

# PRACTICE PAPER – VII

## MATHEMATICS

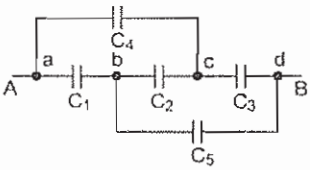
1. If  $f(x) = \sec(\tan^{-1} x)$ , then  $f'(x)$  is equal to
  - (a)  $\frac{x}{\sqrt{1+x^2}}$
  - (b)  $\frac{-x}{\sqrt{1+x^2}}$
  - (c)  $\pm \frac{x}{\sqrt{1+x^2}}$
  - (d) none of these
2. If  $y = \tan^{-1} x$  and  $z = \cot^{-1} x$ , then  $\frac{dy}{dz}$  is equal to
  - (a)  $\frac{\pi}{2}$
  - (b) 1
  - (c) -1
  - (d) none of these
3.  $\int \frac{\log x^n}{x} dx$ ,  $n \in \mathbb{N}$ , is equal to
  - (a)  $\frac{n(\log x)^2}{2} + c$
  - (b)  $\frac{(\log x)^2}{2n} + c$
  - (c)  $n(\log x)^2 + c$
  - (d) none of these
4.  $\int_1^e \frac{1+\log x}{2x} dx$  is equal to
  - (a)  $\frac{1}{4}$
  - (b) e
  - (c)  $\frac{3}{4}$
  - (d)  $\frac{1}{e}$
5.  $\lim_{h \rightarrow 0} \frac{\sin^2(x+h) - \sin^2 x}{h}$  is equal to
  - (a)  $\cos^2 x$
  - (b)  $\sin x \cos x$
  - (c)  $\sin 2x$
  - (d)  $2 \sin x$
6.  $\frac{d}{dx}(\cos^{-1} x) = -\frac{1}{\sqrt{1-x^2}}$  where
  - (a)  $-1 < x < 1$
  - (b)  $-1 \leq x < 1$
  - (c)  $-1 \leq x \leq 1$
  - (d)  $-1 < x \leq 1$
7. The area bounded by the curve  $y^2 = 9x$  and the lines  $x = 1$ ,  $x = 4$  and  $y = 0$  in the first quadrant is
  - (a) 7
  - (b) 14
  - (c) 28
  - (d)  $\frac{14}{3}$
8.  $\int e^x \left( \log x + \frac{1}{x} \right) dx$  is equal to
  - (a)  $\frac{e^x}{x}$
  - (b)  $e^x \log x$
  - (c)  $\frac{e^x \log x}{x}$
  - (d) none of these
9. If  $f(x) = x \tan^{-1} x$  then  $f'(1)$  is equal to
  - (a)  $\frac{\pi}{4} + \frac{1}{2}$
  - (b)  $\frac{\pi}{4} - \frac{1}{2}$
  - (c)  $\frac{1}{2} - \frac{\pi}{4}$
  - (d) none of these
10. Derivative of  $\sin^3 x$  is with respect to  $\cos^2 x$  is
  - (a)  $\tan^3 x$
  - (b)  $-\tan x$
  - (c)  $\tan x$
  - (d)  $\cot x$
11.  $\int_0^{\sqrt{3}} \frac{dx}{1+x^2}$  is equal to
  - (a)  $\frac{\pi}{3}$
  - (b)  $\frac{2\pi}{3}$
  - (c)  $\frac{\pi}{16}$
  - (d)  $\frac{\pi}{12}$
12.  $\int x^3 e^{x^2} dx$  is equal to
  - (a)  $x^2(e^{x^2} - 1)$
  - (b)  $\frac{1}{2}x^2(e^{x^2} - 1)$
  - (c)  $\frac{1}{2}e^{x^2}(x^2 - 1)$
  - (d) none of these
13. If  $a$  is a real number, then  $\lim_{x \rightarrow a} \frac{|x-a|}{x-a}$ 
  - (a) is real to 1
  - (b) is equal to -1
  - (c) is equal to 0
  - (d) none of these
14.  $\lim_{x \rightarrow \infty} \left( 1 + \frac{3}{x} \right)^x$  is equal to
  - (a)  $e^{1/3}$
  - (b)  $e^3$
  - (c)  $3e$
  - (d) none of these

