

Group Code <b>CH</b>	COURSE	
	CHEMICAL ENGINEERING	
MAXIMUM MARKS	TOTAL DURATION	MAXIMUM TIME FOR ANSWERING
180	200 Minutes	180 Minutes

MENTION YOUR DIPLOMA CET NUMBER				BOOKLET VERSION CODE		SERIAL NUMBER
				<b>A1</b>		<b>209169</b>

DOs:

1. This question booklet is issued to you by the invigilator after the 2<sup>nd</sup> bell i.e., after 9.50 am.
2. Check whether the DCET Number has been entered and shaded in the respective circles on the OMR answer sheet.
3. The version code and 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 and Serial Number of this question booklet should be entered on the Nominal Roll without any mistakes.
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 3<sup>rd</sup> bell rings at 10.00 am, till then;
  - Do not remove the seal present on the right hand side of this question booklet.
  - Do not look inside this question booklet or start answering on the OMR answer sheet.

### IMPORTANT INSTRUCTIONS TO CANDIDATES

1. In case of usage of signs and symbols in the questions, the regular textbook connotation should be considered unless stated otherwise.
2. This question booklet contains 180 (items) questions and each question will have one statement and four different options / responses & out of which you have to choose one correct answer.
3. After the 3<sup>rd</sup> Bell is rung at 10.00 am, remove the paper seal on the right hand side 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.
4. Completely darken / shade the relevant circle with a blue or black ink ballpoint pen against the question number on the OMR answer sheet.

ಸರಿಯಾದ ಕ್ರಮ CORRECT METHOD	ತಪ್ಪು ಕ್ರಮಗಳು WRONG METHOD											
(A) ● (C) (D)	(A) (B) (C) (D)	(A) (B) (C) (D)	(A) (B) (C) (D)	(A) (B) (C) (D)	(A) (B) (C) (D)	(A) (B) (C) (D)	(A) (B) (C) (D)	(A) (B) (C) (D)	(A) (B) (C) (D)	(A) (B) (C) (D)	(A) (B) (C) (D)	(A) (B) (C) (D)

5. Please note that even a minute unintended ink dot on the OMR answer sheet will also be recognized and recorded by the scanner. Therefore, avoid multiple markings of any kind on the OMR answer sheet.
6. Use the space provided on each page of the question booklet for Rough Work. Do not use the OMR answer sheet for the same.
7. Last bell will ring at 1.00 pm, stop marking on the OMR answer sheet.
8. Hand over the OMR answer sheet to the room invigilator as it is.
9. After separating the top sheet (Office copy), the invigilator will return the bottom sheet replica (candidate's copy) to you to carry home for self-evaluation.



## PART - A

### APPLIED SCIENCE

- Which of the following is the supplementary unit of SI System?  
(A) Candela (B) Kelvin  
(C) Radian (D) Mole
- The main scale of Slide Calipers is divided into millimeter, the length of Vernier is 19 mm and is divided into 20 equal parts. The least count is  
(A) 0.01 cm (B) 0.001 cm  
(C) 0.05 cm (D) 0.005 cm
- Which one of the following is not a vector quantity?  
(A) Velocity (B) Acceleration  
(C) Speed (D) Force
- The magnitude of resultant of two forces  $\vec{P}$  and  $\vec{Q}$  acting in the same line and in opposite direction is  
(A)  $P + Q$  (B)  $P - Q$   
(C)  $\frac{P}{Q}$  (D)  $\frac{Q}{P}$
- Two forces 3N and 5N are acting at a point making an angle of  $60^\circ$ . The magnitude of the resultant is  
(A) 15 N (B) 2 N  
(C) 7 N (D) 8 N
- Torque produces  
(A) rotational motion (B) linear motion  
(C) both rotational and linear motion (D) neither rotational nor linear motion

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Space For Rough Work

7. Which one of the following is not related to couple?
- (A) Kicking of football (B) Opening and closing of tap  
(C) Rotation of steering wheel (D) Pedalling of bicycle
8. Within elastic limit, stress is
- (A) independent of strain (B) zero  
(C) directly proportional to strain (D) inversely proportional to strain
9. The length of a wire increases by 1% on suspending a load of 2 N from it. The tensile strain in the wire is
- (A) 0.01 (B) 0.5  
(C) 2 (D) 1
10. Pressure at any point inside a liquid
- (A) remains zero (B) increases with depth  
(C) decreases with depth (D) independent of depth
11. The pressure at the bottom of a swimming pool 20m wide and the water 2m deep (given density of water  $1000 \text{ Kg/m}^3$  and  $g = 10 \text{ m/s}^2$ ) is
- (A)  $2 \times 10^3 \text{ Pa}$  (B)  $40 \times 10^3 \text{ Pa}$   
(C)  $10 \times 10^3 \text{ Pa}$  (D)  $20 \times 10^3 \text{ Pa}$
12. In the case of liquids, as the temperature increases, the surface tension generally
- (A) remains constant (B) decreases  
(C) increases (D) zero

