

1. The equation $PV = nRT$ is best obeyed by gases at
 - (A) Low pressure, high temperature
 - (B) High pressure, low temperature
 - (C) Low pressure, low temperature
 - (D) None

2. Fugacity Coefficient of a substance is the ratio of its fugacity to
 - (A) Mole fraction
 - (B) Activity
 - (C) pressure
 - (D) Activity Coefficient

3. The change in entropy for a gas following $PV = nRT$ is given by
 - (A) $S_2 - S_1 = -R \ln(p_1/p_2)$
 - (B) $S_2 - S_1 = R \ln(v_2/v_1)$
 - (C) $S_2 - S_1 = R \ln(p_1/p_2)$
 - (D) $S_2 - S_1 = -R \ln(v_2/v_1)$

4. Entropy change in case of reversible adiabatic process
 - (A) Minimum
 - (B) Zero
 - (C) Remains unchanged
 - (D) Maximum

5. Pick out the extensive property out of the following
 - (A) Surface tension
 - (B) Free Energy
 - (C) Specific heat
 - (D) Refractive Index

6. Screen capacity is expressed in terms of
 - (A) Tons/hr
 - (B) Tons/ft²
 - (C) Tons/hr - ft²
 - (D) Both (A) & (B)

7. The crushed material received for separation is called
- (A) Tailing
 - (B) Heading
 - (C) Concentrate
 - (D) Middling
8. For beneficiation of iron ore, the most commonly used method is
- (A) Jigging and tabling
 - (B) Froth flotation
 - (C) Flocculation
 - (D) None of these
9. Filtration rate does not depend upon the
- (A) Pressure drop and area of filtering surface
 - (B) Resistance of cake and the septum
 - (C) Properties of the cake and the filtrate
 - (D) None of the above
10. The term 'angle of nip' is concerned with the operation of
- (A) Jaw Crusher
 - (B) Roll Crusher
 - (C) Gyratory Crusher
 - (D) None of the above
11. Any substance above its critical temperature exists as
- (A) Saturated vapour
 - (B) Solid
 - (C) Gas
 - (D) Liquid
12. For a given substance at a specified temperature, activity is _____ to fugacity
- (A) directly proportional
 - (B) inversely proportional
 - (C) equal
 - (D) None of the above

13. The loss due to sudden expansion is
- (A) $(V_1^2 - V_2^2)/2gc$
 - (B) $(V_1 - V_2)^2/2gc$
 - (C) $(V_1 - V_2)/2gc$
 - (D) None of these
14. Discharge in laminar flow through a pipe varies
- (A) as the square of the radius
 - (B) inversely as the pressure drop
 - (C) inversely as the viscosity
 - (D) as the square of the diameter
15. Which of the following can be used to create a flow of gas where no significant compression is required ?
- (A) reciprocating compressor
 - (B) blower
 - (C) axial flow compressor
 - (D) centrifugal compressor
16. Cavitation in a centrifugal pump results from
- (A) high discharge pressure
 - (B) low barometric pressure
 - (C) high discharge velocity
 - (D) high discharge rate
17. At absolute zero temperature, all substances have the same
- (A) Heat Capacity
 - (B) Crystalline Structure
 - (C) Entropy
 - (D) None of the above
18. Remote control valve is a _____ valve.
- (A) gate
 - (B) butterfly
 - (C) needle
 - (D) globe

19. Water on heating from 1 to 4 °C
- (A) Contracts
 - (B) Expands
 - (C) Has the same volume
 - (D) may contract or expand
20. Which of the following is a Newtonian fluid ?
- (A) rubber latex
 - (B) sewage sludge
 - (C) quick sand
 - (D) non-colloidal solution
21. Which of the following defines the recycle ratio in a chemical process ?
- (A) Gross feed stream/recycle feed stream.
 - (B) Recycle stream/gross feed stream.
 - (C) Recycle stream/fresh feed stream.
 - (D) None of these
22. The dimensions of surface tension is
- (A) ML^{-2}
 - (B) MT^{-2}
 - (C) MLT^{-2}
 - (D) $ML^{-2}T$
23. Number of gm moles of solute dissolved in 1 kg of solvent is called its
- (A) Molality
 - (B) Molarity
 - (C) Normality
 - (D) Formality
24. Sewage sludge is an example of
- (A) Bingham plastic
 - (B) Newtonian fluid
 - (C) Pseudoplastic fluid
 - (D) Dilatent fluid

