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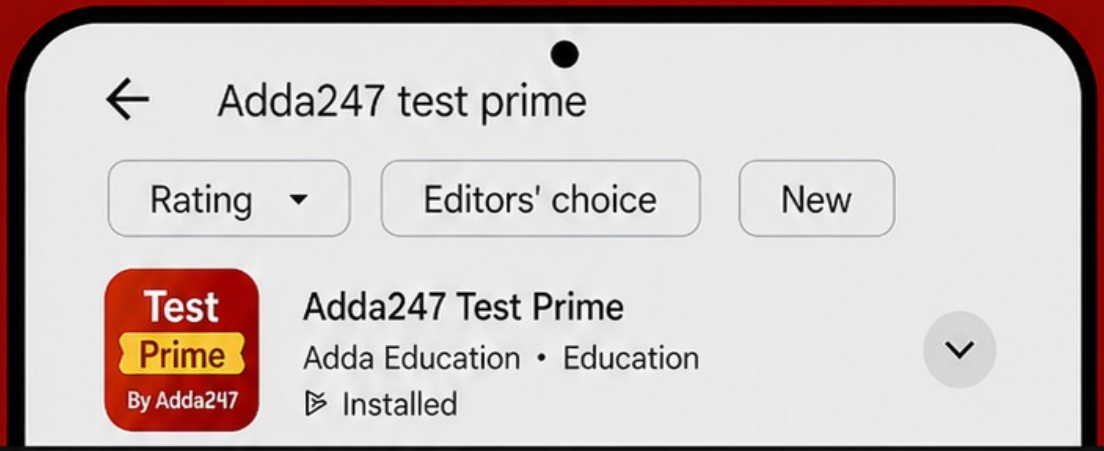

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COMBINED TECHNICAL SERVICES EXAMINATION

(DIPLOMA LEVEL)

COMPUTER BASED TEST

DATE OF EXAM: 23.09.2025 A.N.

PAPER – II

CHEMICAL ENGINEERING AND TECHNOLOGY

(SUBJECT CODE: 452)

1. Which of the following is unit of Internal Energy?

(A) Joule (J)
(B) Joule/Sec
(C) Joule.Sec
(D) Watt/Sec
(E) Answer not known

2. Which of the following statement is correct about throttling process?

(i) Throttling process, occurs when fluid flow through a restriction like partly closed value without change in kinetic or potential energy.

(ii) The primary result of the process is pressure drop of the fluid.

(iii) Throttling process produces shaft work and enthalpy also changes.

(A) (i) only
(B) (iii) only
(C) (i) and (ii) only
(D) (ii) and (iii) only
(E) Answer not known

3. The thermodynamic consistency test with experimental values can be carried out for vapor liquid equilibrium using

(A) Margule's equation
(B) Gibbs Duhem equation
(C) Van Laar equation
(D) Wilson equation
(E) Answer not known

4. The residual Gibb's energy G_i^R is related to fugacity coefficient ϕi of a species i at temperature T by

(A) $G_i^R = RT\phi i$ (B) $G_i^R = RT / \phi i$

(C) $G_i^R = RT / n\phi i$ (D) $G_i^R = R / n\phi i$

(E) Answer not known

5. The ratio of ideal work to actual work of a process is known as

(A) Entropy (B) Enthalpy

(C) Thermodynamic efficiency (D) Carnot efficiency

(E) Answer not known

6. The enthalpy H is related to internal energy U for a constant pressure process by

(A) H = U – PV (B) H = PV – U

(C) H = U + PV (D) H = U + P/V

(E) Answer not known

7. Match the following thermodynamic process :

(1) Isothermal processes – constant pressure

(2) Adiabatic processes – constant Temperature

(3) Isobaric processes – constant heat

(4) Isochoric process – constant volume

(A) 2 3 1 4 (B) 2 3 4 1

(C) 3 2 1 4 (D) 3 2 4 1

(E) Answer not known

8. Which of the following statements are correct about state and path functions?

(i) Work is a state function and does not depend on path.

(ii) Internal energy is a state function and does not depend on path.

(iii) Heat is a path function as it depends on path.

(A) (i) only
(B) (ii) only
(C) (i) and (iii) only
(D) (ii) and (iii) only
(E) Answer not known

9. Which of the following is true about le chatelier principle?

(i) When a stress is applied on a system in equilibrium, system tends to adjust itself so as to reduce the stress.

(ii) Change in concentration affect equilibrium.

(iii) Change in pressure and temperature does not affect equilibrium.

(A) (i) only
(B) (i) and (iii) only
(C) (i) and (ii) only
(D) (ii) and (iii) only
(E) Answer not known

10. Which of the following is correct representation of Dalton's law?

(A) $P_{Total} = P_1 + P_2 + P_3.....$
(B) $V_{Total} = V_1 + V_2 + V_3.....$
(C) $T_{Total} = T_1 + T_2 + T_3.....$
(D) $R_{Total} = R_1 + R_2 + R_3.....$
(E) Answer not known

11. Which of the following statement is true about extensive properties?

(i) It depend on the quantity of matter present.

(ii) It does not depend on the quantity of matter present.

(iii) Examples of Extensive properties are volume, enthalpy, entropy and Gibbs' tree energy.

(A) (i) only
(B) (i) and (iii) only
(C) (i) and (ii) only
(D) (ii) and (iii) only
(E) Answer not known

12. A system that can transfer both energy and matter to and from its surrounding is called

(A) an isolated system
(B) a closed system
(C) an open system
(D) a heterogeneous system
(E) Answer not known

13. Which of the following statements are correct about ideal gas mixture?

(i) Volume% = mol% = Pressure% for ideal gas mixture

(ii) Ideal gas mixture does not obey equation of state PV = nRT

(iii) Total pressure of gas is equal to sum of the partial pressure of components

(A) (i) only
(B) (iii) only
(C) (ii) and (iii) only
(D) (i) and (iii) only
(E) Answer not known

14. Which of the following is atomic mass of oxygen?

(A) 8 (B) 16
(C) 18 (D) 20
(E) Answer not known

15. The number of moles of solute per liter of solution is called as

(A) Molarity (B) Molality
(C) Normality (D) Mole fraction
(E) Answer not known

16. The capacity of any rotary drum filters depends strongly on the characteristics of the _____

(A) Submergence ratio (B) Filter area
(C) Pressure (D) Feed slurry
(E) Answer not known

17. In a discontinuous filters, name the type of filters where better washing of the cake is needed.

(A) Plate and frame filter press (B) Belt filters
(C) Vacuum filters (D) Leaf filters
(E) Answer not known

18. Name the type of filters, the feed suspension flows under pressure at a fairly high velocity across the filter medium.

(A) Cake filters (B) Clarifying filters
(C) Cross flow filters (D) Cyclone separator
(E) Answer not known

19. To increase the filtration rate, adding a some compound it is called as _____.

(A) Filter press
(B) Cake filter
(C) Filter aid
(D) Septum
(E) Answer not known

20. Heavy duty two arm mixer in which agitators are in the interrupted spiral is

(A) Pony mixer
(B) Beater mixer
(C) Banbury mixer
(D) Ribbon mixer
(E) Answer not known

21. Well designed turbine impeller systems can be used with viscosities up to about

(A) 10 pa.s
(B) 20 pa.s
(C) 40 pa.s
(D) 50 pa.s
(E) Answer not known

22. A propeller with a pitch of 1.0 is said to have

(A) Square pitch
(B) Rectangular pitch
(C) Triangular pitch
(D) Parabolic pitch
(E) Answer not known

23. Impellers agitators that generate currents parallel with the axis of the impeller shaft are called _____.

(A) axial-flow impellers
(B) radial-flow impellers
(C) circular flow impellers
(D) Disc flow impellers
(E) Answer not known

24. In hydrocyclone most of the liquid goes back upward in the inner chamber and leaves through the central discharge pipe, which is known as a _____.