15. If this scalar triple product of three non-zero vectors is zero, then the vectors are  
 (a) collinear (b) co-directional  
 (c) coplanar (d) co-terminus
16.  $\hat{i} \cdot (\hat{j} + \hat{k}) + \hat{j} \cdot (\hat{k} \times \hat{i}) + \hat{k} \cdot (\hat{i} \times \hat{j})$  is equal to  
 (a) 0 (b) -3  
 (c) -1 (d) 3
17. If  $F_1 \equiv (0, 0)$ ,  $F_2 \equiv (3, 4)$  and  $|PF_1| + |PF_2| = 10$ , then locus of p is  
 (a) an ellipse (b) a straight line  
 (c) a hyperbola (d) a line segment
18. The length of the chord of the circle  $(x - 3)^2 + (y - 5)^2 = 80$  cut-off by the line  $3x - 4y - 9 = 0$  is  
 (a) 16 (b) 8  
 (c)  $\sqrt{96}$  (d)  $2\sqrt{96}$
19. The area of the parallelogram, whose diagonal are given by the vectors,  $3\hat{i} + \hat{j} - 2\hat{k}$  and  $\hat{i} - 3\hat{j} + 4\hat{k}$ , is  
 (a)  $10\sqrt{3}$  (b)  $5\sqrt{3}$   
 (c) 8 (d) 4
20. If  $\vec{a}$  and  $\vec{b}$  are in the plane which is perpendicular to plane containing  $\vec{c}$  and  $\vec{d}$ , then  $(\vec{a} \times \vec{b}) \cdot (\vec{c} \times \vec{d})$  is  
 (a) 0 (b) 1  
 (c)  $\vec{a} \cdot \vec{d} + \vec{b} \cdot \vec{c}$  (d)  $\vec{a} \cdot \vec{c} + \vec{b} \cdot \vec{d}$
21. The value of k, such that the equation  $2x^2 + 2y^2 - 6x + 8y + k = 0$  represents a point circle, is  
 (a) 0 (b) 25  
 (c)  $\frac{25}{2}$  (d)  $-\frac{25}{2}$
22. The area of triangle formed by the lines  $y = x$ ,  $y = 2x$  and  $y = 3x + 4$  is  
 (a) 4 (b) 7  
 (c) 9 (d) 8
23. Vector moment of the force  $\vec{F} = 3\hat{i} + 2\hat{j} - 4\hat{k}$  acting at the point  $(1, -1, 2)$  about the point  $(2, -1, 3)$  is  
 (a)  $2\hat{i} - 7\hat{j} - 2\hat{k}$  (b)  $-2\hat{i} - \hat{j} + 2\hat{k}$   
 (c)  $2\hat{i} + 7\hat{j} - 2\hat{k}$  (d)  $-2\hat{i} - 7\hat{j} + 2\hat{k}$
24. If  $\vec{a}$  and  $\vec{b}$  are two parallel vectors with equal magnitudes, then  
 (a)  $\vec{a} = \vec{b}$   
 (b)  $\vec{a} \cdot \vec{b} = 0$   
 (c)  $\vec{a} \neq \vec{b}$   
 (d)  $\vec{a}$  and  $\vec{b}$  may or may not be equal
25. The length of tangent from the point  $(2, -3)$  to the circle  $2x^2 + y^2 = 1$  is  
 (a) 5 (b) -5  
 (c)  $\frac{5}{\sqrt{2}}$  (d)  $-\frac{5}{\sqrt{2}}$
26. If  $2x - 3y = 0$  is the equation of the common chord of the circles  $x^2 + y^2 + 4x = 0$  and  $x^2 + y^2 + 2\lambda y = 0$ , then the values of  $\lambda$  is  
 (a) 3 (b) 2  
 (c) 1 (d) 0
27. The range of  $f(x) = \frac{x-3}{3-x}$ ,  $x \neq 3$  is  
 (a) 1 (b) -1  
 (c) {1} (d) {-1}
28. Which of the following lines is a normal to the circle  $(x - 1)^2 + (y - 2)^2 = 10$ ?  
 (a)  $x + y = 3$   
 (b)  $(x - 1) + (y - 2) = 10$   
 (c)  $x + 2y = 10$   
 (d)  $2x + y = 3$
29. A circle with its centre on the line  $y = x + 1$  is drawn to pass through the origin and touch the line  $y = x + 2$ . The centre of the circle is  
 (a)  $(\frac{1}{2}, -\frac{1}{2})$  (b)  $(-1, 0)$   
 (c)  $(\frac{-1}{2}, \frac{1}{2})$  (d)  $(-1, 2)$
30. The domain of definition of the real function  $f(x) = \sqrt{\log_{16}(x^2)}$  of the real variable x is  
 (a)  $x > 0$  (b)  $|x| \geq 1$   
 (c)  $|x| \geq 4$  (d)  $x \geq 4$
31. The domain of the function  $\log(\sin^2 x)$  is  
 (a)  $[0, 1]$  (b)  $(-\infty, \infty)$   
 (c)  $[-1, 1]$  (d)  $R - \{n\pi, n \in I\}$

