COMBINED TECHNICAL SERVICES EXAMINATION

(NON-INTERVIEW POSTS)

COMPUTER BASED TEST

PAPER – II – CHEMICAL ENGINEERING

(DEGREE STANDARD) (CODE: 405)

1. Match the alloys with its composition.

(a)	Durrion	1.	Tin–Lead
(b)	Terneplate	2.	Silicon – Iron
(c)	Ferrite	3.	Zinc–copper
(d)	Brass	4.	Chromium – ferrous

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

(E) Answer not known

2 The situation of loose joint under varying load may be susceptible to,

(A) Marine corrosion
(B) Stress corrosion cracking
(C) Galvanic corrosion
(D) Fretting corrosion
(E) Answer not known

3. Hardenable stainless steels usually contains ———— carbon

(A) 0.6%
(B) 0.9%
(C) 1.2%
(D) 1.5%
(E) Answer not known

4. Brass is an alloy of copper and

(A) Tin
(B) Zinc
(C) Lead
(D) Nickel
(E) Answer not known

5. Silica bricks are never used for

(A) Open–hearth furnaces
(B) Coke ovens
(C) Gas retorts
(D) Furnaces subjected to extreme conditions
(E) Answer not known

6. The material used in the storage of ammonia is

(A) Mild steel
(B) Stainless steel 316
(C) Stainless steel 304
(D) Carbon steel
(E) Answer not known

7. Paddle agitator

(A) Produces radial flow
(B) Produces axial flow
(C) Moves at a speed less than critical speed
(D) Move at a speed greater than critical speed
(E) Answer not known

8. Choose the suitable mixers for respective solids used

(a) Kneading machines	1. Uniform coating of solid particles with a small liquid
(b) Pony mixers	2. Mix deformable or plastic solids
(c) Muller mixers	3. Mix Rubber and plastic solids, Masticate crude rubber
(d) Banbury mixers	4. Blend viscous liquid or light pastes

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

(E) Answer not known

9. To keep the power input constant for a stirred vessel operating under fully developed turbulent flow conditions (constant power number), if the impeller diameter is increased by 20%, the impeller speed should be decreased by a factor of

(A) $(1.2)^{\frac{3}{2}}$ (B) $(1.2)^{\frac{3}{5}}$

(C) $(1.2)^{\frac{2}{3}}$ (D) $(1.2)^{\frac{5}{3}}$

(E) Answer not known

10. In jet mixers, the shrinking core disappears at a distance from the nozzle of ———— times of diameter of the nozzle

(A) 3.4 (B) 4.3

(C) 4.7 (D) 7.4

(E) Answer not known

11. Filter medium resistance is important during the ———— of filtration

(A) Early stages
(B) Final stages
(C) Entire process
(D) Decreased time
(E) Answer not known

12. Specific cake resistance of compressible sludge

(A) Increases with pressure drop
(B) Decreases with pressure drop
(C) Unchanged with pressure drop
(D) Decreases and increases with pressure drop
(E) Answer not known

13. A filter aid is added to the slurry before filtration to

(A) Decrease the porosity of the cake
(B) Decrease the compressibility of the cake
(C) Increase the compressibility of the cake
(D) Increase the porosity of the cake
(E) Answer not known

14. Sphericity for a non–spherical particle is given by

(A) $6\ Dp\frac{Sp}{Vp}$
(B) $\frac{6}{Dp}\frac{Vp}{Sp}$
(C) $\frac{6}{Dp}\frac{Sp}{Vp}$
(D) $\frac{Dp}{6}\frac{Vp}{Sp}$
(E) Answer not known

15. What is the standard screen used to measure the particle size?

(A) 35 – 45 mm
(B) 68 – 88 mm
(C) 38 μm – 76 mm
(D) 88 – 110 mm
(E) Answer not known

16. The specific surface area of a particle for the whole bed is given by ———— (if the particles are non–spherical)

Whereas, ϕ = Sphericity

ε = Bed porosity

D_{sp} = Dia of the particle

(A) $\frac{6}{\phi D_{sp}}$
(B) $\frac{6\phi}{D_{sp}}$
(C) $6(1-\varepsilon)/\phi$
(D) $6(1-\varepsilon)/\phi D_{sp}$
(E) Answer not known

17. The collection efficiency of cyclone separators increases with

(1) Decreasing particle size
(2) Increasing particle density
(3) Decreasing gas velocity
(4) Increasing gas temperature

Which of the following statements are correct?

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

18. A ballmill is used for grinding a powder from $50\,\mu m$ to $10\,\mu m$. If the diameter of ball mill is 100mm, The diameter of the ball is 10 mm, and operating speed is 50% of the critical speed, calculate the operating speed in RPM.

(A) 69.46 RPM
(B) 60.46 RPM
(C) 70.46 RPM
(D) 79.46 RPM
(E) Answer not known

19. The value of drag co–efficient (C_D) remains almost constant at a value of 0.1, for the Reynold's Number (Nee) in the range of

(A) $N_{Re} > 2\times10^5$
(B) $500 > N_{Re} < 2\times10^5$
(C) $0.2 < N_{Re} < 500$
(D) $10^{-4} < N_{Re}$ 0.2
(E) Answer not known

20. Match the following terms with correct unit

(a)	Rm–Medium Resistance	1.	Dimensionless
(b)	α–specific cake resistance	2.	m^{-1}
(c)	Screen opening	3.	$\frac{m}{kg}$
(d)	Shape factor	4.	mm

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

(E) Answer not known

21. The type of heat exchanger has the same space is occupied by the hot and cold gases, between which heat is exchanged known as

(A) Shell and tube heat exchanger

(B) Regenerator

(C) Direct contact heat exchanger

(D) Indirect contact heat exchanger

(E) Answer not known

22. For a given inlet and outlet temperatures of the hot and cold fluids, the Logarithmic mean temperature difference (LMTD) is

(A) Greater for parallel flow heat exchanger than counter current flow exchangers

(B) Greater for counter current flow heat exchangers than parallel flow

(C) Same for both parallel and counter - current heat exchangers

(D) Depends on the properties of fluid

(E) Answer not known

23. Economy of evaporator is

(A) Number of kilograms of water vaporised per hour

(B) Number of kilograms of steam fed per hour

(C) Kilogram of steam fed per No.of kilograms vaporised

(D) Number of kilograms vaporised per kilogram of steam fed

(E) Answer not known

24. Economy of multiple effect evaporator is not influenced by

(A) Boiling point elevation
(B) Temperature of feed
(C) Ratio of weight of thin liquor to thick liquor
(D) Ratio of heat transfer
(E) Answer not known

