DIPLOMA - COMMON ENTRANCE TEST-2017

CH	COURSE	DAY : SUNDAY DATE : 02-07-2017
	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 - 1	207089

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 / polythene bag 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 / polythene bag 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.
   - **Completely 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 :

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 Bell 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. Handover the **OMR ANSWER SHEET** to the room invigilator as it is.
7. After separating the top sheet (KEA copy), 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.**

PART – A

APPLIED SCIENCE

1. The S.I. unit of Coefficient of Viscosity is

   (A) Poise (B) NSm^{-2}

   (C) $NS^{-1}m^2$ (D) $NS^{-1}m^{-2}$

2. The prefix used for 10^{+9} is

   (A) Mega (B) Tera

   (C) Giga (D) Hecta

3. The physical quantity which has the dimensional formula $[ML^0T^{-2}]$ is

   (A) Force (B) Surface tension

   (C) Viscosity (D) Work

4. The least count of slide callipers is given by

   (A) 1 MSD + 1 VSD (B) 1 MSD × 1 VSD

   (C) 1 MSD – 1 VSD (D) $\frac{1\text{ MSD}}{1\text{ VSD}}$

5. The product of force and time is

   (A) Momentum (B) Moment

   (C) Impulse (D) Acceleration

6. The change in position of a particle in a particular direction is referred to as

   (A) Speed (B) Displacement

   (C) Velocity (D) Acceleration

Space For Rough Work

7. The equation of motion of a body for distance travelled ' S_n ' in the ' n^{th} ' second is given by

(A) $S_n = u + \frac{a}{2}(2n-1)$ (B) $S_n = u - \frac{a}{2}(2n-1)$

(C) $S_n = u + \frac{a}{2}(2n+1)$ (D) $S_n = u - \frac{a}{2}(2n+1)$

8. A bullet of mass 0.01 kg is fired with a velocity of 960 ms^{-1} from a rifle of mass 3 kg, the velocity of recoil of rifle is

(A) $-320\,ms^{-1}$ (B) $-0.32\,ms^{-1}$

(C) $-3.2\,ms^{-1}$ (D) $-32\,ms^{-1}$

9. One of the following is not a scalar quantity :

(A) Mass (B) Density

(C) Force (D) Speed

10. If a body fixed about a point rotates in clockwise direction, the moment of force is measured as

(A) Positive (B) Negative

(C) Zero (D) Equal

11. The resultant magnitude of two forces P and Q acting in same line and in same direction is

(A) $P - Q$ (B) $P + Q$

(C) $Q - P$ (D) $\frac{P}{Q}$

Space For Rough Work

12. The resultant magnitude of two forces 6 N and 8 N acting at right angles to each other is

(A) 100 N (B) 10 N

(C) 48 N (D) 14 N

13. The value of resultant magnitude of two forces acting at a point is maximum, when the angle between the two forces is

