Question Papers

ExamCode: CHE_CHTECH_022015

1. **The equilibrium constant, K for a chemical reaction depends on-**
   1) Ratio of reactant
   2) Pressure only
   3) Temperature only
   4) Temperature and pressure

2. **The objective of by-pass stream is to-**
   1) Heat conservation
   2) Control the composition of final exit stream
   3) Utilise valuable reactants
   4) Get high extent of reaction

3. **Rate of adsorption increases as the-**
   1) Temperature increases
   2) Temperature decreases
   3) Pressure decreases
   4) Size of adsorbent increases

4.

Schmidt number is given by-	
A.	$\frac{\mu}{\rho D_{AB}}$
B.	$N_{Re}.N_{Pe}$
C.	$N_{sh}.N_{Re}$
D.	$\frac{\rho D_{AB}}{\mu}$

5. **The Grashoff number is defined as the ratio of the-**
   1) Buoyancy to inertial forces
   2) Buoyancy to viscous forces
   3) Inertial to viscous forces
   4) Buoyancy to surface tension forces

6. **$(N_{Re}.N_{Pr})(D/L)$ is called the _____ number.**
   1) Peclet
   2) Stanton
   3) Graetz
   4) Biot

7. **In SI units fouling factor is expressed in-**
   1) Dimensionless
   2) $W/m^2.K$
   3) $W.K/m^2$
   4) $W.m^2/K$

8.

Thermal diffusivity is given by-	
A.	$\frac{K}{\rho C_p}$
B.	$\rho C_p/K$
C.	C_pK/ρ
D.	$K\rho/C_p$

9. **A rigid tank holds one kilogram of air at 300 K. The air has an internal energy of 0.25 x 10^3kJ with reference to the fixed datum conditions. Heat is added to the air until the interval energy is 0.35 x 10^3 kJ. Calculate the heat transferred to the air.**

1) 10 kJ
2) 100 kJ
3) 0.1 kJ
4) 1000 kJ

10. **Stokes equation is valid in the Reynolds number range.**
1) 0.01 to 0.1
2) 0.1 to 2
3) 2 to 10
4) 10 to 100

11.

In the reaction $2SO_2 + O_2 \rightleftharpoons 2SO_3$ the equilibrium constant K_p is represented in terms of partial pressure by-	
A.	$K_p = \frac{Pso_3}{Pso_2 . Po_2}$
B.	$K_p = Pso_3 / Pso_2 . Po_2^{1/2}$
C.	$K_p = Pso_2 . Po_2 / Pso_3$
D.	$K_p = Pso_2 . Po_2^{1/2} / Pso_3$

12.

For a single stage steady flow compressor the theoretical amount of work done in compressing 1 kmol of gas adiabatically is given by-	
A.	$W = \frac{r-1}{r}(P_1V_1)\left[(P_2/P_1)^{\frac{r-1}{r}} - 1\right]$
B.	$W = \frac{r}{r-1}\frac{1}{(P_1V_1)}\left[(P_1/P_2)^{\frac{r-1}{r}} - 1\right]$
C.	$W = \frac{r-1}{r}\frac{1}{(RT_1)}\left[(P_1/P_2)^{\frac{r-1}{r}} - 1\right]$
D.	$W = \frac{r}{r-1}(RT_1)\left[(P_2/P_1)^{\frac{r-1}{r}} - 1\right]$

13. **In elementary reactions, stoichiometric relationship decides the-**
1) Order of reaction
2) Rate of reaction
3) Conversion of reaction
4) Selectivity of reaction

14. **Dissolution of pills in stomach follows-**
1) Shrinking core model
2) Progressive conversion model
3) Eley-Rideal model
4) Langmuir model

15. **The velocity profile assumed for a plug flow reactor is:**
1) Hyperbolic
2) Exponential
3) Flat
4) Parabolic

16. **Friction generated in unseparated boundary layers is called-**
1) Skin friction
2) Form friction
3) Wake friction
4) Fluid friction

17. **Essential oils are usually obtained using-**

1) Steam distillation
2) Extractive distillation
3) Solvent extraction
4) Leaching

18. **Galileo number is defined as-**

1) Re/Ar
2) Re^2/Nu
3) Re/Fr
4) Re^2/Fr

19.

For spherical particles falling freely through a medium such that laminar conditions prevail, the terminal velocity is given by-	
A.	$V_t = \frac{d}{18\mu}(\rho_s - \rho)g$
B.	$V_t = \frac{d^2}{18\mu}(\rho_s - \rho)g$
C.	$V_t = \frac{d^2}{18\mu}(\rho - \rho_s)g$
D.	$V_t = \frac{d}{18\mu}(\rho - \rho_s)g$

20. **Change in the state of a system by performing work on the system under adiabatic conditions-**

1) The amount of work needed is path-dependent
2) Work alone cannot bring about such a change of state
3) The amount of work needed is independent of path
4) More information is needed to conclude anything about the path dependence

21. **When centrifugal pump operates at a high capacity, the pressure near the impeller eye is:**

1) Infinity
2) Zero
3) High
4) Low

22.

