DIPLOMA - COMMON ENTRANCE TEST-2016

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 - 1	126133

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. Hand over 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. An example of basic S.I. unit is

(A) Newton (B) Joule

(C) Ampere (D) Watt

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

(A) hecta (B) centi

(C) pico (D) peta

3. An example of dimensionless physical quantity is

(A) surface tension (B) strain

(C) impulse (D) period

4. The velocity of a freely falling body gradually _____ as it falls.

(A) decreases (B) increases

(C) remains same (D) increases and then decreases

5. A main scale is divided into half mm and having a vernier containing 20 divisions has a least count of _____ cm.

(A) 2.5×10^{-2} (B) 0.5×10^{-2}

(C) 0.025×10^{-2} (D) 0.25×10^{-2}

6. For a particular mass of the moving body, its friction is minimum when it is

(A) sliding (B) static

(C) rolling (D) dragged

Space For Rough Work

7. All equations of motion hold good under the condition of

(A) constant velocity (B) constant acceleration

(C) variable velocity (D) variable acceleration

8. A force of 1.5×10^{-2} N acts for 3 seconds on a body of mass 0.05 kg moving with velocity 4 m/s. The final velocity of the body is

(A) 4.9 m/s (B) 18 m/s

(C) 9 m/s (D) 7.5 m/s

9. To check the equilibrium of five coplanar concurrent forces, we use law of

(A) Parallelogram of forces (B) Triangle of forces

(C) Lami's theorem (D) Polygon of forces

10. The S.I. unit of momentum is

(A) kg m (B) $kg\ m^{-1}s^{-1}$

(C) $kg\ m\ s^{-2}$ (D) $kg\ m\ s^{-1}$

11. When three forces acting at a point are in equilibrium, the angle opposite to biggest force is always _____ angle.

(A) biggest (B) smallest

(C) equal to other (D) obtuse

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

(A) Law of parallelogram of forces. (B) Lami's theorem.

(C) Law of triangle of forces. (D) Law of polygon of forces.

Space For Rough Work

13. Two forces 3N and 5N acts on a body simultaneously making an angle 60° between them. The resultant force on the body is