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13. The property of a liquid to oppose the relative motion between different layers is called
- (A) density (B) elasticity  
(C) viscosity (D) capillarity
14. An expression for coefficient of viscosity is (if  $F$  = viscous force;  $A$  = Area,  $V$  = difference in Velocity,  $x$  = distance between two layers)
- (A)  $\eta = -\frac{FA}{xV}$  (B)  $\eta = -\frac{FV}{Ax}$   
(C)  $\eta = -\frac{Fx}{AV}$  (D)  $\eta = -\frac{FxA}{V}$
15. The expression that represents Charle's law is
- (A)  $PV = \text{constant}$  (B)  $VT = \text{constant}$   
(C)  $\frac{P}{V} = \text{constant}$  (D)  $\frac{V}{T} = \text{constant}$
16. The pressure of a gas at  $27^\circ\text{C}$  is one atmospheric pressure. Keeping the volume constant, if the temperature is raised to  $60^\circ\text{C}$ , then its pressure will be
- (A) 1.11 atmospheric pressure (B) 1.5 atmospheric pressure  
(C) 2.2 atmospheric pressure (D) 2 atmospheric pressure
17. Hot water at  $80^\circ\text{C}$  will exchange heat with surroundings maintained at  $25^\circ\text{C}$  till the temperature of water becomes
- (A)  $80^\circ\text{C}$  (B)  $50^\circ\text{C}$   
(C)  $55^\circ\text{C}$  (D)  $25^\circ\text{C}$
18. Radiator in automobiles works on the principle of
- (A) Conduction (B) Convection  
(C) Radiation (D) Evaporation

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19. In the expression  $C_p - C_v = R$ , notation R represents
- (A) Resultant force (B) Planck's constant  
(C) Universal gas constant (D) Resonance
20. Physical quantity that represents the energy of the mechanical wave is
- (A) Wave length (B) Frequency  
(C) Amplitude (D) Wave period
21. Which one of the following is not an example of simple harmonic motion?
- (A) Swinging of cradle (B) Oscillations of simple pendulum  
(C) Vibrations of tuning fork (D) Motion of hands of clock
22. In the equation for velocity of sound in air, which of the following options does not hold good according to Laplace?
- (A) Poor conductivity of air (B) Rapid pressure changes  
(C) Maintaining constant temperature (D) Rise and fall of temperature
23. Distance between two consecutive nodes in a stationary wave is equal to
- (A) Wavelength of individual wave (B) Difference of wavelengths of two waves  
(C) Sum of wavelengths of two waves (D) Half of wavelength of individual wave
24. When the tension on the sonometer wire is increased by 15 N, its frequency is doubled. The original tension is
- (A) Zero (B) 5 N  
(C) 10 N (D) 15 N

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25. Two identical waves superpose on one another, then the beat frequency is
- (A) Zero (B) One  
(C) Ten (D) Infinity
26. Damage to the suspension bridge by marching military troops is due to
- (A) Reverberation (B) Resonance  
(C) Beats (D) Noise
27. A tuning fork produces waves in a medium. The parameter that changes with temperature of the medium is
- (A) Wavelength (B) Frequency  
(C) Amplitude (D) Period
28. The electromagnetic radiation used to detect the artificial gems from the original gems is
- (A) Microwave (B) Radio wave  
(C) Ultraviolet ray (UV ray) (D) X-ray
29. During excitation of an atom from ground state to excited state, the number of photons absorbed by the single atom is
- (A) 2 (B) 1  
(C) 3 (D) 0
30. In Nano-technology, the manipulation of atom is done in the range of
- (A) 1 nano meter – 100 nano meter (B) 1 micro meter – 100 micro meter  
(C) 1 pico meter – 100 pico meter (D) 1 millimeter – 100 millimeter

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Space For Rough Work

31. Live telecast of a programme can be viewed by

- (A) Manual communication (B) X-ray communication  
(C) Landline communication (D) Satellite communication

32. Optical Fibre is used in

- (A) Endoscopy (B) Biometric Machine  
(C) Simple Microscope (D) Simple Telescope

33. Acetic acid is an example for

- (A) Strong Electrolyte (B) Neutral Solution  
(C) Weak Electrolyte (D) Non-Electrolyte

