemical unit processes are used to treat wastewater.
- D. Unit operations and chemical unit processes are used to further remove BOD, nutrients, pathogens, and parasites

**58. The Alkalinity is:**

- A. The ability of a substance to neutralize a base
- B. The ability of a substance to act both as an acid and as a base
- C. The ability of a substance to neutralize an acid.
- D. The ability of a substance to neutralize alcohol

**59. Round form bacterias are called:**

- A. Vibrios
- B. Bacilli
- C. Cocci
- D. Spirilles

**60. Animal cells do not have:**

- A. Mitochondria
- B. Nucleoli
- C. Chloroplast
- D. Lysosomes

**61. Surface water sources are:**

- A. Extraction of ground water by riverside wells or sub-surface extraction wells sunk in the bed of a river course
- B. The direct supply from an impounding reservoir or lake, supplemented if necessary by gravity feed from an adjacent catchment or pumped inflow from another source



- C. Ground water extraction to supplement abstraction from rivers or reservoirs
- D. Artificial recharge of aquifers.

**62. Amoebic dysentery is caused by:**

- A. Virus
- B. Bacteria
- C. Protozoa
- D. Fungi

**63. Water resources are:**

- A. Surface water resources.
- B. Atmospheric water resources.
- C. Underground water resources.
- D. Surface and underground water resources.

**64. The average abstraction taken from a source over a number of years called:**

- A. Probability yield
- B. Historic yield
- C. Average yield
- D. Operating yield

**65. In general, the water cycle consist of:**

- A. Condensation and sediments.
- B. Evaporation, condensation and sediments.
- C. Evaporation and condensation.
- D. Condensation and transpiration.

**66. Animal cells do not have:**

- A. Mitochondria
- B. Nucleoli
- C. Cell wall
- D. Lysosomes

**67. The accurate numerical method of finding the historic yield is to use the formula:**

- A.  $\text{Yeld} = \frac{\text{catchment runoff} + \text{storage}}{\text{length of critical period}}$
- B.  $\text{Yeld} = \frac{\text{daily flows ower a period} + \text{storage}}{\text{length of critical period}}$
- C.  $\text{Yeld} = \frac{\text{inflow ower a period} + \text{storage}}{\text{length of critical period}}$
- D.  $\text{Yeld} = \frac{\text{weekly flows ower a period} + \text{storage}}{\text{length of critical period}}$

**68. The term Ecology Means:**

- A. Study of the impact of humans in environment
- B. Study of interaction of organisms
- C. Study of organisms in their natural home interacting with their surroundings

D. Study of surrounding nature

**69. The site of cell respiration and ATP production in eukaryotic cells is:**

- A. Cell membrane
- B. Mitochondria
- C. Golgi apparatus
- D. Endoplasmatic reticulum

**70. Which of them is not disinfectant?**

- A. chlorine ( $Cl_2$ )
- B. Oxygen ( $O_2$ )
- C. Chloramines ( $NH_2Cl$ ,  $NHCl_2$ )
- D. Chlorine dioxide ( $ClO_2$ );

**71. The Ecosystem defines as:**

- A. Different living organisms living in an environment and exchanging energy and matter.
- B. A self-regulating group of biotic communities of species interacting with one another with their non-living environment exchanging energy and matter.
- C. Different groups of living organisms interacting with one another.
- D. A self-regulating organisms living in an environment and exchanging energy and matter.

**72. What is softened of water?**

- A. Remove of the odor
- B. Remove of the sulfur
- C. Remove of the turbidity
- D. Remove of the Rigidity (Ca, Mg) salts

**73. Ground water sources are:**

- A. Rivers and Lakes
- B. Collection of rainfall runoff
- C. Abstraction from a river or canal, supplemented if necessary by releases from a storage reservoir;
- D. Springs, wells, and boreholes;

**74. The sum total of water, air and land and the inter-relationships that exist among them and with the human beings, other living organisms and materials defines as:**

- A. Ecology
- B. Biota
- C. Environment
- D. Ecosystem

**75. Structures formed inside bacterial cells and are released when cells are exposed to adverse environmental conditions called:**

- A. Spores
- B. Oocytes
- C. Flagellas
- D. Spermatozoids

**76. The steady supply that could just be maintained through a repetition of the worst drought on record is called**

- A. Average yield
- B. Probability yield
- C. Operating yield
- D. Historic yield

**77. Clearing of forest cover exposes the soil to wind, rain and storms, thereby resulting in loss of top fertile layer of soil called:**

- A. Soil erosion
- B. Depletion of nutrients
- C. Deforestation
- D. High Yielding

**78. The circular DNA molecules in eukaryotes called:**

- A. Nucleotides
- B. Chromosomes
- C. Plasmids
- D. Nucleoplasm

**79 At any instant of time, spring flow is related to the volume of stored water in the aquifer by the relationship:**

- A.  $Q = kT$
- B.  $Q = kF$
- C.  $Q = kS$
- D.  $Q = kR$

**80. The major part of available fresh water is locked up into:**

- A. Glaciers and Ice
- B. Groundwater
- C. Lakes
- D. Rivers

**81. Stickslike bacterias are called:**

- A. Vibrios
- B. Bacilli
- C. Cocci
- D. Spirilles

**82. The theoretical velocity of falling spherical particles in slowly moving water  $V$  (mm/s), is:**

- A.  $V = \frac{g}{2.9 \times 10^4} (r - 1) \frac{d^2}{\gamma}$
- B.  $V = \frac{g}{1.8 \times 10^4} (r - 1) \frac{d^2}{\gamma}$
- C.  $V = \frac{g}{1.8 \times 10^4} (D - 1) \frac{d^2}{\gamma}$
- D.  $V = \frac{g}{1.8 \times 10} (r - 1) \frac{d^2}{\gamma}$

**83. Cholera is caused by:**

- A. Virus
- B. Bacteria
- C. Protozoa
- D. Fungi

**84. What substance is excreted from methantank during digestion?**

- A. Oxygen
- B. Hydrogen sulphide
- C. Methane (CH<sub>4</sub>)
- D. Nitrogen

**85. The velocity gradient is defined in terms of power input by the following relationship:**

- A.  $G = \left( \frac{R}{\mu V} \right)^{1/2}$
- B.  $G = \left( \frac{T}{\mu V} \right)^{1/2}$
- C.  $G = \left( \frac{F}{\mu V} \right)^{1/2}$
- D.  $G = \left( \frac{P}{\mu V} \right)^{1/2}$

**86. Meeting the needs of the present without compromising the ability of future generations to meet their own needs defined as:**

- A. Environmental impact statement
- B. Impact prediction
- C. Mitigation
- D. Sustainable development

**87. All algae contains:**

- A. Chlorophyll
- B. Chrizophyll
- C. Neutrophil
- D. Basophil

**88. The useful power input of hydraulic mixers is related to head loss by the equation:**

- A.  $P = Q \rho gh$
- B.  $P = Q \rho gr$
- C.  $P = Q \rho gf$
- D.  $P = Q \rho gt$

**89. The raw form in which the energy resources occur in nature are:**

- A. Secondary energy resources
- B. Transformation resources
- C. Primary energy resources
- D. Motion energy resources

**90. Structures made from woven stainless steel or polyester wires with a pore size ranging from 15 to 45  $\mu\text{m}$  called:**

- A. Roughing filters
- B. Microstrainers
- C. Prechlorinators
- D. Ozonators

#### **Literature**

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