(A) Overflow
(B) Feed
(C) Underflow
(D) Vortex finder
(E) Answer not known

25. For a Cyclone separator 1 ft in diameter with tangential velocity 50 ft/s near the wall. Find the separation factor

(A) 155
(B) 255
(C) 55
(D) 355
(E) Answer not known

26. Mechanically agitated thickeners the range of depth should be

(A) 2 to 6 ft
(B) 4 to 8 ft
(C) 6 to 10 ft
(D) 8 to 12 ft
(E) Answer not known

27. Assertion [A] : In Constant-pressure filtration, the pressure drops is held constant.

Reason [R] : Due to constant pressure drop, the rate of filtration should be constant.

(A) Both [A] and [R] are true [R] is not correct explanation of [A]
(B) Both [A] and [R] are False
(C) [A] is True, [R] is False
(D) Both [A] and [R] are true, [R] is correct explanation of [A]
(E) Answer not known

28. Another way of using a filter aid is by _____ other than addition of inert material into slurry before filtration.

(A) Pre coat
(B) Filter medium
(C) Post coat
(D) Pre filtration
(E) Answer not known

29. Which of the following statement are true about filter media?

(i) It must not plug or blind.
(ii) It must not be expensive.
(iii) It must not relation the solids to be filtered.

(A) (i) only
(B) (i) and (ii) only
(C) (ii) and (iii) only
(D) (i) and (iii) only
(E) Answer not known

30. Top-suspended centrifuges are extensively used in _____.

(A) Flour separation
(B) Sugar refining
(C) Pharma industry
(D) Petroleum industry
(E) Answer not known

31. Smooth-roll crushers producing a product in the range of

(A) 1 to 12 mm
(B) 12 to 75 mm
(C) 150 to 250 mm
(D) 75 to 150 mm
(E) Answer not known

32. Assertion [A] : Crushers do the heavy work of breaking large pieces of solid materials in to small lumps.

Reason [R] : Secondary crushers reduces the lumps to particle perhaps 6 mm in size.

(A) [A] is true but [R] is false
(B) Both [A] and [R] is true, and [R] is correct explanation of [A]
(C) Both [A] and [B] is false
(D) Both [A] and [B] is true, and [R] is not correct explanation of [A]
(E) Answer not known

33. Assertion [A] : Crushing laws proposed many years ago by Rittinger and Kick.

Reason [R] : A more realistic way of estimating the power required for crushing was proposed by Bond.

(A) [A] is true but [R] False

(B) Both [A] and [R] are true, [R] is the correct explanation of [A]

(C) [A] is False, [R] is true

(D) Both [A] and [R] are true, but [R] is not the correct explanation of [A]

(E) Answer not known

34. Assertion [A] : For homogenous mass the ratio of the normal to the applied pressure is constant 'K' which is characteristic of the material.

Reason [R] : The value of 'K' between 0.35 and 0.6 for cohesive solids.

(A) [A] is true, [R] is false

(B) [A] and [R] is true

(C) [A] and [R] is False

(D) [A] is False, [R] is true

(E) Answer not known

35. _____ are used to measure the size of particles in the size range between about 3 and 0.0015 m.

(A) Standard screens

(B) Impactors

(C) Grinders

(D) Crushers

(E) Answer not known

36. Fluid energy mills can accept feed particles as large as

(A) 4 mm
(B) 8 mm
(C) 12 mm
(D) 16 mm
(E) Answer not known

37. Assertion [A] : In the ball mill the speed at which centrifuging occurs is called the critical speed.

Reason [R] : The operating speed of the ball must be less than critical speed.

(A) Both [A] and [R] are true
(B) [A] is false [R] is true
(C) [A] is true [R] is false
(D) Both [A] and [R] are false
(E) Answer not known

38. The capacity of a screen is controlled simply by varying the _____.

(A) Rate of product out
(B) Rate of feed in
(C) Size of the feed
(D) Shape of the feed
(E) Answer not known

39. Screening is a method of separating particles according to _____.

(A) Shape alone
(B) Size alone
(C) Density alone
(D) Viscosity alone
(E) Answer not known

40. Choose the right answer among type.

Which of the following characterization are belongs to individual solid particles?

1. Size
2. Shape
3. Density
4. Viscosity

(A) 1 only
(B) 1 and 2 only
(C) 1, 2 and 3 only
(D) 1, 2, 3 and 4
(E) Answer not known

41. Which of the following is true about characteristics of a good fuel?

(i) Low cost
(ii) Easy to transport
(iii) High moisture content

(A) (i) only
(B) (i) and (iii) only
(C) (i) and (ii) only
(D) (ii) and (iii) only
(E) Answer not known

42. Which of the following statements are true about antiknocking properties?

(i) $Pb(C2Hs)_4$ is antiknocking agent.

(ii) TEL is short term of $Pb(C2Hs)_4$

(iii) Lead and lead oxide not contaminate air

(iv) Lead and lead oxide not deposite on spark plug.

(A) (i) only
(B) (i) and (iii) only
(C) (i) and (ii) only
(D) (ii) and (iii) only
(E) Answer not known

43. Which of the following is primary fuel?

(A) Coke
(B) LPG
(C) Wood
(D) Water gas
(E) Answer not known

44. Which of the following properties related to the lowest temperature at which the oil lubricant gives off enough vapours?

(A) Flash point
(B) Fire point
(C) Cloud point
(D) Pour point
(E) Answer not known

45. Which of the following statements are true about characteristics of a good fuel?

(i) A fuel should possess high calorific value

(ii) A fuel should possess low ignition temperature

(iii) A fuel should have high moisture content

(A) (i) only
(B) (i) and (iii) only
(C) (i) and (ii) only
(D) (ii) and (iii) only
(E) Answer not known

46. Assertion [A] : LPG – Liquefied Petroleum Gas.

Reason [R] : It is obtained as a by-product, during the cracking of heavy oils.

(A) [A] is true but [R] is false
(B) Both [A] and [R] are true and [R] is the correct explanation
(C) [A] is false [R] is true
(D) Both [A] and [R] are true, but [R] is not correct explanation of [A] is correct
(E) Answer not known

47. Which of the following is true about characteristics of a good fuel?

(i) Should burn without much smoke.

(ii) Combustion should be easily controllable

(iii) Low calorific value.