(A) 0° (B) 90°

(C) 180° (D) 45°

14. Rise of liquid in a capillary tube is due to

(A) Energy (B) Viscosity

(C) Surface tension (D) Pressure

15. The ratio of volume stress to volume strain is called

(A) Bulk modulus (B) Young's modulus

(C) Rigidity modulus (D) Poisson's ratio

16. The reciprocal of bulk modulus of elasticity is called

(A) Compressibility (B) Rigidity

(C) Plasticity (D) Modulus of elasticity

17. The force of cohesion is maximum in

(A) Solids (B) Gases

(C) Liquids (D) Plasma

Space For Rough Work

18. The value of surface tension is 80 dyne/cm. What will be its value in Nm^{-1} ?

(A) $8\times10^{2}\ Nm^{-1}$ (B) $80\ Nm^{-1}$

(C) $8\times10^{-2}\ Nm^{-1}$ (D) $8\times10^{3}\ Nm^{-1}$

19. Pressure at the bottom of a container having base area of $10\ m^2$ filled with water to a height of 10 m is

(A) 9.8×10^{4} Pa (B) 980×10^{4} Pa

(C) 9.8×10^{-4} Pa (D) 980×10^{-4} Pa

20. 100 °C when expressed in absolute scale is

(A) 100 K (B) 0 K

(C) 273 K (D) 373 K

21. Gas law which gives the relation between pressure and volume changes is

(A) Boyle's law (B) Charles' law

(C) Gay-Lussac's law (D) Hooke's law

22. Amount of heat required to raise the temperature of one gram of water through 1 °C is

(A) Heat capacity (B) Conductivity

(C) Calorie (D) Joule

23. An example of longitudinal wave is

(A) Sound waves (B) Waves on the surface of water

(C) Light waves (D) Electromagnetic waves

Space For Rough Work

24. The relation between velocity of sound v, and absolute temperature T is

(A) $v \propto T$ (B) $v \propto \frac{1}{T}$

(C) $v \propto \sqrt{T}$ (D) $v \propto T^2$

25. The distance between a node and the next antinode in a stationary wave is equal to

(A) one wavelength (B) half wavelength

(C) twice wavelength (D) one fourth wavelength

26. Damage caused by marching military columns to the suspension bridge is due to

(A) Echo (B) Resonance

(C) Beats (D) Interference

27. During forced vibrations, if the forced frequency is F_1 and natural frequency is F_2, the body resonates if

(A) $F_1 > F_2$ (B) $F_2 > F_1$

(C) $F_1 = 2.5\, F_2$ (D) $F_1 = F_2$

28. The fundamental frequency of transverse vibrations of the stretched string is inversely proportional to

(A) tension (B) length of string

(C) square root of tension (D) square root of length of string

29. Minimum length of a hall to produce an echo is

(A) 50 m (B) 34 m

(C) 25 m (D) 17 m

Space For Rough Work

30. The property of light that Huygen's wave theory could explain is

(A) Polarisation (B) Photoelectric effect

(C) Interference (D) Compton effect

31. The spectrum of black body radiation is successfully explained by

(A) Newton's corpuscular theory of light

(B) Huygen's wave theory of light

(C) Maxwell's electromagnetic theory of light

(D) Planck's quantum theory of light

32. For constructive interference of light, the path difference should be

(A) $\frac{2n\lambda}{2}$ (B) $(2n+1)\frac{\lambda}{2}$

(C) $(2n+1)\frac{\lambda}{3}$ (D) $(2n+1)\frac{\lambda}{4}$

33. Two very close objects are just resolved if the central maximum of one object is on

(A) central maximum of another

(B) first minimum of another

(C) beyond second minimum of another

(D) between central maximum and first minimum of another

34. The light is incident at polarising angle θ_p and the angle of refraction is r, then

(A) $\theta_p + r = 0°$ (B) $\theta_p + r = 90°$

(C) $\theta_p + r = 180°$ (D) $\theta_p + r = 360°$

Space For Rough Work

35. Minimum energy required to remove an electron from the metal surface is called

(A) Kinetic energy (B) Potential energy

(C) Work function (D) Energy function

36. When the size of the scattering particle is small, the intensity of scattered light is inversely proportional to

(A) fourth power of wavelength (B) square of wavelength

(C) square root of wavelength (D) cube of wavelength

37. Time for which an atom stays in metastable state is of the order of

(A) Seconds (B) Milli-seconds

(C) Micro-seconds (D) Nano-seconds

38. If an element emits β-ray then its atomic number

(A) increases by one (B) decreases by one

(C) remains same (D) decreases by two

39. If the concentration of H^+ ions is more than 10^{-7} gm ion per litre, the solution is

(A) Base (B) Acid

(C) Neutral (D) Both Acid and Base

40. A galvanic cell is one in which

(A) chemical energy produce electric energy

(B) electric energy produce chemical energy

(C) chemical energy will not produce electric energy

(D) electric energy will not produce chemical energy

Space For Rough Work

PART – B

APPLIED MATHEMATICS

41. The value of x if $\begin{vmatrix} 1 & 2 & 3 \\ 2 & x & 3 \\ 3 & 4 & 3 \end{vmatrix} = 0$ is

(A) 0 (B) -3

(C) 3 (D) 18

42. The value of x, if $4x + y = 7$, $3y + 4z = 5$ and $3z + 5x = 2$ is

(A) 0 (B) 1

(C) 3 (D) -1

43. If $A = \begin{bmatrix} 2 & -1 \\ 3 & -4 \end{bmatrix}$, then A^{-1} is

(A) $-\frac{1}{5}\begin{bmatrix} -4 & -3 \\ 1 & 2 \end{bmatrix}$ (B) $-\frac{1}{5}\begin{bmatrix} -4 & 1 \\ -3 & 2 \end{bmatrix}$

(C) $-\frac{1}{11}\begin{bmatrix} -4 & -3 \\ 1 & 2 \end{bmatrix}$ (D) $-\frac{1}{11}\begin{bmatrix} -4 & 1 \\ -3 & 2 \end{bmatrix}$

44. The characteristic equation of the matrix $A = \begin{bmatrix} 2 & -1 \\ 5 & -6 \end{bmatrix}$ is

(A) $A^2 + 8A - 7I = 0$ (B) $A^2 + 4A - 17I = 0$

(C) $A^2 + 4A + 7I = 0$ (D) $A^2 + 4A - 7I = 0$

Space For Rough Work

45. If $\begin{bmatrix} 2 & 3 \\ 1 & 2 \end{bmatrix} + A = \begin{bmatrix} 5 & 1 \\ 3 & 2 \end{bmatrix}$, then A is

(A) $\begin{bmatrix} 3 & 2 \\ -2 & 0 \end{bmatrix}$ (B) $\begin{bmatrix} 3 & -2 \\ 2 & 0 \end{bmatrix}$