(A) 8 N (B) 4 N

(C) 7 N (D) 49 N

14. Dimensional formula for stress is

(A) $[LM^{-1}T^{-2}]$ (B) $[L^{-1}MT^{-2}]$

(C) $[L^{-1}M^{-1}T]$ (D) $[L^{2}M^{-1}T^{-2}]$

15. The pull in the bicycle chain is an example of

(A) tensile stress (B) volume stress

(C) shear stress (D) shear strain

16. Viscosity of water at 20 °C in centipoise is

(A) 1.792 (B) 0.650

(C) 1.005 (D) 0.470

17. Dimensional formula of surface tension is

(A) $[LMT^{-2}]$ (B) $[L^{2}MT^{-2}]$

(C) $[LM^{-1}T^{-2}]$ (D) $[L^{0}MT^{-2}]$

18. A steel needle can be floated on the surface of water because of the

(A) density of steel is greater than water

(B) density of steel is less than water

(C) surface tension

(D) viscosity

Space For Rough Work

19. Thrust on the bottom of the container having a base area of 10 m^2 filled with water to a height of 6 m is

(A) 60×10^2 N (B) 58.8×10^4 N

(C) 60.8 N (D) 600 N

20. Keeping the temperature constant, if the pressure of the gas is doubled its volume

(A) remains constant (B) doubles

(C) reduces to one fourth (D) reduces to half

21. Heat transfer in the absence of the medium is

(A) conduction (B) convection

(C) radiation (D) absorption

22. Zero of absolute scale of temperature is at

(A) 0 °C (B) 100 °C

(C) 273 °C (D) – 273 °C

23. Ripples on water surface is an example of

(A) electromagnetic waves (B) transverse waves

(C) waves travelling in space (D) longitudinal waves

24. The time interval between two consecutive waxing and waning of sound waves is

(A) beat period (B) wave period

(C) beat frequency (D) wave frequency

Space For Rough Work

25. S.I. unit of intensity of sound is

(A) watt per square meter (B) watt per meter

(C) watt square meter (D) watt meter

26. The study of characteristics of buildings with reference to sound is

(A) resonance (B) interference

(C) echo (D) acoustics

27. The distance travelled by the disturbance in the medium for one complete oscillation is

(A) wave velocity (B) wavelength

(C) wave frequency (D) wave amplitude

28. Momentum of a photon is given by

(A) $P = \frac{\lambda}{h}$ (B) $P = \frac{h}{\lambda}$

(C) $P = \lambda h$ (D) $P = \lambda^2 h$

29. The velocity of sound in case of liquids is given by

(A) $\sqrt{\frac{d}{k}}$ (B) $\sqrt{kd}$

(C) $\sqrt{\frac{k}{d}}$ (D) $\sqrt{\frac{d^2}{k}}$

30. A tuning fork vibrating in air is an example of

(A) damped free vibrations (B) resonant vibrations

(C) undamped free vibrations (D) forced vibrations

Space For Rough Work

31. Raman lines are

(A) unpolarised (B) polarised

(C) diffracted (D) reflected

32. A crystal which has two optic axes is

(A) calcite (B) quartz

(C) mica (D) glass

33. Electron microscope is used to

(A) study virus and bacteria

(B) view three dimensional images

(C) automatic switching on and off of street-lights

(D) electronic industry for soldering

34. Which of the following statements is correct in case of γ-rays ?

(A) Penetrating power is less than β-rays.

(B) Penetrating power is less than α-rays.

(C) Penetrating power is very high.

(D) γ particles are nothing but electrons.

35. For destructive interference of light the path difference should always be

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

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

Space For Rough Work

36. The resultant intensity of interference of two monochromatic waves having same amplitude and constant phase difference equal to ϕ is

(A) $2a\cos\left(\frac{\phi}{2}\right)$ (B) $4a^2\cos^2\left(\frac{\phi}{2}\right)$

(C) $4a^2\cos\left(\frac{\phi}{2}\right)$ (D) $4a\cos^2\left(\frac{\phi}{2}\right)$

37. For two objects to be just resolved, the principle maximum should be on

(A) first maximum (B) second maximum

(C) first minimum (D) second minimum

38. Resolving power of microscope is given by

(A) $\frac{\lambda}{2n\sin\theta}$ (B) $\frac{n}{2\lambda\sin\theta}$

(C) $\frac{2\lambda\sin\theta}{n}$ (D) $\frac{2n\sin\theta}{\lambda}$

39. In case of acids, the concentration of H^+ ions is

(A) more than 10^{-7} g ions/litre.

(B) less than 10^{-7} g ions/litre.

(C) equal to 10^{-7} g ions/litre.

(D) between 10^{-7} g ions/litre and 10^{-14} g ions/litre.

40. Corrosion of metal can be prevented by keeping it in

(A) acidic medium (B) basic medium

(C) neutral medium (D) moisture

Space For Rough Work

PART – B

APPLIED MATHEMATICS

41. The value of the determinant $A = \begin{vmatrix} 1 & 1 & 1 \\ 3 & 3 & 3 \\ 4 & 5 & 6 \end{vmatrix}$ is

(A) 1 (B) 3

(C) -2 (D) 0

42. The value 'x' by Cramer's rule in $3x + 2y = 4$ and $x - 2y = 8$ is

(A) 12 (B) 3

(C) -13 (D) 15

43. If $A = \begin{bmatrix} 2 & -3 \\ 1 & 5 \end{bmatrix}$ $B = \begin{bmatrix} 1 & 2 \\ 4 & -3 \end{bmatrix}$, then $A + 2B$ is

(A) $\begin{bmatrix} 4 & 1 \\ 9 & -1 \end{bmatrix}$ (B) $\begin{bmatrix} 4 & 1 \\ 9 & 1 \end{bmatrix}$

(C) $\begin{bmatrix} 3 & -1 \\ 5 & 2 \end{bmatrix}$ (D) $\begin{bmatrix} 3 & 1 \\ 5 & 2 \end{bmatrix}$