34. The process of coating tin over iron and steel is known as

- (A) Alloying (B) Galvanizing  
(C) Tinning (D) Refining

35. The batteries which are recharged and reused are called

- (A) Primary Battery (B) Secondary Battery  
(C) Fuel Cell (D) Alkaline Battery

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Space For Rough Work



36. PAFC is a type of

(A) Primary Cell

(B) Secondary Cell

(C) Solar Cell

(D) Fuel Cell

37. The easily fusible material which is formed when Flux reacts with gangue is

(A) Slag

(B) Alloy

(C) Polymer

(D) Mineral

38. Which of the below given polymers is obtained by condensation polymerization?

(A) Poly ethene

(B) Nylon

(C) PVC

(D) Poly propane

39. Which of the following is not a composite material?

(A) Fibreglass

(B) Concrete

(C) Ceramic

(D) Bronze

40. The pH value of Lemon juice is about

(A) 2.4

(B) 8.2

(C) 10.2

(D) 14

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Space For Rough Work



**PART – B**  
**ENGINEERING MATHEMATICS**

41. The value of  $\begin{vmatrix} \cos 50^\circ & \sin 10^\circ \\ \sin 50^\circ & \cos 10^\circ \end{vmatrix}$  is

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

(B)  $\frac{\sqrt{3}}{2}$

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

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

42. The values of  $x$  &  $y$  from the simultaneous equations  $3x + 4y = 7$  and  $7x - y = 6$  are.

(A)  $x = 1, y = 1$

(B)  $x = -1, y = -1$

(C)  $x = 1, y = -1$

(D)  $x = -1, y = 1$

43. If  $\begin{vmatrix} x & 3 \\ 3 & x \end{vmatrix} = 0$  then the value of  $x$  is

(A)  $\pm 1$

(B)  $\pm 3$

(C)  $\pm 9$

(D)  $\pm \sqrt{6}$

44. If  $A = \begin{bmatrix} -1 & 3 \\ 4 & -5 \end{bmatrix}$ , then  $2A^T$  is

(A)  $\begin{bmatrix} -2 & 6 \\ 8 & -10 \end{bmatrix}$

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

(C)  $\begin{bmatrix} -2 & 8 \\ 6 & 8 \end{bmatrix}$

(D)  $\begin{bmatrix} -2 & 8 \\ 6 & -10 \end{bmatrix}$

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Space For Rough Work

45. If A is a given square Matrix then

(A)  $\text{adj } A = \frac{A^{-1}}{|A|}$

(B)  $\text{adj } A = \frac{|A|}{|A^{-1}|}$

(C)  $\text{adj } A = |A| \cdot A^{-1}$

(D)  $AA^{-1} = \text{adj } A \cdot |A|$

46. The characteristic Equation of the Matrix  $A = \begin{bmatrix} -5 & 6 \\ -2 & 1 \end{bmatrix}$  is

(A)  $\lambda^2 - 6\lambda + 12 = 0$

(B)  $\lambda^2 - 4\lambda + 17 = 0$

(C)  $\lambda^2 + 4\lambda + 7 = 0$

(D)  $\lambda^2 - 4\lambda + 7 = 0$

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

(A)  $\hat{a} = \frac{3i + 4j - 2k}{\sqrt{26}}$

(B)  $\hat{a} = \frac{3i + 4j - 2k}{\sqrt{29}}$

(C)  $\hat{a} = i + j - 2k$

(D)  $\hat{a} = \frac{3i + 4j - 2k}{\sqrt{21}}$

48. If  $\vec{a} = i + \lambda j$  and  $\vec{b} = 2j + 3k$  and  $\vec{a} \cdot \vec{b} = 0$  then ' $\lambda$ ' is Equal to

(A)  $-\frac{2}{3}$

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

(C)  $\frac{3}{2}$

(D) 0

49. Area of the triangle whose adjacent sides are  $\vec{a} = 2i - j + 2k$  and  $\vec{b} = 3i - j$  is

(A)  $\sqrt{41}$  sq.units

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

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

(D)  $\frac{\sqrt{65}}{2}$  sq.units

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Space For Rough Work



50. The number of possible outcomes in the sample space when two dice of different colours are rolled is
- (A) 36 (B) 6  
(C) 9 (D) 12
51.  $\sin \theta$  is positive and  $\tan \theta$  is negative when  $\theta$  is in
- (A) I quadrant (B) II quadrant  
(C) III quadrant (D) IV quadrant
52. The value of
- $$\frac{\tan(\pi - \alpha)}{\tan(-\alpha)} + \frac{\cos(\frac{\pi}{2} - \alpha)}{\sin(2\pi - \alpha)} + \frac{\operatorname{cosec}(\frac{3\pi}{2} + \alpha)}{\sec(\pi + \alpha)}$$
- is
- (A) -1 (B) 2  
(C) -2 (D) 1
53. The value of  $\sin(105^\circ)$  is
- (A)  $\frac{\sqrt{3} + 1}{2\sqrt{2}}$  (B)  $\frac{\sqrt{3} - 1}{2\sqrt{2}}$   
(C)  $\frac{1 - \sqrt{3}}{2\sqrt{2}}$  (D)  $\frac{\sqrt{3}}{2\sqrt{2}}$
54. The value of  $\frac{1 - \cos A + \sin A}{1 + \cos A + \sin A}$  is
- (A)  $\tan A$  (B)  $\tan\left(\frac{A}{2}\right)$   
(C)  $\cot\left(\frac{A}{2}\right)$  (D)  $\cot A$
55. If  $\sin A = \frac{1}{3}$ , then the value of  $\sin 3A$  is
- (A)  $-\frac{3}{27}$  (B) 1  
(C)  $\frac{-4}{27}$  (D)  $\frac{23}{27}$

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56. The value of  $2 \cos 3A \cdot \sin 2A$  is

(A)  $\sin 5A + \sin A$

(B)  $\cos 5A + \cos A$

(C)  $\sin 5A - \sin A$

(D)  $\cos 5A - \cos A$

57. The polar form of  $1 + i$  is

(A)  $\sqrt{2} \left[ \cos \frac{\pi}{4} + i \sin \frac{\pi}{4} \right]$

(B)  $\sqrt{2} \left[ \cos \frac{\pi}{4} - i \sin \frac{\pi}{4} \right]$

(C)  $\sqrt{2} \left[ \sin \frac{\pi}{4} + i \cos \frac{\pi}{4} \right]$

(D)  $\sqrt{2} \left[ -\cos \frac{\pi}{4} - i \sin \frac{\pi}{4} \right]$

58.  $\lim_{x \rightarrow -3} \frac{x^2 - 5x + 6}{x^2 - 3x} =$

(A)  $\frac{-5}{3}$

(B)  $\frac{1}{3}$

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

(D)  $\frac{5}{3}$

59.  $\lim_{x \rightarrow a} \frac{\sqrt{x^3} - \sqrt{a^3}}{x - a} =$

(A)  $\frac{3}{2} \sqrt{a}$

(B)  $\frac{3}{2\sqrt{a}}$

(C)  $\sqrt{a}$

(D)  $\frac{1}{\sqrt{a}}$

60.  $\lim_{\theta \rightarrow 0} \frac{\cos 3\theta - \cos \theta}{\theta \sin 2\theta} =$