(C) $\begin{bmatrix} -2 & 3 \\ 2 & 0 \end{bmatrix}$ (D) $\begin{bmatrix} 0 & 3 \\ -2 & 2 \end{bmatrix}$

46. The middle term of the expansion of $\left(x^2 - \frac{2}{x}\right)^{24}$ is

(A) ${}^{24}C_{10}2^{10}x^{12}$ (B) ${}^{24}C_{11}2^{12}x^{12}$

(C) ${}^{24}C_{13}2^{10}x^{10}$ (D) ${}^{24}C_{12}2^{12}x^{12}$

47. The term independent of x in $\left(x^2 - \frac{4}{3x}\right)^9$ is

(A) ${}^{9}C_{6}(4)^{6}$ (B) ${}^{9}C_{6}(3)^{-6}$

(C) ${}^{9}C_{6}\left(\frac{4}{3}\right)^{6}$ (D) ${}^{9}C_{6}\left(\frac{3}{4}\right)^{6}$

48. If $3i - 2j + k$, $i - 3j + 5k$, $2i + j - 4k$ are the sides of a triangle, then the triangle is

(A) Right angled triangle (B) Equilateral triangle

(C) Isosceles triangle (D) Isosceles right angled triangle

49. If $\vec{a} = (2, -1, 4)$ and $\vec{b} = (2, -3, 4)$, then projection of $\vec{a}$ on $\vec{b}$ is

(A) $\frac{23}{\sqrt{21}}$ (B) $\frac{23}{\sqrt{29}}$

(C) $\frac{-23}{\sqrt{29}}$ (D) $\frac{-23}{\sqrt{21}}$

Space For Rough Work

50. The sine of the angle between the vectors $(2i - 2j + k)$ and $2i + j + 2k$ is

(A) $\frac{\sqrt{65}}{3}$ (B) $\frac{\sqrt{65}}{\sqrt{3}}$

(C) $\frac{\sqrt{65}}{9}$ (D) $\sqrt{65}$

51. If $x \sin^2 45 = \frac{\tan^2 45 + \cot^2 30}{\sin^2 45 + \cos^2 45}$ then the value of x is

(A) 4 (B) 2

(C) 6 (D) 8

52. The value of $\frac{4}{3}\sec^2\frac{\pi}{3} - \text{cosec}^2\frac{\pi}{6} + \frac{3}{4}\tan^2\frac{\pi}{4} - 2\sin^2\frac{\pi}{3}$ is

(A) $-\frac{11}{12}$ (B) $\frac{53}{12}$

(C) $\frac{7}{12}$ (D) $-\frac{7}{12}$

53. The value of

$$\frac{\sin(90-\theta)}{\cos(360-\theta)} + \frac{\sec\left(\frac{3\pi}{2}+\theta\right)}{\text{cosec}(\pi+\theta)} + \frac{\tan(180-\theta)}{\tan(-\theta)} \text{ is}$$

(A) 1 (B) -1

(C) 3 (D) 2

54. The value of cosec 43 cot 43 cot 47 cos 47

(A) 1 (B) 0

(C) -1 (D) 2

Space For Rough Work

55. The value of $\frac{\tan 69^\circ + \tan 66^\circ}{1 - \tan 69^\circ \tan 66^\circ}$

(A) 1 (B) -1

(C) 0 (D) ∞

56. If $\tan \frac{A}{2} = x$ then $\sin A + \tan A$ is

(A) $\frac{4x}{1-x^2}$ (B) $\frac{4x}{1+x^2}$

(C) $\frac{4x}{1+x^4}$ (D) $\frac{4x}{1-x^4}$

57. The value of $\sin 70^\circ - \sin 50^\circ - \sin 10^\circ$ is

(A) 1 (B) 0

(C) -1 (D) $\frac{1}{2}$

58. $\sin^{-1} x$ is also equal to

(A) $\text{cosec}^{-1}\left(\frac{1}{x}\right)$ (B) $\text{cosec}\, x$

(C) $\text{cosec}^{-1} x$ (D) $\frac{1}{\sin x}$

59. Centroid divides the median in the ratio

(A) 2 : 1 (B) 1 : 2

(C) 1 : 1 (D) 1 : 4

60. The co-ordinates of a point which divides the line join of the points (a + b, a – b) and (a – b, a + b) in the ratio 2 : 3 is