44. If $A = \begin{bmatrix} 2 & 3 & 4 \\ -2 & x & -4 \\ -5 & 6 & 7 \end{bmatrix}$ is singular, then the value of x is

(A) -3 (B) 3

(C) $\frac{1}{3}$ (D) $\frac{-1}{3}$

Space For Rough Work

45. The characteristic roots of the matrix $A = \begin{bmatrix} 1 & 4 \\ 3 & 2 \end{bmatrix}$ is

(A) 5, 2 (B) –5, –2

(C) 5, –2 (D) –5, 2

46. If ${}^{n}C_{16} = {}^{n}C_{3}$, then the value of n is

(A) –19 (B) 19

(C) 13 (D) –13

47. The last term in the expansion of $\left(3x^2 + \frac{1}{2x^2}\right)^4$ is

(A) $\frac{1}{8x^8}$ (B) $\frac{1}{16x^8}$

(C) $81\,x^8$ (D) $12\,x^8$

48. The unit vector of $\vec{a} = 2i - 3j + 4k$ is

(A) $\frac{2i-3j+4k}{\sqrt{29}}$ (B) $\frac{2i-3j+4k}{\sqrt{11}}$

(C) $\frac{2i-3j+4k}{\sqrt{3}}$ (D) $\frac{\sqrt{29}}{2i-3j+4k}$

49. If $\vec{a} = i - 4j + 3k$ and $\vec{b} = -2i + j + 6k$, then the projection of $\vec{a}$ on $\vec{b}$ is

(A) $\frac{24}{\sqrt{41}}$ (B) $\frac{12}{\sqrt{26}}$

(C) $\frac{-12}{\sqrt{41}}$ (D) $\frac{12}{\sqrt{41}}$

Space For Rough Work

50. The area of triangle whose two sides are $\vec{a} = 3i + 4j + k$ and $\vec{b} = 5i + 6j + 2k$ is

(A) 3 sq. units (B) $\frac{1}{2}$ sq. units

(C) $\frac{3}{2}$ sq. units (D) $\frac{9}{2}$ sq. units

51. The simplification of $\frac{1}{1+\sin\theta} + \frac{1}{1-\sin\theta}$ is

(A) $2\cos^2\theta$ (B) $2\sec^2\theta$

(C) $\tan^2\theta$ (D) $2\operatorname{cosec}^2\theta$

52. The value of $\tan^2 30° + \sin^2 45° + \cos^2 90° + \cos^2 60°$ is

(A) $\frac{4}{3}$ (B) $\frac{13}{12}$

(C) $\frac{13}{24}$ (D) $\frac{25}{12}$

53. The simplification of $\frac{\sin(180°-A)\cos(360°-A)}{\tan(90°+A)\sin(-A)}$ is

(A) sin A (B) cosec A

(C) – sin A (D) – cosec A

54. If $\cos A = \frac{-3}{5}$ where $90° < A < 180°$, then the value of cot A is

(A) $\frac{3}{4}$ (B) $\frac{4}{3}$

(C) $\frac{-3}{4}$ (D) $\frac{-4}{3}$

Space For Rough Work

55. The value of $\cos 105°$ is

(A) $\frac{\sqrt{3}-1}{2\sqrt{2}}$ (B) $\frac{\sqrt{3}+1}{2\sqrt{2}}$

(C) $\frac{2\sqrt{2}}{1-\sqrt{3}}$ (D) $\frac{1-\sqrt{3}}{2\sqrt{2}}$

56. If $\tan\frac{A}{2} = \frac{1-\cos A}{\sin A}$, then the value of $\tan 22\frac{1}{2}°$ is

(A) $\sqrt{2}+1$ (B) $1-\sqrt{2}$

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

57. The value of $\cos 5x \cdot \cos 3x$ is

(A) $\cos 8x + \cos 2x$ (B) $\frac{1}{2}(\cos 8x + \cos 2x)$

(C) $\frac{1}{2}(\sin 8x + \sin 2x)$ (D) $\frac{1}{2}(\cos 8x - \cos 2x)$

58. The simplified value of $\tan^{-1}\left(\frac{1}{2}\right) + \tan^{-1}\left(\frac{1}{3}\right)$ is

(A) $\frac{\pi}{4}$ (B) $\frac{\pi}{3}$

(C) 1 (D) $\tan^{-1}\left(\frac{1}{7}\right)$

59. Distance of a point P(– 2, 5) from the origin is

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

(C) $\sqrt{3}$ (D) 29

60. The co-ordinates of the point which divides the line joining the points A (8, 3) and B(–5, 6) in the ratio of 2 : 3 externally is

(A) (– 34, –3) (B) (34, 3)

(C) $\left(\frac{14}{5}, \frac{21}{5}\right)$ (D) (34, –3)