(A)  $\tan 2\theta$

(B) 2

(C) -2

(D) 1

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Space For Rough Work



61. Equation of the straight line passing through the point (1, 3) and having slope  $-2$  is
- (A)  $2x - y + 5 = 0$  (B)  $x + 2y + 5 = 0$   
 (C)  $x - 2y - 5 = 0$  (D)  $2x + y - 5 = 0$
62. Equation of the straight line passing through the origin and perpendicular to the line  $5x - 4y - 1 = 0$  is
- (A)  $5x - 4y = 0$  (B)  $4x + 5y = 0$   
 (C)  $5x - 4y + 1 = 0$  (D)  $4x + 5y + 1 = 0$
63. If  $y = \frac{x^2 - 5}{x^2 + 3}$ , then  $\frac{dy}{dx} =$
- (A)  $\frac{4x^3 - 4x}{(x^2 + 3)^2}$  (B)  $\frac{16x}{(x^2 + 3)^2}$   
 (C)  $\frac{4x}{(x^2 + 3)^2}$  (D)  $\frac{-16x}{(x^2 + 3)^2}$
64. If  $y = \sin^{-1}(\cos x)$ , then  $\frac{dy}{dx} =$
- (A)  $\frac{1}{\sqrt{1-x^2}}$  (B)  $\frac{-\sin x}{\sqrt{1-x^2}}$   
 (C)  $1$  (D)  $-1$
65. If  $y = \sqrt{y \log x}$ , then  $\frac{dy}{dx} =$
- (A)  $\frac{1}{x(2y-1)}$  (B)  $\frac{1}{x}$   
 (C)  $\frac{1}{x(1-2y)}$  (D)  $\frac{1}{xy}$

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**Space For Rough Work**

66. If  $x = a \cos^2 \theta$  and  $y = b \sin^3 \theta$ , then  $\frac{dy}{dx} =$

(A)  $-\frac{3b}{2a} \sin \theta$

(B)  $-\frac{3b}{2a}$

(C)  $\frac{2a}{b} \cos \theta$

(D)  $\frac{-2a}{3b \sin \theta}$

67. If  $y = x^y$ , then  $\frac{dy}{dx} =$

(A)  $\frac{y^2}{x(1-\log x)}$

(B)  $\frac{y^2}{x(1+\log y)}$

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

(D)  $\frac{y^2}{x(1+\log x)}$

68. If  $y = \sin^2 x$ , then  $\frac{d^2y}{dx^2} =$

(A)  $2 \cos 2x$

(B)  $2 \sin 2x$

(C)  $2 \sin x \cos x$

(D)  $2x \sin x$

69. The Equation of tangent to the curve  $y = \sin x$  at the point  $(\pi, 0)$  is

(A)  $x + y + 1 = 0$

(B)  $x - y - 1 = 0$

(C)  $x + y - \pi = 0.$

(D)  $x - y + \pi = 0.$

70. The rate of change of radius of the sphere is  $9\text{cm/s}$ . Then the rate of change of volume of the sphere when the radius is  $2\text{ cm}$  is equal to

(A)  $144\pi \text{ cm}^3/\text{s}$

(B)  $9\pi \text{ cm}^3/\text{s}$

(C)  $56\pi \text{ cm}^3/\text{s}$

(D)  $64\pi \text{ cm}^3/\text{s}$

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Space For Rough Work



$$71. \int \frac{1}{1 + \cos x} dx =$$

(A)  $\tan x + \sec x + c$

(B)  $\tan x - \sec x + c$

(C)  $-\cot x + \operatorname{cosec} x + c$

(D)  $\cot x - \operatorname{cosec} x + c$

$$72. \int (\sqrt{x} + \cot x) dx =$$

(A)  $\frac{2}{3} x^{3/2} + \log \sin x + c$

(B)  $\frac{3}{2} x^{2/3} + \log \sec x + c$

(C)  $\frac{2}{3} x^{3/2} - \log \sin x + c$

(D)  $\frac{3}{2} x^{2/3} - \log \sec x + c$

$$73. \int \frac{e^{\log x}}{x} dx =$$

(A)  $e^x + c$

(B)  $\log(e^x) + c$

(C)  $x \log e^x + c$

(D)  $e^{\log x} + c$

$$74. \int \log x \cdot dx =$$

(A)  $x \log x + x + c$

(B)  $x \log x - x + c$

(C)  $x + \log x + c$

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

$$75. \int \frac{x}{\sqrt{1+x^2}} dx =$$

(A)  $\sqrt{1+x^2} + c$

(B)  $\sqrt{1-x^2} + c$

(C)  $\frac{1}{\sqrt{1+x^2}} + c$

(D)  $\frac{1}{\sqrt{1-x^2}} + c$

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Space For Rough Work

76.  $\int_{-2}^1 (x + 1)(x - 1) dx =$

(A) 0

(B) 1

(C) -1

(D) -2

77. The area bounded by the curve  $y = \sin^2 x$ , the  $x$ -axis and the ordinates  $x = 0$  and  $x = \frac{\pi}{2}$  is