(A) (i) only
(B) (i) and (iii) only
(C) (i) and (ii) only
(D) (ii) and (iii) only
(E) Answer not known

48. In case of liquids, Ohm's law is

(A) Directly related to potential difference
(B) Partially obeyed
(C) Fully obeyed
(D) No relation between current and potential difference
(E) Answer not known

49. The armature of a dc machine is laminated to reduce

(A) Copper losses
(B) Hysterisis loss
(C) Eddy Current Loss
(D) Friction and windage loss
(E) Answer not known

50. The nature of emf generated in the armature winding of a dc generator is

(A) Alternating
(B) Constant
(C) Pulsating
(D) Of triangular form
(E) Answer not known

51. For a dc shunt motor, the armature torque is

(A) Directly proportional to armature current
(B) Inversely proportional to armature current
(C) Directly proportional to square of armature current
(D) Inversely proportional to square of armature current
(E) Answer not known

52. The direction of rotation of dc shunt motor can be reversed by interchanging

(A) The supply terminals
(B) The armature terminals only
(C) The field terminals only
(D) Either armature or field terminal
(E) Answer not known

53. The rating of a transformer is expressed in

(A) KVA
(B) KVAR
(C) KW
(D) KV
(E) Answer not known

54. One ton of refrigeration is equivalent to the refrigeration rate of

(A) 12000 KJ/h in SI units
(B) 12660 BTU/hr
(C) 12660 KJ/h in SI units
(D) 12666 KJ/h in SI units
(E) Answer not known

55. Refrigeration is used to remove heat of chemical reactions and to liquify process gases for gas separation by

(A) Evaporation and condensation
(B) Distillation and condensation
(C) Compression and evaporation
(D) Compression and condensation
(E) Answer not known

56. Desirable characteristics of a refrigerant should be

(A) Non-toxic, Non-corrosive, Non-flammable and chemically stable

(B) Non-toxic, corrosive, flammable and unstable

(C) Non-toxic, corrosive, flammable and low cost

(D) Non-toxic, non-corrosive, non-flammable and high cost

(E) Answer not known

57. What type of refrigerant is used for freezing of ice cream and ice production?

(A) Methane

(B) Ammonia

(C) Freon-12

(D) Chlorofluorocarbon

(E) Answer not known

58. When the volume rate of the refrigerant is large in a vapour compression refrigeration cycle,

(A) Rotary compressors are used

(B) Reciprocating compressors are used

(C) Centrifugal compressors are used

(D) Isothermal compressors are used

(E) Answer not known

59. Solid carbon dioxide or dry ice is known as

(A) Medium of compression

(B) Medium of refrigeration

(C) Cooling substance

(D) Easily undergo sublimation

(E) Answer not known

60. The symbol τ (tow) represents

(A) Tensile stress
(B) Compressive stress
(C) Shear stress
(D) Volumetric stress
(E) Answer not known

61. Mathematical expression for compressive stress is

(A) Resisting force / Area
(B) Area / Resisting force
(C) Decrease in length / Original length
(D) Original length / Decrease in length
(E) Answer not known

62. Identify the true and false statements using the codes :

(i) Tensile stress acts normal to the area and it pulls on the area.
(ii) Normal stress is the stress which acts in a direction parallel to the area.
(iii) The strain produced by shear stress is called shear strain
(iv) Pica Newton = 10^{-9} Newton

(A) (i) – False; (ii) – True; (iii) – False; (iv) – True
(B) (i) – True; (ii) – False; (iii) – True; (iv) – False
(C) (i) – True; (ii) – True; (iii) – False; (iv) – False
(D) (i) – False; (ii) – False; (iii) – True; (iv) – True
(E) Answer not known

63. Stain is defined as

(A) Rate of change with temperature
(B) Dimensional change with load
(C) Ratio of change of dimension of a body to the original dimension
(D) Rate of change with area
(E) Answer not known

64. The unit mega Newton is equal to

(A) 10^{-6} N
(B) 10^{6} N
(C) 10^{9} N
(D) 10^{-9} N
(E) Answer not known

65. Mathematical expression for Newton is

(A) $N = kg \times mm/s^2$
(B) $N = kg \times m/n$
(C) $N = kg \times m/s^2$
(D) $N = kg \times m/s$
(E) Answer not known

66. The controller that use air control medium to provide an output signal is

(A) Hydraulic controller
(B) Pneumatic controller
(C) Microcontroller
(D) Electronic controller
(E) Answer not known

67. Select the static characteristics of instruments from options given

(A) Fidelity
(B) Sensitivity
(C) Lag
(D) Speed of response
(E) Answer not known

68. The transfer function of PI controller is given by

(A) $G(s) = Kc\left[1 + \frac{1}{\tau_I s}\right]$
(B) $G(s) = K_c \tau_I s$
(C) $G(s) = \frac{1}{\tau_s + 1}$
(D) $G(s) = Kc[1 + \tau_I s]$
(E) Answer not known

69. The open loop transfer function of a control system is

(A) The product of individual transfer function in control loop
(B) Product of forward path transfer function
(C) Forward path transfer function/feedback path transfer function
(D) Sum of the individual transfer functions in the control loop
(E) Answer not known

70. Match Column I with Column II

	Column I		Column II
(a)	Temperature	1.	Orifice meter
(b)	Pressure	2.	Thermo couple
(c)	Flow	3.	Bubbles system
(d)	Level	4.	Bourdon gauge

	(a)	(b)	(c)	(d)
(A)	1	2	3	4
(B)	4	3	2	1
(C)	2	1	4	3
(D)	2	4	1	3

(E) Answer not known

71. Which one of the following is unit of pressure?

(A) N
(B) N/m
(C) N/m^2
(D) Kg
(E) Answer not known

72. Centrifugal pumps transport fluids by converting

(A) Kinetic energy to hydrodynamic energy
(B) Hydrodynamic energy to kinetic energy
(C) Mechanical energy to kinetic energy
(D) The chemical energy to hydrodynamic energy
(E) Answer not known

73. If the Reynold's number is less than 2100, the flow in pipe

(A) Laminar
(B) Turbulent
(C) Transition
(D) None of these
(E) Answer not known

74. Piezometer measures _____ pressure only.

(A) Absolute
(B) Gauge
(C) Atmospheric
(D) Absolute and Atmospheric
(E) Answer not known

75. Which of these valve not recommended for controlling flow and usually left fully open or closed?

(A) Butterfly valve
(B) Check valve
(C) Gate valve
(D) Sluice valve
(E) Answer not known

76. Ozone layer in the atmosphere absorbs _____ from sunlight and pass through other radiations to earth.

(A) Visible radiation
(B) UV radiation
(C) IR radiations
(D) Gamma radiations
(E) Answer not known

77. During sewage water treatment, suspended impurities are removed in

(A) Biological process
(B) Settling process
(C) Preliminary process
(D) Activated sludge process
(E) Answer not known

78. Match the type of gases with their volume % in the atmosphere :

	List I		List II
(a)	N_2	1.	20.94
(b)	O_2	2.	0.93
(c)	Ar	3.	78.08
(d)	CO_2	4.	0.03

	(a)	(b)	(c)	(d)
(A)	4	2	1	3
(B)	1	3	4	2
(C)	3	1	2	4
(D)	2	4	3	1

(E) Answer not known

79. _____ is the outer rigid shut of the earth.

(A) Biosphere
(B) Atmosphere
(C) Hydrosphere
(D) Lithosphere
(E) Answer not known

80. Green plants consume _____ and provide _____ to the environment.

(A) O_2 and CO_2
(B) CO_2 and O_2
(C) CO and CO_2
(D) CO_2 and CO
(E) Answer not known

81. Increasing the carbon dioxide content in the atmosphere is known as

(A) Acid rain
(B) Greenhouse effect
(C) Indoor pollution
(D) Occupational diseases
(E) Answer not known

82. An air pollutant which is visible aerosol with the liquid as dispersed phase is known as

(A) Mist
(B) Smoke
(C) Fog
(D) Fumes
(E) Answer not known

83. Dewatering and disposing of solids and liquids collected from the settling tanks is known as

(A) Filtration
(B) Floculation
(C) Secondary settling
(D) Sludge processing
(E) Answer not known

84. _____ is used to report to the public an overall assessment of a given day's air quality.