32.  $\cos 5^\circ - \sin 25^\circ$  is equal to  
 (a)  $\sin 20^\circ$   
 (b)  $\sin 30^\circ$   
 (c)  $\sin 35^\circ$   
 (d)  $\sin 60^\circ$
33. If  $\sec \theta = x + \frac{1}{4x}$ ,  $x \in \mathbb{R}$ ,  $x \neq 0$ , then the value of  $\sec \theta + \tan \theta$  is  
 (a)  $2x$   
 (b)  $\frac{1}{2x}$   
 (c)  $2x$  or  $\frac{1}{2x}$   
 (d) none of these
34. Range of the function  $f(x) = x - [x]$  is  
 (a)  $[0, 1)$   
 (b)  $[0, 2]$   
 (c)  $(9, 1)$   
 (d) none of these
35. Range of the function  $f(x) = \frac{x^2 - x + 1}{x^2 + x + 1}$  is  
 (a)  $\mathbb{R}$   
 (b)  $[3, \infty)$   
 (c)  $\left[\frac{1}{3}, 3\right]$   
 (d) none of these
36. The minimum value of  $\sec^2 \theta + \cos^2 \theta$  is  
 (a) 1  
 (b) 0  
 (c) 2  
 (d) none of these
37. For all  $z_1, z_2 \in \mathbb{C}$ ,  
 (a)  $|z_1, z_2| = |z_1| |z_2|$   
 (b)  $\arg(z_1 z_2) = (\arg z_1) (\arg z_2)$   
 (c)  $|z_1 + z_2| = |z_1| + |z_2|$   
 (d)  $|z_1 - z_2| \leq |z_1| |z_2|$
38. Number of even prime natural numbers is  
 (a) 1  
 (b) 2  
 (c) infinite  
 (d) 0
39. If  $\tan \theta = -\frac{3}{4}$ , then  $\cos \theta$  is  
 (a)  $-\frac{4}{5}$  but not  $\frac{4}{5}$   
 (b)  $-\frac{4}{5}$  or  $\frac{4}{5}$   
 (c)  $\frac{4}{5}$  but not  $-\frac{4}{5}$   
 (d) neither  $\frac{4}{5}$  nor  $-\frac{4}{5}$
40. When  $x = \frac{\pi}{2}$ , then  $\tan x$  is  
 (a)  $\infty$   
 (b)  $-\infty$   
 (c)  $\infty$  or  $-\infty$   
 (d) not defined
41. The value of  $(-1 + \sqrt{-3})^2 + (-1 - \sqrt{-3})^2$  is  
 (a) -2  
 (b) 4  
 (c) -4  
 (d) 8
42. If  $n$  is any integer, then  $i^n$  is  
 (a)  $i$   
 (b) 1, -1  
 (c)  $i, -i$   
 (d) 1, -1,  $i, -i$
43.  $\tan x$  is periodic with period  
 (a)  $\frac{\pi}{2}$   
 (b)  $\pi$   
 (c)  $2\pi$   
 (d)  $\frac{3\pi}{2}$
44. If  $\sin \alpha = \sin \beta$  and  $\cos \alpha = \cos \beta$ , then  
 (a)  $\alpha = \beta$   
 (b)  $\alpha = 2n\pi + \beta$ ,  $n$  natural number  
 (c)  $\alpha = \pm \beta$   
 (d)  $\alpha = 2n\pi + \beta$ ,  $n$  is any integer
45. The real roots of the equation  $7^{\log_7(x^2 - 4x - 5)} = x - 1$  are  
 (a) 1 and 2  
 (b) 2 and 3  
 (c) 3 and 4  
 (d) 4 and 5