Space For Rough Work

61. The area of triangle with the vertices (5, 3), (4, 6) and (5, 8) is

(A) $\frac{15}{2}$ sq. units (B) 15 sq. units

(C) $\frac{5}{2}$ sq. units (D) $\frac{45}{2}$ sq. units

62. The slope of the line making an angle 150° with the x-axis is

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

(C) $\sqrt{3}$ (D) $-\sqrt{3}$

63. The two point form of a straight line is

(A) $y - y_1 = m(x - x_1)$ (B) $\frac{y - y_1}{x - x_1} = \frac{y_2 - y_1}{x_2 - x_1}$

(C) $\frac{y}{x} = \frac{y_2 - y_1}{x_2 - x_1}$ (D) $\frac{y - y_2}{x - x_2} = \frac{y_2 - y_1}{x_2 - x_1}$

64. The equation of straight line perpendicular to $2x + 5y - 8 = 0$ and passing through $(-1, 2)$ is

(A) $2x + 5y + 9 = 0$ (B) $5x - 2y + 1 = 0$

(C) $5x - 2y + 9 = 0$ (D) $5x + 2y - 9 = 0$

65. The value of $\lim_{x \to 3} \frac{2x^2 - 7x + 3}{2x - 6}$ is

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

(C) $\frac{5}{2}$ (D) 5

Space For Rough Work

66. The value of $\lim_{x \to 0} \frac{\sqrt{1-\cos x}}{x}$ is

(A) $\frac{1}{\sqrt{2}}$ (B) $\sqrt{2}$

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

67. If $y = e^x (\cos x - \sin x)$, then $\frac{dy}{dx}$ is

(A) $2e^x \cos x$ (B) $-2e^x \cos x$

(C) $2e^x \sin x$ (D) $-2e^x \sin x$

68. If $x + y = \log x + \log y$, then $\frac{dy}{dx}$ at $x = -1$ and $y = 2$ is

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

(C) 4 (D) $\frac{1}{2}$

69. If $x = a \cos^2 \theta$ and $y = b \sin^2 \theta$, then $\frac{dy}{dx}$ is

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

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

70. The second derivative of $y = \log\left(\frac{1}{x}\right)$ is

(A) x (B) 1

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

Space For Rough Work

71. The equation of normal to the curve $y = (2x + 1)^2$ at $(-2, 0)$ is

(A) $x - 16y + 2 = 0$ (B) $x - 12y + 2 = 0$

(C) $x + 16y + 2 = 0$ (D) $x + 12y + 2 = 0$

72. The maximum value of the function $y = 2x^3 + 3x^2 - 36x$ is

(A) -44 (B) -30

(C) 81 (D) -81

73. The value of $\int \sin 3x \cos 2x \, dx$ is

(A) $\frac{-1}{2}\left[\frac{\cos 5x}{5} + \cos x\right] + C$ (B) $\frac{1}{2}\left[\frac{-\cos 5x}{5} + \cos x\right] + C$

(C) $\frac{1}{2}\left[\frac{\cos 5x}{5} + \cos x\right] + C$ (D) $\frac{-1}{2}[\cos 5x + \cos x] + C$

74. The value of $\int x^2 \sin(2x^3) \, dx$ is

(A) $\frac{-\cos(2x^3)}{6} + C$ (B) $\frac{-\cos(2x^3)}{3} + C$

(C) $12x^3 \cos(2x^3) + C$ (D) $\frac{\cos(2x^3)}{6} + C$

75. $\int \log x \, dx$ is

(A) $\frac{1}{x} + C$ (B) $\frac{1}{x} - x + C$

(C) $x \log x + x + C$ (D) $x \log x - x + C$

Space For Rough Work

76. The value of $\int_0^{\pi/2} \sqrt{1+\sin 2x}\, dx$ is

(A) 0 (B) 1

(C) 2 (D) -2

77. $\int_0^1 \frac{x}{1+x^4}$ is

(A) $\frac{\pi}{4}$ (B) $\frac{\pi}{8}$

(C) $\frac{-\pi}{8}$ (D) $\frac{-\pi}{4}$

78. The area formed by the curve $y = (2x + 1)^3$ between the ordinates $x = -1$ and $x = 1$ is

(A) $\frac{41}{4}$ sq. units (B) 2 sq. units

(C) 20 sq. units (D) 10 sq. units

79. The order and degree of differential equation $\left[1+\left(\frac{dy}{dx}\right)^4\right]^{2/3} = \frac{d^2y}{dx^2}$ is