For the series reaction $A \xrightarrow{K_1} R \xrightarrow{K_2} S$ carried out in a plug flow reaction. The time at which maximum concentration of R occurs is:	
A.	$t_{max} = \frac{k_2 - k_1}{lu(k_2/k_1)}$
B.	$t_{max} = \frac{-lu(k_2/k_1)}{k_2 - k_1}$
C.	$t_{max} = \frac{lu(k_2/k_1)}{k_2 - k_1}$
D.	$t_{max} = \frac{k_1 - k_2}{lu(k_2/k_1)}$

23. **The pressure head required to overcome the resistance to flow in pipes is:**

1) Friction head
2) Velocity head
3) Suction head
4) Static head

24. **A refrigerator required 1kW of power for a refrigeration rate of 3 kJ/s. What is the lowest temperature that can be maintained in the cold space of the refrigerator if the heat is rejected at 27° C?**

1) 293.2 K
2) 13.5 °C
3) 225 K
4) 9 °C

25. **When the thickness of the laminar sublayer is much smaller than the average height of the surface projections, it is called-**

1) Hydrodynamically smooth surface
2) Thermodynamically smooth surface
3) Hydrodynamically rough surface
4) Thermodynamically rough surface

26. **The units of specific heat is ____.**

1) W/g.°C
2) Cal/g.°C
3) W/m.c
4) Cal/m.c

27. **For Reynolds number greater than 30,000, the value of C_d for square edged orifice fall in the range.**

1) 0.3 - 0.5
2) 0.15 - 0.25
3) 0.595 - 0.620
4) 0.9 - 0.99

28. **The kinetic energy correction factor for fully developed laminar flow is:**

1) One
2) Zero
3) Two
4) Infinity

29. **Which one of the following is obtained as co-products during the manufacture of soda ash through dual process?**

1) Ammonium chloride
2) Ammonium carbonate
3) Ammonium hydroxide
4) Sodium chloride

30. **Unit for rate of Heat Transfer per unit length is ____.**

1) W/m
2) Cal/m
3) W/m.°C
4) Cal/m.°C

31. **Calcining of Lime stone produces _____.**

1) Slaked lime
2) Quick lime
3) Calcium silicate
4) Calcium carbonate

32. **The wet bulb and dry bulb temperature for a vapour gas mixture are 25°C and 30°C respectively. If the mixture is heated to 45°C at constant pressure, the wet bulb temperature will be-**

1) 25°C
2) >25°C
3) <25°C
4) -25°C

33. **For an ideal gas the slope of the pressure, volume curve at a given point, will be-**

1) Steeper for an isothermal than for an adiabatic process
2) Steeper for an adiabatic than for an isothermal process
3) Identical for both the process
4) Irreversible for both the process

34. **For estimation of heat energy of a solid compound, one can use-**

1) Clapeyron's equation
2) Gibbs equation
3) Kopp's rule
4) Trouton's rule

35. **Unit of heat transfer coefficient is ____.**
1) w/m^2c
2) w/m.c
3) cal/m.c
4) cal/gm.c

36. **Peclet number in heat transfer is defined as-**
1) Dv/α
2) $C_p\mu/k$
3) hD/k
4) C_pk/μ

37. **In Ponchan-Savant method analysis of the distillation column is based on-**
1) Enthalpy balance only
2) Material balance only
3) Both enthalpy and material balance
4) The assumption of constant molal overflow

38. **In the case of cooling towers, the ratio of the rates of heat and mass transfer is indicated by-**
1) Lewis number
2) Grashoff number
3) Sherwood number
4) Nusselt number

39.

For forced convection of low viscous fluids in tubes the film coefficient for heat transfer is calculated for cooling using the equation.	
A.	$N_u = 0.023(R_e)^{0.8}(P_n)^{0.4}$
B.	$N_u = 0.023(R_e)^{0.8}(P_n)^{0.33}$
C.	$N_u = 0.027(R_e)^{0.8}(P_n)^{0.33}$
D.	$N_u = 0.027(R_e)^{0.8}(P_n)^{0.33}\left(\frac{\mu}{\mu_{SC}}\right)$

40.

The Graetz number is given as-	
A.	$D\bar{V}/\alpha$
B.	mC_p/KL
C.	hD/k
D.	$mC_P/\mu L$

41. **The units of thermal conductivity is ____.**
1) cal/m.c
2) w/m.c
3) cal/g.c
4) w/g.c

42. **Natural convection is due to-**
1) Heat capacity difference
2) Density difference
3) Viscosity difference
4) Velocity difference

43. **Liquid A decomposes by first order kinetics and in a batch reactor 50% of A is converted in a 5 minute run. How much longer would it take to reach 75% conversion.**

1) 10 min
2) 7.5 min
3) 5 min
4) 2.5 min

44. **In an isothermal batch reactor 70% of a liquid reactant is converted in 13 min. What space time is needed to effect this conversion in a plug flow reactor-**

1) 13 min
2) 26 min
3) 6.5 min
4) 30 min

45. **For any particular duty and for all positive reaction orders, the ratio of the volume of a mixed flow reactor to a plug flow reactor-**

1) =1
2) >1
3) <1
4) 0

46. **A pulse of tracer is introduced into an ideal CSTR(with mean residence time T) at time t=0. The time taken for exit concentration to reach 1/2 of its initial value will be-**

1) 2T
2) 0.5 T
3) T/0.693
4) 0.693T

47. **An endothermic aqueous phase first order irreversible reaction is carried out in an adiabatic PFR. The rate of reaction.**

1) Is maximum at the inlet of the reactor
2) Goes through a maximum along the length of the reactor
3) Goes through a minimum along the length of the reactor
4) Is a maximum at the exit

48.