(A) Clean air index
(B) Air quality index
(C) Air quantity measurement
(D) Population of pollutants
(E) Answer not known

85. The unit operation adopted to prevent pathogen regrowth in the water during the period before it is used is called

(A) Primary disinfection
(B) Secondary disinfection
(C) Softening
(D) Primary sedimentation
(E) Answer not known

86. Match Column I with Column II :

Column I	Column II
(a) Air purifying respiration	(i) Can inter mark respirator
(b) Air supplying respiration	(ii) SCBA
	(iii) Filter Mark respirator
	(iv) Air Line respirator

(A) (a) – (i) and (ii), (b) – (iii) and (iv)
(B) (a) – (i) and (iii), (b) – (ii) and (iv)
(C) (a) – (i), (ii) and (iii), (b) – (iv)
(D) (a) – (i), (b) – (ii), (iii) and (iv)
(E) Answer not known

87. Safety Harness is associated with which of the given work permit system?

(A) Hot work permit system
(B) Cold work permit system
(C) Limited work permit system
(D) Height work permit system
(E) Answer not known

88. A hot work permit is required for activities involving

(A) Handling chemicals
(B) Parenting
(C) Welding on cutting operations
(D) Equipment cleaning
(E) Answer not known

89. Action of putting off the fire is known as

(A) Fire accident
(B) Fire fighting
(C) Flash point
(D) Hotspot
(E) Answer not known

90. _____ is designed to provide both workers and emergency personnel with the proper procedures for handling or working with a particular substance.

(A) Personal Protective Equipment (PPE)
(B) Material Safety Data Sheet (MSDS)
(C) Operational effort
(D) Industrial toxicology
(E) Answer not known

91. _____ is a central law, regulating safety, health and welfare in factories.

(A) The Factories Act 1940
(B) The Factories Act 1945
(C) The Factories Act 1947
(D) The Factories Act 1948
(E) Answer not known

92. Choose the wrong one :

An accidents can occur by any unplanned and uncontrolled event caused by

(A) Human error
(B) Situational factors
(C) Environmental factors
(D) Underload
(E) Answer not known

93. Workers in areas where dB level is high should be provided with personal protective equipment such as

(A) Shock absorber and canal caps
(B) Canister mask and Apron
(C) Safety goggles and gumboots
(D) Earplug and ear muff
(E) Answer not known

94. Identify the industrial disaster which is occured due to earthquake (Tsunami) from the option given.

(A) The Chernobyl Reactor accident
(B) The union Carbide Bhopal Disaster
(C) The Fukushima Daiichi Nuclear Disaster
(D) Campos Basin Oil platform Accident
(E) Answer not known

95. _____ leaked on large scale from Union Carbide factory, Bhopal in 1984.

(A) Methyl salicylate
(B) Methyl isocyanite
(C) Methyl isocyanate
(D) Ethyl salicylate
(E) Answer not known

96. The sound waves produce sensation in human ears provided frequency of waves is in the range of

(A) 1 to 100 Hz
(B) 1000 to 30,000 Hz
(C) ✓ 20 to 20,000 Hz
(D) 10,000 to 50,000 Hz
(E) Answer not known

97. The fire extinguishing technique which involves the removal of oxygen supply from fire is known as

(A) Cooling
(B) Ventilation
(C) ✓ Smothering
(D) Starvation
(E) Answer not known

98. Select the personal protective equipment which provides protection against falling of person from height from the option given

(A) Goggles
(B) Aprons
(C) Self Contained Breathing Apparatus (SCBA)
(D) ✓ Safety Harness
(E) Answer not known

99. Select the portable fire extinguishers which contains horn type discharge nozzle from the options given

(A) Foam type fire extinguishers
(B) Dry chemical powder type fire extinguishers
(C) ✓ CO_2 type fire extinguishers
(D) Gas pressure actuated water type fire extinguishers
(E) Answer not known

100. Match Column I with Column II :

Column I	Column II
(a) LFL	(i) Local flammability limit
(b) UFL	(ii) Lower Flammability limit
	(iii) Ultra Flammability limit
	(iv) Upper Flammability limit

(A) (a)-(i) and (b)-(iii)
(B) (a)-(ii) and (b)-(iii)
(C) (a)-(ii) and (b)-(iv)
(D) (a)-(i) and (b)-(iv)
(E) Answer not known

101. Choose the Wrong Answer.
Urea has _____

(A) Molecular weight - 60.05
(B) Melting point - 132.7°c
(C) Fairly soluable in water
(D) Sweetening Agent
(E) Answer not known

102. _____ is not the property of Ammonia in the below given choice

(A) Very soluble in water
(B) Heavy gas
(C) Nitrogeneous material
(D) Used as a fertilizer
(E) Answer not known

103. Portland cement is defined as

(A) Finely ground calcium aluminates and silicates
(B) Finely ground calcium aluminates
(C) Finely ground calcium silicates
(D) Finely ground Magnesium aluminates
(E) Answer not known

104. Choose the correct component may be added to inhibit the corrosion of steel reinforcing bars in concrete

(A) Calcium Nitrate
(B) Calcium Carbonate
(C) Calcium Sulfate
(D) Calcium oxide
(E) Answer not known

105. Choose the correct components to increase the rate of hydration in the portland cement.

(A) Higher C_3S and C_3A
(B) Higher C_2S and C_3A
(C) Higher C_2AS and C_2S
(D) Higher C_2S and C_2A
(E) Answer not known

106. Higher percentage of SiO_2 present in _____ type of glass.

(A) Borosilicate glass
(B) Alumino silicate glass
(C) Flint glass
(D) Crookes glass
(E) Answer not known

107. Choose the wrong answer for the different step in glass manufacturing.

(A) Reaction in the furnace to form glass
(B) Calcination
(C) Annealing
(D) Finishing
(E) Answer not known

108. Choose the primary constituent of most commercial glass.

(A) Silica (or) sand
(B) Clay
(C) Lime
(D) Calcium ore
(E) Answer not known

109. Physical properties of Glass is an _____.

(A) Super cooled liquid of infinite viscosity
(B) Super cooled crystalline solid
(C) Super cooled soft material
(D) Super cooled foam
(E) Answer not known

110. Solution polymerization has the advantage of :

(A) Better heat control
(B) Low molecular weight functional group reactions
(C) Can be processed with solvent addition
(D) Produce pure polymers
(E) Answer not known

111. _____ catalyst is commonly used in industrial isomerisation processes.

(A) Platinum
(B) Alumina
(C) Cadmium
(D) Vanadium peroxide
(E) Answer not known

112. Which of the following types of cracking uses a catalyst?

(A) Thermal cracking
(B) Catalytic cracking
(C) Naphtha cracking
(D) Catalytic reforming
(E) Answer not known

113. Name the main ingredient used in the portland cement.

(A) Lime stone
(B) Calcium
(C) Sulphur
(D) Potassium
(E) Answer not known

114. _____ process is used in order to concentrate Nitric acid.

