

Sl. No. :

JCCTP/18

Register
Number

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2018

**CHEMICAL TECHNOLOGY
(PG Degree Standard)**

Time Allowed : 3 Hours]

[Maximum Marks : 300

Read the following instructions carefully before you begin to answer the questions.

IMPORTANT INSTRUCTIONS

1. The applicant will be supplied with Question Booklet 15 minutes before commencement of the examination.
2. This Question Booklet contains 200 questions. Prior to attempting to answer the candidates are requested to check whether all the questions are there in series and ensure there are no blank pages in the question booklet. **In case any defect in the Question Paper is noticed it shall be reported to the Invigilator within first 10 minutes and get it replaced with a complete Question Booklet. If any defect is noticed in the Question Booklet after the commencement of examination it will not be replaced.**
3. Answer all questions. All questions carry equal marks.
4. You must write your Register Number in the space provided on the top right side of this page. Do not write anything else on the Question Booklet.
5. An answer sheet will be supplied to you, separately by the Room Invigilator to mark the answers.
6. You will also encode your Question Booklet Number with Blue or Black ink Ball point pen in the space provided on the side 2 of the Answer Sheet. If you do not encode properly or fail to encode the above information, action will be taken as per commission's notification.
7. Each question comprises *four* responses (A), (B), (C) and (D). You are to select **ONLY ONE** correct response and mark in your Answer Sheet. In case you feel that there are more than one correct response, mark the response which you consider the best. In any case, choose **ONLY ONE** response for each question. Your total marks will depend on the number of correct responses marked by you in the Answer Sheet.
8. In the Answer Sheet there are **four** circles (A), (B), (C) and (D) against each question. To answer the questions you are to mark with Blue or Black ink Ball point pen **ONLY ONE** circle of your choice for each question. Select one response for each question in the Question Booklet and mark in the Answer Sheet. If you mark more than one answer for one question, the answer will be treated as wrong. *e.g.* If for any item, (B) is the correct answer, you have to mark as follows :

(A) ● (C) (D)
9. You should not remove or tear off any sheet from this Question Booklet. You are not allowed to take this Question Booklet and the Answer Sheet out of the Examination Hall during the time of examination. After the examination is concluded, you must hand over your Answer Sheet to the Invigilator. You are allowed to take the Question Booklet with you only after the Examination is over.
10. The sheet before the last page of the Question Booklet can be used for Rough Work.
11. Do not tick-mark or mark the answers in the Question Booklet.
12. Applicants have to write and shade the total number of answer fields left blank on the boxes provided at side 2 of OMR Answer Sheet. An extra time of 5 minutes will be given to specify the number of answer fields left blank.
13. Failure to comply with any of the above instructions will render you liable to such action or penalty as the Commission may decide at their discretion.

SPACE FOR ROUGH WORK



1. pH of a solution is defined as

(A) $\log \frac{1}{[H^+]}$

(B) $\log[H^+]$

(C) $\frac{1}{\log[H^+]}$

(D) $\frac{1}{\log[H^+]}$

2. Linde gas liquefaction process employs cooling

(A) by throttling

(B) by expansion in an engine

(C) at constant pressure

(D) at constant volume

3. One ton of refrigeration capacity is equivalent to heat removal rate of

(A) 12600 Btu/hr

(B) 126 J/hr

(C) 12600 kJ/hr

(D) 12600 kw

4. In an ideal solution, the activity of a component equals to its

(A) Mole fraction

(B) Fugacity at the same temperature and pressure

(C) Partial pressure

(D) Chemical potential

5. If a vapour behaves as an ideal gas, its fugacity coefficient ϕ_i^s

(A) equals to zero

(B) equals to unity

(C) is always infinity

(D) is negative

6. The expression for chemical potential is

(A) $\mu_i = \left(\frac{\partial U^t}{\partial n_i} \right)_{s,v,n_j \neq i}$

(B) $\mu_i = \left(\frac{\partial V^t}{\partial n_i} \right)_{s,v,n_j \neq i}$

(C) $\mu_i = \left(\frac{\partial P}{\partial n_i} \right)_{s,v,n_j \neq i}$

(D) $\mu_i = \left(\frac{\partial T}{\partial n_i} \right)_{s,v,n_j \neq i}$

7. A limiting reactant is the one which decides the _____ is chemical reaction.
- (A) equilibrium constant (B) rate constant
 (C) conversion (D) order
8. Average molecular weight of air is
- (A) 21 (B) 29
 (C) 23 (D) 26
9. 1 torr is equivalent to
- (A) 1 mm Hg (B) 1 Pascal
 (C) 1 atm (D) 1 mm water column
10. The fugacity coefficient at 1 bar for a gas that follows the equation of state $P_V = RT(1 - 0.00513)P$, where P is pressure in bar is
- (A) 0.975 (B) 0.995
 (C) 0.950 (D) 0.8
11. Continuity equation for an incompressible fluid is
- (A) $A_1V_1 = A_2V_2$ (B) $\rho_1A_1V_1 = \rho_2A_2V_2$
 (C) $(A_1V_1)/\rho_1 = (A_2V_2)/\rho_2$ (D) $(\rho_1A_1)/V_1 = (\rho_2A_2)/V_2$
- where V = velocity, ρ = density, A = area.
12. The fluid forces considered in the Navier-Stokes equation are
- (A) gravity, velocity and viscous
 (B) gravity, pressure and turbulent
 (C) pressure, viscous and turbulent
 (D) pressure, viscous and gravity