25. The Net Transfer Unit is (NTU)

(A) $U.C_{min}/A$
(B) UA / C_{min}
(C) $A.C_{min}$
(D) $U/A.C_{min}$
(E) Answer not known

26. Choose the correct statement or statements

(i) The shape factor of small enclosed body with respect to the enclosing surface is zero

(ii) The shape factor of small enclosed body with respect to the enclosing surface is unity

(iii) A small opening form a large enclosure at constant temperature will provide black body radiation

(iv) Black paint is an example of Block body

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

27. Reynolds analogy expresses the relationship between heat transfer for laminar flow on a flat plate and

(A) Velocity
(B) Fluid friction
(C) Viscosity
(D) Density
(E) Answer not known

28. The prandtl number for gases is

(A) 100
(B) 1
(C) 50
(D) 200
(E) Answer not known

29. The Reciprocal of resistance is

(A) Viscosity
(B) Heat transfer coefficient
(C) Thermal conductivity
(D) Conductance
(E) Answer not known

30. Which loss is relatively high in centrifugal pump having open impellers?

(A) Mechanical losses
(B) Leakage losses
(C) Recirculation losses
(D) Hydraulic losses
(E) Answer not known

31. In centrifugal pumps

(A) Discharge is not Even, it is pulsating

(B) Are belt driven

(C) Needs priming

(D) Develop high pressure

(E) Answer not known

32. Which of the following options represent the compression ratio range for blowers?

(A) Compression ratio above 7

(B) Compression ratio above 6 and below 8

(C) Compression ratio below 3 or 4

(D) Compression ratio above 10

(E) Answer not known

33. The operating range of fluidization velocities for all particle sizes are

(A) Greater with larger particles

(B) Much greater with small particles

(C) Almost the same

(D) Greater with small particles

(E) Answer not known

34. The factors on which the rate of drying depends

(1) Gas velocity and Humidity of gas

(2) Dry bulb temperature

(3) Dew point

(4) Area of drying surface and temperature

(A) (1) and (4)

(B) (2) and (3)

(C) (3) and (4)

(D) (1) and (2)

(E) Answer not known

35. Choose the major loss of energy in pipes from the options given

(A) Frictional loss

(B) Shock loss

(C) Entry loss

(D) Exit loss

(E) Answer not known

36. For laminar flow through a packed bed the pressure drop is proportional to;

(V_s is superficial liquid velocity and D_p is the particle diameter)

(A) $\frac{V_s}{D_p^2}$

(B) $\frac{V_s^2}{D_p^2}$

(C) $\frac{V_s^2}{D_p}$

(D) $\frac{V_s^2}{D_p^3}$

(E) Answer not known

37. An example of thixotropic fluid is

(A) Starch in water
(B) Corn flour solution
(C) Gypsum suspension
(D) Some paints
(E) Answer not known

38. Shear rate thinning fluids are known as

(A) Newtonian
(B) Pseudo plastic
(C) Bingham plastic
(D) Dilatant
(E) Answer not known

39. The type of reservoir used in single column manometer is

(A) Small
(B) Large
(C) Extremely small
(D) Size is Irrelevant
(E) Answer not known

40. For laminar flow of incompressible fluid in closed conduit of radius 'R' maximum shear stress occurs at

(A) A distance equal to $\frac{R}{4}$ from the wall
(B) The centre
(C) A distance equal to $\frac{R}{2}$ from the wall
(D) The wall
(E) Answer not known

41. Removal of the solids present in the catalyst is called as

(A) Regeneration
(B) Reactivation
(C) Poisoning
(D) Displacement
(E) Answer not known

42. Which of the following is true for fluidized catalytic beds?

(A) Batch reactor category
(B) No pressure drop
(C) Bulk density is a function of the flow rate through the bed
(D) Cannot be used for multi–phase chemical reactions
(E) Answer not known

43. The reaction 2A+B→2C occurs on a catalytic surface the reactant A and B diffuse to the catalyst surface and get converted completely. To the product C, which diffuses back. The steady state molar fluxes of A,B and C are related by

(A) $N_A = 2N_B = N_C$
(B) $N_A = -\left(\frac{1}{2}\right)N_B = -N_C$
(C) $N_A = 2N_A = -N_C$
(D) $N_A = \left(\frac{1}{2}\right)N_B = N_C$
(E) Answer not known

44. The Knudsen diffusivity is dependent on

(A) The molecular velocity only
(B) The pore radius of the catalyst only
(C) The molecular mean free path only
(D) The molecular velocity and pore radius of the catalyst
(E) Answer not known

45. A phase tracer is introduced in an ideal CSTR (with a mean residence time τ) at time = 0. The time taken for the exit concentration of the tracer to reach half of its initial value will be

(A) 2τ

(B) 0.5τ

(C) $\tau/0.693$

(D) 0.693τ

(E) Answer not known

46. The operation of a Rotameter is based on

(A) Variable area flow meter

(B) Variable head flow meter

(C) Pressure drop across a nozzle

(D) Pressure at a stagnation point

(E) Answer not known

47. The instrument which uses semiconductor devices for temperature measurement are

(A) Thermistors

(B) Bimetallic thermometers

(C) Mercury thermometers

(D) Gas filled thermometers

(E) Answer not known

48. The non–adiabatic fixed bed reactors, radial mixing was supposed to be sufficiently good that all the resistance to energy transfer could be concentrated at the

(A) Reactor wall
(B) Baffles
(C) Agitator
(D) Feed concentration
(E) Answer not known

49. For the liquid phase zero–order reaction X→Y, the conversion of X in a CSTR is found to be 0.2 at a space velocity of 0.1 min^{-1}. What will be the conversion for a PFR with a space velocity of 0.2 min^{-1}? Assume that all the other operating conditions are the same for CSTR and PFR.