25. Drag force on the float of a rotameter is
- (A) $\propto Q$
 - (B) $\propto \sqrt{Q}$
 - (C) $\propto Q^2$
 - (D) constant
- (where Q is the flow rate of the fluid)
26. Efficiency of a heat engine working on Carnot cycle between two temperature levels depends upon
- (A) The mass of the working fluid.
 - (B) The pressure of working fluid.
 - (C) The two temperatures only
 - (D) Both mass and pressure of the working fluid.
27. The fluid property due to which, Mercury does not wet the glass is
- (A) surface tension
 - (B) viscosity
 - (C) cohesion
 - (D) adhesion
28. Fugacity and pressure are numerically equal when the gas is
- (A) in standard state.
 - (B) in ideal state.
 - (C) at low temperature.
 - (D) at high pressure.
29. Addition of non volatile solute to solvent produces _____ in its solvent.
- (A) freezing point elevation
 - (B) boiling point depression
 - (C) vapour pressure lowering
 - (D) none of these

30. Isotonic solutions must have the same
- (A) viscosity
 - (B) molar concentration
 - (C) normality
 - (D) critical temperature
31. Othmer chart is useful in estimating the heat of
- (A) mixing
 - (B) wetting
 - (C) adsorption
 - (D) none of these
32. CaCO_3 contains _____ percent of Ca by weight.
- (A) 40
 - (B) 48
 - (C) 96
 - (D) 12
33. Heat of reaction is not influenced by
- (A) the method through which final products are obtained
 - (B) the physical state of products and reactants
 - (C) whether the reaction is carried out at constant temperature and constant pressure.
 - (D) none of the above
34. The temperature at which real gases obey Boyle's law is termed as
- (A) triple point
 - (B) Boyle's temperature
 - (C) eutectic point
 - (D) inversion temperature
35. The reverse process of fractional crystallization is called
- (A) stripping
 - (B) leaching
 - (C) differential distillation
 - (D) absorption

36. Gases having same reduced pressures and reduced temperatures
- (A) deviate from ideal gas behavior to the same degree
 - (B) have nearly the same compressibility factor
 - (C) both (A) & (B)
 - (D) neither (A) nor (B)
37. Reynolds number for flow of water at room temperature through 2 cm dia. pipe at an average velocity of 5 cm/sec is around
- (A) 2000
 - (B) 10
 - (C) 1000
 - (D) 100
38. Cavitation occurs in a centrifugal pump when the suction pressure is
- (A) Equal to the developed head.
 - (B) Greater than the vapour pressure of the liquid at that temperature.
 - (C) Equal to the vapour pressure.
 - (D) Less than the vapour pressure of the liquid at that temperature.
39. Molar heat capacity of water in equilibrium with ice at constant pressure is
- (A) 0
 - (B) ∞
 - (C) 1
 - (D) none of these
40. If pH value of a solution is 8, then its pOH value will be
- (A) 6
 - (B) 1
 - (C) 7
 - (D) 10
41. Mass velocity is independent of temperature and pressure when the flow is
- (A) Steady and the cross-section is unchanged.
 - (B) Steady through changing cross-section.
 - (C) Unsteady through unchanged cross-section.
 - (D) Unsteady and the cross-section is changed.

42. An ideal fluid is
- (A) Highly viscous.
 - (B) One which obeys Newton's law of viscosity.
 - (C) Frictionless and incompressible.
 - (D) None of these.
43. Cumulative analysis for determining surface is more precise than differential analysis because of the
- (A) Assumption that all particles in a single fraction are equal in size.
 - (B) Assumption that all particles in a single fraction are equal in size, is not needed.
 - (C) Fact that screening is more effective.
 - (D) None of these.
44. Crushing efficiency is the ratio of the
- (A) Energy fed to the machine to the surface energy created by the crushing.
 - (B) Energy absorbed by the solid to that fed to the machine.
 - (C) Surface energy is created by the crushing to the energy absorbed by the solid.
 - (D) Energy absorbed by the solid to the surface energy created by the crushing.
45. Mixer used for rubber compounding is
- (A) Mixer-extruders
 - (B) Banbury internal mixer
 - (C) Muller mixer
 - (D) None of these
46. Gold ore concentration is mostly done using
- (A) Froth Flotation
 - (B) Tabling
 - (C) Jigging
 - (D) Elutriation
47. Wheat is ground into flour in a
- (A) Hammer Crusher
 - (B) Roller Crusher
 - (C) Impact Mill
 - (D) Tube Mill