13. Which is not a reciprocating pump?
 (A) Piston pump (B) Plunger pump
 (C) Diaphragm pump (D) Centrifugal pump
14. Flow is called subsonic if Mach number is
 (A) less than unity (B) at or near unity
 (C) less than 2100 (D) 4000 and above
15. The flow is proportional to the pressure drop and inversely proportional to the fluid viscosity. This statement is known as
 (A) Henry's law (B) Darcy's law
 (C) Fick's law (D) Kirchoff's law
16. The velocity of a very small compression-rarefaction wave moving adiabatically and frictionlessly through the medium is
 (A) Average velocity (B) Absolute velocity
 (C) Relative velocity (D) Acoustical velocity
17. For a centrifugal pump, the net positive suction head is defined as
 (A) $h_{vs} + h_{ps}$ (B) $h_{vd} + h_{pd}$
 (C) $h_{vs} + h_{ps} - p_s$ (D) $h_{vd} + h_{pd} - p_d$
 where, h_{vs} – velocity head at suction, h_{vd} – velocity head at discharge, h_{ps} – pressure head at suction, h_{pd} – pressure head at discharge, p_s – vapor pressure of liquid at suction temperature, p_d – vapor pressure of liquid at discharge temperature.
18. Filtration operation when carried out by continuous increase of the inlet pressure of slurry, is called
 (A) constant rate filtration (B) varying pressure filtration
 (C) varying rate filtration (D) constant pressure filtration

19. For flow through bed of solid particles at particle Reynolds numbers upto 1.0, the pressure drop per unit length of bed will be given by
- (A) Hagen-Poiseuille Equation (B) Darcy's Equation
 (C) Kozeny-Carman Equation (D) Burke-Plummer Equation
20. The exit age distribution of fluid leaving a vessel is used to
- (A) Study the reaction mechanism
 (B) Study the extent of non-ideal flow in the vessel
 (C) Determine the rate constant and order of reaction
 (D) Determine the activation energy of the reaction
21. When the rate equation of a reaction corresponds to the Stoichiometry of the reaction, it is called as
- (A) Stoichiometric reaction (B) Elementary reaction
 (C) Non elementary reaction (D) Non Stoichiometric reaction
22. The heat equation for an adiabatic reaction, assuming complete conversion is
- (A) $-\Delta H_{r_2} = C'_p \Delta T$ (B) $-\Delta H_{r_2} = C'_p / \Delta T$
 (C) $-\Delta H_{r_1} - \Delta H_{r_2} = C'_p \Delta T$ (D) $-\Delta H_{r_1} = \Delta H_{r_2} + C'_p \Delta T$

Where

ΔH_{r_1} - heat of reaction of entering stream

ΔH_{r_2} - heat of reaction of leaving stream

C'_p - mean specific heat of unreacted feed stream

ΔT - temperature difference between entering and leaving streams

23. If $\frac{D}{uL} \rightarrow \infty$ in dispersion model, the flow tends to be
- (A) Plug flow (B) Mixed flow
 (C) Both plug and mixed flow (D) Stopped

24. Thermal conductivity is minimum for
- (A) Water (B) Air
- (C) Petroleum coke (D) Asphalt
25. Vaporizing a definite fraction of liquid in such a way that the evolved vapor is in equilibrium with the residual liquid, separating the vapor and condensing it is
- (A) Evaporative distillation
- (B) Flash distillation
- (C) Rectification
- (D) Recuperation
26. Capacity of an evaporator is defined as
- (A) No. of kgs of solvent vaporised per kg of steam fed
- (B) No. of kgs of solvent vaporised per hour
- (C) No. of kg of steam consumed per hour
- (D) No. of kg of steam consumed per kg of solvent
27. The ratio of momentum diffusivity to mass diffusivity is known as
- (A) Schmidt number (B) Sherwood number
- (C) Prandtl number (D) Mach number
28. Saturated gas is a gas in which
- (A) Vapour is in equilibrium with liquid at the same gas temperature
- (B) Vapour and liquid are at different temperatures
- (C) Partial pressure of vapor is more than the vapor pressure of liquid
- (D) Vapor pressure of liquid is more than partial pressure of vapor