(A) $\frac{5a+5b}{5}, \frac{5a-5b}{5}$ (B) $\frac{a+b}{5}, \frac{a-b}{5}$

(C) $\frac{5a+b}{5}, \frac{5a-b}{5}$ (D) $\frac{5a-b}{5}, \frac{a+5b}{5}$

Space For Rough Work

61. The equation of straight line whose intercepts are 3 and 5 on the axes is

(A) $5x - 3y = 15$ (B) $5x + 3y = 15$

(C) $5x + 3y = 1$ (D) $15x + 15y = 1$

62. The angle between the lines whose slopes are $\sqrt{3}$ and $\frac{1}{\sqrt{3}}$ respectively is

(A) $\frac{\pi}{6}$ (B) $\frac{\pi}{3}$

(C) $\frac{\pi}{4}$ (D) $\frac{\pi}{2}$

63. The equation of the straight line passing through (2, 3) and x intercept is twice its y intercept is

(A) $x + 2y = 8$ (B) $x - 2y = 8$

(C) $x + y = 4$ (D) $2x + 2y = 8$

64. The equation to the line passing through the point (–6, 7) and parallel to the line joining (3, 4) and (6, –8) is

(A) $4x + y + 31 = 0$ (B) $x + 4y - 1 = 0$

(C) $x - 4y + 1 = 0$ (D) $4x + y + 17 = 0$

65. $\lim_{0 \to \pi/2} (\sec 0 - \tan 0)$ is equal to

(A) 0 (B) 1

(C) $\frac{\pi}{2}$ (D) π

66. $\lim_{x \to 4} \frac{x - 4}{3 - \sqrt{13 - x}}$ is equal to

(A) 3 (B) 9

(C) 6 (D) 0

Space For Rough Work

67. If $y = (1+\log x)^5$, then $\frac{dy}{dx}$ is

(A) $5(\log x)^4$ (B) $\frac{5}{x}(1+\log x)^4$

(C) $5(1+\log x)^4$ (D) $5x^4 \log x$

68. If $x = \cos^{-1} t$ and $y = \sin^{-1} t$, then $\frac{dy}{dx}$ is

(A) -1 (B) 1

(C) $\frac{1}{2\sqrt{1-t^2}}$ (D) $\frac{2}{\sqrt{1-t^2}}$

69. If $y = x \log y$, then $\frac{dy}{dx}$ is

(A) $\frac{\log x^x}{x-y}$ (B) $\frac{\log y^x}{x-y}$

(C) $\frac{\log y^y}{x-y}$ (D) $\frac{\log y^y}{y-x}$

70. If $y = \frac{x+1}{x+2}$, then $\frac{dy}{dx}$ is

(A) $\frac{1}{(x+2)^2}$ (B) $\frac{2x+3}{(x+2)^2}$

(C) $-\frac{1}{(x+2)^2}$ (D) $\frac{2x-3}{(x+2)^2}$

71. The equation of tangent to the curve $y^2 = 4x$ at (1, 2) is

(A) $x + y - 3 = 0$ (B) $x - y + 1 = 0$

(C) $2x - y = 0$ (D) $2x + y - 4 = 0$

Space For Rough Work

72. The maximum value of $7 - 8x - 2x^2$ is

(A) 15 (B) -4

(C) -2 (D) 31

73. The value of $\int \log 2x \, dx$ is

(A) $x \log 2x + x + C$ (B) $x \log 2x - x + C$

(C) $\frac{1}{2x} + C$ (D) $\frac{1}{x} + C$

74. The value of $\int \sec^4 x \cdot \tan x \, dx$

(A) $\frac{\sec^4 x}{4} + C$ (B) $4 \sec^4 x + C$

(C) $3 \sec^2 x + C$ (D) $\frac{\tan^4 x}{4} + C$

75. The value of $\int x \log x \, dx$ is

(A) $\frac{x^2}{2} \log x - \frac{x^2}{2} + C$ (B) $\frac{x^2}{2} \log x + \frac{x^2}{2} + C$

(C) $\frac{x^2}{2} \log x - \frac{x^2}{4} + C$ (D) $\frac{x^2}{2} \log x + \frac{x^2}{4} + C$

76. $\int_0^{\pi/4} \tan^2 x \, dx$ is equal to

(A) $\frac{\pi}{4} - 1$ (B) $1 - \frac{\pi}{4}$

(C) $\frac{\pi^2}{16}$ (D) $\frac{\pi^2}{16} - 1$

Space For Rough Work

77. The value of $\int_0^1 x\sqrt{1-x^2}\,dx$ is

(A) $-\frac{1}{3}$ (B) 0

(C) ∞ (D) $\frac{1}{3}$

78. The volume generated by revolving the line $y = x + 1$ about the x-axis between the ordinates $x = 0$ and $x = 2$

(A) $\frac{26\pi}{3}$ units (B) $\frac{10\pi}{3}$ units

(C) $\frac{26}{3}$ units (D) 4 units

79. The degree and order of the differential equation $\frac{d^2y}{dx^2} = \left[1+\left(\frac{dy}{dx}\right)^2\right]^{1/3}$ are

(A) 2 and 1 (B) 1 and 2

(C) 3 and 2 (D) 2 and 3

80. The solution of differential equation $\frac{dy}{dx} + y\tan x = \sec x$ is

(A) $y\sec x = \tan x + C$

(B) $y\sin x = \sec x + C$

(C) $\log(\sec x) = \tan x + C$

(D) $y\sec x = -\cot x + C$

Space For Rough Work

PART – C

CHEMICAL ENGINEERING

It consists of **81** to **180** questions :