(A) Concentration by $Ca(NO_3)^2$
(B) Concentration by $Ba(NO_3)^2$
(C) Concentration by $Mg(NO_3)^2$
(D) Concentration by H_3PO_4
(E) Answer not known

115. What is IMI process in the production of phosphoric acid?

(A) Mining process
(B) Wet process
(C) Electric Furnace Process
(D) Carbo-nitric process
(E) Answer not known

116. One important source of silica in water is _____.

(A) Activated sludge process outlet
(B) Sand filter
(C) Clarifier outlet
(D) Hydrolysis of magnesium salt
(E) Answer not known

117. Select the wrong statements with respect to Hot lime-soda process:

(i) The reaction proceeds slower
(ii) Softening capacity increases
(iii) Coagulants are required
(iv) Produce water quality of residual hardness 50-60 ppm

(A) (ii) and (iv)
(B) (i), (iii) and (iv)
(C) (i), (ii) and (iii)
(D) (ii), (iii) and (iv)
(E) Answer not known

118. Select the correct statements with respect to oil from the following.

(i) They are partially unsaturated

(ii) Melting point is low

(ii) They are liquid at room temperature

(iv) Packing of molecules is comparatively less dense.

(A) (i), (ii), (iii)
(B) ✓ (i), (ii), (iii), (iv)
(C) (i), (iii), (iv)
(D) (ii), (iv)
(E) Answer not known

119. When oil/fat is treated with hydrogen under high pressure and at 250°C gives _____.

(A) Soap + Glycerol
(B) ✓ Glycerol + Long-chain alcohol
(C) Glycerol + Saturated Glyceride
(D) Calcium stearate
(E) Answer not known

120. Pick out a statement which is disadvantages of detergents over soaps from the following.

(A) ✓ Synthetic detergents are not fully bio-degradable
(B) Detergents works well even with hard water
(C) Detergents are more easily soluble in water
(D) Detergents do not form any precipitate with hard water
(E) Answer not known

121. ———— is not used as an edible oil.

(A) Mineral oil
(B) Coconut oil
(C) Palm oil
(D) Peanut oil
(E) Answer not known

122. Temporary hardness can usually be reduced by

(A) Chemical agents
(B) Heating
(C) Cooling process
(D) Filtration
(E) Answer not known

123. Which of the following statement is correct about the common units used in expressing water analyses,

(i) Parts per million (ppm)
(ii) Kilogram per litre (kg/l)
(iii) Kg/hr

(A) only (i)
(B) only (ii)
(C) only (iii)
(D) none of the above
(E) Answer not known

124. The cold lime-soda process is indeed partially applicable to softening of ———— water.

(A) Municipal water
(B) Sewage water
(C) Sea water
(D) Pond water
(E) Answer not known

125. Choose the correct statement about the ion-exchange systems choosen vary according to

(i) The volumes and compositions of the raw material

(ii) The effluent-quality requirements for different uses

(iii) The comparative capital and operating costs

(A) only (i)
(B) only (ii)
(C) only (iii)
(D) All (i), (ii) and (iii)
(E) Answer not known

126. _____ the solids circulate downward around the fluid column, such a bed has found particular use in drying wheat, peas, flax.

(A) Spouted bed dryer
(B) Tray dryer
(C) Spray dryer
(D) Rotary dryer
(E) Answer not known

127. A revolving cylindrical shell, horizontal or slightly inclined toward the outlet with internal flights to lift the solids is called as

(A) Tray drier
(B) Rotary drier
(C) Flash drier
(D) Spray drier
(E) Answer not known

128. The highest practical temperature of drying gas either flue gas (or) air used in spray drier is in the range of

(A) 100 to 250°C
(B) 80 to 500°C
(C) 80 to 760°C
(D) Above 1000°C
(E) Answer not known

129. An adsorption isotherm arithmetic graph the concave upward curve described as adsorption is ————————.

(A) Strongly Favorable
(B) Linear
(C) Favorable
(D) Unfavorable
(E) Answer not known

130. Choose the correct statements from the following about stationary solid bed leading process.

(i) It is carried out in an extraction battery called Shank's process
(ii) A series of pressure tanks operated with counter current solvent flow is known as diffusion battery
(iii) It is carried out in Bollmann extractor or Rotocel extractor

(A) (i) only
(B) (i) and (ii) only
(C) (ii) and (iii) only
(D) (iii) only
(E) Answer not known

131. Choose the correct statements of the following about vaccum crystallizer

(i) The effect of static head on the boiling point is not important.
(ii) Crystals tend to settle to the bottom of crystallizer where there may be little or no supersaturation
(iii) Nucleation control is not good in vacuum crystallizer.

(A) (i) only
(B) (ii) only
(C) (ii) and (iii) only
(D) (i) and (iii) only
(E) Answer not known

132. The portion of water in the wet solid that cannot be removed by the inlet air is called as :

(A) Critical moisture
(B) Free moisture
(C) Equilibrium moisture
(D) Unbound moisture
(E) Answer not known

133. Choose the correct statement regarding agitated pulse column used in extraction process.

(i) Agitation is provided by external reciprocating pump
(ii) Downcomers are used in pulsating column
(iii) Pulsation disperses the liquid and eliminates channeling

(A) (i) only
(B) (ii) only
(C) (iii) and (ii) only
(D) (i) and (iii) only
(E) Answer not known

134. Match the following for the terms used in extraction :

Operation		Term
(a)	Solution to be extracted	1. Extract
(b)	The liquid that is contacted with feed	2. Raffinate
(c)	Solvent rich product	3. Feed
(d)	Residual liquid devoid of solute	4. Solvent

	(a)	(b)	(c)	(d)
(A)	1	2	3	4
(B)	3	4	1	2
(C)	2	3	4	1
(D)	4	3	2	1

(E) Answer not known

135. Choose the correct matches for choice of solvent for extraction process :

	Characteristics		Value
(i)	selectivity	-	greater than one
(ii)	Distribution coefficient	-	less than one
(iii)	Density difference	-	lesser
(iv)	Viscosity and vapour pressure	-	low

(A) (i) and (iv)
(B) (i) and (ii)
(C) (ii) and (iv)
(D) (iii) and (iv)
(E) Answer not known

136. A rich and B rich solubility curves of an extraction process merge is ordinarily not at the maximum value of C on the solubility curve.

(A) Plait point
(B) Binodal point
(C) Peak point
(D) Nodal point
(E) Answer not known

137. Choose the correct matches for operations in packed bed. Absorption column.

(i) Flooding – higher gas velocity
(ii) Loading – liquid hold in column decrease
(iii) Channely – high liquid rate
(iv) Loading point – liquid holdup starts to increase

(A) (i) and (ii)
(B) (iii) and (iv)
(C) (i) and (iv)
(D) (ii) and (iv)
(E) Answer not known

138. Intalox saddles are somewhat like :

(A) Raschig rings
(B) Berl saddle
(C) Pallring
(D) Intolax saddle
(E) Answer not known

139. A wet solid is to be dried from 80 to 5% moisture, on wet basis. Compute the Initial moisture content?

(A) 2
(B) 4
(C) 6
(D) 8
(E) Answer not known

140. Assertion [A] : A constant boiling vapor liquid mixture is known as azeotrope.

Reason [R] : Vapor pressures of two components of mixtures and too close and positive deviation is large it forms a maximum boiling azeotrope.