34. 2ml urine sample was treated with reagent to generate a colour with phosphate, which was diluted to 100ml. To a second 2ml sample, 5ml of phosphate solution containing 0.0300 mg phosphate/ml was added, which was treated in same way. The observance of 1st was 0.428 and second was 0.538. Calculate the concentration in milligram of phosphate/mililiter of specima.
- (A) 0.30 mg PO₄³⁻/mL (B) 0.292 mg PO₄³⁻/mL
(C) 0.276 mg PO₄³⁻/mL (D) 0.254 mg PO₄³⁻/mL
35. Express observance of .0510 in terms of transmittance.
- (A) 87% (B) 88.9%
(C) 86.9% (D) 89.8%
36. Thermocouples is suitable for measuring
- (A) Liquid temperatures only
(B) Very high temperature only
(C) Very low temperature only
 (D) Both high and low temperatures
37. If molar absorptivity is 12,000 l/mol.cm, absorbance is .001 for 1 cm path length, the minimum molar concentration is _____.
- (A) $1.10 \times 10^{-7} M$ (B) $1.20 \times 10^{-7} M$
(C) $1.20 \times 10^{-6} M$ (D) $1.20 \times 10^{-8} M$
38. The molecular weight of a given substance can be found using
- (A) UV-Spectrometer
 (B) Mass-Spectrometer
(C) X-ray Diffraction
(D) Nuclear Magnetic resonance spectroscopy

39. A digital computer programmed to perform the function of a process controller is a
- (A) pneumatic control
 - (B) electronic control
 - (C) mixed control
 - (D) micro processor – based control
40. A zero $G(S)$ is any value of ' S ' for which $G(S)$ equals
- (A) zero
 - (B) one
 - (C) infinite
 - (D) finite
41. The catalyst used in the manufacture of sulphuric acid by contact process is
- (A) Iron
 - (B) Aluminium oxide
 - (C) Nickel
 - (D) Vanadium pentoxide
42. Yellow glycerine is made into white, using
- (A) activated carbon
 - (B) diatomaceous earth
 - (C) bauxite
 - (D) bentonite
43. Activity coefficient (γ_i) of a component ' i ' in an ideal solution is _____.
- (A) 0
 - (B) 0.5
 - (C) 1
 - (D) ∞
44. What compound must be excluded from entry into absorber in the manufacture of nitric acid?
- (A) bromides
 - (B) chlorides
 - (C) iodides
 - (D) nicotine

45. Oils and fats are converted to soap in a process called
- (A) hydrogenation (B) esterification
(C) saponification (D) condensation
46. Mercury electrolytic cell produces
- (A) 10 – 12% NaOH solution
(B) 50 – 70% NaOH solution
(C) 97 – 98.5% NaOH solution
(D) 20 – 25% NaOH solution
47. It is recommended as a mouthwash because of its oxidizing and cleansing effects
- (A) sodium peroxide (B) sodium perborate
(C) sodium amide (D) sodium cyanide
48. It is employed for the diazotization of amines in making azo dyes
- (A) Sodium amide (B) Sodium sulfide
(C) Sodium nitrite (D) Sodium silicates
49. Vat dyes were reduced into soluble form by using thin in particularly
- (A) sodium peroxide (B) sodium hydrosulfite
(C) sodium silicate (D) sodium chloride
50. It is used in treating gold ore, in electroplating in the preparation of hydrocyanic acid and in making adiponitrile
- (A) sodium peroxide (B) sodium perborate
(C) sodium amide (D) sodium cyanide

51. Bone Phosphate of Lime (BPL) is
- (A) POCl_3 (B) PCl_3
(C) H_3PO_4 (D) $\text{Ca}_3(\text{PO}_4)_2$
52. Nitro phosphates are
- (A) mixtures of Ammonium nitrate and various phosphates
(B) mixtures of Ammonium sulphate and various phosphates
(C) mixtures of super phosphate and urea
(D) mixtures of Ammonium sulphate and KCl
53. The P_2O_5 content of triple super phosphate is
- (A) 16 – 20% P_2O_5 (B) 25 – 35% P_2O_5
(C) 42 – 50% P_2O_5 (D) 55 – 70% P_2O_5
54. What is nitro Lime?
- (A) Ammonium sulfate nitrate
(B) Potassium sulphate
(C) Calcium Ammonium nitrate
(D) Ammonium phosphate
55. The principal source of cellulose for making paper is
- (A) Wood
(B) Corn stalk
(C) Bhabbar grass
(D) Rough waste from textile industry

56. The characteristics of pulp by sulphate process is
- (A) dull white colour
 - (B) easy to bleach
 - (C) less resistant to mechanical refining
 - (D) strong fibres
57. _____ pulp in a high – grade type of pulp and serves in the manufacture of some of the finest papers, including bond.
- (A) Sulfit
 - (B) Kraft
 - (C) NSSC
 - (D) Lignin
58. Which one is not a thermosetting resin?
- (A) Bakelite
 - (B) Epoxy Resins
 - (C) Epon
 - (D) Polyesters
59. This is not a sodium phosphate classification of structure
- (A) Meta phosphate
 - (B) Ortho phosphate
 - (C) Penta chloro phosphate
 - (D) Poly phosphate
60. Which one is not a yield stimulators?
- (A) Dinoseb
 - (B) Ethepon
 - (C) Glyphosine
 - (D) 2,4-dichlorophenoxy acetic acid