(A) 0.10
(B) 0.15
(C) 0.20
(D) 0.25
(E) Answer not known

50. The elements of fluid can cross the vessel boundary more than one time is called as ———— boundary condition.

(A) Open vessel
(B) Closed vessel
(C) Exit stream
(D) Entrance stream
(E) Answer not known

51. The single time fixed amount inlet for finding the E curve is called

(A) Pulse input
(B) Step input
(C) Trace input
(D) Continuous input
(E) Answer not known

52. For a second order liquid phase reaction 50% of 'A' converted in 10 min. The time taken for 75% conversion is

(A) 10 min
(B) 20 min
(C) 30 min
(D) 40 min
(E) Answer not known

53. The unsteady state material balance equation for the first order reaction carried out in a CSTR is ————————.

where 'Q' is the volumetric flow rate, 'C_{AO}' and 'C_A' are inlet and outlet concentration, in the reactor, 'K'-rate constant and 'V' is the volume of the reactor

(A) $V\frac{dC_A}{dt} = QC_{Ao} + QC_A + KC_{AV}$

(B) $V\frac{dC_A}{dt} = QC_{Ao} - QC_A - KC_{AV}$

(C) $V\frac{dC_A}{dt} = QC_{Ao} - QC_A$

(D) $QC_{Ao} - QC_A = KC_{AV}$

(E) Answer not known

54. From the Arrhenius law, the value of the frequency factor (K_0) does not affect

(A) Concentration
(B) Pressure
(C) Temperature
(D) Flow rate
(E) Answer not known

55. The time required to process one reactor volume of feed measured at specified condition is known as

(A) Space velocity
(B) Space time
(C) Volumetric feed rate
(D) Mass flow rate
(E) Answer not known

56. The units of frequency factor in Arrhenius equation is

(A) Same as those of the rate constant
(B) Depend on the order of the reaction
(C) Depend on temper, pressure of the reaction
(D) Are cycles per unit times
(E) Answer not known

57. Which among the following is used to study the kinetics of surface catalyzed reactions for enzyme?

(A) Michaelis – Menton
(B) Levenspiel Model
(C) Ottengraf Model
(D) Logistic Model
(E) Answer not known

58. Which of the following statement is/are correct?

Statement 1 : Reactions with high activation energies are very high temperature – sensitive.

Statement 2 : Reactions with low activation energies are relatively temperature – insensitive

(A) Statement 1 only correct
(B) Statement 1 and 2 correct
(C) Statement 2 only correct
(D) Both Statement are incorrect
(E) Answer not known

59. The unit for rate of reaction is usually

(A) Moles per liter per second
(B) Moles per second per liter
(C) Moles per second
(D) Moles per liter
(E) Answer not known

60. The rate constant of a zero order reaction is 0.2 mol/lit. hr. What will be the initial concentration of the reactant if, after half an hour, its concentration is 0.05 mol/lit?

(A) 0.115 moles / litre

(B) 0.15 sec^{-1}

(C) 0.15 moles/litre

(D) 0.0115 moles

(E) Answer not known

61. The Integrating factor of the equation

$(x+1)\frac{dy}{dx} - y = e^{3x}(x+1)^2$ is

(A) $-\frac{1}{e}$

(B) $\frac{1}{e}$

(C) $\frac{1}{x+1}$

(D) $\log(x+1)$

(E) Answer not known

62. The Hermitian matrix of A is : where, $A=\begin{bmatrix} 2 & 3+4i \\ 3-4i & -5 \end{bmatrix}$ $A'=$

(A) $\begin{bmatrix} 0 & 3+4i \\ 3-4i & 0 \end{bmatrix}$

(B) $\begin{bmatrix} 1 & 3+4i \\ 3-4i & 1 \end{bmatrix}$

(C) $\begin{bmatrix} 2 & 3-4i \\ 3+4i & -5 \end{bmatrix}$

(D) None of the above

(E) Answer not known

63. Form the differential equation of simple Harmonic Motion given by $x = A\cos(nt+\alpha)$ where x and t are variables and A and α are constants.

(A) $\frac{dx}{dt}=Ax$

(B) $\frac{d^2x}{dt^2}=nx$

(C) $\frac{d^2x}{dt^2}+n^2x=0$

(D) $\frac{d^2x}{dt^2}+nx=0$

(E) Answer not known

64. Find the order and degree of the differential equation

$$\frac{d^2y}{dx^2}=f(x)\left[1+\left(\frac{dy}{dx}\right)^2\right]^{3/2}$$

(A) Order 2 degree 3
(B) Order 1 degree 2
(C) Order 3 degree 2
(D) Order 2 degree 2
(E) Answer not known

65. $\frac{d^2x}{dx^2}+a^2x=0$ —— (1)

$X=0$ at $x=0$

$X=0$ at $x=2R$

The solution of (1) which satisfies the conditions $X=0$ at $x=0$ is in the form; $X=C\ \sin ax$ and the condition $x=0$ at $x=2R$ requires $c\sin aR=0$; $a_n=\frac{n\pi}{2R}$ where $n\neq 0$; the values of a, a_n are called ;

(A) Eigen functions
(B) Eigen values
(C) Fourier values
(D) Finite values
(E) Answer not known

66. The product of Eigen values of a matrix is the equal to its

(A) Rank

(B) Determinant

(C) Trace

(D) Transpose

(E) Answer not known

67. Eliminate a and b from $Z = axe^y + \frac{1}{2}a^2e^{2y} + b$

and find the partial differential equation

(A) $\frac{\partial z}{\partial x} = xe^y + \frac{1}{2}e^{2y}$

(B) $\frac{\partial z}{\partial y} = x\left(\frac{\partial z}{\partial x}\right) + \left(\frac{\partial z}{\partial x}\right)^2$

(C) $\frac{\partial z}{\partial x} = x\left(\frac{\partial z}{\partial y}\right) + \left(\frac{\partial z}{\partial y}\right)^2$

(D) $\frac{\partial z}{\partial y} = xe^y + \frac{1}{2}e^y$

(E) Answer not known

68. The Lagrange's auxiliary equations for the partial differential equation $P_p + Q_q = R$ is [Choose the best answer].

