CH	COURSE	DAY : SUNDAY
	CHEMICAL ENGINEERING	TIME : 10.00 A.M. TO 1.00 P.M.

MAXIMUM MARKS	TOTAL DURATION	MAXIMUM TIME FOR ANSWERING
180	200 MINUTES	180 MINUTES

MENTION YOUR DIPLOMA CET NUMBER	QUESTION BOOKLET DETAILS	
	VERSION CODE	SERIAL NUMBER
	A – 4	170112

DOs :

1. Check whether the Diploma CET No. has been entered and shaded in the respective circles on the OMR answer sheet.
2. This Question Booklet is issued to you by the invigilator after the 2ⁿᵈ **Bell i.e., after 09.50 a.m.**
3. The Serial Number of this question booklet should be entered on the OMR answer sheet and the respective circles should also be shaded completely.
4. The Version Code of this question booklet should be entered on the OMR answer sheet and the respective circles should also be shaded completely.
5. compulsorily sign at the bottom portion of the OMR answer sheet in the space provided.

DON'Ts:

1. **THE TIMING AND MARKS PRINTED ON THE OMR ANSWER SHEET SHOULD NOT BE DAMAGED / MUTILATED / SPOILED.**
2. **The 3ʳᵈ Bell rings at 10.00 a.m., till then;**
   - Do not remove the paper seal of this question booklet.
   - Do not look inside this question booklet.
   - Do not start answering on the OMR answer sheet.

IMPORTANT INSTRUCTIONS TO CANDIDATES

1. This question booklet contains 180 (items) questions and each question will have one statement and four answers. (Four different options / responses.)
2. After the 3ʳᵈ **Bell is rung at 10.00 a.m.** remove the paper seal of this question booklet and check that this booklet does not have any unprinted or torn or missing pages or items etc., if so, get it replaced by a complete test booklet. Read each item and start answering on the OMR answer sheet.
3. During the subsequent 180 minutes:
   - Read each question (item) carefully
   - Choose one correct answer from out of the four available responses (options / choices) given under each question / item. In case you feel that there is more than one correct response, mark the response which you consider the best. In any case, choose only one response for each item.
   - **Completed darken / shade the relevant circle with a BLUE OR BLACK INK BALL POINT PEN against the question number on the OMR answer sheet.**

Correct Method of shading the circle on the OMR answer sheet is as shown below:

① ● ③ ④

4. Use the space provided on each page of the question booklet for Rough Work. Do not use the OMR answer sheet for the same
5. After the **last Bells is rung at 1.00 p.m.** stop marking on the OMR answer sheet and affix your left hand thumb **impression** on the OMR answer sheet as per the instructions.
6. Hand over the **OMR ANSWER SHEET** to the room invigilator as it is.
7. After separating the top sheet, the invigilator will return the bottom sheet replica (Candidate's copy) to you to carry home for self-evaluation.
8. Preserve the replica of the OMR answer sheet for a minimum period of **ONE year.**

[Turn Over

SEAL

PART - A
APPLIED SCIENCE

1. In the spectrum of scattered light the lines corresponding to wavelength greater than that of incident light are called

   1. Stokes lines
   2. Antistokes lines
   3. Fluorescent lines
   4. Incident lines

2. Resolving power of telescope is given by

   1. $\dfrac{d}{1.22\lambda}$
   2. $\dfrac{1.22\lambda}{d}$
   3. $\dfrac{1.22d}{\lambda}$
   4. $\dfrac{\lambda}{1.22d}$

3. To observe diffraction pattern the obstacle should be

   1. Very big
   2. Dark
   3. Absent
   4. Comparable with the wavelength of light

4. When double refraction occurs, extraordinary ray and ordinary rays will have vibrations in the planes _____ to one another