81. Discharge in laminar flow through pipe varies

(A) as the square of the radius

(B) inversely as the pressure drop

(C) inversely as the viscosity

(D) as the square of the diameter

82. Potential flow is the flow of

(A) compressible fluids with shear

(B) compressible fluids with no shear

(C) incompressible fluids with shear

(D) incompressible fluids with no shear

83. The head loss due to sudden contraction is proportional to

(A) velocity (B) velocity head

(C) turbulence (D) None of these

84. Power loss in an orifice meter is _____ that in venturimeter.

(A) less than (B) same as

(C) more than (D) equal to

85. Slurries can be most conveniently pumped by a _____ pump.

(A) Screw (B) Reciprocating

(C) Gear (D) Centrifugal

86. Pitot tube measures the _____ of a fluid.

(A) pressure (B) average velocity

(C) average flowrate (D) point velocity

Space For Rough Work

87. Sewage sludge is _____ type of Non-newtonian fluid.

(A) Dilatant (B) Bingham plastic

(C) Psuedo plastic (D) None of these

88. What causes the cavitation in centrifugal pump ?

(A) High suction pressure (B) Low barometric pressure

(C) Low suction pressure (D) High suction velocity

89. Mercury is an ideal barometric fluid mainly due to its

(A) High density (B) Low compressibility

(C) Low capillary action (D) Very low vapour pressure.

90. Viscosity of water is about _____ times that of air at room temperature.

(A) 15 (B) 55

(C) 155 (D) 1050

91. Velocity head on sudden enlargement in a horizontal pipe is converted into _____ head.

(A) Elevation (B) Pressure

(C) Both elevation and pressure (D) Neither elevation nor pressure

92. Existence of boundary layer in fluid flow is because of the

(A) Surface tension (B) Fluid density

(C) Fluid viscosity (D) Gravity forces

93. Manometers measure the _____ pressure.

(A) Vacuum as well as atmospheric (B) Difference in

(C) Absolute (D) Gauge

94. Bernoulli's equation does not apply to the functioning of

(A) Venturimeter (B) Orifice meter

(C) Pitot tube (D) None of these

Space For Rough Work

95. A globe valve is the most suitable for applications in which

(A) fluid flow control is required

(B) fluid contains dispersed solid particles

(C) valve is required either fully open or fully closed

(D) one way flow is required

96. For an ideal fluid flow, Reynold's number is

(A) 2100 (B) 100

(C) 0 (D) ∞

97. Check valve is used for _____ flow.

(A) Very precise control (B) Unidirectional

(C) Multidirectional (D) None of these

98. A rotameter works on the principle of _____ pressure drop.

(A) constant (B) variable

(C) both constant and variable (D) neither constant nor variable

99. A streamline is

(A) the line connecting the midpoints of flow cross sections

(B) defined for uniform flow only

(C) drawn normal to the velocity vector at every point

(D) always the path of a particle

100. Bernoulli's equation is dependent on the

(A) First law of thermodynamics

(B) Third law of thermodynamics

(C) Law of conservation of momentum

(D) None of these

Space For Rough Work

101. Heat transfer by conduction is described by

(A) Fourier's law (B) Newton's law of cooling

(C) Stefan-Boltzmann law (D) Fick's law

102. According to Stefan-Boltzmann law, the radiant heat transfer is proportional to

(A) the absolute temperature.

(B) the second power of the absolute temperature.

(C) the third power of the absolute temperature.

(D) the fourth power of the absolute temperature.

103. Baffles used on shell side of heat exchanger will

(A) decrease heat transfer rate (B) increase heat transfer rate

(C) not affect heat transfer rate (D) decrease pressure drop on shell side

104. Dropwise condensation occurs on _____ surface

(A) clean dirt free (B) smooth clean

(C) contaminated cooling (D) polished

105. Heat transfer rate per unit area is called

(A) Thermal conductivity (B) Heat flux

(C) Heat transfer co-efficient (D) Thermal diffusivity

106. Pick out the correct statement :

(A) Rate = Driving force × Resistance

(B) Driving force = Rate × Resistance

(C) Resistance = Driving force × Rate

(D) Rate = Resistance / Driving force

107. Prandtl number is given by –

(A) $\frac{C_p\mu}{a}$ (B) $\frac{C_p\mu}{k}$

(C) $\frac{hD}{k}$ (D) $\frac{\mu}{hC_p}$

Space For Rough Work

108. A 2-4 heat exchanger involves

(A) only counter flow of fluids

(B) only parallel flow of fluids

(C) both counter and parallel flow of fluids

(D) Smaller pressure drop compared to 1-2 exchanger

109. A black body does not _____ radiation.

(A) absorb or emit (B) refract

(C) reflect (D) both refract and reflect

110. What is the logarithmic mean of r_1 and r_2 ?

(A) $\dfrac{r_2 - r_1}{ln \dfrac{r_1}{r_2}}$ (B) $\dfrac{r_1 - r_2}{ln \dfrac{r_2}{r_1}}$