A first order gaseous reaction is catalyzed by a non-porous solid. The kinetic rate constant and the external mass transfer coefficient are k and k_g respectively. The effective rate constant(k_{eff}) is given by-	
A.	$K_{eff} = k + k_g$
B.	$K_{eff} = \frac{k + k_g}{2}$
C.	$K_{eff} = (k k_g)^{1/2}$
D.	$\frac{1}{K_{eff}} = \frac{1}{k} + \frac{1}{k_g}$

49. **For the liquid phase reaction A →P in a series of experiments in a batch reactor, the half life ($t_{1/2}$) was found to be inversely proportional to the square root of the initial concentration of A. The order of the reaction is:**

1) 3/2
2) 1
3) 1/2
4) -1/2

50. **Reactions which have low activation energy are-**

1) Temperature sensitive
2) Concentration independent
3) Temperature insensitive
4) Concentration dependent

51. **The unit for the reaction rate constant for a first order reaction. When the rate is based on unit interfacial surface area is:**

1) sec^{-1}
2) cm/sec
3) cm^2/sec
4) $mol./cm^3.sec$

52. **From statistical mechanics, equilibrium is defined as-**

1) The state of the system consisting of the greatest number of equally likely molecular configurations
2) The rate of change of all the forward and reverse elementary reactions are equal
3) At a given temperature and pressure the free energy of the system is at its lowest value
4) The state of the system which has the overwhelmingly great probability of not occurring

53. **The temperature dependency of the reaction rate constant based on collision theory is:**

1) $k \propto e^{-E/RT}$
2) $k \propto T^{-1/2}e^{-E/RT}$
3) $k \propto Te^{-E/RT}$
4) $k \propto T^2e^{-E/RT}$

54. **Pure O_2 is mixed with air to produce an enriched air containing 50 vol% O_2. The ratio of moles of air to O_2 used is:**

1) 1.72
2) 0.58
3) 0.50
4) 0.20

55.

For the series reaction $A \xrightarrow{K_1} R \xrightarrow{K_2} S$.

When $k_1=k_2$ then the ratio $\frac{C_{Rmax}}{CAo}$ is :

A.	0
B.	1
C.	e
D.	1/e

56. **How many grams of oxygen are in 65g of $C_2H_2O_2$? (Atomic weights : C - 12, H - 1, O - 16)**

1) 18
2) 29
3) 9.5
4) 35.9

57. **1000 kg of wet solids are to be dried from 60% to 20% moisture(by weight). The mass of moisture removed in kg is:**

1) 520
2) 200
3) 400
4) 500

58.

Clausius inequality is written as	
A.	$\oint dQ > 0$
B.	$\oint dQ < 0$
C.	$\oint \frac{dQ}{T} \leq 0$
D.	$\oint \frac{dQ}{T} \geq 0$

59. **Which of the following type of chromatography is used for separation of substances on the basis of their molecular size and shape?**

1) Ion exchange chromatography
2) Gel-permeation chromatography
3) Liq-liquid chromatography
4) Reverse phase chromatography

60. **Which of the following instrumental analysis follows Beer-Lambert's law?**

1) Chromatography
2) Spectroscopy
3) Thermogravimetry
4) Laser particle size analysis

61. **The unit impulse response of a first order process is given by $2e^{-0.5t}$. The gain and time constant of the process are respectively.**

1) 1 and .5
2) 2 and .5
3) 2 and 2
4) 4 and 2

62. **The slope of a Mollier diagram at constant pressure indicates-**

1) Enthalpy
2) Entropy
3) Internal energy
4) Temperature

63. **Consider a piston-cylinder arrangement containing a gas. The system is heated by placing it on the top of a burner. The system undergoes-**

1) A constant volume process
2) A constant pressure process
3) An adiabatic process
4) An isothermal process

64.

For the time domain function f(t) = t. The Laplace transform of $\int_0^t f(t)dt$ is given by-	
A.	$1/2s^3$
B.	$2/s^3$
C.	$1/s^3$
D.	$2/s^2$

65. A unit step input is given to a process that is represented by the transfer function $\frac{(s+2)}{(s+5)}$. The initial value ($t = 0^+$) of the response of the process to the step input is:

A.	0
B.	2/5
C.	1
D.	α

66. **Which of the following unit process involves an introduction of OSO_2OH group on carbon?**

1) Sulfonation
2) Sulfation
3) Sulfo alkylation
4) Sulfo arylation

67. **Aromatic sulfonyl chlorides are useful for the preparation of _____.**

1) Drugs
2) Leather
3) Lubricant additives
4) Detergents

68. **Sulfonation of benzene results in intermediates to produce-**

1) Phenol
2) Resoninol
3) Sulfonal
4) Hexanol

69. The mathematical criteria to be satisfied by a cubic equation of state at the critical point is:

A.	$\left(\frac{\partial P}{\partial V}\right)_{T_c} = 0; \left(\frac{\partial^2 P}{\partial V^2}\right)_{T_c} > 0$
B.	$\left(\frac{\partial P}{\partial V}\right)_{T_c} = 0; \left(\frac{\partial^2 P}{\partial V^2}\right)_{T_c} < 0$
C.	$\left(\frac{\partial P}{\partial V}\right)_{T_c} = 0; \left(\frac{\partial^2 P}{\partial V^2}\right)_{T_c} = 0$
D.	$\left(\frac{\partial T}{\partial P}\right)_{V_c} = 0; \left(\frac{\partial^2 T}{\partial P^2}\right)_{V_c} = 0$

70. **Aniline sulfate is converted to sulfanilic acid by-**

1) Oxidation
2) Baking
3) Reduction
4) Cooking

71. **From freezing-point depression measurements, the van't Hoff 'i' factor of nitric acid in sulfuric acid is found to be-**