61. High temperature yields higher polychlorinated benzenes at
- (A) higher chlorinated levels
 - (B) lower chlorinated levels
 - (C) any chlorinated level
 - (D) medium chlorinated level
62. Cellulose acetate are esters of
- (A) Cellulose
 - (B) Regenerated cellulose
 - (C) Vinyl family
 - (D) Both (B) and (C)
63. SBR is widely used because of its
- (A) low load bearing capacity
 - (B) low abrasion resistance
 - (C) high abrasion resistance
 - (D) poor susceptibility to oxidation
64. Nylon is
- (A) a natural fibre
 - (B) a synthetic thermoplastic fibre
 - (C) a polymer fibre
 - (D) an addition copolymer fibre
65. Which of the following is a product of condensation polymerisation?
- (A) polyolefins
 - (B) polyester resins
 - (C) vinyl resins
 - (D) vinyl alcohol resins
66. Carbon-chain polymers with only single bonds along the backbone are known as
- (A) polyethylenes
 - (B) polyalkenylenes
 - (C) polyalkynylenes
 - (D) polyalkylenes

67. Insulin has upto _____ amino acid unit.
(A) 56 (B) 51
(C) 50 (D) 48
68. _____ is useful in Choriocarcinoma and Hodgkin's disease
(A) Ampicillin (B) Velban
(C) Aldomet (D) Prednisone
69. Hexylresorcinol is prepared by using resorcinol and
(A) Phenol (B) Caproic acid
(C) Acetic acid (D) Benzyl Chloride
70. _____ are organic compounds added to plastics to improve workability during fabrication.
(A) Catalyst (B) Stabilizers
 (C) Plasticizer (D) Fillers
71. Condensation polymerisation is also known as
(A) Addition polymerisation
(B) Chain polymerisation
 (C) Step-wise polymerisation
(D) Chain initiation polymerisation
72. The copolymer of isobutylene with about 2% isoprene is known as
(A) Silicone rubber (B) Neoprene
 (C) Butyl rubber (D) Thiokol

73. Raw material for the manufacture of carbon black by oil furnace process is
- (A) Natural gas
 - (B) Liquid aromatic hydrocarbons
 - (C) Furnace oil
 - (D) Petroleum
74. Activated carbon is regenerated using the process called
- (A) Vapourisation
 - (B) Electrolytic
 - (C) Atomised suspension
 - (D) Electrothermic
75. Boiling water reactor and pressurised water reactor are
- (A) Nuclear reactor
 - (B) Solar reactor
 - (C) Biogas reactor
 - (D) CSTR
76. Isotopes that are not fissile but are convertible to fissile materials are called
- (A) Chain reaction
 - (B) Cornel's hump
 - (C) Fertile materials
 - (D) Moderators
77. An example for slurry explosive is
- (A) Mercury fulminate
 - (B) Lead azide
 - (C) Tetrazine
 - (D) Ammonium nitrate mixture
78. Which one of the following adsorbents is preferred for adsorbing components from aqueous solutions and moist gases because of its poor affinity towards water?
- (A) Activated alumina
 - (B) Activated carbon
 - (C) Silica gel
 - (D) Zeolites

85. _____ is not used as raw material in producing portland cement.

- (A) Calcareous
(B) Igneous
(C) Argillaceous
(D) Siliceous

86. The calcination reaction is

- (A) reversible reaction
(B) irreversible reaction
(C) first order reaction
(D) elementary reaction

87. Plaster of Paris is obtained by heating

- (A) limestone to 120 - 150°C
(B) Soda ash to 120 - 150°C
(C) dolomite to 120 - 150°C
(D) Gypsum to 120 - 150°C

88. _____ is the most common type of ferroelectric and ferromagnetic ceramics.

- (A) Vitreous enamel
(B) Frit
(C) Enamel glass
(D) Barium titanate

89. NiO dissolved in sodium-lead glass yields a

- (A) Blue colour
(B) Brown colour
(C) Yellow colour
(D) Orange colour

90. _____ is produced by growing non metallic crystals from nucleated silver particles developed from an original clear glass containing silver.

- (A) Safety glass
(B) Opal glass
(C) Tempered glass
(D) Coated glass

91. Muscle tissue contains 55-80% of
(A) Protein
(C) Carbohydrates
(B) Water
(D) Fat
92. _____ contain anthocyanin pigments.
(A) Banana
(C) Grapes
(B) Beet-root
(D) Potato
93. _____ is an important sweetener used in confectionary industry.
(A) High fructose corn syrup
(C) Aspartame
(B) Saccharin
(D) Monellin
94. (a) Glucose and fructose are digestible readily in human metabolism
(b) Melibiose and mannose either remain undigested or poorly absorbed in human metabolism
(A) both (a) and (b) are false
(B) (a) is false and (b) is true
(C) (a) is true and (b) is false
(D) both (a) and (b) are true
95. Lignoceric acid is present in
(A) Coconut oil
(C) Corn oil
(B) Cotton seed oil
(D) Linseed oil
96. Amino acid which has a sulphur like flavour
(A) L-tyrosine
(C) Valine
(B) L-methionine
(D) Leucine

97. For a constant volume process, where U is internal energy

(A) $d_U = C_V \cdot d_T$

(B) $d_H = C_V \cdot d_T$

(C) $d_H = d_Q$

(D) $d_W = Pd_V$

98. _____ law state that the net heat evolved or absorbed in a chemical reaction is same whether the reaction takes place in a single step or in a series of steps.