(C) $\dfrac{r_1 - r_2}{ln \dfrac{r_1}{r_2}}$ (D) $\dfrac{r_1 - r_2}{-ln \dfrac{r_1}{r_2}}$

111. Diffusion is a process of

(A) movement of particles from region of higher concentration to one of lower concentration

(B) movement of particles through a semipermeable membrane

(C) rarefaction of particles

(D) accumulation of particles on a solid surface

112. To separate a binary mixture the relative volatility should be _____.

(A) equal to one (B) less than one

(C) greater than one (D) greater than zero

113. Flash distillation operation is suitable for separating components which

(A) boil at very close temperature

(B) boil at widely different temperatures

(C) form minimum boiling azeotrope

(D) form maximum boiling azeotrope

Space For Rough Work

114. Bound moisture in a solid is that liquid which exerts an equilibrium vapour pressure

(A) equal to that of the pure liquid at the given temperature

(B) less than that of the pure liquid at the given temperature

(C) greater than that of the pure liquid at the given temperature

(D) equal to or less than that of the pure liquid at the given temperature

115. The S.I. unit of volumetric diffusivity is

(A) m^2/s (B) m/s

(C) m^3/s (D) m^2/s^2

116. In distillation overhead product contains

(A) only one component (B) two components

(C) any number of components (D) only saturated liquid

117. Rayleigh's equation applies to _____ distillation

(A) differential (B) flash

(C) equilibrium (D) molecular

118. During drying operation it is easier to remove the _____ moisture.

(A) equilibrium (B) critical

(C) unbound (D) bound

119. Drying of a wet solid under constant drying conditions means the exposure of the wet solid to the air of constant

(A) humidity (B) velocity

(C) temperature (D) humidity, velocity and temperature

120. Which of the following is not a continuous drier ?

(A) Drum drier (B) Spray drier

(C) Tunnel drier (D) Tray drier

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121. Measurement of the amount of dry gas collected over water from volume of moist gas is based on the

(A) Charle's law
(B) Dalton's law of partial pressure
(C) Avogadro's hypothesis
(D) Boyle's law

122. N.T.P. corresponds to

(A) 1 atm absolute pressure and 0 °C
(B) 760 mm Hg gauge pressure and 0 °C
(C) 760 torr and 15 °C
(D) 101.325 kPa gauge pressure and 0 °C

123. Number of gram moles of solute dissolved in 1 kg of solvent is called its

(A) Normality
(B) Molarity
(C) Molality
(D) Formality

124. Volume percent for gases is equal to the

(A) weight percent
(B) mole percent
(C) weight percent only for ideal gases
(D) mole percent only for ideal gases

125. Internal energy is independent of the _____ for an ideal gas.

(A) pressure
(B) volume
(C) both pressure and volume
(D) neither pressure nor volume

126. One Newton is equal to _____ dynes.

(A) 10^2
(B) 10^3
(C) 10^4
(D) 10^5

127. Which of the following ratios defines the recycle ratio in a chemical process ?

(A) Gross feed stream / recycle feed stream
(B) Recycle stream / fresh feed stream
(C) Recycle stream / gross feed stream
(D) None of these

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

(A) equilibrium constant (B) conversion

(C) rate constant (D) none of these

129. Average molecular weight of air is about

(A) 21 (B) 29

(C) 23 (D) 79

130. Disappearance of snow in subzero weather exemplifies the process of

(A) Evaporation (B) Sublimation

(C) Vaporisation (D) Melting

131. The most suitable instrument, for measuring the temperature of a red hot furnace is

(A) Platinum resistance thermometer (B) Thermocouple

(C) Optical pyrometer (D) Bimetallic thermometer

132. Psychrometer is used for measuring

(A) humidity of gases (B) moisture content of solids.

(C) water of crystallisation (D) hygroscopic nature of solids

133. Bellows are made of thin sheets of

(A) leather (B) paper

(C) plastic (D) copper

134. Humidity of air is measured by a

(A) Polarimeter (B) Polarograph

(C) Hygrometer (D) Rotameter

135. Which of the following judges the accuracy of an instrument ?

(A) Dead zone (B) Drift

(C) Static error (D) Dynamic error

Space For Rough Work

136. The bulb of vapour pressure thermometer is a

(A) primary element (B) secondary element

(C) manipulating element (D) functioning element

137. Thermocouples use two

(A) dissimilar metal wires (B) similar metal wires

(C) similar metal strips (D) dissimilar metal strips

138. If a solution has pH = 2, it is

(A) highly acidic (B) weakly acidic

(C) neutral (D) alkaline

139. The disadvantage of using water as manometric liquid is its _____.

(A) high vapour pressure (B) corrosive nature

(C) high boiling point (D) low vapour pressure

140. Generation of an e.m.f. when two solutions of different hydrogen ion concentration are separated by a thin glass wall forms the working principle of