1) 2
2) 3
3) 4
4) 5

72. **Which of the following industry uses nitrates of cellulose extensively?**

1) Plastic
2) Cement
3) Paint
4) Sugar

73. **Hough nitrator is employed for the nitration of-**
1) Methane
2) Benzene
3) Butane
4) Pentane

74. **Which of the following factor is considered to be of prime importance in the design of nitrators?**
1) pH control
2) Degree of agitation
3) Feed concentration
4) Feed flowrate

75. **Amines can be oxidised to aldehydes by-**
1) Prevost oxidation
2) Sommelet oxidation
3) Baeyer-villiger reaction
4) Barbier-wieland degradation

76. **The fermentation process, which required one of the following is known as aerobic process?**
1) Oxygen
2) Nitrogen
3) Argon
4) Helium

77. **What percentage of alcohol should be separated using distillation to produce fermented liquor called beer?**
1) 8 -10
2) 2 - 4
3) 5 - 7
4) 16 - 18

78. **The nutrients added to the molasses, in the fermentation of ethyl alcohol are-**
1) Ammonium and magnesium sulphate
2) Calcium and potassium sulphate
3) Potassium and calcium sulphate
4) Sodium and calcium sulphate

79. **An evacuated, rigid, adiabatic tank is filled slowly with air from a supply line supplying air at a constant pressure, P_L and temperature, T_L. The temperature of air in the tank at the end of the filling process will be-**

1) Greater than T_L
2) Equal to T_L
3) Less than T_L
4) The average of ambient temperature and T_L

80. **Specific heat at constant pressure (C_p) for helium is 5.19 kJ/kg.k and its molecular mass is 4 kg/kmol. The specific heat at constant volume (C_v) of helium, in kJ/kg.k, is:**
1) 1.19
2) 2.11
3) 3.11
4) 5.19

81. **Tower fermentors are used for-**
1) Continuous penicillin production
2) Continuous beer production
3) Production of enzymes
4) Batch production of beer

82. If the specific growth rate, μ, is constant with time during the exponential growth period, the equation correlating bacterial number density C_n cell number concentration with respect to time can be expressed as:

A.	$C_n = C_{no}\exp[\mu(t-t_o)]$
B.	$C_{no} = C_n\exp[\mu(t-t_o)]$
C.	$C_n / C_{no} = \frac{1}{\mu}\exp(t-t_o)$
D.	$C_{no} / C_n = \frac{1}{\mu}\exp(t-t_o)$

83. The treatment technology which is mainly used for the removal of cyanides is:

1) Aerobic decomposition
2) Resin adsorption
3) Oxidation by ozone
4) Electro dialysis

84. Which one of the following coagulants is used in water treatment. When magnesium content of water is high?

1) Aluminium sulphate
2) Sodium aluminate
3) Ferric sulphate
4) Ferric chloride

85. Which one of the following expressions represents the Joule-Thomson coefficient?

1) $(\partial T/\partial P)_H$
2) $(\partial T/\partial V)_H$
3) $(\partial P/\partial H)_S$
4) $(\partial S/\partial T)_P$

86. Calgon is a trade name given to-

1) Sodium silicate
2) Calcium phosphate
3) Sodium hexa metaphosphate
4) Sodium zeolite

87. A heat pump extracts heat at the rate of 100 kW from a low temperature reservoir and delivers heat at the rate of 160 kW to a high temperature reservoir. The COP of the heat pump is:

1) 1.60
2) 1.67
3) 2.60
4) 2.67

88. A sample of well water contains 140 g/m³ Ca^{2+} ions & 345 g/m³ Na^+ ions. The hardness of the sample of water, expressed in terms of equivalent $CaCO_3$ in g/m³ is _____. [Assuming atomic masses of Ca : 40, Na : 23, C : 12 & 0 : 16]

1) 350
2) 140
3) 400
4) 200

89. The mass, interval energy, pressure and volume of a system are 10 kg, 100 kJ, 1 bar and 1m³ respectively. The value of specific enthalpy in kJ/kg, of the system is:

1) 10
2) 20
3) 10.1
4) 0.1

90. The three primary soil macro nutrients are-

1) Carbon, oxygen and water
2) Copper, cadmium and carbon
3) Potassium, phosphorus and nitrogen
4) Boron, zinc and manganese

91. **Water gas when mixed with oil, results in-**
1) Producer gas
2) Blue gas
3) Carburetted gas
4) Furnace gas

92. **Any fuel having greater than _____ of combustible carbon can be used for the manufacture of producer gas.**
1) 25%
2) 50%
3) 75%
4) 95%

93. **Which of the following gas is obtained by the carbonisation of coal?**
1) Coke oven gas
2) Carburetted gas
3) Natural gas
4) Refinery off gas

94. Match the following:

List – I	List – II
1) Water gas	a) Carbon monoxide, Hydrogen
2) Producer gas	b) Methane
3) Natural gas	c) Carbon monoxide and Nitrogen

	1	2	3
A.	a	b	c
B.	a	c	b
C.	b	a	c
D.	c	b	a

95. **Which of the following process is NOT involved for the production of synthesis gas?**
1) Fungi process
2) Winkler process
3) Kopper-Tozek process
4) Claude process

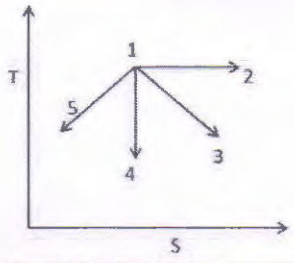
96. **Which one of the following gases is called 'town gas' (used extensively for domestic heating and lighting purposes).**
1) Coal gas
2) Producer gas
3) Natural gas
4) Synthesis gas