(A) $\frac{dx}{P} = \frac{dy}{Q} = \frac{dz}{R}$

(B) $\frac{dx}{P} = \frac{dy}{Q}$

(C) $\frac{dx}{P} = \frac{dz}{R}$

(D) $\frac{dP}{x} = \frac{dQ}{y} = \frac{dR}{z}$

(E) Answer not known

69. Find the value of K for which the system of equations.

$(3k-8)x + 3y + 3z = 0$

$3x + (3k-8)y + 3z = 0$

$3x + 3y + (3k-8)z = 0$

Has a Non-Trivial solution

(A) $2/3, 11/3, 11/3$

(B) $2/3, 2/3, 11/3$

(C) $11/3, 11/3, 11/3$

(D) $2/3, 2/3, 2/3$

(E) Answer not known

70. Match the following methods with their respective order of convergence.

(a)	Newton – Bisection	1.	1
(b)	Secant	2.	1.62
(c)	Newton – Raphson	3.	2

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

(E) Answer not known

71. The roots of the equation $x^3 - 4x - 10 = 0$ lies between

(A) 0 and 1

(B) 2 and 3

(C) 3 and 4

(D) 1 and 2

(E) Answer not known

72. The truncation error of the Trapezoidal Rule [for Single Application] is

(A) $E_t = -\frac{1}{12} f''(\xi)(b-a)^3$

(B) $E_t = -\frac{1}{12} f''(\xi)(a-b)^3$

(C) $E_t = \frac{1}{12} f''(\xi)(a-b)^3$

(D) $E_t = \frac{1}{12} f''(\xi)(b-a)^3$

(E) Answer not known

73. Using the Trapezoidal Rule and 4 equal intervals (n=4), the calculated value of the integral (Rounded to the first decimal place)

$\int_0^{\pi} \sin\theta \, d\theta$ is

(A) 1.7

(B) 1.9

(C) 2.0

(D) 2.1

(E) Answer not known

74. Process in which the basic process variables vary with both time and space, is called as

(A) Lumped parameter models

(B) Distributed parameter models

(C) Steady state models

(D) Neural Network model

(E) Answer not known

75. The positive root of $x^3+1=4x$ by regular falsi method is

(A) 1.1211
(B) 0.7391
(C) 2.1821
(D) 3.123
(E) Answer not known

76. The process of finding an equation of best fit is known as

(A) Transformation of equation
(B) Eigen value
(C) Curve fitting
(D) Orthogonalization
(E) Answer not known

77. Linear equation in one variable is written as

(A) $Ax+B=0$
(B) $A+Bx^2=0$
(C) $AB=0$
(D) $Ax+Bx^2=0$, where A and B are coefficients
(E) Answer not known

78. The system

$x-3y=4$

$-2x+6y=5$

has following type of solution

(A) The system has exactly one solution

(B) No solution

(C) Infinite number solutions

(D) Cannot say

(E) Answer not known

79. Identify the linear equation from the following

(A) $5x+3y-8xy=16$

(B) $x+\pi y+ez=\log 5$

(C) $3x^2+2x+1=0$

(D) $\log y=5x+2$

(E) Answer not known

80. Find the Y-Intercept of the line $3x-4y+10=0$

(A) -4

(B) 3

(C) 10

(D) 2.5

(E) Answer not known

81. The pH range of Acid Rain

(A) 5 to 6 pH
(B) 4 to 4.9 pH
(C) 5.5 to 6.5 pH
(D) 4.5 to 5.5 pH
(E) Answer not known

82. MIC Methyl Isocyanate Burst with

(A) Methyl
(B) Water
(C) Alcohol
(D) Cyanate
(E) Answer not known

83. ———— states that the value beliefs and attitudes differ from one society to another.

(A) Ethical relativism
(B) Descriptive Relativism
(C) Rational Relativism
(D) Contextualism
(E) Answer not known

84. Match the following

(a) Copyright	1. Formula
(b) Trade–Secret	2. Integrated Circuits
(c) Layout designs	3. Loger
(d) Trade mark	4. Books

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

(E) Answer not known

85. Name the correct relativism given below

(A) Honest
(B) Descriptive
(C) Morality
(D) Difficult
(E) Answer not known

86. The positive right means

(A) Basic Right
(B) Specific Right
(C) Right of Refusal
(D) Right to Recognition
(E) Answer not known

87. Professional rights of employees are not justified by the following theory.

(A) Duty theory
(B) Rights theory
(C) Utilitarian theory
(D) Gilligan theory
(E) Answer not known

88. Mathematical version of scenario analysis is

(A) Fault tree analysis
(B) Event tree analysis
(C) Risk benefit analysis
(D) Failure made and effect analysis
(E) Answer not known

89. Match the following

(a) Swimming in a far off lagoon	1. High probability low consequence risk
(b) Swimming in a beach infested with jelly fish	2. Voluntary risk
(c) Informed consent	3. Occupational risk
(d) Asthma in a cotton spinning mill	4. High probability high consequence risk

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

(E) Answer not known

90. Match the following with reference to moral development

(a) Kohlberg	1. Duty and Gift
(b) Gilligan	2. Adapt accepted rights
(c) Post Conventional	3. The philosophy of moral development
(d) Conventional	4. In a different voice

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

(E) Answer not known

91. Which one of the following state is true? With reference to models of professional roles?

(i) Social servants follows the concept of professionalism as independence

(ii) Bureaucratic servants follows the concept of professionalism as employees

(iii) Guardians follow the concept of professionalism as employees

(A) (i) only

(B) (i) and (ii) only

(C) (ii) only

(D) (ii) and (iii) only

(E) Answer not known

92. Engineers being a responsible social experimenter specifies

(A) Safety Point of View
(B) Technical competence point of view
(C) Company point of view
(D) Development point of view
(E) Answer not known

93. Gilligan theory based on moral development is mainly based on

(A) desire to please others
(B) logic and rule based
(C) Caring nature
(D) Factual and Justice
(E) Answer not known

94. Types of ethical dilama compared to profit versus welfare

(A) Technology ethics
(B) Administrative ethics
(C) Business ethics
(D) Environmental ethics
(E) Answer not known

95. In Kohlberg's theory conventional level is defined in which

(A) Norms of one's family group or society are accepted as final standard of morality

(B) Norms of Individual are accepted as final standard of morality

(C) Norms of group of people accepted as final standard of morality

(D) None of above

(E) Answer not known

96. Ethical values are associated with

(A) Social system

(B) Rule making

(C) Compassionate living

(D) Devotional living

(E) Answer not known

97. Which is not one of the three types of inquiry?

(A) Normative

(B) Conceptual

(C) Factual

(D) Informal

(E) Answer not known

98. Match the following :

(a) Personal ethics	1. Grafting or Corruption
(b) Professional ethics	2. Factory of Safety
(c) Micro ethics	3. Organisational level
(d) Macro ethics	4. Day to day life

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

(E) Answer not known

99. Integrity comes under

(A) Public Spirited virtue
(B) Self–direction virtue
(C) Team work virtue
(D) Proficiency virtue
(E) Answer not known

100. The Enquiry that seek to identify and justify the morally desirable norms and standards that guide individuals or groups in taking decisions.