### PHYSICS

46. To convert a galvanometer in a voltmeter, we must connect a  
 (a) low resistance in series  
 (b) high resistance in parallel  
 (c) low resistance in parallel  
 (d) high resistance in series.
47. A galvanometer of  $100\ \Omega$  resistance gives full scale deflection with  $0.01\ \text{A}$  current. How much resistance should be connected to convert it into an ammeter of range  $10\ \text{A}$ ?  
 (a)  $0.2\ \text{W}$  in series  
 (b)  $0.1\ \text{W}$  in parallel  
 (c)  $0.1\ \text{W}$  in series  
 (d)  $0.2\ \text{W}$  in parallel.
48. The potential difference between two electrodes of a galvanic cell, in an open circuit, is known as  
 (a) current  
 (b) electromotive force  
 (c) potential difference  
 (d) impedance.
49. The magnetic field  $B_0$  due to a current carrying circular loop of radius  $12\ \text{cm}$  at its centre is  $0.50 \times 10^{-4}\ \text{T}$ . The magnetic field due to this loop at a point on the axis at a distance of  $5\ \text{cm}$  from the centre is  
 (a)  $3.5 \times 10^{-5}\ \text{T}$       (b)  $3.9 \times 10^{-5}\ \text{T}$   
 (c)  $9.3 \times 10^{-5}\ \text{T}$       (d)  $5.3 \times 10^{-5}\ \text{T}$ .
50. Who disproved the geocentric theory of universe?  
 (a) Aristotle  
 (b) Charles Darwin  
 (c) Issac Newton  
 (d) Copernicus.
51. In a p-n-p transistor working as a common-base amplifier, current gain is  $0.96$  and emitter current is  $7.2\ \text{mA}$ . The base current is  
 (a)  $0.4\ \text{mA}$       (b)  $0.2\ \text{mA}$   
 (c)  $0.29\ \text{mA}$       (d)  $0.35\ \text{mA}$ .
52. In a nuclear reactor, the fast moving neutrons are slowed down by passing them through  
 (a) oil      (b) kerosene  
 (c) heavy water      (d) vacuum.
53. A sample of a radioactive substance contains  $2828$  atoms. If its half-life is  $2$  days, how many atoms will be left intact in the sample after one day?  
 (a)  $1414$       (b)  $1000$   
 (c)  $2000$       (d)  $707$ .
54. Magnetic field is measured in  
 (a) weber      (b) weber/(metre)<sup>2</sup>  
 (c) weber-(meter)<sup>2</sup>      (d) henry.
55. The dimensions of Planck's constant are  
 (a)  $[\text{ML}^2\text{T}^{-1}]$       (b)  $[\text{M}^0\text{L}^{-1}\text{T}^{-3}]$   
 (c)  $[\text{ML}^{-2}\text{T}^{-1}]$       (d)  $[\text{ML}^3\text{T}^{-1}]$
56. The speed of boat is  $5\ \text{km/hr}$  in still water. It crosses a river of width  $1\ \text{km}$  along the shortest possible path in  $15$  minutes. Then velocity of river is  
 (a)  $4\ \text{km/hr}$       (b)  $1\ \text{km/hr}$   
 (c)  $2\ \text{km/hr}$       (d)  $3\ \text{km/hr}$ .
57. A bullet is dropped from the same height when another bullet is fired horizontally. They will hit the ground  
 (a) simultaneously  
 (b) depends upon mass of bullet  
 (c) depends on the observer  
 (d) one after the other.
58. A paper, with two marks having separation  $d$ , is held normal the line of sight of an observer at distance of  $50\ \text{cm}$ . The diameter of the eyeslens of the observer is  $2\ \text{mm}$ . Which of the following is the least value of  $d$  so that the marks can be seen as separate? (mean wavelength of visible light may be taken  $5000\ \text{\AA}$ )  
 (a)  $0.125\ \text{cm}$       (b)  $2.125\ \text{cm}$   
 (c)  $15.25\ \text{cm}$       (d)  $1.225\ \text{cm}$ .
59. At what angle a ray of light will be incident on one face of an equilateral prism, so that the emergent ray may graze the second surface of the prism ( $\mu = 1.5$ )  
 (a)  $18^\circ$       (b)  $38^\circ$   
 (c)  $32^\circ$       (d)  $28^\circ$ .
60. Which of the following waves have the maximum wavelength?  
 (a) X-rays      (b) IR rays  
 (c) UV rays      (d) radio waves.

61. Curie temperature of iron is the temperature below which it is  
 (a) radioactive  
 (b) superconducting  
 (c) ferromagnetic  
 (d) diamagnetic.
62. If a cyclist moving with a speed of 4.9 m/s on a level road can take a sharp circular turn of radius 4 m, then coefficient of friction between the cycle tyres and road is  
 (a) 0.41 (b) 0.51  
 (c) 0.61 (d) 0.71.
63. A body of mass 5 kg is moving in a circle of radius 1 m with an angular velocity of 2 radian/sec. The centripetal force acting on the body is  
 (a) 10 N (b) 40 N  
 (c) 30 N (d) 20 N.
64. A bullet of mass 25 g moving with a velocity of 200 m/s is stopped within 5 cm of the target. The average resistance offered by the target is  
 (a) 10 kN (b) 40 kN  
 (c) 30 kN (d) 20 kN.
65. A machine delivering constant power moves a body along a straight line. The distance moved by the body in time  $t$  is proportional to  
 (a)  $t$  (b)  $t^{3/4}$   
 (c)  $t^{3/2}$  (d)  $\sqrt{t}$
66. A 100 W, 200 V bulb is connected to a 160 volts supply. The actual power consumption would be  
 (a) 64 W (b) 125 W  
 (c) 100 W (d) 80 W.
67. In the given figure, the capacitors  $C_1, C_3, C_4, C_5$  have a capacitance of  $4\mu\text{F}$  each. If the capacitor  $C_2$  has a capacitance of  $10\mu\text{F}$ , then effective capacitance between A and B is  
  