(A) order 2 and degree 3 (B) order 2 and degree 1

(C) order 1 and degree 2 (D) order 1 and degree 4

80. The solution of differential equation $\sec^2 x \tan y\, dx + \sec^2 y \tan x\, dy = 0$ is

(A) $\tan^2 x + \tan^2 y = C$ (B) $\tan x + \tan y = C$

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

Space For Rough Work

PART-C

CHEMICAL ENGINEERING

81. Potential flow is characterized by the

(A) irrotational and frictionless flow

(B) formation of Eddies and crosscurrent within stream

(C) dissipation of mechanical energy into heat.

(D) irrotational and frictional flow

82. Bernoulli's equation is dependent on the

(A) First law of thermodynamics

(B) Second law of thermodynamics

(C) Law of conservation of momentum

(D) Third law of thermodynamics

83. Paper pulp is an example for _____ fluids.

(A) Dilatant (B) Bingham plastic

(C) Newtonian (D) Pseudo plastic

84. Steady flow occurs when the

(A) conditions change steadily with time

(B) conditions are the same at the adjacent points at any instant.

(C) conditions do not change with time at any point.

(D) rate of velocity change is constant.

85. Differential manometer measures the

(A) Absolute pressure (B) Gauge pressure

(C) Pressure difference (D) Vacuum pressure

Space For Rough Work

86. Reynold's number is the ratio of
(A) Viscous forces to inertial forces
(B) Inertial forces to gravity forces
(C) Inertial forces to viscous forces
(D) Viscous forces to gravity forces

87. For pipes that must be broken at intervals for maintenance, the connector used should be a/an
(A) union
(B) tee
(C) elbow
(D) reducer

88. In case of a rotameter, the density of the float material is _____ that of the liquid it replaces.
(A) more than
(B) less than
(C) equal to
(D) same as

89. For a given fluid flow rate, which of the following incurs maximum head loss ?
(A) Orificemeter
(B) Venturimeter
(C) Flow nozzle
(D) All of these

90. The fluid property due to which, mercury does not wet the glass is
(A) Surface tension
(B) Viscosity
(C) Cohesion
(D) Adhesion

91. Which of the following is used to handle smaller quantities of fluid at higher discharge pressure ?
(A) Centrifugal pump
(B) Rotary vacuum pump
(C) Volute pump
(D) Reciprocating pump

92. Centrifugal pump cannot be used to pump
(A) molten sodium (used as a coolant in fast Breeder reactor)
(B) moderately viscous vegetable oil used in soap industry
(C) thick molten soap at 80 °C
(D) water (at high pressures)

Space For Rough Work

93. Cavitation in a centrifugal pump is caused by

(A) high discharge pressure (B) low barometric pressure

(C) high discharge velocity (D) high discharge rate

94. The pressure head of a flowmeter varies for

(A) Venturimeter (B) Rotameter

(C) Areameter (D) Both Venturimeter and Rotameter

95. When the pipe Reynold's number is 6000, the flow is generally

(A) Viscous (B) Laminar

(C) Turbulent (D) Transition

96. Plug cocks are used for

(A) on-off service (B) throttling service

(C) back flow prevention (D) safety purpose

97. Which of the following works on the principle of constant pressure drop ?

(A) Orificemeter (B) Venturimeter

(C) Pitot tube (D) Rotameter

98. Purpose of a relief value in a reciprocating pump is

(A) protect the pump against developing excessive pressure

(B) facilitate unidirectional flow of fluid.

(C) reduce the discharge pressure.

(D) control the rate of discharge.

99. Which of the following produces maximum pressure difference for transportation of gases ?

(A) Vacuum pump (B) Blowers

(C) Fans (D) Compressors

Space For Rough Work

100. Centrifugal pump is normally classified on the basis of the

(A) rpm
(B) type of casing
(C) impeller blade angle
(D) number of blades on impeller

101. Which of the following is a form of energy ?

(A) Pressure
(B) Momentum
(C) Light
(D) Power

102. The unit of thermal conductivity in S.I. unit are

(A) W/m.K.
(B) J/m.K.
(C) $W/m^2.K$
(D) $J/m^2.K$

103. The thermal conductivity of copper

(A) remains unaffected with change in temperature
(B) increases with increase in temperature
(C) decreases with increase in temperature
(D) is less than the thermal conductivity of aluminium at the same temperature

104. The conductance is

(A) directly proportional to the resistance to heat flow.
(B) the reciprocal of the resistance to heat flow.
(C) directly proportional to the thermal potential difference.
(D) the reciprocal of the thermal potential difference.