(A) Conceptual enquiry
(B) Normative enquiry
(C) Factorial enquiry
(D) Descriptive enquiry
(E) Answer not known

101. Modern theoretical developments in molecular thermodynamics of liquid solution behaviour is based on the concept of

(A) Local composition
(B) Local pressure
(C) Local temperature
(D) Local pressure, temperature and composition
(E) Answer not known

102. The effect of temperature on equilibrium constant is given by

(A) $\frac{d\ln k}{dT}=\frac{\Delta H^\circ}{RT^2}$
(B) $\frac{d\ln k}{dT}=\frac{\Delta H^\circ}{RT}$
(C) $\frac{d\ln k}{dT}=\frac{-\Delta H}{RT^2}$
(D) $\frac{d\ln k}{dT}=\frac{-\Delta H^\circ}{RT}$
(E) Answer not known

103. As pressure approaches zero, the ratio of fugacity to pressure (f/p) for a gas approaches

(A) Zero
(B) Unity
(C) Infinity
(D) An indeterminate value
(E) Answer not known

104. The entropy of a perfect crystal of every element or compound is zero at

(A) 0°C
(B) 273°C
(C) 100°C
(D) –273°C
(E) Answer not known

105. When mach number, $M > 1$ the flaw is

(A) Incompressible
(B) Sonic
(C) Sub sonic
(D) Supersonic
(E) Answer not known

106. Identify the model where the activity coefficient is divided into two parts-the molecular size contribution and interaction contributions

(A) UNIFAC model
(B) NRTL model
(C) Vanlaar model
(D) Wilson model
(E) Answer not known

107. Which of the following are intensive property?

(A) Entropy
(B) Heat capacity
(C) Surface tension and chemical potential
(D) Free energy
(E) Answer not known

108. The value of Joule Thomson coefficient at inversion point is

(A) 0
(B) 1
(C) Infinity
(D) Negative
(E) Answer not known

109. Energy can neither be created nor can be destroyed. This is called

(A) Zeroth law of thermodynamics

(B) First law of thermodynamics

(C) Second law of thermodynamics

(D) Third law of thermodynamics

(E) Answer not known

110. In certain systems the degree of freedom is negative, which indicates that system is,

(A) Over defined

(B) Defined

(C) Not defined

(D) Confined

(E) Answer not known

111. Vapor phase hydration of C_2H_4 to ethanol by the following reaction : $C_2H_{2(g)} + H_2O_{(g)} \leftrightarrow C_2H_5OH_{(g)}$

Attains equilibrium at 400 k and 3 bar. The standard Gibb's free energy change of reaction at these condition is $\Delta g^\circ = 4000\,J/mol$. For 2 moles of an equimolar feed of ethylene and steam, the equation in term of the extent of reaction ε (in mole) at equilibrium is

(A) $\frac{\varepsilon(2-\varepsilon)}{(1-\varepsilon)^2} - 0.3 = 0$

(B) $\frac{(1-\varepsilon)^2}{\varepsilon(2-\varepsilon)} - 0.9 = 0$

(C) $\frac{\varepsilon}{(1-\varepsilon)^2} - 0.3 = 0$

(D) $\frac{\varepsilon(2-\varepsilon)}{(1-\varepsilon)^2} - 0.9 = 0$

(E) Answer not known

112. For a single component, two phase mixture, the number of independent variables are

(A) 4
(B) 0
(C) 1
(D) 2
(E) Answer not known

113. In a process, the feed streams flow at a rate of 300 kg/s and 600 kg/s. The output flow rate is 500 Kg/s. The mass stored in the process for ten seconds is

(A) 400 kg
(B) 800 kg
(C) 4000 kg
(D) 2000 kg
(E) Answer not known

114. In a textile mill, an evaporator system concentrates weak liquor containing 4% (by mass) caustic soda to produce a dye containing 25% solids (by mass). The amount of water evaporated per 100 kg of feed is

(A) 100 kg
(B) 75 kg
(C) 84 kg
(D) 24 kg
(E) Answer not known

115. 1000 kg of wet solids are to be dried from 60% to 20% moisture. The mass of water removed in kg is

(A) 570
(B) 200
(C) 400
(D) 500
(E) Answer not known

116. How many kilograms of carbon disulphide will contain 3.5 kilograms atom carbon?

(A) 126 kilograms
(B) 128 kilograms
(C) 266 kilograms
(D) 268 kilograms
(E) Answer not known

117. A heat engine operates between a heat source at 700 k and a heat sink at 300 K. What is the maximum efficiency of the engine?

(A) 0.43
(B) 0.51
(C) 0.57
(D) 0.47
(E) Answer not known

118. What is the unit of specific gravity?

(A) Kg/m^3
(B) m^3/Kg
(C) m/s^2
(D) No unit
(E) Answer not known

119. Absolute pressure is

(A) Atmospheric Pressure + Gauge Pressure
(B) Atmospheric Pressure – Vacuum Pressure
(C) Atmospheric Pressure – Gauge Pressure
(D) Vacuum Pressure + Gauge Pressure
(E) Answer not known

120. The volume of a mixture of two organic liquids 1 and 2 is given by $V = 110 - 17x_1 - 2.5x_1^2$. where V is the volume. x_1 and x_2 are the mole fractions. The expression for partial molar volume of liquid 2 is $(\overline{V}_2)$

(A) $110 - 17x_1 - 2.5x_1^2$ (B) $-17x_1 - 2.5x_1$

(C) $110 + 2.5x_1^2$ (D) $-34 + 5x_1$

(E) Answer not known

121. The enthalpy of formation $\Delta H_f, H_2O$ for the reaction in a fuel cell is

(A) $\Delta H = -242\,\text{kJ/mol}$ (B) $\Delta H = +242\,\text{kJ/mol}$

(C) $\Delta H = +4200\,\text{kJ/mol}$ (D) $\Delta H = -4200\,\text{kJ/mol}$

(E) Answer not known

122. Match the process in Group I with the catalyst in Group II :

	Group I		Group II
(a)	Fischer. Tropsch synthesis	1.	Nickel
(b)	Formaldehyde from methanol	2.	Fe_2O_3
(c)	Hydrogenation of vegetable oil	3.	Silver
(d)	Dehydrogenation of ethyl benzene	4.	Cobalt