 (a)  $2\mu\text{F}$  (b)  $4\mu\text{F}$   
 (c)  $6\mu\text{F}$  (d)  $8\mu\text{F}$
68. The energy stored in a capacitor is actually stored  
 (a) between the plates  
 (b) on the outer surface of the plates  
 (c) on the negative plate  
 (d) on the positive plate.
69. When a current flows in a wire, there exists an electric field in the direction of  
 (a) flow of current  
 (b) at an angle of  $45^\circ$  to the flow of current  
 (c) perpendicular to the flow of current  
 (d) opposite to the flow of current.
70. If the radius of earth is reduced by 1% without changing the mass, then change in the acceleration due to gravity will be  
 (a) 1% decrease (b) 2% decrease  
 (c) 2% increase (d) 1% increase.
71. If the spinning speed of earth is increased, then weight of the body at the equator  
 (a) increase (b) does not change  
 (c) doubles (d) decreases.
72. The ratio of energy required to raise a satellite to a height  $h$  above the earth's surface to heat required to put it into the orbit is  
 (a)  $h : R$  (b)  $h : 2R$   
 (c)  $2h : R$  (d)  $R : h$ .
73. The moment of inertia, of a rigid body, depends upon  
 (a) mass of the body  
 (b) distribution of mass from axis of rotation  
 (c) angular velocity of the body  
 (d) angular acceleration of the body.
74. A circular disc is rotating with angular velocity  $\omega$ . If a man standing at the edge of the disc walks towards its centre, then the angular velocity of the disc will  
 (a) decrease (c) not change  
 (b) be halved (d) increase.
75. First law of thermodynamics deals with the conservation of  
 (a) energy  
 (b) momentum  
 (c) charge  
 (d) mass.

76. Work done by a simple pendulum in one complete oscillations is
- (a) zero (b)  $\frac{1}{2\pi} \sqrt{\frac{L}{g}}$
- (c)  $v \sin \frac{\theta}{2}$  (d)  $\sqrt{mg}$
77. If the equation of a sound wave is given as:  $y = 0.0015 \sin(62.4 x + 316 t)$ , then wavelength of this wave is
- (a) 0.4 unit (b) 0.1 unit
- (c) 0.2 unit (d) 0.3 unit.
78. Which of the following property of light waves is not observed in sound waves?
- (a) reflection (b) Doppler effect
- (c) polarisation (d) refraction.
79. In a sinusoidal wave, the time required for a particular point to move from maximum displacement is 0.17 sec. The frequency of the wave is
- (a) 0.36 Hz (b) 2.94 Hz
- (c) 1.47 Hz (d) 0.73 Hz.
80. A standing wave is represented by:  $y = a \sin(100 t) \cdot \cos(0.01 x)$  where  $t$  in seconds and  $x$  in metres. The velocity of wave is
- (a)  $10^4$  m/s (b)  $10^{-2}$  m/s
- (c)  $10^{-4}$  m/s (d) 1 m/s
81. A simple pendulum of length  $l$  has a maximum angular displacement  $\theta$ . The maximum kinetic energy of the bob of mass  $m$  is
- (a)  $mg l$  (b)  $mg l (1 - \cos \theta)$
- (c)  $mg l \sin \theta$  (d)  $0.5 mg l$ .
82. How many images will be formed if two mirrors are fitted on adjacent wall and one mirror on roof?
- (a) 2 (c) 5
- (b) 7 (d) 10.
83. An optician prescribes spectacles to a patient with a combination of a convex lens of focal length 40 cm and concave lens 25 cm. The power of spectacles is
- (a)  $-1.5$  D (b)  $6.5$  D
- (c)  $1.5$  D (d)  $-6.5$  D.
84. The velocity of an electron in the inner-most orbit of an atom is
- (a) zero (c) highest
- (b) lowest (d) mean.
85. Which of the following has the same mass as that of electron?
- (a) proton
- (b) hydrogen atom
- (c) positron
- (d) neutron.

## CHEMISTRY

86. Which of the following compound will give positive test with Tollen's reagent?
- (a) acetamide (b) acetone
- (c) acetic acid (d) acetaldehyde.
87. Which of the following is the strongest Bronsted base?
- (a)  $\text{ClO}^-$  (b)  $\text{ClO}_4^-$
- (c)  $\text{ClO}_3^-$  (d)  $\text{ClO}_2^-$ .
88. The reaction of an aldehyde with hydroxylamine gives a product which is called
- (a) aldoxime
- (b) aminohydroxide
- (c) semi carbazone
- (d) hydrazone.
89. The half-life period of a radioactive substance is 140 days. After how much time 15g will decay from 16 g sample of it?
- (a) 140 days (b) 560 days
- (c) 280 days (d) 420 days.
90. The charge of an electron is  $-1.6 \times 10^{-19}$  C. The value of free charge on  $\text{Li}^+$  ion will be
- (a)  $3.6 \times 10^{-19}$  C
- (b)  $1 \times 10^{-19}$  C
- (c)  $1.6 \times 10^{-19}$  C
- (d)  $2.6 \times 10^{-19}$  C.
91. The maximum valency of an element with atomic number 7 is
- (a) 2 (b) 5
- (c) 4 (d) 3.