48. In case of a Hammer crusher, the final product size depends on the
- (A) Feed rate.
 - (B) Rotor Speed
 - (C) Both (A) and (B)
 - (D) None of these.
49. In mixer the quantity $((v.L)/D)$ is termed as
- (A) Weber number
 - (B) Peclet Number
 - (C) Brinkman number
 - (D) Schmidt number
- Where $D =$ Diffusivity
50. If radius of basket centrifuge is halved and the r.p.m. is doubled, then
- (A) Linear speed of basket is doubled
 - (B) Centrifugal forces are doubled
 - (C) Linear speed of basket is halved
 - (D) None of these
51. A screen is said to be blinded, when
- (A) Over sizes are present in undersize fraction
 - (B) Under sizes are retained in oversize fraction
 - (C) The screen is plugged with solid particles.
 - (D) Its capacity is abruptly increased.
52. Fourier's law applies to heat transfer by
- (A) Conduction
 - (B) Radiation
 - (C) Convection
 - (D) All the above
53. Heat transfer co-efficient for liquid increases with
- (A) Decreasing temperature.
 - (B) Increasing temperature.
 - (C) Decreasing Reynolds number.
 - (D) None of these.

54. The equivalent diameter for pressure drop is _____ that for heat transfer
- (A) smaller than
 - (B) greater than
 - (C) equal
 - (D) not related
55. In counter flow compared to parallel flow.
- (A) LMTD is greater.
 - (B) Less surface is required for a given heat transfer rate.
 - (C) More surface required for a given heat transfer rate.
 - (D) Both (A) and (B).
56. Multiple effect evaporators are used to
- (A) Increase the steam economy & decrease the capacity.
 - (B) Increase the steam economy & the capacity.
 - (C) Decrease the steam economy & the capacity.
 - (D) Decrease the steam economy & increase the capacity.
57. Multiple effect evaporation accounts for
- (A) Lower operating costs
 - (B) Steam economy
 - (C) Investment economy
 - (D) None of the above
58. For what material of Prandtl number is low
- (A) Liquid metal
 - (B) Aqueous solution
 - (C) Water
 - (D) Lube Oil
59. Dittus-Boelter Equation for determination of heat transfer coefficient is valid
- (A) For Fluids in laminar flow
 - (B) For Fluids in Turbulent flow
 - (C) For Liquid metals
 - (D) none of the above

60. Baffles are provided in heat exchanges to increase the
- (A) Foulingfactor
 - (B) Heat transfer area
 - (C) Heat transfer coefficient
 - (D) Heat transfer rate
61. Thermal diffusivity of a material
- (A) Has the unit m^2/s .
 - (B) $K/\rho.C_p$
 - (C) Ratio of thermal conductivity to thermal capacity
 - (D) All the above
62. In an absorber, HETP does not vary with
- (A) flow rate of liquid
 - (B) flow rate of gas
 - (C) type and size of packing
 - (D) none of these
63. Which of the following assumes constant molal vaporization and over flow ?
- (A) McCabe-Thiele method
 - (B) Ponchan Savarit method
 - (C) enthalpy concentration method
 - (D) plate absorption column
64. Selectivity of the solvent used in solvent extraction should be
- (A) 1
 - (B) >1
 - (C) <1
 - (D) 0
65. As the reflux ratio, in a continuous counter current extraction is increased, the number of stages
- (A) Increase
 - (B) Decrease
 - (C) Remains unchanged
 - (D) Can either increase or decrease depending on the system

66. Radioactive nuclear waste is treated in
- (A) mixer settler extractor
 - (B) rotating disc contactor
 - (C) pulsed column extractor
 - (D) Bollman extractor
67. Freundlich equation applies to adsorption of solute from
- (A) dilute solutions, over a small concentration range
 - (B) gaseous solutions at high pressure
 - (C) concentrated solutions
 - (D) none of the above
68. Which of the following parameters remains almost constant during adiabatic saturation of unsaturated air ?
- (A) dry bulb temperature
 - (B) dew point
 - (C) wet bulb temperature
 - (D) none of the above
69. Which of the following mixtures does not form an azeotrope at atmospheric pressure
- (A) water-alcohol
 - (B) Methyl alcohol-acetone
 - (C) Both (A) and (B)
 - (D) None of the above
70. Ion exchange process is similar to
- (A) absorption
 - (B) adsorption
 - (C) extraction
 - (D) leaching
71. The half life period 't' of a zero order reaction $A \xrightarrow{k} \text{Products}$, is equal to
- (A) $C_{A0}/2K$
 - (B) C_{A0}/K
 - (C) $0.693/K$
 - (D) $1/K$