   1. Parallel
   2. Independent
   3. Perpendicular
   4. At 45°

5. Maxwell's electromagnetic theory could explain

   1. Photo electric effect
   2. Interference of light
   3. Compton effect
   4. Black body radiation

6. The contrast between bright and dark bands of an interference pattern is

   1. Low
   2. High
   3. No change
   4. Gradually decreases

7. A non-electrolyte solution is

   1. Sugar solution
   2. Salt solution
   3. Water
   4. Copper sulphate solution

Space For Rough Work

8. In alkalies the concentration of OH^- ions is

    1. More than 10^{-7}g ions / litre   2. Less than 10^{-7}g ions / litre

    3. Equal to 10^{-7}g ions / litre   4. More than 10^7g ions / litre

9. An example of derived unit is

    1. Meter   2. Second   3. Netwon   4. Candela

10. The prefix used for 10^{-15} is

    1. Femto   2. Pico   3. Peta   4. Nano

11. An example of dimensionless constant is

    1. Strain   2. Efficiency   3. Force   4. Pi

12. A main scale is divided into half mm and having a Vernier containing 10 divisions has a least count of _____cm.

    1. 0.05   2. 0.005   3. 0.02   4. 0.025

13. According to Newton's second law of motion F = Kma. The value of K is

    1. 0.1   2. 0   3. 10   4. 1

14. The velocity of a freely falling body is maximum

    1. At the beginning   2. Just before it touches ground

    3. Exactly half way   4. After it touches ground

15. Wet clothes are dried in washing machine by the property of

    1. Inertia of rest   2. Inertia of direction

    3. Inertia of motion   4. Inertia of time

16. A force of 1.2×10^{-2} N acts for 3 seconds on a body of mass 0.04kg at rest. The velocity gained by the body is

    1. 0.9 m/s   2. 9 m/s   3. 0.09 m/s   4. 9.2 m/s

Space For Rough Work

17. An example of vector quantity is

    1. Volume   .   2. Energy   3. Density   4. Force

18. Handle of the door is fixed away from the end where it is fixed with hinges to

    1. Increase the moment of force   2. Decrease the moment of force

    3. Keep the door firm   4. Lock it easily

19. Resultant of two equal forces perpendicular to each other acts at an angle _____ to first force

    1. 90°   2. 180°   3. 30°   4. 45°

20. The resultant of two forces acting on a body cannot be

    1. Greater than first force

    2. Zero

    3. Lesser than first force

    4. Lesser than the difference between two forces

21. Towing of a boat by two forces is an illustration of

    1. Lami's theorem   2. Law of triangle of forces

    3. Law of parallelogram of forces   4. Law of polygon of forces

22. Shock absorber is an example for

    1. Compressive stress   2. Tensile stress

    3. Shear stress   4. Shear strain

23. Factor of safety of a structure is

    1. Within 2   2. Equal to zero

    3. Vary between 5 and 10   4. More than 10

24. In case of liquids as the temperature increases, the viscosity of liquid decreases due to

    1. Increase in the rate of diffusion of gases

    2. Decrease in the rate of diffusion of gases

    3. Increase in the potential energy of molecules

    4. Increase in the kinetic energy of molecules

Space For Rough Work

25. One Pascal is equal to

    1. 10 dynes/cm^2 2. 1 dyne / cm^2

    3. 100 dynes / cm^2 4. 0.1 dyne / cm^2

26. To calm down turbulent sea, sailors use oil to

    1. Decrease surface tension   2. Increase surface tension

    3. Decrease viscosity   4. Increase cohesive force

27. The thrust on the bottom of the container having a base area of 20 m^2 filled with water to a height of 3 m is _____ (given g =10m/s^2)

    1. 6 x 10^5 N   2. 6 x 10^4 N   3. 6 x 10^3 N   4. 6 x 10^2 N

28. Amount of heat required to raise the temperature of 1 kg of water through 1°C is

    1. One calorie   2. One joule   3. One kilo-calorie   4. One kilojoule

29. Absolute scale of temperature has its zero at

    1. 0°C   2. –100°C   3. 273°C   4. – 273°C

30. In case of an ideal gas, the value of pressure or volume co-efficient is

    1. $\dfrac{1}{273}$ 2. $-\dfrac{1}{273}$ 3. 273   4. –273

31. The distance travelled by the disturbance per unit time in a given direction is

    1. Wave amplitude   2. Wave velocity

    3. Wave frequency   4. Wavelength

32. The speed of the transverse wave along the stretched string is given by

    1. $V=\sqrt{\dfrac{T}{m}}$ 2. $V=\sqrt{\dfrac{m}{T}}$ 3. $V=\sqrt{\dfrac{1}{T}}$ 4. $V=\dfrac{\sqrt{m}}{T}$

Space For Rough Work

33. Absorption co-efficient of sound wave is given by _____. Where E_m is energy absorbed by the given medium E_{ow} is the energy absorbed by open window.

1. $a = \dfrac{E_m}{E_{ow}}$ 2. $a = \dfrac{E_{ow}}{E_m}$ 3. $a = E_m \times E_{ow}$ 4. $a = E_m + E_{ow}$

34. The rich quality of a musical note depends on
    1. Fundamental frequency   2. Loudness
    3. Larger number of over tones   4. Pitch

35. Waxing and waning are the characteristics of
    1. Periodic motion   2. Oscillations   3. Beats   4. Frequency

36. Velocity of sound in air varies
    1. Inversely as the square root of the density of the medium
    2. Directly as the square root of the density of the medium
    3. Directly as the density of medium
    4. Inversely as the density of medium

37. The vibrations of a body of decreasing amplitude are called
    1. Undamped free vibrations   2. Damped free vibrations
    3. Resonant vibrations   4. Forced vibrations

38. Another name for field emission is
    1. Cold cathode emission   2. Thermionic emission
    3. Photoelectric emission   4. Secondary emission

39. In case of photoelectric emission, the rate of emission of electron is
    1. Independent of frequency of radiation
    2. Dependent on frequency of radiation
    3. Dependent on wavelength of incident radiation
    4. Independent of intensity of radiation