97. **Natural gas is called wet gas-**
1) When it contains maximum water
2) When it contains gaseous hydrocarbon from C_1 to C_4
3) When it contains maximum oil
4) When it contains only methane

98. **Which of the following zone is NOT present in the producer gas reactor?**
1) Combustion zone
2) Distillation zone
3) Reduction zone
4) Absorption zone

99. **For household purposes the important components present in the LPG cylinder are-**
1) n-butane 27.2%, butylene 42.8%, propane 2.8%
2) n-butane 10.5%, butylene 50%, propane 5.2%
3) n-butane 12.7%, butylene 26.3%, propane 12%
4) n-butane 15.3%, butylene 35.2%, propane 5%

100. Which of the following processes, shown in the figure below, represents the throttling of an ideal gas?



A.	1 to 2
B.	1 to 3
C.	1 to 4
D.	1 to 5

101. The sulphur content of iron pyrites is normally in the range of-

1) 5 to 10%
2) 15 to 20%
3) 25 to 35%
4) 40 to 45%

102. Which of the following is obtained by heating trana ore?

1) Sodium carbonate
2) Sodium sulphate
3) Sodium silicate
4) Sodium bromide

103. During the manufacture of sulfuric acid, the temperature maintained in the parked bed reactor used to convert sulfur trioxide is in the range of-

1) 100 to 150 °C
2) 200 to 250 °C
3) 300 to 400 °C
4) 400 to 500 °C

104. In the manufacture of sulfuric acid from molten sulfur, most widely used catalyst is _____.

1) Vanadium pentoxide
2) Phosphorus pentoxide
3) Rhodium pentoxide
4) Magnesium pentoxide

105. In the production of Nitric acid by ammonia oxidation process, the temperature maintained in the catalyst zone converter is:

1) 200 °C
2) 400 °C
3) 600 °C
4) 800 °C

106. In the production of Nitric acid by ammonia oxidation process, _____ alloy is used as catalyst.

1) Platinum-Rhodium
2) Copper-Zinc
3) Nickel-Iron
4) Copper-Iron

107. On a LNP vs H coordinate system, where LNP is the y-coordinate and H is the x-coordinate, the slope of a constant entropy line is:

1) 1/V
2) V
3) P/V
4) 1/PV

108. Which one of the following is called as gypsum salt?

1) Calcium sulphate
2) Magnesium sulphate
3) Calcium carbonate
4) Calcium chloride

109. NaOH content is the exit of diaphragm cell is normally in the range of _____.

1) 6 - 8%
2) 10 - 12%
3) 40 - 50%
4) 70 - 80%

110. Commercially, phosphate rock is expressed as bone phosphate of lime. Which is chemically named as-

1) Tricalcium phosphate
2) Dicalcium phosphate
3) Monocalcium phosphate
4) Calcium sulphate

111. Which of the following is known as Salt Cake?

1) Sodium Sulfate
2) Sodium Carbonate
3) Sodium Chloride
4) Sodium Nitrate

112. White lead in paints acts as-

1) Thinner
2) Drying oil
3) Pigment
4) Driver

113. Which one is NOT a function of thinner in a paint?

1) To suspend pigment particles
2) To dissolve film forming material
3) To reduce the consistency of paint
4) To reduce the cracking in the paint film

114. Which one of the following is NOT a non-drying oil?

1) Linseed oil
2) Mustard oil
3) Sunflower oil
4) Rapeseed oil

115. Which one of the following is NOT a characteristic of a good pigment?

1) Transparent
2) Chemically inert
3) Non-toxic
4) Easily miscible

116. Which one of the following is NOT present in vanishes?

1) Pigment
2) Thinner
3) Drying oil
4) Anti-skinning agent

117. Raney nickel is obtained by trecting a powdered alloy of nickel and aluminium with-

1) Caustic soda
2) Potassium chloride
3) Zinc chloride
4) Chromium

118. The removal of saturated glycerides by cooling the oil to low temperatures is known as-

1) Winterisation
2) Pasteurisation
3) Sterilisation
4) Polymerisation

119. Mixed esters of polyhydric alcohols other than glycerin are called _____.

1) Waxes
2) Fats
3) Oils
4) Vanaspathy

120. Number of _____ in the fatty acid radical controls the melting point and chemical reactivity of oils.

1) Single bond
2) Double bonds
3) Benzene rings
4) Phenyl groups

121. _____ is added with extracted vegetable oil to remove free fatty acids as 'foots' by centrifugation.

1) NaOH
2) HCl
3) H_2SO_4
4) HNO_3

122. **In purification of extracted vegetable oil, bleaching is carried out by treating with _____.**

1) NaOH
2) Sulphuric acid
3) Nacl
4) Fuller's earth with carbon

123. **Vanaspathi is produced from vegetable oil by _____.**

1) Hydrogenation
2) Dehydrogenation
3) Sulphonation
4) Isomaisation

124. **Which one of the following catalyst is used for the industrial production of vanaspathi from vegetable oil?**

1) Nickel
2) Iron
3) Palladium
4) Copper

125. **_____ is used as detergent builders to avoid alumina corrosion in washing machines.**

1) Sodium silicate
2) Potassium chloride
3) Magnesium chloride
4) Magnesium sulphate

126. **In the soap production process, which one of the following is used as fat splitting catalysts?**