72. The rate constant of a reaction is a function of
- (A) time of reaction
 - (B) temperature of the system
 - (C) extent of reaction
 - (D) initial concentration of reactants
73. The rate at which a chemical substance reacts is proportional to its
- (A) active mass
 - (B) equivalent weight
 - (C) molecular weight
 - (D) none of the above
74. The eddy diffusivity for a liquid in plug flow must be
- (A) 1
 - (B) 0
 - (C) ∞
 - (D) None of the above
75. Pick out the correct statement
- (A) reactions with high activation energies are very temperature sensitive
 - (B) chemical equilibrium is a static state
 - (C) a photo chemical reaction is catalyzed by light
 - (D) none of the above
76. Which of the following is a characteristic of an ideal PFR ?
- (A) Axial Dispersion
 - (B) Flat velocity profile
 - (C) uniform mixing
 - (D) none of the above
77. Auto catalytic reactions are best carried out in
- (A) CSTR
 - (B) CSTR in series
 - (C) PFR
 - (D) Recycle reactor

78. Knudsen diffusivity is proportional to
- (A) T
 - (B) \sqrt{T}
 - (C) $1/\sqrt{T}$
 - (D) T^2
79. Un reacted core model represents the reaction involving
- (A) combustion of coal particles
 - (B) roasting of sulphide ores
 - (C) both (A) and (B)
 - (D) none of the above
80. For a first order reactor carried out in PFR the space time is
- (A) $1/k \ln C_0/C$
 - (B) $1/k \ln C/C_0$
 - (C) $k \ln C_0/C$
 - (D) $K \ln C/C_0$
81. Fouling factor must be included in the calculation of overall design heat transfer coefficient when the liquid
- (A) containing suspended solids flows at low velocity
 - (B) containing suspended solids flows at high velocity
 - (C) highly viscous
 - (D) is of high specific gravity
82. Optimum economic pipe diameter for fluid flow is determined by the
- (A) viscosity of the fluid
 - (B) density of the fluid
 - (C) total cost considerations (pumping cost + fixed cost of the pipe)
 - (D) none of the above

83. McCabe-Thiele method used for finding theoretical stages in distillation columns assumes that
- (A) the sensible heat differences are small because the temperature changes from tray to tray is small
 - (B) Trouton's rule is applicable
 - (C) the liquid / vapour loading across the column remains constant
 - (D) All the above
84. Reflux ratio variation in a distillation column is between
- (A) zero and infinity
 - (B) zero and one
 - (C) minimum and infinity
 - (D) none of the above
85. Pick out the wrong statement
- (A) the tensile strength of a brittle material is less than its compressive strength
 - (B) the compressive strength of a ductile material is less than its tensile strength
 - (C) in a thick cylindrical shell the hoop stress is maximum at the inner radius
 - (D) the value of crushing load is more than that of buckling load for long columns.
86. Which of the following relationship is not correct in case of a chemical process plant ?
- (A) manufacturing cost = direct production cost + fixed charges + plant over head cost
 - (B) general expenses = Administrative expenses + distribution at marketing expenses
 - (C) total product cost = manufacturing cost + general expenses
 - (D) total product cost = direct production cost + plant over head cost
87. Effluent treatment cost in a chemical plant is categorized as _____ cost.
- (A) fixed
 - (B) over head
 - (C) utilities
 - (D) capital

88. Utilities cost in the operation of a chemical process plant comes under the
- (A) over head cost
 - (B) fixed charges
 - (C) direct production cost
 - (D) general expenses
89. 'Six-tenth's factor' rule is used for estimating
- (A) equipment installation cost
 - (B) equipment cost by scaling
 - (C) cost of piping
 - (D) Utilities cost
90. In financial accounting of a chemical plant, which of the following relationship is invalid ?
- (A) Assets = equities
 - (B) Assets = liabilities + net worth
 - (C) Total income = cost + profits
 - (D) Assets = capital
91. When the damping coefficient is the unity, the system is
- (A) over damped
 - (B) critically damped
 - (C) under damped
 - (D) highly fluctuating
92. In second order under damped system
- (A) decay ratio = overshoot
 - (B) decay ratio = (overshoot)²
 - (C) overshoot increases for increasing damping coefficient
 - (D) large damping coefficient means smaller damping.
93. Gain margin is equal to the
- (A) Amplitude ratio
 - (B) reciprocal of Amplitude ratio
 - (C) gain in proportional controller
 - (D) gain in proportional integral controller