40. Emission of radiation from radioactive element is
    1. Slow   2. Fast   3. Spontaneous   4. Very slow

Space For Rough Work

PART - B
APPLIED MATHEMATICS

41. $\displaystyle\int_{-1}^{1}(2x+1)(5-x)\,dx$ is

1. 10　　　　2. $\dfrac{26}{3}$　　　　3. $\dfrac{-26}{3}$　　　　4. $\dfrac{11}{3}$

42. $\displaystyle\int_{0}^{\pi/4} \tan^2 x\ \sec^2 x\ dx$ is

1. $\dfrac{1}{3}$　　　　2. $\dfrac{4}{3}$　　　　3. $\dfrac{1}{2}$　　　　4. $\dfrac{-1}{3}$

43. The RMS value of $y^2 = x^2 - 2x$ over the interval $[1, 3]$ is

1. $\sqrt{\dfrac{5}{3}}$　　　　2. $\sqrt{\dfrac{2}{3}}$　　　　3. $\dfrac{1}{3}$　　　　4. $\dfrac{1}{\sqrt{3}}$

44. The differential equation of $y^3 = 5\,ax$ by eliminating arbitrary constant a is

1. $\dfrac{dy}{dx} - \dfrac{y}{3x} = 0$　　　　　　2. $\dfrac{dy}{dx} + \dfrac{y}{3x} = 0$

3. $\dfrac{dy}{dx} - \dfrac{3y}{x} = 0$　　　　　　4. $\dfrac{dy}{dx} - \dfrac{5y}{3x} = 0$

45. The integrating factor of the differential equation $x\dfrac{dy}{dx} - (1-x)y = x^3$ is

1. $\dfrac{e^x}{x}$　　　　2. xe^x　　　　3. $e^{\frac{x^2-2x}{2}}$　　　　4. $e^{\frac{2x-x^2}{2}}$

Space For Rough Work

46. If $\begin{vmatrix} 2x+1 & -5x \\ 1 & 3 \end{vmatrix} = 0$, then x is

   1. $\dfrac{3}{11}$
   2. $\dfrac{-3}{11}$
   3. $\dfrac{11}{3}$
   4. $-\dfrac{11}{3}$

47. For the simultaneous linear equations $2x+y+z=1$, $x+y+2z=0$ and $3x+2y-z=2$, the value of Δx is

   1. 3
   2. -11
   3. -7
   4. -3

48. If $A = \begin{bmatrix} 2 & 3 \\ 5 & 4 \end{bmatrix}$, $B = \begin{bmatrix} -1 & 7 \\ -4 & 1 \end{bmatrix}$ then $(A+B)^T$ is

   1. $\begin{bmatrix} 1 & 1 \\ 10 & 5 \end{bmatrix}$
   2. $\begin{bmatrix} 1 & 10 \\ 1 & 5 \end{bmatrix}$
   3. $\begin{bmatrix} -1 & 10 \\ -1 & 5 \end{bmatrix}$
   4. $\begin{bmatrix} -1 & -1 \\ 10 & 5 \end{bmatrix}$

49. If $A = \begin{bmatrix} 1 & -3 \\ -5 & 7 \end{bmatrix}$, then adj A is

   1. $\begin{bmatrix} 1 & -5 \\ -3 & 7 \end{bmatrix}$
   2. $\begin{bmatrix} 7 & -5 \\ -3 & 1 \end{bmatrix}$
   3. $\begin{bmatrix} -1 & -5 \\ -3 & -7 \end{bmatrix}$
   4. $\begin{bmatrix} 7 & 3 \\ 5 & 1 \end{bmatrix}$

50. The cofactor of O in $A = \begin{bmatrix} 3 & -2 & 5 \\ 1 & 6 & 0 \\ 2 & 7 & -4 \end{bmatrix}$ is

   1. -25
   2. 25
   3. -17
   4. 0

Space For Rough Work

51. If $\left(\sqrt{3}+1\right)^3 = 10+6\sqrt{3}$, then the value of $\left(\sqrt{3}+1\right)^3 - \left(\sqrt{3}-1\right)^3$ is

1. $12\sqrt{3}$ 2. 0 3. 20 4. $20+\sqrt{3}$

52. The middle term in the expansion of $\left(x^3 + \dfrac{1}{x^2}\right)^6$

1. $10\,x^3$ 2. $20\,x^3$ 3. $\dfrac{20}{x^3}$ 4. 20

53. If $\vec{a} = i+3j-2k$ and $\vec{b} = 2i-j+3k$, then $\vec{a}\cdot\vec{b}$ is

1. -5 2. 11 3. 7 4. -7

54. The work done by the force $2i-j+6k$ when it displaces the particle from (5, 3, −2) to (7, −4, 8) is

1. 72 2. 48 3. −71 4. 71

55. The sine of the angle between the vectors $\vec{a} = i+j+k$ and $\vec{b} = 2i-3j-4k$ is

1. $\sqrt{\dfrac{62}{87}}$ 2. $\sqrt{\dfrac{87}{62}}$ 3. $\dfrac{-5}{\sqrt{87}}$ 4. $\sqrt{\dfrac{10}{63}}$