1) Zinc oxide
2) Magnesium chloride
3) Sodium sulphate
4) Potassium chloride

127. **Starting from the definition of Gibbs free energy function G = H - TS, the Maxwell relation that can be derived is:**

1) $(\partial P/\partial T)_S = V/S$
2) $(\partial P/\partial T)_S = V$
3) $(\partial V/\partial S)_P = (\partial T/\partial P)_S$
4) $(\partial V/\partial T)_P = -(\partial S/\partial P)_T$

128. **Two systems are available for compressing 10 m³/hr of ambient air to 10 bar. The first one uses a single stage compressor(K1) and the second one uses a multistage compressor with inter-stage cooling (K2). Which one of the following statements is INCORRECT?**

1) K2 will have knockout pots in between the stages
2) Discharge temperature of K1 will be higher than that of K2
3) K2 will consume more power than K1
4) Cost of K2 will be more than that of K1

129. **The proportion of free fatty acid in the oil or fat is indicated by-**

1) Acid value
2) Saponifaction value
3) Ester value
4) Iodine value

130. **Number of milligrams of caustic potash required to neutralize the fatty acids obtained by complete hydrolysis of one gram of oil or fat is known as-**

1) Saponification value
2) Ester value
3) Acid value
4) Iodine value

131. **The vast majority of vegetable and animal fats are made up of fatty acid molecules of more than-**

1) 14 carbon atoms
2) 5 carbon atoms
3) 4 carbon atoms
4) 6 carbon atoms

132. Which one of the following is used for making transparent soaps?

1) Castor oil
2) Neem oil
3) Almond oil
4) Ground nut oil

133. Cotton seed oil is an example for-

1) Drying oil
2) Non-drying oil
3) Semi-drying oil
4) Fast-drying oil

134. Match the product in group I with the application in industry in group II.

Group – I	Group – II
x) Lithium stearate	1) Cosmetics
y) Magnesium stearate	2) Paper
z) Aluminium sulphate	3) Dry cleaning
	4)Greases

	x	y	z
A.	4	1	2
B.	2	3	1
C.	3	4	2
D.	4	2	3

135. For a reversible isothermal expansion of an ideal gas from a state 1 to a state 2-

1) $S_1 = S_2$
2) $S_1 > S_2$
3) $S_1 < S_2$
4) $H_1 > H_2$

136. For an ideal solution-

1) $\Delta V_{mix} = 0, \Delta H_{mix} = 0$
2) $\Delta V_{mix} = 0, \Delta H_{mix} = 0, \Delta S_{mix} = 0$
3) $\Delta H_{mix} = 0, \Delta S_{mix} = 0$
4) $\Delta H_{mix} = 0, \Delta G_{mix} = 0$

137. When 50ml of pure water and 50ml of pure ethanol is mixed at room temperature of 25°C, the volume of the resultant solution will be?

1) 100 ml
2) Lesser than 100 ml
3) Greater than 100 ml
4) 200 ml

138. Which component in fertilizers is responsible for early plant growth and fruit formation?

1) Potassium
2) Phosphorus
3) Calcium
4) Magnesium

139. Component necessary in fertilizer for development of stems and leaves in plant is:

1) Calcium
2) Magnesium
3) Potassium
4) Nitrogen

140. Reversible adiabatic process is also called as-

1) Isothermal process
2) Isentropic process
3) Isochoric process
4) Isobaric process

141. The two major categories of synthetic organic pesticides are-

1) Chlorinated compounds and organo phosphorous compounds
2) Amino compounds and sulphonated compounds
3) Carboxylic compounds and sulphonated compounds
4) Amino compounds and carboxylic compounds

142. Which of the following organic insecticide was first produced in India?

1) BHC
2) DDT
3) Dicofol
4) Butachlor

143. Which of the following acts on the insect's respiratory system?

1) Fumigants
2) Nematacides
3) Acardicides
4) Rodenticides

144. Two tanks, A and B, with the same height are filled with water till the top. The volume of tank A is 10 times the volume of tank B. What can you say about the pressures P_A and P_B at the bottom of the tanks A and B respectively?

1) $P_A = 10\ P_B$
2) $P_B = 10\ P_A$
3) $P_A = P_B$
4) Additional data is required to compare the two pressures

145. Match the devices in Column I with the characteristic in Column II.

Column – I	Column – II
P) Orifice meter	1) High head loss and low cost
Q) Venturimeter	2) High head loss and high cost
	3) Low head loss and high cost
	4) Low head loss and low cost

	P	Q
A.	2	4
B.	1	2
C.	3	1
D.	1	3

146. In the case of a fully developed laminar flow through a pipe, the shear stress at the centre line is:

1) A function of the axial distance
2) A function of the centerline velocity
3) Zero
4) Infinite

147. A fully developed laminar flow is taking place through a pipe. If the flow velocity is doubled maintaining the flow laminar, the pressure loss would be-

1) Halved
2) Unaltered
3) Doubled
4) Four times the original

148. Simultaneous heat and mass transfer is occurring in a fluid flowing over a flat plate. The flow is laminar. The concentration boundary layer will coincide with the thermal boundary layer, when-

1) Sc = Nu
2) Sh = Nu
3) Sh = Pr
4) Sc = Pr

149. A pipe of 25 mm outer diameter carries steam. The heat transfer coefficient between the cylinder and surroundings is 5 W/m².K. It is proposed to reduce the heat loss from the pipe by adding insulation having a thermal conductivity of 0.05 W/m.K. Which one of the following statements is TRUE?