(A)  $\frac{\pi}{4}$  sq. units

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

(C)  $\frac{\pi}{3}$  sq. units

(D)  $\frac{\pi}{6}$  sq. units

78. The order and degree of a differential equation  $4 \left( \frac{dy}{dx} \right)^3 + 8xy + \left( \frac{d^2y}{dx^2} \right)^2 - 7 = 0$  respectively are

(A) 1 and 3

(B) 2 and 2

(C) 2 and 3

(D) 2 and 1

79. The differential equation formed from the equation  $y^2 = 4ax$  by eliminating arbitrary constant is

(A)  $2x \frac{dy}{dx} - y = 0$

(B)  $2x \frac{dy}{dx} + y = 0$

(C)  $y \frac{dy}{dx} - 2x = 0$

(D)  $y \frac{dy}{dx} + 2x = 0$

80. For the differential equation  $\frac{dy}{dx} + (\tan x) \cdot y = \cos x$ , the integrating factor is

(A)  $\log x$

(B)  $\cot x$

(C)  $\operatorname{cosec} x$

(D)  $\sec x$

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Space For Rough Work



**PART – C**  
**CHEMICAL ENGINEERING**

81. Atomic weight of an element is nothing but \_\_\_\_\_
- (A) mass of proton (B) mass of neutron  
(C) mass of electron (D) mass of proton + neutron + electron
82. Equivalent weight of an element is \_\_\_\_\_
- (A) number of parts by mass of the element combined with 1.008 parts by mass of hydrogen  
(B) number of parts by mass of the element combined with 8.0 parts by mass of oxygen  
(C) both A & B  
(D) none of the above
83. When one mole of carbon, completely converted into  $\text{CO}_2$ , the amount of heat liberated is x KJ and one mole of carbon completely converted into CO, the amount of heat liberated is y KJ
- (A)  $x = y$  (B)  $x > y$   
(C)  $x < y$  (D) none of these
84. The amount of heat either liberated or absorbed during the chemical reaction occurs in one step or multiple steps is always constant. This law was stated by \_\_\_\_\_
- (A) Lavoisier (B) Hess  
(C) Gibb (D) Henry
85. For reversible reaction  $x\text{A} + y\text{B} \rightleftharpoons m\text{C} + n\text{D}$ . The chemical equilibrium constant  $K_c =$  \_\_\_\_\_
- (A)  $\frac{x^A + y^B}{m^C + n^D}$  (B)  $\frac{[\text{A}]^x \times [\text{B}]^y}{[\text{C}]^m \times [\text{D}]^n}$   
(C)  $\frac{m^C + n^D}{x^A + y^B}$  (D)  $\frac{[\text{C}]^m \times [\text{D}]^n}{[\text{A}]^x \times [\text{B}]^y}$

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86. The correct order of conditions of spontaneous reaction is \_\_\_\_\_
- (A)  $\Delta H = 0, \Delta G = 0, \Delta S = 0$  (B)  $\Delta H = -Ve, \Delta G = -Ve, \Delta S = +Ve$   
(C)  $\Delta H = +Ve, \Delta G = +Ve, \Delta S = +Ve$  (D)  $\Delta H = -Ve, \Delta G = -Ve, \Delta S = -Ve$
87. Equal volumes of all gases at same temperature and pressure \_\_\_\_\_
- (A) occupy same volume (B) contain equal number of gas particles  
(C) both A and B (D) none of these
88. Which of the following reactions is not feasible \_\_\_\_\_
- (A)  $2H_2O + 2F_2 \rightarrow 4HF + O_2$  (B)  $2KBr + Cl_2 \rightarrow 2KCl + Br_2$   
(C)  $2KBr + I_2 \rightarrow 2KI + Br_2$  (D)  $2KI + Br_2 \rightarrow 2KBr + I_2$
89. Which indicator is suitable for titration involves sodium carbonate solution against sulphuric acid \_\_\_\_\_
- (A) methylene blue (B) methyl orange  
(C) methyl red (D) phenolphthalein
90. Acid is a substance which accepts a pair of electrons and a base which donates a pair of electrons. This acid-base theory was explained by \_\_\_\_\_
- (A) Arrhenius (B) Lowry-Bronsted  
(C) G.N. Lewis (D) Henry
91. Tetra ethyl lead is a chemical used as \_\_\_\_\_
- (A) Anti knocking agent (B) Fire extinguisher  
(C) Mosquito repellent (D) Pain killer

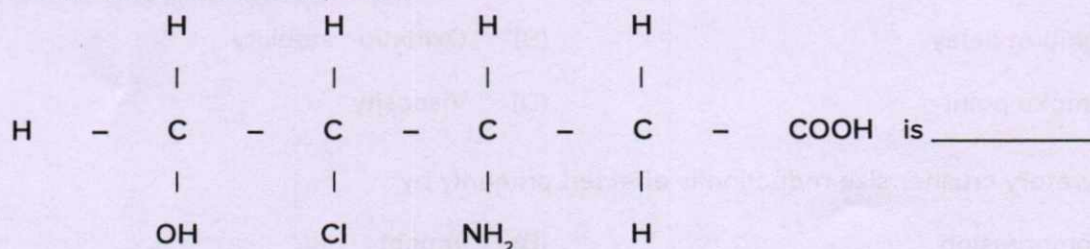
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92. The organic acid present in red-ants is \_\_\_\_\_
- (A) Citric acid (B) Oxalic acid  
(C) Formic acid (D) Benzoic acid
93. Successive member of hydrocarbons in homologous series differ by \_\_\_\_\_ group
- (A) Functional (B) Aryl  
(C) Methyl (D) Methylene
94. The compound having molecular formula  $C_4H_{10}O$  can show \_\_\_\_\_
- (A) Functional isomerism (B) Metamerism  
(C) Position isomerism (D) All of the above