56. If $\cos\theta = \dfrac{5}{13}$ and θ is acute angle, then the value of $3\cos\theta - 2\sin\theta$ is

1. $\dfrac{9}{13}$ 2. 3 3. $\dfrac{-9}{13}$ 4. -3

Space For Rough Work

57. If $x \sin 30° - Sec\ 30° \tan 30° = \tan^2 60°$, then the value of x is

1. $\dfrac{22}{3}$

2. $\dfrac{-22}{3}$

3. $\dfrac{11}{6}$

4. $\dfrac{3}{22}$

58. The value of $\sin 225° + \cos\left(-135°\right)$ is

1. $\sqrt{2}$

2. $-\sqrt{2}$

3. $\dfrac{1}{\sqrt{2}}$

4. $\dfrac{-1}{\sqrt{2}}$

59. The simplified value of $\dfrac{\sin\left(180°-A\right)\cot\left(90°-A\right)\cos\left(360°-A\right)}{\tan\left(180°+A\right)\tan\left(90°+A\right)\sin\left(-A\right)}$ is

1. $\sin A$

2. $-\sin A$

3. 1

4. $cosec\ A$

60. The simplified value of $\dfrac{\sin 2A}{1+\cos 2A}$ is

1. $2\tan A$

2. $\sin A$

3. $\cot A$

4. $\tan A$

61. If $\tan A = \dfrac{3}{4}$ and $\tan B = \dfrac{1}{7}$, then the value of (A+B) is

1. $\dfrac{\pi}{6}$

2. $\dfrac{25}{23}$

3. $\dfrac{\pi}{4}$

4. $\dfrac{23}{25}$

62. The value of $\cos 20° + \cos 100° + \cos 140°$ is

1. 0

2. $\cos 50°$

3. $\dfrac{1}{2}$

4. $\sin 50°$

Space For Rough Work

63. The value of $\cos^{-1}\left[\tan 135°\right]$ is

1. $0°$
2. $180°$
3. $45°$
4. $90°$

64. The centroid of the triangle formed by the vertices $(-10, 6)$, $(2, -2)$ and $(2, 5)$ is

1. $(-2, 3)$
2. $(2, 3)$
3. $\left(-3, \dfrac{9}{2}\right)$
4. $(-6, 9)$

65. A point $(-4, 3)$ divides the line AB externally in the ratio of $1 : 2$. Given $A(-1, -3)$ then the point B is

1. $(6, -3)$
2. $(-10, 15)$
3. $(2, 9)$
4. $(2, -9)$

66. The area of triangle formed by the point, $(3, -1)$, $(2, 0)$ and $(K, 4)$ is 10 Sq. Units, then the value of K is

1. 12
2. 7
3. -22
4. 22

67. The slope of the line joining the points $(-2, 3)$ and $(4, -6)$ is

1. $\dfrac{3}{2}$
2. $\dfrac{-3}{2}$
3. $\dfrac{2}{3}$
4. $\dfrac{-2}{3}$

68. The equation of straight line passing through $(4, -1)$ and having equal intercepts is

1. $x+y-1=0$
2. $x+y-5=0$
3. $x+y-3=0$
4. $x+y+3=0$

69. The equation of the line passing through $(5, -2)$ and parallel to the line $3x+2y+7=0$ is

1. $3x+2y-11=0$
2. $3x-2y+11=0$
3. $3x-2y-19=0$
4. $2x-3y-16=0$

Space For Rough Work

70. The value of $\displaystyle \lim_{x \to -2} \frac{x+2}{x^5+32}$ is

   1. $\dfrac{1}{80}$ 2. 80   3. $\dfrac{-1}{80}$ 4. -80

71. The value of $\displaystyle \lim_{x \to 0} \frac{2x-\tan 3x}{\sin 2x+3x^2}$ is

   1. $\dfrac{-1}{5}$ 2. 0   3. $\dfrac{1}{2}$ 4. $-\dfrac{1}{2}$

72. If $y = e^x \log x$, then $\dfrac{dy}{dx}$ at $x=1$ is

   1. e^x 2. e   3. 1   4. 0

73. If $y = \tan^{-1}\sqrt{\dfrac{1+\cos x}{1-\cos x}}$, then $\dfrac{dy}{dx}$ is

   1. 2   2. -2 3. $\dfrac{-1}{2}$ 4. $\dfrac{1}{2}$

74. If $\sqrt{x^3}+\sqrt{y^3}=\sqrt{a^3}$, then $\dfrac{dy}{dx}$ is

   1. $\sqrt{\dfrac{x}{y}}$ 2. $-\sqrt{\dfrac{x}{y}}$ 3. $\sqrt{\dfrac{y}{x}}$ 4. $-\sqrt{\dfrac{y}{x}}$