1) The outer radius of the pipe is equal to the critical radius
2) The outer radius of the pipe is less than the critical radius
3) Adding the insulation will reduce the heat loss
4) Adding the insulation will increase the heat loss

150. In chemical recovery unit of pulp & paper industry the carbonate sludge is calcined to get ____.

1) Lime
2) Sodium sulphate
3) Sodium carbonate
4) Sodium sulphide

151. Chemical cellulose can he prepared in the form of fibers, which is called-

1) Polyacrylonitrile
2) Rayon
3) Polysaccharide
4) Styrene Acrylonitrile

152. Essential chemical reagents used in digestors for sulfate process for pulp manufacture are ____.

1) NaOH, Na_2S, Na_2CO_3
2) Na_2SO_3, Na_2CO_3, $NaHCO_3$
3) $NaHCO_3$, Na_2SO_3
4) $NaHCO_3$, $NaHSO_3$

153. If a mass of moist air in an airtight vessel is heated to a higher temperature, then-

1) Specific humidity of the air increases
2) Specific humidity of the air decreases
3) Relative humidity of the air increases
4) Relative humidity of the air decreases

154. Pulp is derived from _____.

1) Cellulose
2) Plastic
3) Metals
4) Silica

155. In steam distillation of nitro benzene (bp. 210.6°C)at a total pressure of one atmosphere, the boiling point of the mixture of-

1) Less than 100°C
2) 100°C
3) Between 100°C and 210.6°C
4) 210.6°C

156. If the temperature of the atmosphere increases at constant absolute humidity, the percentage saturation would-

1) Decrease
2) Remain constant
3) Increase
4) None of these

157. In the bleaching of paper using hydrogen peroxide, the stabilizer used is:

1) Sodium hydroxide
2) Sodium sulphate
3) Sodium silicate
4) Sodium carbonate

158. Which one of the following is an antimalarial drug?

1) Chloroform
2) Penicillin
3) Prontosil
4) Quinine

159. **Which of the following is used as catalyst in the catalytic reforming process?**

1) Platinum
2) Alumina
3) Calcium
4) Silica

160. **For condensation of pure vapors, if the heat transfer coefficients in film wise and drop wise condensation are respectively hf and hd, then-**

1) hf = hd
2) hf > hd
3) hf < hd
4) hf could be greater or smaller than hd

161. **The most suitable solvent for deasphalting vacuum residue is:**

1) Propane
2) Methyl ethyl ketone
3) Doctor's solution
4) Methanol amine

162. **If the refinery, petroleum crude is fractioned into gas fraction, light ends, intermediate distillate, heavy distillates, residues and by-products. The group of products including gas oil, diesel oil and heavy fuel oil belongs to the fraction.**

1) Light distillates
2) Intermediate distillates
3) Heavy distillates
4) Residues

163. **The advantage of using a 1-2 shell and tube heat exchanger over a 1-1 shell and tube heat exchanger is:**

1) Lower tube side pressure drop
2) Lower shell side pressure drop
3) Higher tube side heat transfer coefficient
4) Higher shell side heat transfer coefficient

164. **Proper arrangement of petroleum fractions, in the order of their boiling points is:**

1) Lubricating oil → Diesel → Petrol → LPG
2) Lubricating oil → Petrol → Diesel → LPG
3) Petrol → Lubricating oil → Diesel → LPG
4) Petrol → Diesel → LPG →Lubricating oil

165. Match the feed in Group I with the process in Group II.

Group – I	Group – II
X) Gas oil	1) Acetylene production
Y) Residuals	2) Ethylene production
	3) Coking
	4) Cracking

	X	Y
A.	3	4
B.	4	3
C.	2	3
D.	1	4

166. **In a fluid catalytic cracking unit, the nature of the reactions occurring in the reactor and regenerator is:**

1) Reactor - exothermic, Regenerator - exothermic
2) Reactor - exothermic, Regenerator - endothermic
3) Reactor - endothermic, Regenerator - exothermic
4) Reactor - endothermic, Regenerator - endothermic

167. Cetane number increases in the order of-

1) Aromatics →Isoparaffins → Naphthenes → Olefins
2) Aromatics→ Naphthenes → Isoparaffins → Olefins
3) Aromatics → Olefins → Naphthenes → Isoparaffins
4) Olefins → Naphthenes →Isoparaffins →Aromatics

168. Catalyst used for the platforming of petroleum feedstock is:

1) $Pt + Al_2O_3$
2) $Pt + SiO_2$
3) $Pt + TiO_2$
4) Pt

169. Octane number of gasoline is a measure of-

1) Anti-knocking tendency
2) Ignition delay
3) Ignition temperature
4) Smoke point

170. In petroleum refining the process of converting paraffins and naphthenes to aromatics is:

1) Alkylation
2) Hydrocracking
3) Catalytic cracking
4) Catalytic reforming

171. Zeolite ZSM-15 is added to commercial FCC catalyst for-

1) Promoting SO_2 reducing
2) Enhancing octane number
3) Promoting CO oxidation
4) Improving tolerance to metal content in feed

172. Hydrotreating is used for-

1) Removal of water from crude oil
2) Improving octane number of gasoline
3) Removal of sulphur and nitrogen from petroleum fractions
4) Treatment of crude oil with water