95. IUPAC name of the compound



- (A) 3-Amino, 4-Chloro, 5-hydroxy pentanoic acid  
(B) 1-Hydroxy, 2-Chloro, 3-amino-pentanoic acid  
(C) 2, 3, 4-Amino, Chloro, hydroxy-ethanoic acid  
(D) 1, 2, 3-Hydroxy, chloro, amino, butyl carboxylic acid
96. Generally all the saturated hydrocarbons are \_\_\_\_\_ in water
- (A) soluble (B) insoluble  
(C) partially soluble (D) all of the above

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97. Markownikoff's rule explains addition of HCl with  $\text{CH}_3 - \text{CH} = \text{CH}_2$  give the product
- (A)  $\text{CH}_3 - \text{CH}_2 - \text{CH}_2\text{Cl}$  (B)  $\text{CH}_3 - \text{CHCl} - \text{CH}_3$   
(C)  $\text{CH}_3 - \text{CH} = \text{CHCl} + \text{H}_2$  (D)  $\text{CH}_3 - \text{CH} = \text{CH}_2 - \text{HCl}$
98. Dimethyl ether and ethyl alcohol are the examples of \_\_\_\_\_ isomers
- (A) chain (B) functional  
(C) position (D) geometrical
99. \_\_\_\_\_ polymerisation is the chemical reaction of formation of high molecular substances with the elimination of a low molecular side product
- (A) Addition (B) Condensation  
(C) Homo (D) Graft
100. Cetane number of a diesel fuel is the measure of its \_\_\_\_\_
- (A) Ignition delay (B) Oxidation stability  
(C) Smoke point (D) Viscosity
101. In a gyratory crusher size reduction is effected primarily by
- (A) compression (B) impact  
(C) attrition (D) cutting action
102. Which of the following is a fine crusher?
- (A) Hammer mill (B) Edge runner mill  
(C) Pin mill (D) Tube mill
103. Standard screens always have \_\_\_\_\_ apertures
- (A) Rectangular (B) Triangular  
(C) Square (D) Circular

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104. The \_\_\_\_\_ mill is not a revolving mill
- (A) pebble (B) compartment  
(C) cage (D) tube
105. 200 mesh seive size corresponds to \_\_\_\_\_ microns
- (A) 24 (B) 74  
(C) 154 (D) 200
106. Which of the following conveyors cannot be recommended for transportation of abrasive materials
- (A) Belt conveyor (B) Apron conveyor  
(C) Chain conveyor (D) Flight conveyor
107. The process by which fine solids is removed from liquids is termed as
- (A) Decantation (B) Flocculation  
(C) Sedimentation (D) Classification
108. Which of the following is an example of axial-flow impellers?
- (A) Paddle (B) Turbine  
(C) Propeller (D) None of the above
109. During grinding of the solid particles the temperature of the solid particles \_\_\_\_\_
- (A) remains constant (B) increases  
(C) decreases (D) none of the above
110. The operating speed of a ball mill must be
- (A) less than the critical speed (B) equal to the critical speed  
(C) higher than the critical speed (D) equal to or higher than the critical speed

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111. Fluidised bed is formed when the
- (A) fluid friction is zero
  - (B) gravity force is less than the fluid friction
  - (C) pressure forces equal gravity forces
  - (D) sum of the fluid friction and pressure forces are equal and opposite to gravity forces
112. For an ideal fluid flow Reynolds number is
- (A) 2100
  - (B) 100
  - (C) 0
  - (D)  $\infty$
113. Momentum transfer in laminar flow of fluids results due to the
- (A) viscosity
  - (B) density
  - (C) velocity gradient
  - (D) none of these
114. Pitot tube indicates 5 cm of water (manometer) when it is being used for measuring velocity of air. The velocity of air in m/sec is
- (A) 5
  - (B) 14.1
  - (C) 56.22
  - (D) 28.2
115. In centrifugal pumps, cavitation occurs, when pressure of the impeller eye or vane becomes
- (A) less than atmospheric pressure
  - (B) more than liquid vapour pressure
  - (C) less than liquid vapour pressure
  - (D) more than atmospheric pressure
116. In the low Reynolds number region, the drag force on a sphere is proportional to
- (A)  $V$
  - (B)  $V^2$
  - (C)  $V^4$
  - (D)  $V^{0.5}$
117. The head loss in turbulent flow in a pipe varies
- (A) as velocity
  - (B) as (velocity)<sup>2</sup>
  - (C) inversely as the square of diameter
  - (D) inversely as the velocity