75. The second derivative of $y = \log(\sec x - \tan x)$ is

   1. $-\sec x \tan x$ 2. $\sec x \tan x$ 3. $-\sec x$ 4. $\sec x$

Space For Rough Work

76. Water flows into the cylindrical tank of radius 7mt at the rate of 294 cubic mt/sec, then the rate of height of water rising in the tank is

1. $\dfrac{\pi}{6} mt / sec$
2. $\dfrac{6}{\pi} mt / sec$
3. $14406 \; mt / sec$
4. $\dfrac{21}{\pi} mt / sec$

77. The maximum value of the function $y = x + \dfrac{1}{x}$ is

1. 0
2. 2
3. 1
4. −2

78. The value of $\int tan^2 x \; dx$ is

1. $tan \; x - x + c$
2. $x - tan \; x + c$
3. $\left(sec^2 x\right)^2 + c$
4. $-cot \; x - x + c$

79. The value of $\int \dfrac{cos \; x}{1 + sin \; x} \; dx$ is

1. $log\left(sec^2 x + sec \; x \; tan \; x\right) + c$
2. $log\left(sin \; x\right) + c$
3. $log\left(1 + sin \; x\right) + c$
4. $\dfrac{\left(1 + sin \; x\right)^2}{2} + c$

80. $\int sin^2 x \; sin \; 2x \; dx$ is

1. $\dfrac{sin^2 x}{2} + c$
2. $\dfrac{sin^4 x}{2} + c$
3. $sin^2 x + c$
4. $\dfrac{-sin^4 x}{2} + c$

Space For Rough Work

PART - C
CHEMICAL ENGINEERING

81. Synthetic detergent powder is produced by using

    1. Spray dryer   2. Cylinder dryer   3. Drum dryer   4. Pan evaporator

82. Number of gram moles of solute dissolved in one litre of a solution is called its

    1. Equivalent weight   2. Molarity   3. Molality   4. Normality

83. 1 gram mole of methane (CH_4) contains

    1. 6.02×10^{23} atoms of hydrogen   2. 4 gram atoms of hydrogen

    3. 3.01×10^{23} molecules of methane   4. 3 grams of carbon

84. "The total volume occupied by a gaseous mixture is equal to the sum of the pure component volumes." This is the _____ law

    1. Dalton's law   2. Amagert's law   3. Gay-Lussac's law 4. Avogadro's law

85. Volume percent for gases is equal to the _____

    1. Weight percent   2. Mole percent

    3. Weight percent only for ideal gases   4. Mole percent only for ideal gases

86. Average molecular weight of air is about

    1. 21   2. 29   3. 23   4. 79

87. Avogadro's number is equal to

    1. 6.023×10^{23} 2. 6.023×10^{22} 3. 6.022×10^{22} 4. 6.023×10^{24}

88. 'Giga' stands for

    1. 10^9 2. 10^{-12} 3. 10^{12} 4. 10^{15}

Space For Rough Work

89. CaCO$_3$ contains _____ percent of Ca by weight

    1. 40   2. 48   3. 96   4. 12

90. Unit of power is

    1. Joule   2. Watt   3. Joule per second   4. Both 2 & 3

91. A limiting reactant is the one, which decides the _____ in a chemical reaction

    1. Equilibrium constant   2. Conversion

    3. Rate constant   4. Size

92. The most suitable instrument for measuring temperature of a red hot furnace is

    1. Resistance thermometer   2. Thermocouple

    3. Optical pyrometer   4. Bimetallic thermometer

93. Which of the following is a desirable characteristic of an instrument ?

    1. High drift   2. High fidelity

    3. High measuring lag   4. Poor reproducibility

94. Thermocouple is suitable for measuring

    1. Liquid temperature only   2. Very high temperature only

    3. Very low temperature only   4. Both high and low temperature

95. Psychometer determines the

    1. Humidity of gases   2. Moisture content of solids

    3. Water of crystallisation   4. Hygroscopic nature of solids

96. A barometer measures the _____ pressure

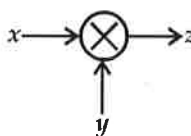   1. Absolute   2. Gauge   3. Atmospheric   4. Vacuum