(A) Kirchoff's law

(B) Hess's law

(C) Kopp's rule

(D) Lavoisier and Laplace law

99. Which is the correct form of Maxwell's equation?

(A) $\left(\frac{\partial T}{\partial V}\right)_S = -\left(\frac{\partial P}{\partial S}\right)_V$

(B) $\left(\frac{\partial T}{\partial P}\right)_S = -\left(\frac{\partial S}{\partial V}\right)_V$

(C) $\left(\frac{\partial T}{\partial V}\right)_S = \left(\frac{\partial S}{\partial V}\right)_T$

(D) $\left(\frac{\partial V}{\partial T}\right)_P = \left(\frac{\partial S}{\partial V}\right)_T$

100. Fugacity and pressure are numerically equal, when the gas is

(A) in ideal state

(B) at high pressure

(C) at low temperature

(D) in standard state

101. For a given mass of an ideal gas the product of pressure and volume is constant at constant temperature is given by

(A) Charles law

(B) Boyle's law

(C) Amagat's law

(D) Dalton's law

102. The ratio of quantity of a reactant present in the reactor feed of a recycling operation to the quantity of that same reactant entering the operation as fresh feed is known as

(A) Recycle ratio

(B) Combined feed ratio

(C) By pass ratio

(D) Purge ratio

103. The relation between equilibrium constant and standard free energy is

- (A) $\Delta G^0 = -RT \ln k$ (B) $\Delta G^0 = RT \ln k$
 (C) $\Delta G^0 = RP \ln k$ (D) $\Delta G^0 = -RV \ln k$

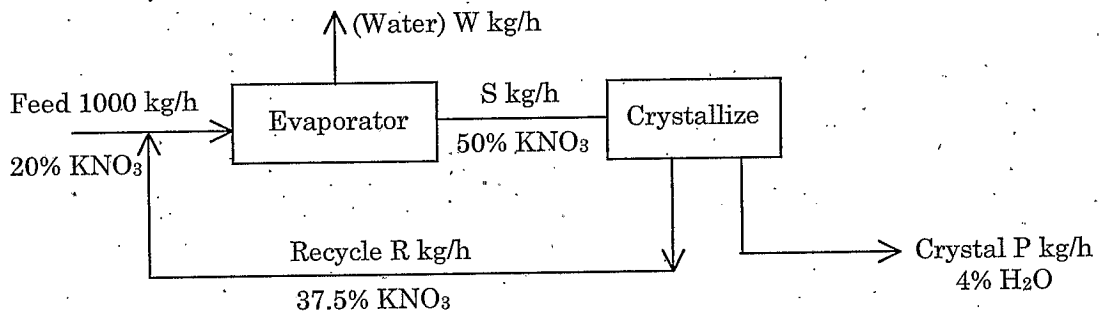
104. Pick out the Clausius-Clapeyron equation from the following

- (A) $\frac{d \ln p^s}{dT} = \frac{\Delta H}{RT^2}$ (B) $\frac{d \ln p^s}{dT} = \frac{\Delta H}{RT}$
 (C) $\frac{d \ln p^s}{dT} = \frac{\Delta S}{RT^2}$ (D) $\frac{d \ln p^s}{dT} = \frac{\Delta S}{RT}$

105. A gas mixture contain $\text{CO}_2, \text{CO}, \text{N}_2, \text{O}_2$ which partial pressures are 75, 50, 595, 26 mm Hg respectively. Calculate the composition of CO_2 in the mixture

- (A) 0.101 (B) 0.067
 (C) 0.797 (D) 0.035

106.



Calculate the value of R (Recycle).

- (A) 766.6 kg (B) 730 kg
 (C) 780 kg (D) 743 kg

107. Rich cow's milk (4536 kg/h) at 4.4°C is being heated in a heat exchanger to 54.4°C by hot water? The average heat capacity of cow's milk is 3.85 KJ/kg. K. How much heat is needed?

- (A) 250.kw (B) 242.5 kw
 (C) 248.5 kw (D) 251.5 kw

108. Critical speed of a ball mill is equal to

(A) $\frac{1}{4\pi} \sqrt{\frac{g}{R_1 - R_2}}$

(B) $\frac{1}{2\pi} \sqrt{\frac{g}{R_1 - R_2}}$

(C) $\frac{1}{\pi} \sqrt{\frac{g}{R_1 - R_2}}$

(D) $\frac{1}{2\pi} \sqrt{\frac{R_1 - R_2}{g}}$

R_1 - Radius of ball mill, R_2 - Radius of ball

109. For crushing of solids, the Rittinger's law states that the work required for crushing is proportional to

- (A) the new surface created
(B) the size reduction ratio
(C) the change in volume due to crushing
(D) the compression ratio

110. Removal of solid particles from a fluid by passing the fluid through a septum on which the solids are deposited is known as