92. How many grams of  $\text{CaCO}_3$  will give 56 g of  $\text{CaO}$ ?  
 (a) 120 g (b) 56 g  
 (c) 100 g (d) 112 g.
93. The chloramphenicol is an example of  
 (a) antibiotic (b) sulphadiazole  
 (c) antiseptic (d) antipyretic.
94. The metal present in vitamin  $\text{B}_{12}$  is  
 (a) iron (b) manganese  
 (c) magnesium (d) cobalt.
95. Terylene is used for making  
 (a) sails (b) fabrics  
 (c) seat belts (d) all of these.
96. The bad smelling substance, formed by the action of alcoholic caustic potash on chloroform and aniline, is  
 (a) nitrobenzene  
 (b) phenyl isocyanate  
 (c) phenyl isocyanide  
 (d) phenyl cyanide.
97. Which of the following is called laughing gas?  
 (a) nitric oxide  
 (b) dinitrogen pentoxide  
 (c) dinitrogen trioxide  
 (d) nitrous oxide.
98.  $\text{ZnO}$  when heated with  $\text{BaO}$  at  $1100^\circ\text{C}$  gives a compound. Identify the compound  
 (a)  $\text{BaZnO}_2$  (b)  $\text{BaO}_2 + \text{Zn}$   
 (c)  $\text{BaCdO}_2$  (d)  $\text{Ba} + \text{ZnO}_2$
99. In the metallurgy of zinc, the zinc dust obtained from roasting contains some zinc oxide. How is this removed?  
 (a) smelting is employed  
 (b) shock coding with a shower of lead  
 (c) absorbance of UV light  
 (d) X-ray method is used.
100. When chloroform is exposed to air the compound formed is  
 (a) phosgene  
 (b) chloral  
 (c) acetyl chloride  
 (d) all of these.
101. In an isobaric process, the ratio of heat supplied to the system ( $dQ$ ) and work done by the system ( $dW$ ) for diatomic gas is  
 (a) 1 : 1 (b) 7 : 2  
 (c) 7 : 5 (d) 5 : 7.
102. Equal volumes of monoatomic and diatomic gases at same initial temperature and pressure are mixed.  
 The ratio of specific heats of the mixture  $\left(\frac{C_p}{C_v}\right)$  will be  
 (a) 1 (b) 2  
 (c) 1.67 (d) 1.5.
103. If the rate of diffusion of  $\text{CH}_4$  is twice of that of a gas X, then what is the molecular mass of the gas X?  
 (a) 32 (b) 96  
 (c) 80 (d) 64.
104. What is the value of carbonate hardness of water sample if 100 ml of it took 5 ml of 0.09 N HCl solution? (Molecular weight of  $\text{Na}_2\text{CO}_3 = 106$ )  
 (a) 4.50 mg-eq/litr. (b) 1.80 mg-eq/litr.  
 (c) 0.042 mg-eq/litr. (d) 477.00 mg-eq/litr.
105. The rate of a chemical reaction depends upon  
 (a) time (b) pressure  
 (c) concentration (d) all of these.
106. Which of the following shows electrical conduction?  
 (a) sodium (b) potassium  
 (c) diamond (d) graphite.
107. The maximum number of hydrogen bonds formed by a water molecule in ice is  
 (a) 4 (b) 1  
 (c) 2 (d) 3.
108. The homologue of ethylene is  
 (a)  $\text{C}_2\text{H}_2$  (b)  $\text{C}_3\text{H}_4$   
 (c)  $\text{C}_3\text{H}_6$  (d)  $\text{C}_3\text{H}_8$
109. The extraction of IA and IIA group metals is done by  
 (a) carbon reduction  
 (b) aluminothermic process  
 (c) metal displacement  
 (d) electrolytic reduction.

110. In laboratory, silicon can be prepared by heating
- silica with magnesium
  - carbon in electric furnace
  - potassium with fluorine
  - none of these.
111. The element having atomic number 56 belongs to
- actinides
  - alkaline earth metals
  - transition series
  - lanthanides.
112. For  $l = 3$ , the corresponding values of magnetic quantum numbers would be
- $-1, -2, -3$
  - $0, \pm 1, \pm 2, \pm 3$
  - $\pm 1, \pm 2, \pm 3$
  - $0, +1, +2, +3$ .
113. The interatomic distances in  $H_2$  and  $Cl_2$  molecules are 74 and 198 Pm respectively. The bond length of HCl is
- 124 Pm
  - 248 Pm
  - 272 Pm
  - 136 Pm.
114. The process of heating steel and then suddenly cooling it is known as
- annealing
  - case-hardening
  - tampering
  - hardening.
115. The electronic configuration of  $Mn^{2+}$  ion in its ground state is
- $3d^5 4s^0$
  - $3d^2 4s^2 4p^2$
  - $3d^3 4s^2$
  - $3d^4 4s^1$ .
116. The shape of ethylene molecule is
- square planar
  - linear
  - pyramidal
  - tetrahedral.
117. An isomer of ethanol is
- ethanal
  - dimethyl ether
  - diethyl ether
  - methanol.
118. The indicator used in the titration of iodine against sodium thiosulphate is
- starch
  - $K_3Fe(CN)_6$
  - $K_2CrO_4$
  - potassium.
119. If Na is heated in presence of air, it forms
- $Na_2CO_3$
  - $Na_2O_2$
  - $Na_2O$
  - both (b) and (c).
120. Which of the following is the most stable carbonium ion among the following?
- $\overset{\cdot}{C}_6H_5CH_2$
  - $CH_3\overset{\cdot}{C}H_2$
  - $C_6H_5-CH_2\overset{\cdot}{C}H_2$
  - $C_6H_5\overset{\cdot}{C}H-C_6H_5$
121. When metallic copper comes in contact with moisture, a green powdery/pasty coating can be seen over it. This is chemically known as
- copper sulphide - copper carbonate
  - copper carbonate - copper sulphate
  - copper carbonate - copper hydroxide
  - copper sulphate - copper sulphide.
122. Carborundum is
- SiC
  - $AlCl_3$
  - $Al_2(SO_4)_3$
  - $Al_2O_3 \cdot 2H_2O$ .
123. In graphite, carbon atoms are joined together due to
- ionic bonding
  - Van der waal's forces
  - metallic bonding
  - covalent bonding.
124. The positive charge of an atom is
- spread all over the atom
  - distributed around the nucleus
  - concentrated at the nucleus
  - all of these.
125. The hybridisation of carbons of C—C single bond of  $HC\equiv C-CH=CH_2$  is
- $sp^3 - sp^3$
  - $sp - sp^2$
  - $sp^3 - sp$
  - $sp^2 - sp^3$