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Space For Rough Work

97. Continuous measurement of specific gravity of a liquid is done by

    1.   Hydrometer   2.   Contact type electric indicator

    3.   Psychrometer   4.   Sight glass

98. Measurement of pressure in ammonia reactor is done by

    1.   U tube manometer   2.   Pirani gauge

    3.   Bourdon gauge   4.   Inclined tube manometer

99. Emf generated by thermocouples is of the order of _____

    1.   Millivolts   2.   Microvolts   3.   Volts   4.   Kilovolts

100. A pH meter has _____ cells

    1.   One   2.   Two   3.   Three   4.   No

101. Which type of controller use flapper nozzle mechanism?

    1.   Hydraulic   2.   Electronic   3.   Computer   4.   Pneumatic

102. Humidity is most commonly measured by

    1.   Vapor pressure determination

    2.   Dry and wet bulb temperature measurement

    3.   Physical expansion

    4.   Evaporation

103. On-off control is a special case of _____ control

    1.   P   2.   P–I–D   3.   P–D   4.   P–I

104. Which of the following is a controlled variable heat exchanger ?

    1.   Flowrate of cooling fluid   2.   Outlet temperature of cooling fluid

    3.   Inlet temperature of cooling fluid   4.   Inlet temperature of heating fluid

Space For Rough Work

105. Which of the following controllers require minimum stabilising time ?

   1.   P–I   2.   P–D   3.   P   4. P–I–D

106. What is absent in a self operated controller ?

   1.   Controlling element   2.   Input signal

   3.   Final control element   4.   Measuring element

107. The symbol

   $x \longrightarrow \bigotimes \longrightarrow z$
   $\uparrow$
   y

   in a block diagram stands for

   1.   Multiplier   2.   Dynamic function

   3.   Summing junction   4.   Final control element

108. Continuous measurement of acidity in a fertilizer neutraliser is done by

   1.   Chromatograph   2.   Spectrometer

   3.   pH meter   4.   Thermal conductivity cell

109. Derivative control is used

   1.   Alone   2.   Along with proportional control

   3.   Along with Integral control   4.   Along with on-off control

110. Addition of I-controller to P-controller eliminates the

   1.   Stabilising time   2.   Maximum deviation

   3.   Offset   4.   Error

111. Diaphragm control valve is used for

   1.   Fluids of high viscosity   2.   Corrosive chemical liquids

   3.   Granules of solid material   4.   Low viscous liquids

Space For Rough Work

112. Atomic weight of an element is equal to the sum of _____

    1.   Numbers of protons and neutrons

    2.   Masses of protons and neutrons

    3.   Masses of protons, neutrons and electrons

    4.   Numbers of protons, neutrons and electrons

113. Equivalent mass of an element is equal to the _____

    1.   Product of atomic mass and valency

    2.   Ratio of atomic mass to valency

    3.   Ratio of atomic number to valency

    4.   Product of atomic number and valency

114. When a chemical reaction occurs between decinormal solutions of hydrochloric acid and sodium hydroxide, then the enthalpy change is said to be _____

    1.   Enthalpy of solution   2.   Enthalpy of combustion

    3.   Enthalpy of formation   4.   Enthalpy of neutralisation

115. Law of conservation of energy is explained by

    1.   Zeroth Law of thermodynamics   2.   Second Law of Thermodynamics

    3.   First Law of Thermochemistry   4.   Second Law of Thermochemistry

116. The correct relationship between K_c and K_p is _____

    1. $K_c = K_p (RT)^{\Delta n}$ 2. $K_c = K_p (RT)^{1/\Delta n}$

    3. $K_p = K_c (RT)^{\Delta n}$ 4. $K_p = K_c (RT)^{1/\Delta n}$

117. High entropy increases the rate of reactions, in such case which of the following is in the correct order ?

    1.   Solid < liquid < gas   2.   Liquid < gas < solid

    3.   gas < liquid < solid   4.   liquid < solid < gas

Space For Rough Work

118. The spontaneity of a reaction depends on ΔH, ΔS, ΔG in the order of _____ values respectively

    1.   Negative, positive and negative   2.   Positive, positive and positive

    3.   Negative, negative and negative   4.   Positive, negative and positive

119. Molecularity of a chemical reaction is linked with

    1.   Concentration of reactants

    2.   Temperature applied

    3.   Pressure applied

    4.   Total number of reactant molecules involved

120. The amount of electric current passed through an aqueous solution of a salt depends on

    1.   Nature of electrodes   2.   Ionic concentration of electrolyte

    3.   Temperature used   4.   Presence of a catalyst

121. According to _____ theory acids are protogenic and bases are protophilic

    1.   Arrhenius   2. Bronsted-Lowry   3.   Lewis   4.   Ostwald's

122. The unique characterestic of carbon is its _____ property

    1.   Isomerism   2. Complexity   3.   Catenation   4.   Solubility

123. Cyclohexane belongs to _____ hydrocarbons

    1.   Aliphatic   2. Aromatic   3.   Alicyclic   4.   Acyclic

124. Which of the following is not a characteristic of homologous series of hydrocarbons ?

    1.   They can be represented by a general formula

    2.   They differ from their neighbour members by CH2 unit

    3.   They can be prepared by similar methods

    4.   They have same melting points, boiling points and densities

Space For Rough Work

125. Identify the type of chemical reaction $R - CH = CH_2 + H - X \rightarrow R - \underset{\underset{X}{|}}{C}H - CH_3$