- (A) Filtration
(B) Elutriation
(C) Thickening
(D) Clarification

111. $\frac{pV}{nRT} = 1 + \frac{B}{V/n} + \frac{C}{(V/n)^2} + \frac{D}{(V/n)^3} + \dots$ is

- (A) Virial equation
(B) Van der Wall equation
(C) Kelvin equation
(D) Kremser equation

112. The gross energy requirement in kilowatt hours per ton (2000 lb) of the product pass a 100 μm screen is known as

- (A) Crushing efficiency
(B) Work index
(C) Power index
(D) Kick's law

113. When granular solids are piled up on a flat surface, the sides of the pile are at a definite reproducible angle with the horizontal, this angle is known as
- (A) Contact angle (B) Angle of nip
 (C) Angle of repose (D) Critical angle
114. Specific cake resistance for incompressible filter cakes is proportional to
- (A) ΔP (B) $\sqrt{\Delta P}$
 (C) $1/\Delta P$ (D) independent of ΔP
115. Total drag on a body is the sum of
- (A) Pressure drag and velocity drag
 (B) Friction drag and velocity drag
 (C) Friction drag and pressure drag
 (D) Pressure drag, velocity drag and friction drag
116. The formation of vane contracts is noticed in which the following flow measuring device?
- (A) Venturimeter (B) Orifice meter
 (C) Pitot tube (D) Rota meter
117. The Navier-Stokes' equation is completely equivalent to
- (A) Newton's law of viscosity (B) Newton's law of motion
 (C) Euler's equation of motion (D) Hagen-Poiseuille's equation
118. Thickness of turbulent boundary layer at a distance 'x' from the leading edge over a flat plate after turbulence is fully developed varies as
- (A) $x^{4/5}$ (B) $x^{5/4}$
 (C) $x^{2/5}$ (D) $x^{5/3}$

119. In a double pipe heat exchanger, the equivalent diameter is equal to
- (A) flow area / wetted perimeter
 - (B) $4 \times$ flow area / wetted perimeter
 - (C) wetted perimeter / flow area
 - (D) $4 \times$ wetted perimeter / flow area
120. Multiple effect evaporators are used to
- (A) increase the steam economy and decrease capacity
 - (B) increase the capacity and decrease steam economy
 - (C) increase both steam economy and capacity
 - (D) decrease both steam economy and capacity
121. The law which states that the boiling point of a given solution is a linear function of the boiling point of pure water at the same pressure is
- (A) Newton's law
 - (B) Duhring's law
 - (C) Shank's law
 - (D) Nusselt's law
122. The ratio of the energy absorbed to the total incident energy is called
- (A) Reflectivity
 - (B) Absorptivity
 - (C) Transmissivity
 - (D) Conductivity
123. Rotary driers are generally used for
- (A) Drying fruits
 - (B) Drying free - flowing granular materials
 - (C) Drying pastes and slurries
 - (D) Making milk powder

124. The key factor in Nucleation is the
- (A) Effect of particle size on solubility
 - (B) Effect of cluster formations
 - (C) Temperature
 - (D) Saturation pressure
125. If the overall mass transfer co-efficient is very sensitive to temperature changes
- (A) Mass transfer with chemical reaction occurs
 - (B) The mass transfer is accompanied by evolution of heat
 - (C) The resistance on the two sides of the interface are approximately equal
 - (D) The mass transfer is likely to be liquid phase controlled
126. Extraction utilizes differences in the
- (A) Relative volatilities of their components
 - (B) Vapor pressures of their components
 - (C) Solubilities of their components
 - (D) Boiling points of their components
127. The rate constant of a reaction depends
- (A) Time
 - (B) Concentration of substance
 - (C) Temperature
 - (D) Mole fraction of substance
128. The isothermal gas phase reaction $A \rightarrow 3R$ with 50% inerts, how many times the final volume will change if conversion is 100%
- (A) 3
 - (B) 1.5
 - (C) 2
 - (D) 2.5

129. Phase angle (ϕ) of the Sinusoidal response of first order system is given by

(A) $\phi = \text{Tan}^{-1}(-w\tau)$

(B) $\phi = \text{Tan}^{-1}(w\tau)$

(C) $\phi = \text{Tanh}^{-1}(-w\tau)$

(D) $\phi = \text{Tanh}^{-1}(w\tau)$

130. Damped Vibrator is an example of

(A) Zero order system

(B) First order system

(C) Second order system

(D) Third order system

131. With a damping coefficient more than 1, the second order response will be

(A) Oscillatory

(B) Non oscillatory

(C) Critically damped

(D) Overshoot

132. For a Second order system as radian frequency (w) increases, the value of phase angle $|\phi|$ asymptotically approaches to