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

(E) Answer not known

123. Identify the organic substances qualified as heat of fusion materials

(A) Fatty acids
(B) Bagasse
(C) Rock Substances
(D) Anematics
(E) Answer not known

124. The wind speed is measured using

(A) Pyranometer
(B) Manometer
(C) Anemometer
(D) Wind vane
(E) Answer not known

125. The presence of sodium sulphate in pulp

(A) Makes the Pulp bleachability easier
(B) Poor strength properties of paper
(C) Make the pulp bleaching poor
(D) To recover the organic content
(E) Answer not known

126. Sodium silicate is added in detergents to

(A) Increase foam
(B) Enhance dirt suspension
(C) Avoid corrosion
(D) Increase brightness
(E) Answer not known

127. Rancidity of the fatty oil can be reduced by its

(A) Hydrogenation
(B) Purification
(C) Oxidation
(D) Decoloration
(E) Answer not known

128. Match the following :

Gas	Composition
(a) Synthesis gas	1. CH_4, ethane
(b) Coke oven gas	2. Propane, butane
(c) Natural gas	3. CH_4, H_2
(d) Liquified Petroleum Gas (LPG)	4. CO, H_2

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

(E) Answer not known

129. The spent looking liquor, is commonly called as

(A) White liquor
(B) Green liquor
(C) Black liquor
(D) Digestion liquor
(E) Answer not known

130. Identify the polymer which is formed due to condensation - polymerization.

(A) High-density polyethylene
(B) Low-density polyethylene
(C) Polypropylene
(D) Polyester resin
(E) Answer not known

131. Match the following drugs with their field of applications :

(a) Ether USP	1. Antianxiety
(b) Diazepam USP	2. Anesthesia and solvent
(c) Acetophenetidine USP	3. Antiulcer
(d) Cimetidine	4. Analgestic and Antipyretic

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

(E) Answer not known

132. Styrene butadiene rubber (SBR) is

(A) Natural rubber
(B) An engineering plastics
(C) A synthetic rubber
(D) A synthetic manomer
(E) Answer not known

133. Choose the correct option :

(a) $[Ca_3(PO_4)_2]_3.CaF_2$	1. Phosphate Rock
(b) $CaH_4(PO_4)_2$	2. STTP
(c) $Na_5P_3O_{10}$	3. Salt Cake
(d) Na_2SO_4	4. Triple superphosphate

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

(E) Answer not known

134. Choose the best answer :

(a)	Slaked lime	1.	Calcium oxide
(b)	Quick lime	2.	Sodium carbonate decahydrate
(c)	Gypsum	3.	Calcium hydroxide
(d)	Washing soda	4.	Calcium sulfate dihydrate

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

(E) Answer not known

135. The enzymes used to convert molasses to ethyl alcohol are

(A) Lactase and invertase

(B) Invertase and zymase

(C) Amylase and zymase

(D) Protease and invertase

(E) Answer not known

136. Pick the correct catalyst from Group II for the process in Group I :

Group I	Group II
(a) Hydrodesulfurization	1. Zeolites
(b) Fluid catalytic cracking	2. Pt/Al_2O_3
(c) Naphtha Reforming	3. $Co\text{-}mo/Al_2O_3$

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

(E) Answer not known

137. The main raw material for the production of cement

(A) Limestone
(B) Coal
(C) Gypsum
(D) Sulphuric acid
(E) Answer not known

138. The three major components are necessary in fertilizers

(1) Nitrogen
(2) Phosphorus
(3) Acetylene
(4) Potassium

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

139. The preferred reaction system for oxidation of O-xylene to phthalic anhydride

(A) Jacketed liquid phase CSTR
(B) Jacketed steam heated multi tubular reactor
(C) Multi tubular reactor with cooling
(D) Multi-stage multi-tubular reactor with inter stage cooling
(E) Answer not known

140. Nitrogenous fertilizer is graded based in its

(A) N_2O_4 content
(B) N_2 content
(C) HNO_3 content
(D) NO_2 content
(E) Answer not known

141. The density of supercritical water

(A) Decreases with increase in temperature
(B) Increases with decrease in pressure
(C) Decreases with increase in pressure
(D) Increases with increase in temperature
(E) Answer not known

142. In an Ion exchange process, cation exchange resin bed is regenerated by using

(A) Acid solution
(B) Base solution
(C) Buffer solution
(D) Salt solution
(E) Answer not known

143. Ion exchangers with fixed negative charges can bind mobile cations are called as

(A) Anion exchanger
(B) Cation exchanger
(C) Acidic exchanger
(D) Basic exchanger
(E) Answer not known

144. Identify the correct pair of property-unit from the following

(A) Specific conductivity – ohm cm^{-1}
(B) Equivalent conductivity – ohm^{-1} cm^2. eq^{-1}
(C) Molar conductivity – ohm^{-1} cm. $mole^2$
(D) Cell constant – ohm^{-1} cm^{-1}
(E) Answer not known

145. The ultra filtration retains particles of

(A) Micron – submicron size
(B) Macro size
(C) Micron size
(D) Sub micron size
(E) Answer not known

146. ———— is an example of hydrophilic membrane.