    1. Substitution   2. Hydrogenation   3. Halogenation   4. Addition

126. Which of the following chemical compounds undergo addition reaction?

    1. Saturated   2. Unsaturated   3. Aromatic   4. Both 2 & 3

127. Ethanol and methoxy methane belong to _____ isomerism

    1. Nuclear   2. Position   3. Functional   4. Stereo

128. IUPAC name of $CH_3\text{-}\underset{\underset{CH_2\text{-}CH_3}{|}}{CH}\text{-}CH_3$ is

    1. 1, 2 – Dimethyl propane   2. 2 – Ethyl propane

    3. 2 – Methyl butane   4. 2 – Propyl ethane

129. IUPAC name of $CH_3\text{-}\underset{\underset{CH_3}{|}}{CH}\text{-}\underset{\underset{Cl}{|}}{CH}\text{-}CHO$ is

    1. 2 – Methyl – 3 – chlorobutanal

    2. 2 – chloro – 3 – methyl butanal

    3. 2 – chloro – 3, 3' – dimethyl – propanal

    4. 2 – chloro – pentanal

130. Cetane number of diesel used in trucks may be about

    1. 35   2. 50   3. 85   4. 100

131. The main purpose of adding phenol to gasoline is to

    1. Improve the octane number   2. Act as an antioxidant

    3. Reduce its viscosity   4. Increase its pour point

Space For Rough Work

132. Soft and non-abrasive material can be made into fines by

    1.   Attrition   2. Compression   3. Cutting   4. None of the above

133. The operating speed of a ball mill should be _____ the critical speed

    1.   Less than   2. Much more than 3. Atleast equal to 4. Slightly more than

134. A fluid energy mill is used for

    1.   Cutting   2. Grinding   3. Ultragrinding   4. Crushing

135. Screen capacity is not a function of

    1.   Its opening size   2. Screening mechanism

    3.   Screening surface   4. Atmospheric humidity

136. Mixing mechanism employed in a pan mixer is by

    1.   Mulling   2. Kneading   3. Dispersion   4. Cutting

137. Use of baffles in agitators help in minimising the _____ tendency

    1.   Swirling   2. Vortexing

    3.   Both swirling and vortexing   4. Paddling

138. Which of the following crushing law is most accurately applicable to the fine grinding of materials ?

    1.   Bond's law   2. Kick's law   3. Rittingers law   4. None of the above

139. _____ mixer is used for devulcanisation of rubber scrap and making water dispersion and rubber solution

    1.   Tumbler   2. Bambury   3. Muller   4. Ribbon Blender

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Space For Rough Work

140. _____ baffles are provided in ball mills

    1.   Horizontal   2. Vertical   3. Only two   4. No

141. A _____ mixer resembles a ball mill without balls

    1.   Bambury   2. Pug mill   3. Tumbling   4. Pan

142. Dimension of absolute viscosity is _____

    1. MLT^{-1} 2. $ML^{-1}T$ 3. $ML^{-1}T^{-1}$ 4. $M^{-1}LT$

143. A fluid in which the shearing stress within it is proportional to the velocity gradient across the sheared section, is called a _____ fluid

    1.   Bingham   2. Newtonian   3. Pseudoplastic   4. Dilatant

144. An ideal fluid is

    1.   non-viscous and compressible   2. incompressible and viscous

    3.   non-viscous and incompressible   4. viscous and compressible

145. Pitot tube measures the _____ of a fluid

    1.   Pressure   2. Maximum velocity

    3.   Average velocity   4. Point velocity

146. Small pressure differences in liquids is measured using a/an

    1.   U - tube manometer   2. Inclined tube manometer

    3.   Orificemeter   4. Venturimeter

147. A tube is specified by its _____

    1.   Thickness only   2. Outer diameter only

    3.   Thickness and outer diameter both   4. Thickness and inner diameter both

Space For Rough Work

148. Bernoulli's equation describes the

    1.   Mechanical energy balance in potential flow

    2.   Kinetic energy balance in laminar flow

    3.   Mechanical energy balance in turbulent flow

    4.   Mechanical energy balance in boundary layer

149. Pipes having diameter 14 inches or more are designated by

    1.   Outside diameter   2.   Inside diameter

    3.   Schedule number   4.   BWG number

150. The pressure head of a flowmeter remains constant for

    1.   Orifice meter   2. Venturimeter   3.   Pitot tube   4.   Rotameter

151. The most serious disadvantage of an orificemeter is that

    1.   It is not very accurate

    2.   It is very costly

    3.   Most of the pressure lost is not recoverable

    4.   It is not suitable for measuring gas flow

152. Plunger pumps are used for

    1.   Viscous mass   2. Corrosive liquids 3.   Higher pressures   4.   Slurries

153. The valve used for very remote and accurate control of fluid flow is

    1.   Gate valve   2. Needle valve   3.   Check valve   4.   Globe valve

154. Glass pipes are joined by

    1.   Welding   2.   Flanges

    3.   Soldering   4.   Bell and Spigot joint

Space For Rough Work

155. Head developed by a centrifugal pump depends on
    1. Speed of the impeller
    2. Diameter of the impeller
    3. Both speed and diameter of the impeller
    4. Neither speed nor diameter of the impeller