(A) [A] is true [R] is false
(B) [A] is false [R] is true
(C) [A] is true and [R] is true
(D) [A] is true and [R] is correct explanation of [A]
(E) Answer not known

141. Match the following for feed condition with q values. (moles of liquid flow entering stripping section that is due to introduction of each mole of feed) :

	Feed condition		Q value
(a)	Cold feed	1.	$q = 0$
(b)	Feed at bubble point	2.	$0 < q < 1$
(c)	Feed as partial vapour	3.	$q = 1$
(d)	Dew point	4.	$q > 1$

	(a)	(b)	(c)	(d)
(A)	1	2	3	4
(B)	4	1	2	3
(C) ✓	4	3	2	1
(D)	3	4	1	2

(E) Answer not known

142. Which of the following statements are correct about distillation?

(i) It is a method of separating the components of solution.

(ii) The separation factor applied in distillation process is known as relative humidity.

(iii) Relative volatility is the separation factor used in distillation.

(A) (ii) only
(B) (iii) only
(C) ✓ (i) and (iii) only
(D) (i) and (ii) only
(E) Answer not known

143. Which of the following statements are correct?

(i) The family of adiabatic saturation curves for air water system is called psychrometric chart.

(ii) The family of plot of absolute humidity of air water system versus temperature is also psychrometric chart.

(iii) The family of adiabatic saturation curves for benzene gas system is called as psychrometric chart.

(A) (i) and (iii)
(B) (ii) and (iii)
(C) (i), (ii) and (iii)
(D) (i) and (ii)
(E) Answer not known

144. [A] : The unsaturation of vapor invapor gas mixture depends on the partial pressure of vapor.

[R] : If the partial pressure of vapor is less than the equilibrium vapor pressure of liquid at same temperature then mixture is unsaturation.

(A) [A] is true, [R] is false
(B) [A] is false, [R] is true
(C) [A] is true, [R] is correct explanation of [A]
(D) [A] is true and [R] is not the correct explanation of [A]
(E) Answer not known

145. Match correctly the quantities with corresponding units :

	Quantity		Unit
(a)	Molar flex	1.	m
(b)	Diffusivity	2.	kgmol/m^{2}h
(c)	Concentration	3.	m^2/h
(d)	Distance	4.	kgmol/m^3

	(a)	(b)	(c)	(d)
(A)	1	2	3	4
(B)	2	3	4	1
(C)	4	1	2	3
(D)	3	4	2	1

(E) Answer not known

146. Proximate analysis involves the determination of _____

(A) Carbon, nitrogen
(B) Ash, moisture
(C) Sulphur, oxygen
(D) H_2, N_2
(E) Answer not known

147. Coal contains 22.5%, moisture 77.5 kg of dry coal contains 22.5 kg water, calculate for 100 kg of dry coal contains equal amount of water.

(A) 27.27 kg
(B) 28.31 kg
(C) 29.03 kg
(D) 30.09 kg
(E) Answer not known

148. Give examples of secondary liquid fuel.

(A) Synthetic petrol
(B) Producer gas
(C) Coal gas
(D) Petroleum
(E) Answer not known

149. If the mole of water is accounted in the calculation of composition of flue gas analysis is called _____

(A) Composition on dry basis
(B) Composition on wet and dry basis
(C) Composition on wet basis
(D) Composition on inert basis
(E) Answer not known

150. _____ is the calorific value of fuel which is determined in the absence of water vapour.

(A) Average Heating Value
(B) High Heating Value
(C) Net Calorific Value
(D) Low Heating Value
(E) Answer not known

151. A generalised equation for calculation of heat of formation at any temperature T in K is

(A) $\Delta H_f = \alpha - \beta T + \gamma T^2$
(B) $\Delta H_f = \alpha - \beta T$
(C) $\Delta H_f = \beta T - \alpha - \gamma T^2$
(D) $\Delta H_f = \Delta H_f^\circ + \int_{298}^{T} \Delta c_{mp}^\circ dT$
(E) Answer not known

152. Match the following :

(a)	Refuse	1.	Cinder
(b)	Gaseous fuel	2.	No ash
(c)	Solid fuel	3.	Latent Heat account for heat loss
(d)	Steam boilers	4.	Blow-down heat loss

	(a)	(b)	(c)	(d)
(A)	2	1	4	3
(B)	1	3	4	2
(C) ✓	1	2	3	4
(D)	4	2	3	1

(E) Answer not known

153. The orsat analysis of the flue gasses from a boiler house chimney gives CO_2–11.4%, O_2–4.2%, H_2 – 84.4% (mole %). Assuming complete combustion. Find the C : H ratio in the fuel.

(A) 1
(B) 3
(C) ✓ 5
(D) 7
(E) Answer not known

154. Crude oil is found to contain 87.1% C, 12.5% H_2, 0.4% Sulphur (by mass). Its GCV at 25°C (298.15 K) is measured kJ/kg oil. Calculate NCV at 25°C (298.15K).

Note : Latent heat of H_2O vapour at 25°C is 2747.8 kJ.

(A) ✓ 42323.2 kJ/kg oil
(B) 40123.2 kJ/kg oil
(C) 43232.27 kJ/kg oil
(D) 44.2320 kJ/kg oil
(E) Answer not known

155. In the Batch extractor. An aqueous solution of pyridine and water is to be extracted with chlorobenzene the feed contains 100 kg mixture solution, the quantity of solvent required is 179.76 kg. Calculate weight ratio of solvent to feed.

(A) 2.71212
(B) 3.1213
(C) 1.7976
(D) 5.7192
(E) Answer not known

156. Inert gases are commonly used in chemical process industries are

(A) H_2, O_2
(B) NH_3, H_2S
(C) CO_2, CO
(D) Neon, Argon
(E) Answer not known

157. Choose the wrong answer.

1. For any unit process Input-Output = Accumulation.
2. For steady state Unit process Input-Output = 0.
3. The law of conservation of mass state that the total mass of various component involved in a Unit process remains constant.
4. The law of conservation of mass is not on the basis of material balance calculations.

(A) 1, 2, 3, 4 are wrong
(B) 1, 2, 3, only wrong
(C) 4 only wrong
(D) 3 only wrong
(E) Answer not known

158. Choose the wrong answer :

The different types of graphs generally used

1. Ordinary graph
2. Semi-log graph
3. Log–Log graph
4. Rectangle graph

(A) 1, 2 only wrong
(B) 2, 3 only wrong
(C) 3 only wrong
(D) 4 only wrong
(E) Answer not known

159. The percentage yield can be expressed as considered the general chemical reaction.

$A \rightleftharpoons P$

$A \rightleftharpoons R$

where P – Desired product

R – Undesired product

A – Limiting reactant

(A) $\%\ \text{yield} = \dfrac{\text{Moles of A reacted to produce P}}{\text{Moles of A totally reacted}} \times 100$

(B) $\%\ \text{yield} = \dfrac{\text{Moles of P reacted to produce A}}{\text{Moles of A + moles of P}} \times 100$

(C) $\%\ \text{yield} = \dfrac{\text{Moles of A} \times \text{P}}{\text{Moles of A + P}} \times 100$

(D) % yield = [moles of A + moles of P / moles of A × P] × 100

(E) Answer not known

160. Molecular wt of SO_3 is 80.06 using molar quantities 100 kg of SO_3 ———— kmol.

(A) 1.391 kmol
(B) 1.2491 kmol
(C) 2.125 kmol
(D) 3.119 kmol
(E) Answer not known

161. Pure water and alcohol are mixed to get a 60% (weight) alcohol solution. The densities (kg/m^3) of water, alcohol and solution may be taken to be 998, 798 and 895 respectively at 293 K. Calculate volume percent of ethanol in the solution at 293 K.