105. The thermal diffusivity of a material is important in the analysis of problems involving heat transfer by

(A) radiation
(B) natural convention
(C) condensation
(D) conduction

Space For Rough Work

106. Convection is the method of heat transfer in which

(A) The heat is sent out or emitted in waves.

(B) The heat is transferred along a chain of molecules.

(C) The heat is carried along by a movement of warmed matter.

(D) all of the these

107. The Prandtl number is the ratio of

(A) $\frac{\text{Kinematic viscosity}}{\text{Thermal diffusivity}}$ (B) $\frac{\text{Thermal diffusivity}}{\text{Kinematic viscosity}}$

(C) $\frac{\text{Thermal diffusivity}}{\text{Mass diffusivity}}$ (D) $\frac{\text{Absolute viscosity}}{\text{Thermal viscosity}}$

108. The transfer of heat energy from a heated body to a colder body by the emission of heat waves is

(A) Conduction (B) Natural convection

(C) Forced convection (D) Radiation

109. If some of the tubes in a heat exchanger are plugged, the effective heat transfer area will

(A) remain the same (B) increases

(C) decreases (D) zero

110. The total emissivity of a perfect black body is

(A) 0 (B) 1

(C) 0.90 (D) ∞

111. Diffusion is a process of movement of particles

(A) higher concentration to lower concentration

(B) through a semi permeable membrane

(C) by rarefaction

(D) accumulate on a solid surface

Space For Rough Work

112. The binary diffusivity in gases is dependent upon

(A) the temperature
(B) the pressure
(C) nature of the component
(D) all of these

113. The steady state temperature reached by a small amount of liquid evaporating into a large amount of unsaturated vapour-gas mixture is called

(A) dry-bulb temperature
(B) dew point
(C) wet-bulb temperature
(D) bubble point

114. The temperature of water coded in a cooling water is always

(A) less than wet bulb temperature of entering air.
(B) equal to wet bulb temperature of entering air.
(C) greater than wet bulb temperature of entering air.
(D) equal to dry bulb temperature of entering air.

115. Relative volatility α for a binary system

(A) decreases with increase in pressure
(B) increases with increase in pressure
(C) increases with temperature
(D) has no significance

116. The flooding in a distillation column is detected by

(A) a sharp increase in pressure drop
(B) a sharp increase in murphree tray efficiency
(C) a sharp decrease in pressure drop
(D) a sharp decrease in liquid hold up in the column.

117. Milk powder is made from milk by drying in a

(A) drum drier
(B) rotary drier
(C) spouted bed drier
(D) spray drier

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118. Mass transfer co-efficient is defined as

(A) flux = co-efficient / concentration difference

(B) co-efficient = flux / concentration difference

(C) flux = concentration difference / coefficient

(D) none of the these

119. When the temperature and humidity of air is low, we usually use _____ draft cooling tower.

(A) Natural (B) Forced

(C) Inducted (D) None of these

120. Which is the controlling factor for a drum drier ?

(A) Diffusion (B) Heat transfer

(C) Both (A) and (B) (D) Neither (A) nor (B)

121. Recycling in a chemical process facilitates

(A) increased yield (B) enrichment of product

(C) heat conversion (D) all of the these

122. One Newton is equal to _____ dynes.

(A) 10^2 (B) 10^3

(C) 10^4 (D) 10^5

123. Conversion of 15 ft/min to m/sec

(A) 0.0762 (B) 0.762

(C) 0.672 (D) 0.0672

124. Sum of atomic weights of all the constituent elements in the molecule is termed as

(A) Atomic weight (B) Molecular weight

(C) Valency (D) Equivalent weight

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125. The molecular weight of $KMnO_4$ is

(A) 150 kg
(B) 148 gm
(C) 158 gm
(D) 148 kg

126. Number of gram equivalent weight of solute dissolved in one litre of solution is called

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

127. Composition of mixture and solution can be expressed as

(A) Weight percent
(B) Volume percent
(C) Mole percent
(D) All of these

128. Ideal gas law can be formulated by

(A) Boyle's law
(B) Charle's law
(C) Amgot's law
(D) Both (A) and (B)