156. Reciprocating pumps compared to centrifugal pumps
    1. Can handle slurries more efficiently
    2. Deliver liquids at uniform pressure
    3. Can be operated with delivery valve closed
    4. Are not subject to air binding

157. For connecting more than two branches of pipes at the same point, use a/an
    1. Elbow   2. Bend   3. Union   4. Tee

158. Which of the following is a gas moving equipment ?
    1. Blower   2. Reciprocating pump
    3. Centrifugal pump   4. Rotary pump

159. Erosion and pit formation on the impeller of a centrifugal pump may be due to
    1. Cavitation
    2. Low speed of impeller
    3. Its operation with delivery valve closed for considerable time after starting the pump
    4. Off centering of pump with motor

160. Multistage centrifugal pumps generally used for
    1. Highly viscous liquids   2. Low head but high discharge
    3. Slurries with high solid concentration   4. High head

161. Gear pump is
    1. Non-positive displacement pump   2. Positive displacement pump
    3. Centrifugal pump   4. Started with delivery valve closed

Space For Rough Work

162. Thermal conductivity is minimum for

1. Ashpalt
2. Petroleum coke
3. Water
4. Air

163. Select the wrong statement

1. Heat can be converted into work
2. Heat can be reflected by a mirror
3. Heat waves cannot pass through vacuum
4. Heat is a form of energy

164. Log-mean transfer area for the two heat transfer areas A_1 and A_2 is given by

1. $\dfrac{(A_1 - A_2)}{ln\left(A_2/A_1\right)}$

2. $\dfrac{(A_1 - A_2)}{ln\left(A_1/A_2\right)}$

3. $(A_1 - A_2)ln\left(A_1/A_2\right)$

4. $\dfrac{ln\left(A_1/A_2\right)}{(A_1 - A_2)}$

165. Heat transfer by radiation is described by

1. Newton's law of viscosity
2. Fick's law
3. Fourier's law
4. Stefan-Boltzmann law

166. Absorptivity of the perfect black body is

1. 1
2. 0
3. 0.5
4. ∞

167. 1–4 shell and tube heat exchanger means

1. 1 shell side pass and 4 tube side passes
2. 4 shell side passes and 1 tube side pass
3. 4 tubes per pass
4. 4 shell side passes and 4 tube side passes

Space For Rough Work

168. Baffles used on shell side of a heat exchanger will
   1. Decrease heat transfer rate
   2. Increase heat transfer rate
   3. Not affect heat transfer rate
   4. Decrease pressure drop on shell side

169. The purpose of steam trap is
   1. To condense steam
   2. To release excess pressure
   3. To remove condensate and inert gases
   4. To remove water

170. The boiling point of a solution is affected by
   1. Boiling point elevation only
   2. Liquid head only
   3. Both boiling point elevation and liquid head
   4. Liquid side heat transfer co efficient

171. The surface tension of water
   1. is independent of temperature
   2. Decreases with increasing temperature
   3. Increases with increasing temperature
   4. Initially decreases and then increases with increasing temperature

172. According to Fick's law of diffusion, the flux is directly proportional to
   1. Pressure difference
   2. Temperature gradient
   3. Concentration gradient
   4. Density difference

173. In a cooling tower, make up fresh water must be added to replace losses from
   1. Entrainment
   2. Evaporation losses
   3. Blow down
   4. All of the above

174. The diffusivity has the same dimensions as
   1. Absolute viscosity
   2. Kinematic viscosity
   3. Density
   4. Concentration

Space For Rough Work

175. Flash distillation operation is suitable for separating components which

1. Boil at very close temperatures
2. Boil at widely different temperatures
3. Form minimum boiling azeotrope
4. Form maximum boiling azeotrope

176. In a distillation operation, the heat removed in condenser

1. Remains unaffected with change in reflux ratio
2. Increases with increase in reflux ratio
3. Decreases with increase in reflux ratio
4. None of the above

177. At total reflux the capacity of a distillation column is

1. Zero
2. Maximum
3. Minimum
4. Optimum

178. Bound moisture in a solid is that liquid which exerts an equilibrium vapor pressure

1. Equal to that of the pure liquid at the given temperature
2. Less than that of pure liquid at the given temperature
3. Greater than that of pure liquid at the given temperature
4. Zero

179. The rate of drying during constant rate period

1. Is unaffected by the air temperature
2. Decreases with increase in air temperature
3. Increases with increase in air temperature
4. None of the above

180. Rotary dryers are

1. Used to make milk powder
2. Used to make synthetic detergent powder
3. Suitable for handling free flowing granular materials
4. Suitable for handling sticky materials

Space For Rough Work