**INTELLIGENCE, LOGIC & REASONING**

126. If the sum of three consecutive odd numbers is 57, then the middle number is  
 (a) 17 (b) 19  
 (c) 21 (d) 23
127. If the ratio of the areas of two squares is 1 : 2, then ratio of the perimeters of these two squares will be  
 (a)  $1 : \sqrt{2}$  (b) 1 : 2  
 (c) 1 : 4 (d) 2 : 1
128.  $(0.\overline{6} + 0.\overline{7}) + 0.\overline{8} + 0.\overline{3} =$   
 (a) 1 (b)  $2\frac{8}{5}$   
 (c)  $2\frac{2}{3}$  (d)  $2\frac{2}{10}$
129. If  $\frac{5 + 2\sqrt{3}}{7 + 4\sqrt{3}} = a + b\sqrt{3}$  then the values of a and b are  
 (a) a = 11, b = 11 (b) a = 11, b = 6  
 (c) a = 11, b = -6 (d) a = -11, b = -6
130. If the code of STEADY is 931785 and that of ENTRY is 12345, then what will r be the code of SEDATE?  
 (a) 814195 (b) 954185  
 (c) 614781 (d) 918731
131. From the given alternatives, the word which cannot be formed from the letters used in the word SUPERIMPOSABLE is  
 (a) POSSIBLE  
 (b) REPOSURE  
 (c) SPIRE  
 (d) REPTILE
132. Which one set of letters when sequentially placed in the gaps of the given letter series shall complete it? bab.....b.....b .....  
 .....abb  
 (a) abba (b) bbba  
 (c) abab (d) babb
133. 0.....8, 27, 64, 125  
 (a) 1 (b) 2  
 (c) 3 (d) 4
- Directions (Q.134 – 135) :** Choose the correct relation.
134. Sculptor: chisel: : author:  
 (a) table (b) paper  
 (c) book (d) pen
135. Book : bookcase : : clothes :  
 (a) rack (b) press  
 (c) hanger (d) wardrobe

**ENGLISH LANGUAGE & COMPREHENSION**

**Directions (Q.136 – 139) :** Read the following passage carefully and answer the questions given below:

Though the US prides itself on being a leader in the world community, a recent report shows that it lags far behind other industrialised countries in meeting the needs of its youngest and most vulnerable citizens. The US has a higher infant mortality rate, a higher proportion of low birth weight babies, a smaller proportion of babies immunised against childhood diseases and a much higher rate of adolescent pregnancies. These findings, described as a 'quiet crisis' requiring immediate and far-reaching action, appeared in a report prepared by a task force of educators, doctors, politicians and business people. According to the report, a fourth of the nation's 12 million infants and toddlers

live in poverty. As many as half confront risk factors that could harm their ability to develop intellectually, physically and socially. Child immunisations are too low, more children are born into poverty, more are in substandard care while their parents work and more are being raised by single parents. When taken together, these and other risk factors can lead to educational and health problems that are much harder and more costly to reverse.

The crisis begins in the womb with unplanned parenthood. Women with unplanned pregnancies are less likely to seek pre-natal care. In the US, 80% of teenage pregnancies and 56% of all pregnancies are unplanned. The problems continue after birth where unplanned pregnancies and unstable partnerships often go hand in hand. Since 1950, the number of singleparent families has

nearly tripled. More than 25 per cent of all births today are to unmarried mothers. As the number of single-parent families grows and more women enter the work force, infants and toddlers are increasingly in the care of people other than their parents.