(A) CO_2 analyser (B) Spectrometer

(C) pH meter (D) Polarograph

141. Offset –

(A) varies with time (B) varies exponentially with time

(C) does not vary with time (D) varies as square of time

142. Steady state deviation resulting from a change in the value of the load variable is called the

(A) offset (B) error ratio

(C) deviation (D) static error

143. The mechanism which changes the value of the manipulated variable in response to the output signal from the control unit is called the

(A) manipulating element (B) controlling element

(C) final control element (D) comparing element

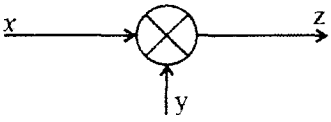
Space For Rough Work

144. For which type of the following controllers, the offset is zero and it has the highest maximum deviation ?

(A) P-I controllers
(B) P-D controllers
(C) P controllers
(D) P-I-D controllers

145. In a heat exchanger, outlet temperature of heating/cooling fluid is the _____ variable.

(A) load
(B) manipulated
(C) controlled
(D) none of these

146. The symbol 

in a block diagram stands for

(A) multiplier
(B) dynamic function
(C) summing junction
(D) measuring function

147. For high loads, the suitable controller is _____

(A) on-off
(B) positioning (P, PI, PD, PID controllers etc.)
(C) both on-off and positioning (P, PI, PD, PID controllers etc.)
(D) neither on-off nor positioning (P, PI, PD, PID controllers etc.)

148. Addition of derivative control to proportional controllers reduces the

(A) stabilising time
(B) maximum deviation
(C) offset
(D) none of these

149. Feed forward controller is used to account for _____ changes.

(A) load
(B) set point
(C) manipulated variable
(D) none of these

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150. Which of the following controllers has maximum offset ?

(A) P controller (B) P-I controller

(C) P-D controller (D) P-I-D controller

151. How many moles of electrons weigh one kilogram ? (Mass of electron = 9.108×10^{-31} kg, Avogadro number = 6.022×10^{23})

(A) 6.022×10^{23} (B) $\frac{1}{9.108} \times 10^{31}$

(C) $\frac{6.022}{9.108} \times 10^{54}$ (D) $\frac{1}{9.108 \times 6.022} \times 10^{8}$

152. The enthalpy of formation of ammonia is -46.0 kJ mol^{-1}. The enthalpy change for the reaction $2NH_3 \rightarrow N_2 + 3H_2$ is _____.

(A) + 46.0 kJ (B) – 23 kJ

(C) + 92.0 kJ (D) – 92.0 kJ

153. Separating of _____ is an example of endothermic reaction.

(A) proton from proton

(B) neutron from neutron

(C) electron from electron

(D) electron from a neutral atom

154. A spontaneous reaction is impossible, if _____

(A) both ΔH and ΔS are negative (B) both ΔH and ΔS are positive

(C) ΔH is negative and ΔS is positive (D) ΔH is positive and ΔS is negative

155. The concentration of reactants is increased by x, then equilibrium constant k becomes _____.

(A) K (B) K/x

(C) K + x (D) log K/x

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156. The half life period of a zero order reaction is _____

(A) proportional to initial concentration of reactants.

(B) independent of initial concentration of reactants.

(C) inversely proportional to initial concentration of reactants.

(D) inversely proportional to square of initial concentration of reactants.

157. The rate at which substance reacts depends on its _____

(A) atomic number (B) active mass

(C) molecular weight (D) atomic weight

158. Which of the following is both Arrhenius and Bronsted acid ?

(A) $AlCl_3$ (B) BF_3

(C) HNO_3 (D) CO_2

159. The quantity of electricity required to liberate one gram equivalent of an element is called _____.

(A) ampere (B) faraday

(C) ohm (D) volt

160. The buffer action of blood is due to the presence of _____.

(A) amino acid and ammonia (B) bicarbonate and carbonic acid

(C) HCl and NaCl (D) Urea and Na^+

161. The hybridization of carbon atoms in alkanes is _____

(A) sp (B) sp^2

(C) sp^3 (D) sp^3d

162. Give the IUPAC name of the compound $CH_3OCH_2CH_3$ is _____

(A) dimethyl ether (B) methoxy ethane

(C) methyl ethyl oxide (D) propyl ether

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163. Acetylides are metallic salts obtained by the action of certain metals on _____

(A) ethane (B) ethene

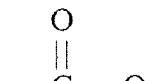
(C) ethyne (D) methane

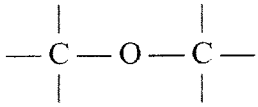
164. Presence of halogens in organic compounds is detected by _____ test.