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118. For liquid flow through a packed bed, the superficial velocity as compared to average velocity through the channel in the bed is
- (A) more (B) less  
(C) equal (D) independent of porosity
119. Viscosity of a liquid decreases \_\_\_\_\_ with rise in temperature
- (A) exponentially (B) linearly  
(C) logarithmically (D) none of these
120. Which of the following produces maximum pressure difference for transportation of gases?
- (A) Vacuum pumps (B) Blowers  
(C) Fans (D) Compressors
121. 1 bar is almost equal to \_\_\_\_\_ atmosphere
- (A) 1 (B) 10  
(C) 100 (D) 1000
122. 1 BTU =
- (A) 453.6 calories (B) 252 calories  
(C) 288 calories (D) 350 calories
123. Elements in a periodic table are arranged in order of their
- (A) atomic weight (B) metallic character  
(C) mass number (D) atomic number
124. Conversion of 1000 dyne to newton is
- (A)  $10^{+2}$  (B)  $10^{-2}$   
(C)  $10^{-4}$  (D)  $10^4$

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125. A steam is flowing in a pipe at a flow rate of 4500 kg/hr with dia of 12 inch and density of steam is  $2166 \text{ kg/m}^3$ , then the volumetric flow rate in  $\text{m}^3/\text{sec}$ .
- (A)  $10.78 \times 10^{-5}$  (B)  $2.075 \times 10^{-5}$   
(C)  $8.35 \times 10^{-5}$  (D)  $5.77 \times 10^{-7}$
126. Calculate the kilo-mole atoms of carbon which weighs 60 kg
- (A) 5 k.mol (B) 8 k.mol  
(C) 3 k.mol (D) 6 k.mol
127. The molecular weight of sodium sulphate
- (A) 150 gm (B) 180 gm  
(C) 142 gm (D) 145 gm
128. The number of gram equivalent weight of solute dissolved in 1 litre of solution is
- (A) molality (B) formality  
(C) molarity (D) normality
129. Conversion of 5N  $\text{H}_3\text{PO}_4$  to g/l is
- (A) 200 g/l (B) 163 g/l  
(C) 170 g/l (D) 160 g/l
130. The average molecular weight of air is 28.84, then the density of air at NTP is
- (A)  $5.87 \text{ kg/m}^3$  (B)  $1.287 \text{ kg/m}^3$   
(C)  $4.96 \text{ kg/m}^3$  (D)  $2.827 \text{ kg/m}^3$
131. Volume per cent for gases is equal to the
- (A) weight per cent (B) mole per cent  
(C) weight per cent only for ideal gases (D) mole per cent only for ideal gases

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132. One micro is equal to \_\_\_\_\_ cm
- (A)  $10^{-2}$  (B)  $10^{-4}$   
(C)  $10^{-6}$  (D)  $10^{-8}$
133. Avogadro number is the number of molecules in one \_\_\_\_\_ of a gas
- (A) gram (B) kilogram  
(C) gm. mole (D) litre
134. An aqueous solution of soda ash ( $\text{Na}_2\text{CO}_3$ ) contains 20% by weight soda ash. Express the composition as weight %  $\text{Na}_2\text{O}$
- (A) 116.98 kg (B) 11.698 kg  
(C) 15.678 kg (D) 18.23 kgs
135. 98 grams of  $\text{H}_2\text{SO}_4$  is dissolved in water to prepare 1 litre of solution. Then the Normality of the solution is
- (A) 1 N (B) 4 N  
(C) 5 N (D) 2 N
136. One newton is equal to \_\_\_\_\_ dynes
- (A)  $10^2$  (B)  $10^3$   
(C)  $10^4$  (D)  $10^5$
137. Weight of 56 litres of Ammonia at N.T.P. is \_\_\_\_\_ gm
- (A) 2.5 (B) 42.5  
(C) 56 (D) 2800
138. The value of gas constant R in J/mol. $^\circ\text{K}$  is
- (A) 0.008314 (B) 1.9872  
(C) 8.3145 (D) 0.08206

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139. The ratio of  $\frac{\text{Total mass of mixture}}{\text{Total moles of mixture}}$  is
- (A) Weight fraction (B) Average weight fraction  
(C) Average mole fraction (D) Average molecular weight
140. The molecular weight of sodium hydroxide is
- (A) 40 gm (B) 45 gm  
(C) 30 gm (D) 20 gm
141. PVC is a \_\_\_\_\_ material
- (A) Thermoplastic (B) Thermosetting  
(C) Fibrous (D) Chemically active
142. Most commonly used rubber vulcanisation agent is
- (A) Sulphur (B) Bromine  
(C) Platinum (D) Alumina
143. The monomer of natural rubber is
- (A) DMT (B) Isoprene  
(C) 2 methyl-1-propene (D) Both B & C
144. Properties of a polymer is affected by the
- (A) Chain length (B) Inter molecular forces  
(C) Branching and cross linking (D) Both A & B
145. Plastic tubes and pipes are generally made by \_\_\_\_\_ moulding
- (A) injection (B) transfer  
(C) extrusion (D) compression