173. Match the unit process in Group-I with the industry in Group-II.

Group – I	Group – II
x) Steam cracking	1) Petroleum refining
y) Hydro cracking	2) Petrochemicals
z) Condensation	3) Polymers
	4) Soaps and Detergents

	x	y	z
A.	3	1	4
B.	3	2	4
C.	1	2	3
D.	2	1	3

174. Match the polymers in Group-I with the raw material in Group-II.

Group – I	Group – II
w) Polyester	1) Ethylene glycol
x) Polyamide	2) Adipic acid
y) Epoxy resin	3) Bisphenol
z) Viscose rayon	4) Cellulose

	w	x	y	z
A.	1	2	3	4
B.	2	1	4	3
C.	1	2	4	3
D.	3	2	4	1

175. **Heat transfer by natural convection is enhanced in systems with-**

1) High viscosity
2) High coefficient of thermal expansion
3) Low temperature gradients
4) Low density change with temperature

176. **A material which breaks before the yield point is reached is known as-**

1) Brittle
2) Tough
3) Transparent
4) Rubber

177. **Phenol-formaldehyde resin is commercially known as-**

1) PVC
2) Bakelite
3) Elastomer
4) Nylon

178. **Tubeless tyres can be made from-**

1) SBR
2) Butylrubber
3) Silicone rubber
4) Nitrile rubber

179. **Nylon 66 is so named because-**

1) The average degree of polymerization of the polymer is 1966
2) The number of C atoms between 2 nitrogen atoms are 6
3) The number of nitrogen atoms between two carbons atoms are 6
4) The polymer was first synthesized in 1966

180. **Which of the following is NOT employed in the commercial production of linear polyvinyl chloride?**

1) Emulsion polymerisation
2) Suspension polymerisation
3) Addition polymerisation
4) Condensation polymerisation

181. Match the products in Group-I with the raw materials in Group – II.

Group – I	Group – II
X) Nylon 66	1) Chloro difluoro methane
Y) Terylene	2) Dimethyl terephthalate and ethylene glycol
	3) Acetylene and hydrogen cyanamide
	4) Hexamethylene diamine and adipic acid

	X	Y
A.	3	4
B.	4	3
C.	4	2
D.	1	2

182. Identify the group in which all the polymers mentioned can be used to make fibers.

1) Butadiene, copolymers, polyamides, urea aldehydes
2) Cellulose derivatives, polyisoprene, polyethylene
3) Cellulose derivative, polyamides, polyurethanes
4) Polymopylene, polyvinylchloride, silicones

183. Which one of the following is a major raw material for organic synthesis?

1) Animal fat
2) Vegetable oil
3) Coal
4) Pulp and paper

184. To determine the heat transfer coefficient, Dittus-Boelter equation is valid for-

1) Laminar flow
2) For liquid metals
3) Turbulent flow
4) Natural convection

185. Which one of the following control actions is called as anticipatory control?

1) Proportional control
2) On-off control
3) Integral control
4) Derivative control

186. Coal is purchased according to the specification of _____.

1) Size, ash and sulfur content
2) Size and silica content
3) Ash and metal content
4) Size and water content

187. For a feedback control system to be stable, the-

1) Roots of the characteristic equation should be real
2) Poles of the closed loop transfer function should lie in the left half of the complex plane
3) Bode plots of the corresponding open loop transfer function should monotonically decrease
4) Poles of the closed loop transfer function should lie in the right half of the complex plane

188. A proportional controller with a gain of K_c is used to control a first order process. The offset will increase of-

1) K_c is reduced
2) K_c is increased
3) Integral control action is introduced
4) Derivative control action is introduced

189. A second order system with the transfer function $\frac{4}{s^2+2s+4}$ has a damping factor of-

A.	2.0
B.	0.5
C.	1.0
D.	4.0

190. The local velocity of a fluid along a streamline can be measured by-

1) Pitot tube
2) Venturimeter
3) Rotameter
4) Orificemeter

191. In Hagen-Poiseuille flow through a cylindrical tube, the radial profile of shear stress is:

1) Constant
2) Cubic
3) Parabolic
4) Linear

192. Portland cement is defined as finely ground-

1) Calcium aluminates and silicates
2) Magnesium aluminates and silicates
3) Potassium aluminates and silicates
4) Zirconium aluminates and silicates

193. Quick lime refers to-

1) $Ca(OH)_2$
2) CaO
3) $CaCO_3$
4) $CaSiO_3$

194. Slaked lime is ___.

1) CaO
2) $Ca(OH)_2$
3) $CaSiO_3$
4) $CaCO_3$

195. Which of the following is used as a basic flux in the manufacture of steel?

1) Lime
2) Magnesium
3) Potassium
4) Zirconium

196. For a mixing tank operating in the laminar regime, the power number varies with the Reynolds number(Re) as-

1) $Re^{-0.5}$
2) $Re^{0.5}$
3) Re
4) Re^{-1}

197. High alumina cement is manufactured industrially by fusing ____.

1) Limestone and bauxite
2) Mgo and $Mgcl_2$
3) Calcium silicate and pure Al metal
4) Calcium carbonate and $Mgcl_2$

198. In constant pressure filtration-

1) Resistance decreases with time
2) Rate of filtration is constant
3) Rate of filtration increases with time
4) Rate of filtration decreases with time

199. The critical speed of the ball mill of radius R, which contains balls of radius r, is proportional to-

1) $(R - r)^{-0.5}$
2) $(R - r)^{-1}$
3) $(R - r)$
4) $(R - r)^2$

200. Match the heterogeneous in Group I with equipment used to separate them in Group II.

Group – I	Group – II
P) Gas-solid	1) Filter press
Q) Liquid-liquid	2) Cyclone
	3) Decanter
	4) Thickener

	P	Q
A.	1	2
B.	2	3
C.	3	4
D.	4	1