More disturbingly, recent statistics show that American parents are increasingly neglecting or abusing their children. In only four years from 1987 - 1991, the number of children in foster care increased by over 50 per cent. Babies under the age of one are the fastest growing category of children entering foster care. The crisis affects children 'under the age of three most severely, the report says. Yes, it is this period from infancy through pre-school years – that sets the stage for a child's future.

- 136.** The task force report seems to be based on the data pertaining to the period
- 1987 to 1991
  - 1950 to 1991
  - 1987 onwards till date
  - 1950 onwards till date
- 137.** An increasing number of infants in the US are in foster care on account of an increasing number of
- women becoming economically independent
  - women getting divorced and abandoning their babies
  - employed couples who are required to stay a part
  - single-parent families with the female member working
- 138.** Children born out of unplanned pregnancies are highly vulnerable because
- their parents are mostly poor
  - they are raised by single parents
  - they are mostly malnourished
  - they are less likely receive pre-natal care
- 139.** The number of children born to married mothers in the US is approximately how many times the number of children born to unwed mothers?
- 3.5 times
  - 3 times
  - 2 times
  - 1.5 times

**Directions (Q.140 – 141):** In each of the following questions, fill in the blanks with the correct word from the given options.

- 140.** She is.....MBA.
- at
  - an
  - a
  - the
- 141.** He is elder.....me.
- to
  - by
  - than
  - from

**Directions (Q.142 – 144) :** In each of the following questions, out of the given alternatives, choose the antonym of the given word.

- 142.** Insertion
- addition
  - substitution
  - extraction
  - increment
- 143.** Density
- thinness
  - thickness
  - toughness
  - kindness
- 144.** Amnesty
- reward
  - gift
  - crowd
  - punishment

**Directions (Q.145 – 147) :** In each of the following questions, out of the given alternatives, choose the synonym of the given word.

- 145.** Sustain
- believe
  - revive
  - support
  - allow
- 146.** Stupid
- silly
  - insane
  - disobedient
  - incapable
- 147.** Ascend
- leap
  - grow
  - deviate
  - mount

**Directions (Q.148 – 150) :** Choose the correct word to complete the sentences from the given choices.

- 148.** No one can do this job but .....
- him
  - our
  - me
  - own

- Neither Mohan nor his sister has done .....  
 'sson.  
 (a) those  
 (b) own  
 (c) their  
 (d) her
150. .... is doubtful whether he will come.  
 (a) it  
 (b) that  
 (c) their  
 (d) its

## ANSWERS

### MATHEMATICS

1. (a) 2. (c) 3. (a) 4. (c) 5. (c) 6. (a) 7. (b) 8. (b) 9. (a) 10. (b)  
 11. (d) 12. (c) 13. (a) 14. (b) 15. (c) 16. (d) 17. (a) 18. (a) 19. (b) 20. (a)  
 21. (c) 22. (a) 23. (a) 24. (d) 25. (c) 26. (a) 27. (d) 28. (a) 29. (c) 30. (b)  
 31. (d) 32. (c) 33. (c) 34. (a) 35. (c) 36. (c) 37. (a) 38. (a) 39. (b) 40. (d)  
 41. (c) 42. (d) 43. (b) 44. (d) 45. (b)

### PHYSICS

46. (d) 47. (b) 48. (b) 49. (b) 50. (d) 51. (c) 52. (c) 53. (c) 54. (b) 55. (a)  
 56. (d) 57. (a) 58. (c) 59. (d) 60. (d) 61. (c) 62. (c) 63. (d) 64. (a) 65. (c)  
 66. (a) 67. (b) 68. (a) 69. (a) 70. (c) 71. (d) 72. (c) 73. (b) 74. (d) 75. (a)  
 76. (a) 77. (b) 78. (c) 79. (c) 80. (a) 81. (b) 82. (c) 83. (a) 84. (b) 85. (c)

### CHEMISTRY

86. (d) 87. (a) 88. (a) 89. (b) 90. (c) 91. (b) 92. (c) 93. (a) 94. (b) 95. (d)  
 96. (c) 97. (d) 98. (a) 99. (a) 100. (a) 101. (b) 102. (d) 103. (d) 104. (a) 105. (d)  
 106. (d) 107. (a) 108. (d) 109. (d) 110. (a) 111. (b) 112. (b) 113. (d) 114. (d) 115. (a)  
 116. (a) 117. (b) 118. (a) 119. (d) 120. (d) 121. (c) 122. (a) 123. (d) 124. (c) 125. (b)

### INTELLIGENCE, LOGIC & REASONING

126. (b) 127. (a) 128. (c) 129. (c) 130. (d) 131. (d) 132. (d) 133. (a) 134. (d) 135. (d)

### ENGLISH LANGUAGE & COMPREHENSION

136. (d) 137. (d) 138. (d) 139. (b) 140. (b) 141. (a) 142. (c) 143. (a) 144. (a) 145. (c)  
 146. (a) 147. (d) 148. (a) 149. (d) 150. (a)