(A) Polyethylene
(B) Poly propylene
(C) Polytetra fluoroethylene
(D) Nylon
(E) Answer not known

147. In gas-liquid chromatography, the mass of solvent phase per unit volume (W) equals the

(A) Bed density × fraction solvent loading
(B) Bed density / Fraction solvent loading
(C) Bed density – Fraction solvent loading
(D) Bed Density + Fraction solvent loading
(E) Answer not known

148. The driving force in dialysis process is

(A) Pressure difference
(B) Concentration difference
(C) Temperature difference
(D) Fugacity difference
(E) Answer not known

149. Separation process in which one or more components of a liquid mixture diffusing through a selective membrane evaporate under low pressure is

(A) Membrane separation
(B) Reverse osmosis
(C) Crystallization
(D) Pervaporation
(E) Answer not known

150. The membrane skin thickness and average poresize can be varied by changing the

(A) Casting conditions (or) post casting treatment
(B) Cross flow filtration
(C) Selective skin support
(D) Counter flow filtration
(E) Answer not known

151. Distillation column is fed with $F\frac{mol}{h}$ of concentration x_F and delivers D mol/h of overhead product of concentration x_D and B mol/h of bottom product of concentration x_B. The flow of vapor with in the column is related as

(A) $\frac{D}{F}=\frac{x_F-x_B}{x_D-x_B}$ (B) $\frac{D}{F}=\frac{x_D-x_B}{x_F-x_B}$

(C) $\frac{D}{F}=\frac{x_D-x_F}{1-x_B}$ (D) $\frac{D}{F}=\frac{1-x_B}{x_D-x_F}$

(E) Answer not known

152. The chief disadvantages of supercritical fluid extraction is the

(A) High pressure required
(B) Temperature required
(C) Fluid concentration
(D) Selection of solvent
(E) Answer not known

153. The moisture contained by the substance which exerts an equilibrium vapor pressure less than that of pure liquid at the same temperature

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

154. Fractional solvent extraction

(A) Employs only one solvent
(B) Employs double-solvent
(C) Results in low recovery
(D) Employs no solvent
(E) Answer not known

155. Flooding in a packed bed absorption column results due to

(A) High pressure drop
(B) Low pressure drop
(C) Low velocity of liquid
(D) High temperature
(E) Answer not known

156. Schmidt number is the ratio of

(A) $\frac{\text{Momentum diffusivity}}{\text{Thermal diffusivity}}$
(B) (Momentum diffusivity/mass diffusivity)
(C) (Thermal diffusivity/mass diffusivity)
(D) $\frac{\text{Mass diffusivity}}{\text{Momentum diffusivity}}$
(E) Answer not known

157. For mass transfer to an Isolated sphere as the Reynolds number approach zero, the Sherwood number approach a lower limit of

(A) 0
(B) 0.61
(C) 1
(D) 2
(E) Answer not known

158. Milk is pasteurized if it is heated to 336 k for 30 min. But if it is heated to 347 k it only needs 15 sec for the same result. Find the activation energy?

Activation energy and rate constant (K_1 and K_2) of chemical reaction at two different temperatures (T_1 and T_2) are related by

(A) $\ln\left(\frac{k_2}{k_1}\right)=\frac{-E}{R}\left(\frac{1}{T_2}-\frac{1}{T_1}\right)$

(B) $\ln\left(\frac{k_2}{k_1}\right)=\frac{-E}{R}\left(\frac{1}{T_2}+\frac{1}{T_1}\right)$

(C) $\ln\left(\frac{k_2}{k_1}\right)=\frac{E}{R}\left(\frac{1}{T_1}+\frac{1}{T_2}\right)$

(D) $\ln\left(\frac{k_2}{k_1}\right)=\frac{-E}{R}\left(\frac{1}{T_1},\frac{1}{T_2}\right)$

(E) Answer not known

159. The rate of reaction $A \rightarrow B$ doubles as the concentration of A, C_A is doubled. If the rate of reaction is proportional to C_A^n, then what is the value of n for this reaction?

(A) 0.5

(B) 2

(C) 1

(D) 0

(E) Answer not known

160. The flux J, relative to

(A) Characteristic nature of the constituent

(B) Application to design of equipments

(C) Diffusivity of the constituent

(D) Distance travelled by the constituent

(E) Answer not known

161. Choose the correct answer The purpose of feed forward control is to

(A) Eliminate the need for feed back control in a process

(B) Reduce the effect of load variation on the process variable

(C) Save energy

(D) Compensate for dead time and lag time in a process

(E) Answer not known

162. Typical control system design specifications for the gain and phase margins are

(A) < 1.7 and $> 30°$

(B) > 1.7 and $< 30°$

(C) > 1.7 and $> 30°$

(D) < 1.7 and $< 30°$

(E) Answer not known

163. The transfer function of the given proportional-Derivative controller is $G(s)=K_c(1+0.2)$ Find its corner frequency (W_c)

(A) $W_c=4$

(B) $W_c=1$

(C) $W_c=5$

(D) $W_c=1.5$

(E) Answer not known

164. The transfer function of a PID controller is

(A) $K_c\left(1+\tau_I S+\tau_D S\right)$

(B) $K_c\left(1+\frac{1}{\tau_I S}+\tau_D S\right)$

(C) $K_c\left(1+\tau_I S+\frac{1}{\tau_D S}\right)$

(D) $K_c\left(1+\frac{1}{\tau_I S}\right)$

(E) Answer not known

165. For given characteristic equation $s^4+2s^2+5s^2+4s+2=0$. The system is

(A) Stable
(B) Unstable
(C) Initially stable then unstable
(D) Initially unstable then stable
(E) Answer not known

166. The system with a transfer function of $\frac{4}{s^2+2s+4}$ is

(A) Over damped system
(B) Critically system
(C) Under damped system
(D) Undamped system
(E) Answer not known

167. The time required to achieve the fractional response of 0.5 of a first order system to a step change in input is

(A) $\tau \ln 10$
(B) $\tau \ln 5$
(C) $\tau \ln 4$
(D) $\tau \ln 2$
(E) Answer not known

168. The open loop transfer function of a control system is $K_R/(1+\tau s)$, this represents

(A) A first order system
(B) Dead time system
(C) A first order time lag
(D) A second order system
(E) Answer not known

169. Which is the most suitable instrument for measuring the temperature of a red hot furnace?

(A) Bimettalic thermometer
(B) Optical pyrometer
(C) Thermocouple
(D) Platinum resistance thermometer
(E) Answer not known

170. Match the process variables with the list of devices given below :

Process variables	Measuring devices
(p) Temperature	1. Bourdon tube element
(q) Pressure	2. Orifice plates
(r) Flow	3. Infrared analyzer
(s) Liquid level	4. Displacer devices
(t) Composition	5. Pyrometer

	(p)	(q)	(r)	(s)	(t)
(A)	5	1	2	4	3
(B)	3	1	4	2	5
(C)	1	3	4	2	5
(D)	3	1	2	4	5

(E) Answer not known

171. A control configuration is the information structure, used to connect available measurement to the available

(A) Manipulated variable
(B) Disturbance
(C) Measured output
(D) Unmeasured output
(E) Answer not known