129. Specific volume is the ratio of molal volume to

(A) Pressure
(B) Specific gravity
(C) Molecular weight
(D) Area

130. The basis for material balance calculation is the

(A) Ideal gas law
(B) The law of conservation of mass
(C) Dalton's law
(D) Amagot's law

131. Degree to which an instrument indicates the changes in measured variable without dynamic error is called its

(A) Speed of response
(B) Reproducibility
(C) Fidelity
(D) Accuracy

132. Which of the following is most suitable for measuring temperature in the range of –40 °C to 425 °C ?

(A) Mercury thermometer
(B) Bimetallic thermometer
(C) Radiation pyrometer
(D) Resistance thermometer

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133. Thermal wells are used in temperature measurement to

(A) guard against corrosive and oxidizing action on thermocouple material

(B) reduce measuring lag

(C) increase fidelity

(D) increase sensitivity

134. Pirani gauge is used for measuring

(A) very high pressure (B) high vacuum

(C) liquid level under pressure (D) liquid level at atmospheric pressure

135. Use of I-Control along with P-Control facilitates

(A) Elimination of offset (B) Reduction of offset

(C) Reduction of stability time (D) Reduction of both offset and stability time

136. The actuating medium of a pneumatic controller is

(A) Compressed air (B) Oil

(C) Water (D) Gas

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

(A) Offset (B) Error ratio

(C) Static error (D) Dynamic error

138. In which controller action there is a continuous relation between value of controlled variable and the value of output signal of the controller ?

(A) P (B) D

(C) I (D) P-D

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

(A) Final control element (B) On-off control

(C) Floating control action (D) Comparators

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140. The basic principle involved in the measurement of temperature by thermocouple is the _____ effect.

(A) Raman
(B) Seebeck
(C) Peltier and Seebeck
(D) Thomsom and Peltier

141. Which of the following controllers has zero offset and highest maximum deviation ?

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

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

(A) load
(B) manipulated
(C) controlled
(D) uncontrolled

143. Which of the following controllers has got the smallest maximum deviation ?

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

144. Bellows are made of thin sheets of

(A) Metal
(B) Glass
(C) Paper
(D) Glass/paper

145. Which of the following is the operating range of radiation pyrometer ?

(A) 300 to 1200 °C
(B) 800 to 2000 °C
(C) –40 to 1000 °C
(D) 0 to 2000 °C

146. Optical pyrometer measures the

(A) emf
(B) current
(C) temperature
(D) flowrate

147. Humidity of air can be measured by

(A) Polarimeter
(B) Rotameter
(C) Orificemeter
(D) Hygrometer

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148. Thermocouple employs two

(A) dissimilar metal strips (B) dissimilar metal wires

(C) similar metal strips (D) similar metal wires

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

(A) Drift (B) Dead zone

(C) Static error (D) Reproducibility

150. Which controller has maximum offset ?

(A) P (B) P-I

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

151. Mass number of an element is equal to

(A) Number of protons and neutrons

(B) Number of neutrons and electrons

(C) Masses of protons and electrons

(D) Masses of protons and neutrons

152. Equivalent weight of a metallic element can be determined by _____ method.

(A) Hydrogen displacement (B) Oxide

(C) Chloride (D) All of these

153. During a chemical reaction certain amount of heat is liberated from a system to surroundings in such reaction the enthalpy change is indicated by _____ value of ΔH.

(A) Positive (B) Negative

(C) Zero (D) Changes from negative to positive

154. In any chemical reaction, either heat absorbed or liberated is constant, whether reaction occur in single step or multiple steps is explained under

(A) I^{st} Law of Thermochemistry (B) II^{nd} Law of Thermochemistry

(C) Law of mass action (D) Law of conservation of momentum

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155. For a reversible reaction : $aA + bB \rightarrow cC + dD$, equilibrium constant is

(A) $K_c = \frac{[C]^C \cdot [d]^D}{[a]^A \cdot [b]^B}$ (B) $K_c = \frac{[A]^a + [B]^b}{[C]^c + [D]^d}$

(C) $K_c = \frac{[C]^c + [D]^d}{[A]^a + [B]^b}$ (D) $K_c = \frac{[C]^c \cdot [D]^d}{[A]^a \cdot [B]^b}$