(A) 79%
(B) 67.3%
(C) 59.2%
(D) 48.521%
(E) Answer not known

162. Volume fraction of the component is the ratio of its

V_A – Pure component volume of A.

V – Volume of the solution.

(A) V_A/V
(B) V/V_A
(C) $1 - V/V_A$
(D) $1 + V/V_A$
(E) Answer not known

163. 250 kg wet ammonia sulphate containing 50 kg moisture is sent to dryer in order to remove 90% of the moisture in the feed. Calculate the weight fraction of the water.

(A) 0.10
(B) 0.20
(C) 0.30
(D) 0.40
(E) Answer not known

164. The value of 1 Std atmosphere (atm) =

(A) 1.925 bar
(B) 1.01325 bar
(C) 1.6231 bar
(D) 1.7250 bar
(E) Answer not known

165. How many moles of sodium sulphate will contain 100 kg of sodium?

(A) 7.524×10^4 mol
(B) 2.174×10^3 mol
(C) 3.124×10^3 mol
(D) 5.219×10^3 mol
(E) Answer not known

166. Economy of single effect evaporator always

(A) one
(B) more than one
(C) less than one
(D) zero
(E) Answer not known

167. Calculate the heat transferred area required for evaporation of liquid having $U = 2350\ W/m^2K$, $\Delta T = 21$, $Q = 2816283W$.

(A) 20 m^2
(B) 30.5 m^2
(C) 40.52 m^2
(D) 57.07 m^2
(E) Answer not known

168. Which type of battles commonly used in the fabrication of shell and tube heat exchanger?

(A) Disc battle
(B) Segmental battle
(C) Ring type battle
(D) Orifice type battle
(E) Answer not known

169. Match the following type
Classification of evaporators

(a)	Power plant evaporator	1.	Vertical tube
(b)	Chemical evaporator	2.	Batch evaporators
(c)	Single effect evaporator	3.	Forward feed
(d)	Multiple effect evaporators	4.	Process evaporators

	(a)	(b)	(c)	(d)
(A)	1	3	2	4
(B)	4	2	3	1
(C)	4	1	2	3
(D)	3	1	2	4

(E) Answer not known

170. The net rate of Radiant energy flow from the gray body to the black surrounding is given by the expression is

(A) $Q = MCP\ \Delta\ T$
(B) $E = \sigma\ T4$
(C) $Q/A = e.\ \sigma\ (T_1^4 - T_2^4)$
(D) $Q = UA\ \Delta T$
(E) Answer not known

171. _____ is the radiant energy emitted from a body per unit area per unit time per unit wave length about the wavelength λ.

(A) Kirchhoff's law
(B) Monochromatic emissive power
(C) Total emissive power
(D) Stephan Boltzmann law
(E) Answer not known

172. Stefan-Boltzmann's law expressed as

(A) $E_b = \sigma T^4$
(B) $E_b = T^4$
(C) $E = e \cdot E_b$
(D) $E = e \cdot E_b T^4$
(E) Answer not known

173. On which factor does emissive power of body depend?

(A) Wave length only
(B) Temperature only
(C) Physical Nature only
(D) Wavelength, Temperature, Physical Nature
(E) Answer not known

174. The rate of equation for convective heat transfer is prescribed by Newton's law of cooling expressed as

(A) $Q = Mcp(t_s - t_f)$
(B) $Q = mcp\Delta T$
(C) $Q = hA(t_s - t_f)$
(D) $\lambda_m T = \text{constant}$
(E) Answer not known

175. Calculate the interchange factor of radiant heat exchange between two parallel oxidised iron plates having emissivities of the plates are $e_1 = e_2 = 0.736$.

(A) 0.999
(B) 1.217
(C) ✓ 0.5823
(D) 0.7917
(E) Answer not known

176. Calculate the total heat loss by convection and radiation per 1 meter length of the pipe has $h_c = 8.34$ w/m².c, $A = 0.157\, m^2$, $e = 0.9$, $\sigma = 5.67 \times 10^{-8}$, $\Delta T = 125K$.

(A) 202 w/m
(B) 301 w/m
(C) 370 w/m
(D) ✓ 344.7 w/m
(E) Answer not known

177. Match the following :

1. Nusselt number – $\beta_g \cdot \Delta T \cdot D^3 P^2 / \mu^2$
2. Reynolds number – hD/K
3. Prandle number – $Dv\rho/\mu$
4. Grashot number – $CP\mu/K$

(A) 2, 4, 3, 1
(B) 4, 2, 1, 3
(C) ✓ 2, 3, 4, 1
(D) 1, 2, 4, 3
(E) Answer not known

178. $Q/A = 400$ w/m^2, $\Delta T = 400$ K, K for asbestos = 0.11 W/mK, Area of Heat transfer = 1 m^2, find out thickness of insulation.

(A) 200 mm
(B) 150 mm
(C) 98 mm
(D) 140 mm
(E) Answer not known

179. Heat transfer by convection occurs as a result of the movement of the fluid on a macroscopic scale in the form of

(A) Concentration difference
(B) Circulating current
(C) Pressure difference
(D) Volume difference
(E) Answer not known

180. Log mean temperature difference is for co-current flow heat exchanger is

(A) LMTD = $\Delta T_1 - \Delta T_2 / \ln\left(\Delta T_1 / \Delta T_2\right)$
(B) LMTD = $\Delta T_2 - \Delta T_1 / \ln\left(\Delta T_2 / \Delta T_1\right)$
(C) LMTD = $Q / U_A \Delta T$
(D) LMTD = $U_A \Delta T\, lm$
(E) Answer not known

181. Flow in non circular cross section, the equivalent diameter, De defined mathematically as

(A) $D_e = \pi/4\, D^2$

(B) $D_e = \pi D$

(C) ✓ $D_e = 4 \times r_H$

(D) $D_e = \left(\pi/4\, D^2\right) - \left(\pi/4\, Di^2\right)$

(E) Answer not known

182. Sider-Tate equation for the calculation of heat transfer coefficient for laminar flow of fluids in horizontal tubes (or) pipes is

(A) $N_{N4} = hL/K$

(B) $N_{pr} = C_p\mu/K$

(C) $N_{\mathrm{Re}} = Dve/\mu$

(D) ✓ $N_{N4} = 1.86\left[(N_{\mathrm{Re}})(N_{pr})(D/L)\right]^{1/3}\left[H/\mu w\right]^{0.14}$

(E) Answer not known

183. _____ is the type boiling in which the heating surface is surrounded by submerged in a relatively large body of the liquid which is agitated by the motion of the bubbles and natural convection currents

(A) Bulk boiling

(B) Local boiling

(C) ✓ Pool boiling

(D) Subcooled boiling

(E) Answer not known

184. Calculate the area of Heat exchanger for the given $U = 2000$ w/m² °C. $\Delta TIm = 200k, Q = 80 \times 10^3 W$.

(A) $2\ m^2$ (B) $4\ m^2$

(C) $6\ m^2$ (D) $8\ m^2$

(E) Answer not known

185. Choose the right answer :

(a)	Stefan-Boltzman Law	1.	λmT = constant
(b)	Wien's Law	2.	$E = \alpha$
(c)	Kirchhoff's law	3.	$Q \alpha T^4$
(d)	Convection thermal resistance	4.	$1/h_A$

	(a)	(b)	(c)	(d)
(A)	1	2	3	4
(B)	4	3	2	1
(C)	3	2	1	4
(D)	2	3	4	1

(E) Answer not known

186. A space time of 2 min means that every _____ volume of feed at specified conditions is being treated by the reactor.