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146. Which of the following is the lowest cost plastic commercially available?
- (A) Polythene (B) Teflon  
(C) Bakelite (D) PVC
147. Condensation polymerisation is not involved in the manufacture of
- (A) Teflon (B) Polythene  
(C) Terylene (D) Nylon
148. Hot drink cups are usually made of
- (A) Polystyrene (B) Polythene  
(C) Poly propylene (D) PVC
149. Ebonite is a
- (A) highly vulcanised rubber (B) natural rubber  
(C) unvulcanised raw rubber (D) adhesive
150. Poly propylene is preferred to polythene because the former is
- (A) Non-inflammable (B) Harder  
(C) Stronger (D) Both B & C
151. McLeod gauge is used to measure the
- (A) point velocity (B) flow rate  
(C) vacuum (D) pressure
152. Working principle of mercury in glass thermometer is
- (A) volumetric expansion (B) pressure rise with temperature  
(C) linear expansion (D) none of these
153. \_\_\_\_\_ controller has the maximum stabilising time
- (A) P (B) PD  
(C) PI (D) PID

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154. Bourdon gauges are used for measuring pressure ( $\text{kg}/\text{cm}^2$ )
- (A)  $< 2$  (gauge) (B)  $> 2$  (gauge)  
(C)  $< 2$  (gauge) (D)  $> 10$  (absolute)
155. Which of the following fluid flow measuring devices can measure the largest flow rate
- (A) V-notch (B) Rota-meter  
(C) Orificemeter (D) Weir
156. Which of the following is not classified as a thermoelectric pyrometer?
- (A) Resistance thermometer (B) Thermocouple  
(C) Optical pyrometer (D) Radiation pyrometer
157. \_\_\_\_\_ is a desirable static characteristic of instruments
- (A) Drift (B) Dead zone  
(C) Static error (D) Reproducibility
158. \_\_\_\_\_ input increases linearly with time
- (A) Step (B) Ramp  
(C) Impulse (D) Sinusoidal
159. The unit of time constant of a system is the same as that of
- (A) velocity (B) time  
(C)  $(\text{time})^{-1}$  (D) none of these
160. Example for final control element is a
- (A) valve (B) switch  
(C) signal (D) none of these

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161. Which area is used in case of heat flow by conduction on through a cylinder?
- (A) Logarithmic mean area                      (B) Arithmetic mean area  
(C) Geometric mean area                      (D) None of these
162. The S.I. unit of thermal conductivity is
- (A)  $w/(m^2.k)$                                       (B)  $w/(m.k)$   
(C)  $w/m$     (D)  $w/k$
163. Maximum heat transfer rate is obtained in \_\_\_\_\_ flow
- (A) Laminar    (B) Turbulent  
(C) Creeping    (D) Transition region
164. Film-wise condensation occurs on
- (A) clean and dirt free                              (B) rough and dirty  
(C) contaminated cooling                              (D) Oily
165. Film boiling is usually not desired in commercial equipments because
- (A) The heat transfer rate is low in view of the large temperature drop  
(B) It is difficult to maintain  
(C) It is not economic  
(D) none of these
166. The number of kg vaporised per kg of steam fed to the evaporator is defined as
- (A) capacity    (B) rate of evaporation  
(C) economy    (D) rate of vaporisation
167. In a multiple effect evaporator, which of the following is most suitable flow?
- (A) Forward feed                                      (B) Backward feed  
(C) Mixed feeds                                      (D) Parallel feed

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168. A 2-4 heat exchanger involves
- (A) only counter flow of fluid
  - (B) only parallel flow of fluid
  - (C) both counter and parallel flow of fluids
  - (D) smaller pressure drop compared to 1-2 heat exchanger
169. When warm and cold liquids are mixed, the heat transfer is mainly by
- (A) conduction
  - (B) convection
  - (C) radiation
  - (D) both A & C
170. A perfect black body is perfect \_\_\_\_\_ of radiation
- (A) Absorber
  - (B) Emitter
  - (C) Both A & B
  - (D) Neither A nor B
171. In paper industry, paper is dried in a \_\_\_\_\_ dryer
- (A) tunnel
  - (B) heated cylinder
  - (C) tray
  - (D) none of the above
172. Moisture in a solid exerting an equilibrium vapour pressure equal to that of the pure liquid at the same temperature is called the \_\_\_\_\_ moisture
- (A) critical
  - (B) free
  - (C) bound
  - (D) unbound
173. Refractory bricks are usually dried in a \_\_\_\_\_ dryer
- (A) tray
  - (B) conveyor
  - (C) tunnel
  - (D) festoon
174. Heat sensitive materials like certain pharmaceuticals and food stuffs can be dried in a/an \_\_\_\_\_ dryer
- (A) freeze
  - (B) tray
  - (C) rotary
  - (D) indirect tray

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175. In the constant rate period, the rate of drying curve for batch drying \_\_\_\_\_
- (A) cracks develop on the surface of the solid
  - (B) rate of drying decreases abruptly
  - (C) surface evaporation of unbound moisture occurs
  - (D) none of these
176. Sticky material can be dried in
- (A) tray
  - (B) rotary
  - (C) fluidised bed
  - (D) none of these
177. Drying of a solid involves
- (A) only heat transfer
  - (B) only mass transfer
  - (C) both heat and mass transfer
  - (D) none of these
178. Bound moisture is that liquid which exerts an equilibrium vapour pressure \_\_\_\_\_ that of the pure liquid at the given temperature
- (A) less than
  - (B) more than
  - (C) equal to
  - (D) none of the above
179. Which of the following is not a continuous drier?
- (A) spray
  - (B) tunnel
  - (C) drum
  - (D) tray
180. Drying operation under vacuum is carried out to
- (A) dry those materials which have very high unbound moisture content
  - (B) dry materials having high bound moisture content
  - (C) increase drying temperature
  - (D) decrease drying temperature

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