94. Which of the following controllers has the least maximum deviation ?
- (A) P-controller
 - (B) P-I controller
 - (C) P-I-D controller
 - (D) P-D controller
95. Bellows are made up of
- (A) leather
 - (B) paper
 - (C) plastic
 - (D) thin copper sheet
96. Off set
- (A) varies with time
 - (B) varies exponentially with time
 - (C) does not vary with time
 - (D) varies with square of the time
97. Phase lag of first order system is
- (A) $\tan^{-1}(\omega T)$
 - (B) $-\tan^{-1}(\omega T)$
 - (C) $\pi/2$
 - (D) 0
98. Which controller has zero off set
- (A) P
 - (B) P-I
 - (C) P-I-D
 - (D) both (B) and (C)
99. Laplace transform of a ramp input of slope K is
- (A) K/S
 - (B) K/S^2
 - (C) $1/S$
 - (D) K/S^3

- 100.** Cascade control employs
- (A) two feed forward
 - (B) two feed backs
 - (C) one feedback and one feed forward
 - (D) none of the above
- 101.** Cement mainly contains
- (A) CaO , SiO_2 , Al_2O_3
 - (B) MgO , SiO_2 , K_2O
 - (C) Al_2O_3 , MgO , Fe_2O_3
 - (D) CaO , MgO , K_2O
- 102.** Hydrazine is largely used
- (A) as a starting material for 'Hypo'
 - (B) in photographic industry
 - (C) as rocket fuel
 - (D) in printing industry.
- 103.** Fat splitting catalyst is
- (A) CaCO_3
 - (B) ZnO
 - (C) Al_2O_3
 - (D) Fe
- 104.** Which oil is preferred for paint manufacture ?
- (A) drying oil
 - (B) non-drying oil
 - (C) semi-drying oil
 - (D) saturated oil

105. Coke oven gas consist mainly of
- (A) H_2 & CH_4
 - (B) CO_2 & CO
 - (C) H_2 & CO
 - (D) CO & CH_4
106. Acrylonitrile is mainly used in _____ industry.
- (A) polymer
 - (B) printing
 - (C) dyeing
 - (D) Photographic
107. Nylon 6-6 is manufactured from
- (A) Hexamethylene diamine and adipic acid
 - (B) Hexamethylene diamine and maleic anhydride
 - (C) Caprolactum
 - (D) Dimethyl tetra phthalate and ethylene glycol
108. Salt is added in the kettle during soap manufacture to separate
- (A) Soap from lye
 - (B) glycerine from lye
 - (C) the metallic soap
 - (D) the unsaponified fat from soap
109. The end bleaching agent used to move last traces of colour bodies from the pulp is
- (A) MgO
 - (B) ClO_2
 - (C) SO_2 gas
 - (D) Mercaptans
110. In the Solvay process the product from the calciner is
- (A) dehydrated soda ash
 - (B) dense soda ash
 - (C) sodium bicarbonate
 - (D) light soda ash

111. In urea production, undesired product is
- (A) Ammonia
 - (B) Biuret
 - (C) Ammonium carbamate
 - (D) Water
112. The most recent process for the manufacture of sulphuric acid is
- (A) Contact process
 - (B) Double Contact Double Absorption (DCDA)
 - (C) Lead chamber process
 - (D) None of the above
113. Black liquor contains _____
- (A) Organic sulphur compounds
 - (B) Sodium sulphide
 - (C) Sodium carbonate
 - (D) All of above
114. What is the degree of freedom for a system comprising liquid water in equilibrium with its vapour ?
- (A) 0
 - (B) 1
 - (C) 2
 - (D) 3
115. Internal energy of an ideal gas
- (A) Increases with increase in pressure
 - (B) Decreases with increase in temperature
 - (C) Is independent of temperature
 - (D) None of the above

- 116.** Size measurement of ultra fine particles can be expressed in terms of
- (A) centimeter
 - (B) screen size
 - (C) micron
 - (D) surface area per unit mass
- 117.** Shape factor for a cylinder whose length equals its diameter is
- (A) 1.5
 - (B) 0.5
 - (C) 1
 - (D) None of the above
- 118.** Monel metal is an alloy of
- (A) Molybdenum and Nickel
 - (B) Nickel and Copper
 - (C) Molybdenum and Aluminium
 - (D) Molybdenum and Zinc
- 119.** Which of the following is a desirable characteristic of an instrument ?
- (A) High drift
 - (B) High fidelity
 - (C) High measuring lag
 - (D) Poor reproducibility
- 120.** A stable system is one
- (A) for which the output response is bounded for all bounded input.
 - (B) which exhibits an unbounded response to a bounded input.
 - (C) which satisfies the conditions for servo problem.
 - (D) none of these

Space For Rough Work