(A) 90°

(B) 45°

(C) 60°

(D) 180°

133. A pneumatic valve always has some

(A) Phase lag

(B) Static lag

(C) Overshoot

(D) Dynamic lag

134. Control which is suitable, if no-offset and no oscillations is tolerable, is.

(A) Proportional control

(B) Proportional Integral control

(C) Proportional derivative control

(D) Proportional integral derivative control

135. Pick the wrong statement for Mass spectrometry
- (A) It is used to determine elemental composition of matter
 - (B) It does not provide the structure and compositions of Solid surfaces
 - (C) Evaluate isotopic ratios of atoms in sample
 - (D) Used for qualitative and quantitative compositions of complex mixtures.
136. _____ groups have chelating properties towards certain metallic ions.
- (A) Sulfonate groups
 - (B) Aminodiacetate
 - (C) Quaternary amino
 - (D) Carboxylate
137. In chromatography, displacement types pump is also known as
- (A) Syringe pump
 - (B) Reciprocating pump
 - (C) Pneumatic pump
 - (D) Rotary pump
138. The maximum efficiency of a heat engine operating between a heat source at 100°C and sink at 0°C is
- (A) 100%
 - (B) 73.2%
 - (C) 50%
 - (D) 26.8%
139. McLeod gauge issued to measure
- (A) vacuum pressure
 - (B) temperature
 - (C) level
 - (D) flow
140. Micro computer based control systems which have the capability of communicating with other controllers through a network is called
- (A) feed forward control
 - (B) feed back control
 - (C) distributed control
 - (D) stand alone control

141. In Tennessee this type of phosphate rocks are not found
- (A) brown (B) blue
(C) white (D) yellow
142. Alkyl Benzene sulphonate (ABS) is a
- (A) plasticiser (B) coating ingredient
(C) lubricant (D) detergent
143. Hydrophilic group of a soap or detergent solution is
- (A) water hating (B) water loving
(C) soil hating (D) soil loving
144. Fat splitting catalyst is
- (A) CaCO_3 (B) ZnO
(C) Al_2O_3 (D) Fe
145. In a reaction $2\text{SO}_2 + \text{O}_2 \rightleftharpoons 2\text{SO}_3$, the reverse reaction becomes appreciable at and above the temperature of
- (A) 400°C (B) 450°C
(C) 550°C (D) 650°C
146. The most recent process for the manufacture of Sulphuric acid is
- (A) Lead chamber process
(B) Frasch process
(C) Finnish process
(D) Double Contact Double Absorption (DCDA)

147. This is extensively employed in the leather industry as a depilatory
- (A) Sodium Cyanide (B) Sodium Nitrite
(C) Sodium Silicate (D) Sodium Sulfide
148. Which chemical is widely used in the dyeing of denim with indigo?
- (A) Sodium silicate (B) Sodium peroxide
(C) Sodium hydrosulfite (D) Sodium amide
149. 50% of thin salt is consumed in the country for the manufacture of Kraft pulp, 38% goes into the compounding of house hold detergents and the remainder for glass, dyes textile and medicine
- (A) Sodium chloride (B) Sodium silicate
(C) Sodium hydrosulfite (D) Sodium sulfate
150. Which process is virtually obsolete for the production of sulfuric acid?
- (A) Contact process
(B) Chamber process
(C) Partial or stage – wise combustion
(D) Arc process
151. Which is known as sevin insecticides?
- (A) Carbophos (B) Dimethoate
(C) P – Dichlorobenzene (D) Carbaryl
152. $\text{NH}_2 \cdot \text{CO} \cdot \text{NH}_2$ is
- (A) Urea (B) Ammonium Carbamate
(C) Biuret (D) Ammonium nitrate

153. In fertilizer the major component required for the development of starches of potatoes and grains is
- (A) Nitrogen (B) Phosphorus
 (C) Potassium (D) Carbon
154. The presence of sodium sulphate in pulp
- (A) poor strength properties of paper
(B) make the pulp bleachability poor
(C) increase its flexibility and opacity of paper
 (D) makes the pulp bleachability easier
155. Bleaching can be done for bamboo pulp by
- (A) Alkali extraction process
(B) Nitration process
 (C) Chlorination process
(D) Sulphonation process
156. The purpose of Hollander beater is
- (A) Dissolving of fibres
(B) Sizing of fibres
(C) Rag pulping
 (D) Fibrillation of fibres
157. Major constituent in white liquor is
- (A) Silica (B) Sodium carbonate
 (C) Caustic soda (D) Sodium sulphate

158. In four driner machine the paper enters the rolls with a moisture content of 60 to 70% and leaves them _____ to _____ dry.
- (A) 90 to 94% (B) 80 to 83%
(C) 74 to 80% (D) 95 to 97%
159. _____ is the commercially important amino resin.
- (A) Epoxy resin (B) Urea formaldehyde
(C) Monoglyceride (D) Polycarbonate
160. Type of paper used in the manufacture of news print paper is
- (A) tissue paper (B) ground wood paper
(C) wrapping paper (D) paper board
161. Butadiene is a co-product of the steam cracking of petroleum in
- (A) Acetalene manufacture
(B) Propylene manufacture
(C) Ethylene manufacture
(D) Styrene manufacture
162. Which one of the following statement is wrong?
- (A) Yeast and bacteria are unicellular
(B) Molds multiply by vegetative growth
(C) Molds are multicellular
(D) Yeasts multiply by fission, bacteria by budding
163. Solubility of NH_3 in organic solvents when compared with water is
- (A) very low (B) low
(C) high (D) same