(A) 1 min one reactor (B) 2 min two reactors

(C) 1 min two reactors (D) 2 min one reactor

(E) Answer not known

187. _____ is the ratio of volumetric feed rate to the reactor volume.

(A) Space-time
(B) Mean residence time
(C) Space velocity
(D) Linear velocity
(E) Answer not known

188. A gas-phase reaction, $2A \rightarrow R$ is investigated on a CSTR, then the stoichiometric co-efficients of the chemical reaction are

	S_A	S_R	Δ
(A)	+2	–1	+1
(B)	–2	–1	–1
(C)	+2	+1	+1
(D)	–2	+1	–1

(E) Answer not known

189. Assess the true or false statements of the following using the codes :

(i) A plug flow reactor with the same volume as a continuously – stirred – Tank Reactor provides higher conversion.

(ii) A plug flow reactor represents best reactor configuration.

(iii) Different performance of the reactor is based on the concentration profile of the reactants.

(iv) In designing of a single continuously stirred – Tank Reactor, the reaction rate r, varies with Z, the we can plot $\frac{r_0}{r}$ vs Z.

(A) (i)-True; (ii)-False; (iii)-True; (iv)-False

(B) (i)-False; (ii)-True; (iii)-False; (iv)-True

(C) (i)-False; (ii)-False; (iii)-True; (iv)-False

(D) (i)-True; (ii)-True; (iii)-True; (iv)-True

(E) Answer not known

190. Choose the wrong statement from the following with respect to plug-flow reactor.

(A) The reactor is operated at steady state

(B) The fluid moves in a continuous velocity profile

(C) No spatial variations in species concentrations

(D) The fluid moves in a flat velocity profile

(E) Answer not known

191. Choose the correct procedure for designing plug-flow reactor with multiple chemical reactions.

(i) Identify all reactions takes place in a reactor.

(ii) Define the stoichiometric co-efficients of each species in each reaction.

(iii) Determine the number of independent chemical reaction.

(iv) Specify the inlet conditions.

(A) (i), (ii), (iii)
(B) (ii), (iii), (iv)
(C) (iii), (iv), (i)
(D) (i), (ii), (iii), (iv)
(E) Answer not known

192. Individual particles are blown act of the fluidised bed when the gas velocity exceeds

(A) Minimum fluidizing velocity
(B) Linear velocity
(C) Terminal velocity
(D) Angular velocity
(E) Answer not known

193. Choose the correct option for the important characteristics of steady-state flow reactor.

(A) Composition changes with time
(B) Composition at any point is unchanged with time
(C) Volume of the fluid and composition is unchanged with time
(D) Volume of the fluid is constant but composition changes
(E) Answer not known

194. The ratio of volume of mixed reactor to that of volume of plug flow reactor _____ with reaction order, for a particular conversion.

(A) Increases
(B) Decreases
(C) Increases and then decreases
(D) Decreases and then increases
(E) Answer not known

195. Select a condition that is not assumed in K-L model for Bubbling Fluidised Bed (BFB)

(A) Bubbles are not spherical
(B) Gas-Solid velocity is constant
(C) Bubble drags up a wake of solids
(D) Ignore the upflow of gas through the cloud
(E) Answer not known

196. The chemical reaction takes place of atleast two phases is known as

(A) Homogeneous reaction
(B) Catalytic reaction
(C) Heterogeneous reaction
(D) Acid base reaction
(E) Answer not known

197. A single stoichiometric equation, and single rate equation are choosen to represent the progress of the reaction is

(A) Single reaction
(B) Multiple reaction
(C) Elementary reaction
(D) Non elementary reaction
(E) Answer not known

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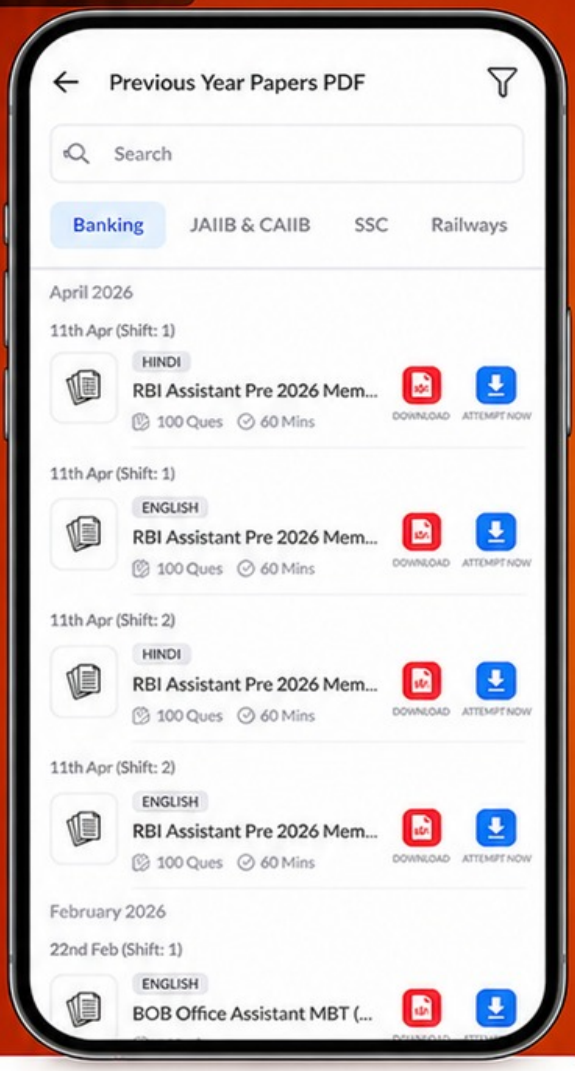

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198. Milk is pasteurized if it is heated to 63°C for 30 min. But if it is heated to 74°C it only needs 15s for the same result. Find the activation energy of this sterilization process.

(A) E = 422000 J/mol
(B) E = 451000 J/mol
(C) E = 402000 J/mol
(D) E = 282000 J/mol
(E) Answer not known

199. In chemical reaction, the intermediate is formed in the first reaction and then disappears as it reacts further to give the product is called

(A) Chain reaction
(B) Non chain reaction
(C) Forward reaction
(D) Reverse reaction
(E) Answer not known

200. The rate of reaction, based on unit mass of solid in fluid-solid systems

$$r_c^1 = \frac{1}{W}\frac{dNi}{dt} = \frac{\text{moles } i \text{ formed}}{(?)\text{ time}}$$

where $W = ?$

W is called as

(A) mass of solid
(B) volume of solid
(C) surface
(D) volume of reactor
(E) Answer not known