172. Find the eigen values of $2A^2$ if $A=\begin{bmatrix}4 & 1\\ 3 & 2\end{bmatrix}$ without finding A^2?

(A) 5, 1
(B) 25, 1
(C) 50, 2
(D) 100, 2
(E) Answer not known

173. Find the classification of $F_x - f_{yy} = 0$?

(A) Elliptic
(B) Parabolic
(C) Hyperbolic
(D) Linear
(E) Answer not known

174. Gauss seidal method is also termed as ———— method

(A) Iterations
(B) False positions
(C) Successive displacement
(D) Eliminations
(E) Answer not known

175. Thermistor is a

(A) Semi conductor whose resistance decreases with increase in temperature
(B) Metal whose resistance increases linearly with temperature
(C) Metal whose resistance does not vary with temperature
(D) Device for measuring nuclear radiation
(E) Answer not known

176. ———— is a plot of overall variation of heat supply and demand across the entire process, which are zero at the pinch

(A) Grid diagram
(B) Hot composite curve
(C) Cold composite curve
(D) Grand composite curve
(E) Answer not known

177. The order of convergence of Newton's Raphson method

(A) 2
(B) 3
(C) 4
(D) 5
(E) Answer not known

178. The mathematical model equation, for a liquid level in a conical vessel is given by $\frac{dx}{dt} = -Kx^{-1.5} + \alpha u x^{-2}; \alpha = \frac{3.14 R^2}{H}$

$K = 0.117$ (value coefficient) assume $\alpha = 0.785$ R and H are the known dimensions of conical tank

(A) A 1% increase in u causes 2% change in x
(B) A 1% increase in u causes 1% changes in x
(C) A 2% increase in u causes 3% changes in x
(D) A 2% increase in u causes 1% changes in x
(E) Answer not known

179. In the degree of freedom analysis $N_F = N_V - N_E$ is said to be zero in mathematical model it means that the problem is ———— where N_V - number of variables involved in the equation; N_E - Number of independent equation

(A) Under determined
(B) Over determined
(C) Exactly determined
(D) Negatively determined
(E) Answer not known

180. In case of convex optimization programming problem, there will be

(A) No maxima
(B) Saddle point
(C) No minima
(D) Delta point
(E) Answer not known

181. Management of hazardous waste is listed under ———— of LDR program.

(A) 458 and 578
(B) 260 and 278
(C) 262 and 268
(D) 272 and 278
(E) Answer not known

182. Flotation technique is used in paper industry to recover

(A) Fine fibres
(B) Enzymes
(C) Paper pulp
(D) Solid impurities
(E) Answer not known

183. Maximum allowable noise exposure limits for a man working for 8 hours a day in a noisy chemical plant is about

(A) 20 Decibels
(B) 60 Decibels
(C) 90 Decibels
(D) 120 Decibels
(E) Answer not known

184. Select the correct option that contains the occupational diseases that are listed in Factories Act, 1948

(A) Anthrax and Silicosis
(B) Diarrhea and Lead poisoning
(C) Cholera and Byssinosis
(D) Diarrhea and Pneumoconiosis
(E) Answer not known

185. The particles of ———— are added to water containing nuclear waste, which makes the radio active materials into lumps within minutes.

(A) Alum
(B) Argon
(C) Neon
(D) Graphene
(E) Answer not known

186. A ———————— is a form of safe system of work operated where there may be a high degree of foreseeable risk.

(A) HAZOP
(B) Fault Tree Analysis
(C) Safety Culture
(D) Permit - to work system
(E) Answer not known

187. Which safety signs are indicated by a green square or rectangle with symbols and lettering in white?

(A) Prohibition signs
(B) Warning signs
(C) Mandatory signs
(D) Safe condition signs
(E) Answer not known

188. Extinguishing of fire through the process of isolating the fix from the supply of oxygen by blanketing it water foam, sand etc is known as

(A) Smothering
(B) Cooling
(C) Interruption of chain reaction
(D) Starring
(E) Answer not known

189. A petroleum storage tank containing 500 litres of petrol catches fire. Identify the type of fire that takes place in the above mentioned scenario.

(A) Class A fire
(B) Class B fire
(C) Class D fire
(D) Class C fire
(E) Answer not known

190. The number of disabling injuries per million man hours of operation is called as

(A) Threshold value
(B) Frequency rate
(C) Ceiling level
(D) Time-Weight average
(E) Answer not known

191. Name the fire detector that can be used to detect the fire at the incipient stage itself.

(A) Infrared flame detector
(B) Ultraviolet flame detector
(C) Ionization detector
(D) Optical smoke detector
(E) Answer not known

192. The HAZOP stand for

(A) Hazard and operability studies
(B) Hygiene and offshore studies
(C) Health and operation studies
(D) Hazardous and offshore studies
(E) Answer not known

193. Find out the treatment system to remove phosphorus from waste water.

(A) Ozonation
(B) Ion exchange
(C) Metal salt addition
(D) Electro dialysis
(E) Answer not known

194. Winkler method is used to find

(A) DO
(B) BOD
(C) COD
(D) TOC
(E) Answer not known

195. General term used for particles suspended in air is

(A) Aerosol
(B) Plume
(C) Smog
(D) Fume
(E) Answer not known

196. Choose the correct option which indicates point sources of water pollution :

(1) Acid Rain

(2) Agricultural run-off

(3) Municipal discharge pipes

(4) Industrial discharge pipes

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

197. In a waste water both inorganic and organic matters are measured by ———————— test.

(A) Biological Oxygen Demand (BOD)
(B) Chemical Oxygen Demand (COD)
(C) Turbidity meter
(D) Colorimeter
(E) Answer not known

198. Air pollution from automobiles can be controlled by fitting

(A) Catalytic converter
(B) Cyclone separator
(C) Fabric filter
(D) Electrostatic precipitator
(E) Answer not known

199. The chemical responsible for bhopal gas tragedy is

(A) Ammonia
(B) Methyl Isocyanate
(C) Chlorine
(D) Sulphur di oxide
(E) Answer not known

200. An example of Non-Persistent pollutant is

(A) Domestic sewage
(B) Pesticides
(C) Plastics
(D) Nuclear waste
(E) Answer not known