164. Talc is used in plastics processing as

- (A) plasticizers
 (B) fillers and reinforcements
(C) emulsifier
(D) stabilizer

165. The type of resin used in the decorative and structural panels is

- (A) Furanes
(B) Acrylics
(C) Polypropylene
(D) Polybutylene

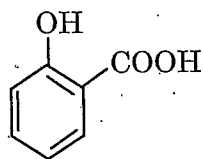
166. Propanolol is prepared from 1-naphthol and

- (A) caproic acid
(B) epichlorohydrin
(C) resorcinol
(D) sodium phenolate

167. Riboflavin is also known as

- (A) Vitamin B₁
(B) Vitamin B₂
(C) Vitamin B₆
(D) Vitamin B₁₂

168. Name the following structure



- (A) salicylic acid
(B) benzoic acid
(C) formic acid
(D) acetic acid

169. Insulin is isolated from _____ of beef or hogs.

- (A) liver
(B) pancreas
(C) gall bladder
(D) kidney

170. _____ is used for grinding tungsten carbide tooling, glass and nonferrous metals
- (A) Pyrolytic graphite (B) Diamond
(C) Graphite (D) Carbon fiber
171. _____ is produced by the thermal cracking of hydrocarbons such as, methane, propane and acetylene at reduced pressures.
- (A) Artificial graphite (B) Carbon black
 (C) Pyrolytic graphite (D) Carbon fibres
172. Monazite sand is a chief source of
- (A) Uranium (B) Thorium
(C) Radium (D) Polonium
173. Destructive distillation of coal is the process of
- (A) Heating coal in excess of air
(B) Heating coal with water
 (C) Heating coal in absence of air
(D) Heating coal with carbondioxide
174. In low temperature Carbonisation, liquid products contain more
- (A) Crude light oil (B) Tar-acids, tar-bases
(C) Water (D) Tar
175. _____ is root formed by the incomplete burning of carbonaceous solids or liquids
- (A) Carbon fibre (B) Lamp black
(C) Activated carbon (D) Carbon black

182. The fluxes required to blend the particles of the refractories to maintain reduced vitrification are kept at
- (A) Maximum (B) Minimum
- (C) Moderate (D) No influence
183. The first reaction in the production of ceramic product is to drive off the water of hydration and this occurs at about
- (A) 500 – 600°C (B) 600 – 650°C
- (C) 700 – 750°C (D) 400 – 450°C
184. The chemical reactions which occur on heating clay is quite important. At about 1000°C, the alumina and silica combine to form
- (A) γ - alumina (B) β - alumina
- (C) Mullite (D) Cristobalite
185. Glost firing is the technical term for
- (A) Crazeing (B) Glazing
- (C) Firing of the glaze (D) Vitrification
186. A fracturing or a flaking off, of a refractory brick, due to uneven heat stresses or compression caused by heat is known as
- (A) Shivering (B) Spalling
- (C) Over glazing (D) Crazeing
187. _____ dryers are used in drying of bricks.
- (A) Spray (B) Tunnel
- (C) Rotary (D) Vacuum

188. Sugar alcohols found in pears, apples and plums

- (A) Sorbitol (B) Xylitol
(C) Maetital (D) Inositol

189. Most preferred starch for laundry purpose is

- (A) Corn starch (B) Wheat starch
(C) Cassava starch (D) Rice starch

190. The usual range of over run in ice cream is from

- (A) 50 to 60% (B) 60 to 70%
 (C) 70 to 100% (D) 10 to 20%

191. Enzyme used in the preparation of cheese from milk is

- (A) Aspertase (B) Lactase
 (C) Rennin (D) Amylasé

192. Betalains are

- (A) Sugar (B) Pigments
(C) Protein (D) Fat

193. Anthocyanin pigments are not present in

- (A) Grapes (B) Berries
(C) Plums (D) Banana

194. Humid volume is defined as the
- (A) total volume of a unit mass of vapor-free gas and whatever vapor it may contain at 1 atm and the gas temperature
 - (B) total volume of water vapor in air
 - (C) total volume of moist gas present in air
 - (D) defined as humidity
195. Give an example of fluxing agent used in making ceramic products.
- (A) Borax
 - (B) Polyacrylonitrile
 - (C) Sodium hydrosulphite
 - (D) Sodium sulphide
196. The sweetness index of B-D-fructose is
- (A) 0.9
 - (B) 0.42
 - (C) 1
 - (D) 0.8
197. _____ is used as an emulsifier in confectionary.
- (A) Margarine
 - (B) Lecithin
 - (C) Casein
 - (D) Butyric acid
198. _____ are used to stabilise fats and oil.
- (A) Oxidants
 - (B) Surface actino agent
 - (C) Stabilizers
 - (D) Antioxidant
199. The important protein in whole milk is
- (A) Lipovitellin
 - (B) Globulins
 - (C) Casein
 - (D) Prolamins
200. Over-ripening of fruits can be prevented by dipping in
- (A) Ascorbic acid
 - (B) Sodium sulphate
 - (C) Hydrogen peroxide
 - (D) Sodium chloride

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