(A) Beilstein's (B) Iodoform

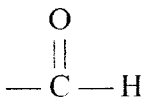
(C) Millon's (D) Silver nitrate

165. The functional group of ether is _____

(A) 

(B) 

(C) $O=C=O$

(D) 

166. An isomer of ethanol is _____

(A) methanol (B) acetone

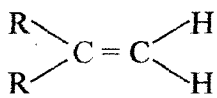
(C) dimethyl ether (D) diethyl ether

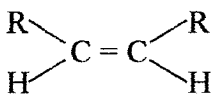
167. Natural gas composed primarily of

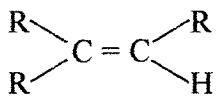
(A) methane (B) n-butane

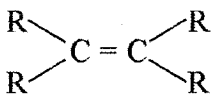
(C) n-octane (D) a mixture of n-octane and iso-octane

168. Which of the following alkenes will react fastest with hydrogen under catalytic conditions ?

(A) 

(B) 

(C) 

(D) 

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169. C_nH_{2n} general formula is obeyed by _____

(A) alkenes only
(B) cycloalkanes only
(C) arenes only
(D) Both alkenes and cycloalkanes

170. Cetane number of high speed diesel must be $\geq$ _____

(A) 30
(B) 45
(C) 75
(D) 95

171. Increasing the capacity of a screen _____ the screen effectiveness.

(A) decreases
(B) increases
(C) does not effect
(D) None of these

172. Fluid energy is used for _____

(A) cutting
(B) grinding
(C) ultra grinding
(D) crushing

173. Soft and non abrasive materials can be made into fines by _____.

(A) attrition
(B) compression
(C) cutting
(D) none of these

174. Screw conveyors are _____

(A) run at very high rpm
(B) suitable for sticky materials
(C) suitable for highly abrasive materials
(D) All of these

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175. _____ are mixed using ribbon blenders.

(A) Lumpy solids and low viscosity liquids

(B) Dry powders

(C) High viscosity liquids

(D) Thick pastes

176. Which of the following is not categorised as a mechanical operation ?

(A) Agitation (B) Filteration

(C) Size enlargement (D) Humidification

177. Propellers are

(A) axial flow mixers

(B) low speed impellers

(C) used for mixing liquids of high viscosity

(D) radial flow mixers

178. In paint industries, blending of light paste is done by using a _____

(A) masticator (B) change can mixer

(C) kneader (D) None of these

179. Which of the following is a coarse crusher ?

(A) Smooth roll crusher (B) Toothed roll crusher

(C) Gyratory crusher (D) Tube mill

180. Apron conveyors are used for

(A) heavy loads and short runs (B) small loads and long runs

(C) heavy loads and long runs (D) None of these

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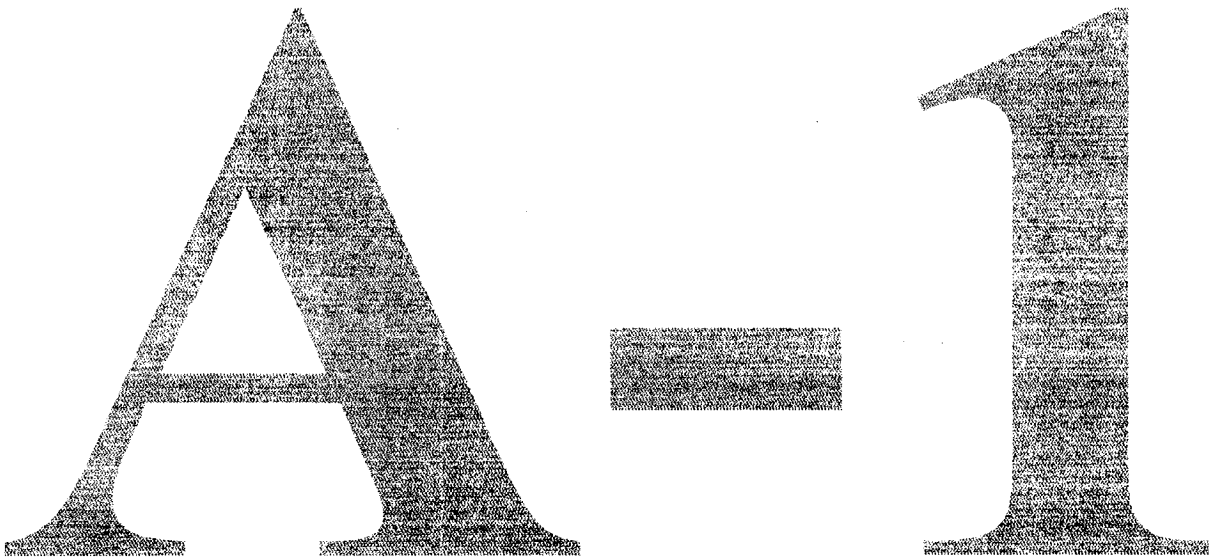
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