156. Let H be the enthalpy, G is the free energy, S is the entropy and T is the temperature, then the correct relationship is

(A) $\Delta G = \Delta H + T\Delta S$ (B) $\Delta G = \Delta H - T\Delta S$

(C) $\Delta H = \Delta G + TDS$ (D) $\Delta H = \Delta G - TDS$

157. In general, 1 gram atomic mass of any element contains Avogadro number of atoms, then the mass of one atom of that element is equal to

(A) gram atomic mass × Avogadro number

(B) $\frac{\text{Gram atomic mass}}{\text{Avogadro number}}$

(C) $\frac{\text{Avogadro number}}{\text{Gram atomic mass}}$

(D) $\frac{\text{Molecular mass}}{\text{Avogadro number}}$

158. Order of a chemical reaction is linked with

(A) Temperature used (B) Pressure applied

(C) Catalyst used (D) Powers of concentration of reactants

159. An aqueous solution of glucose belongs to

(A) Strong electrolyte (B) Weak electrolyte

(C) Non-electrolyte (D) None of these

160. According to _____ theory, in water medium, acid release hydrogen ions and bases release hydroxyl ions.

(A) Arrhenius (B) Bransted-Lowry

(C) Lewis (D) Ostwald's

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161. The presence of carbon and hydrogen in the organic compound is tested by _____ method.

(A) Lassaigne's (B) Liebig's

(C) Kjeldahl's (D) Ostwaald's

162. Free radicals are formed due to cleavage of covalent bond by _____ process.

(A) Homolysis (B) Heterolysis

(C) Electrolysis (D) Catalysis

163. In a homologous series of hydrocarbons each member differs from its neighbour by _____ unit.

(A) CH_4 (B) CH_3

(C) CH_2 (D) CH

164. The correct order of reactivity of hydrogen halides towards addition reaction is

(A) HF > HCl > HBr > HI (B) HI > HBr > HCl > HF

(C) HCl > HF > HBr > HI (D) HBr > HI > HF > HCl

165. Two and more hydrocarbons having same molecular formula but different structural formula are called

(A) Monomers (B) Polymers

(C) Isomers (D) Allotropes

166. n-Butane and 2-methyl propane belongs to _____ isomerism.

(A) Chain (B) Position

(C) Functional (D) Geometrical

167. Trivial name of methanol is

(A) Ether (B) Wood spirit

(C) Formalin (D) Aniline

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168. Tetraethyl lead is added in gasoline to

(A) increase its octane number
(B) reduce its octane number
(C) increase its cetane number
(D) reduce its cetane number

169. Mercaptans are generally represented as

(A) R-COOH
(B) R-S-R
(C) R-S-H
(D) R-CO-R

170. Incomplete combustion of a fuel is characterized by high _____ in the flue gas.

(A) Carbon-dioxide
(B) Carbon-monoxide
(C) Temperature
(D) Smoke

171. Size reduction does not occur due to compression in case of

(A) Rod mill
(B) Gyratory crusher
(C) Jaw crusher
(D) Smooth roll crusher

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

(A) Masticator
(B) Change can mixer
(C) Kneader
(D) Banburry mixer

173. _____ are mixed using ribbon blenders.

(A) Lumpy solids and low viscosity liquids
(B) Dry powders
(C) High viscosity liquids
(D) Thick pastes

174. Which of the following parts of a jaw crusher is subjected to maximum wear and tear during its operation ?

(A) Pitman
(B) Jaw plates
(C) Toggles
(D) Crush shaft

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175. Screw conveyors are

(A) run at very high rpm
(B) suitable for sticking materials
(C) suitable for liquids
(D) all of the above

176. 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

177. A propeller agitator

(A) produces mainly axial flow.
(B) is used for mixing high viscosity pastes.
(C) runs at very low speed (2 rpm)
(D) all of these

178. Paddle agitator

(A) is suitable for mixing low viscosity liquids.
(B) produces axial flow
(C) moves at very high speed.
(D) use for wetting purpose.

179. Mixing of plastic solids is generally facilitated by

(A) Dispersion
(B) Mastication
(C) Kneading
(D) Coagulation

180. _____ conveyors are also called scrapers.

(A) Apron
(B) Pneumatic
(C) Bucket elevator
(D) Screw Conveyor

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