

PRACTICE PAPER – IV

MATHEMATICS

1. If $1, \omega, \omega^2$ are the cube roots of unity, then $\frac{a + b\omega + c\omega^2 + d\omega^2}{c + d\omega + a\omega + b\omega^2}$ is equal to
 (a) 1 (b) ω^2
 (c) ω (d) none of these
2. $\sqrt{2+\sqrt{3}} + \sqrt{2-\sqrt{3}}$ is equal to
 (a) $\sqrt{3}$ (b) $\sqrt{3}/\sqrt{2}$
 (c) $\sqrt{2}/\sqrt{3}$ (d) $\sqrt{6}$
3. The expression $\frac{\sqrt{3}-1}{2\sqrt{2}-\sqrt{3}-1}$ is equal to
 (a) $\sqrt{2} + \sqrt{3} + \sqrt{4} + \sqrt{6}$
 (b) $\sqrt{6} - \sqrt{4} + \sqrt{3} + \sqrt{2}$
 (c) $\sqrt{6} - \sqrt{4} - \sqrt{3} + \sqrt{2}$
 (d) none of these
4. If $z_1 = 3 + 4i$ and $z_2 = 4 - 3i$, then
 (a) $|z_1| > |z_2|$ (b) $|z_2| > |z_1|$
 (c) $|z_2| = |z_1|$ (d) $\text{Amp}(z_1) = \text{Amp}(z_2)$
5. The number of real solution of $x^2 - |x| - 2 = 0$ is
 (a) 1 (b) 2
 (c) 3 (d) 4
6. If the roots of the equation, $8x^2 - 6x + a = 0$ are of the form α and α^2 , then value of α is
 (a) 1, -27 (b) -1, 27
 (c) -1, -27 (d) 1, 27
7. If the roots of the equation $ax^2 + bx + c = 0$ are negative of each other, then
 (a) $c = 0$ (b) $b = c = 0$
 (c) $b = 0$ (d) $b = 0, c \neq 0$
8. $11^3 + 12^3 + 13^3 + \dots + 20^3$ is
 (a) an odd integer divisible by 5
 (b) an even integer
 (c) multiple of 10
 (d) an odd integer but not a multiple of 5
9. If a, b, c, d , are in G.P., then a/c equals
 (a) $\frac{d}{c}$ (b) $\frac{b}{a}$
 (c) $\frac{c}{b}$ (d) $\frac{d}{b}$
10. If p th term of an AP is q and q th term is p , then its r th term is
 (a) $p - q + r$ (b) $p - q - r$
 (c) $p + q - r$ (d) $p + q + r$
11. If ${}^{x+5}P_{n+1} = \frac{11(n-1)^{n+3}}{2} P_n$ then the value of x is
 (a) 2 or 6 (b) 2 or 11
 (c) 7 or 11 (d) 6 or 7
12. The value of expression ${}^{47}C_4 + \sum_{j=1}^5 {}^{52-j}C_3$ is equal to
 (a) ${}^{47}C_5$ (b) ${}^{52}C_5$
 (c) ${}^{52}C_4$ (d) ${}^{52}C_3$
13. A box contains two white balls, three black balls and four red balls. The number of ways in which three balls can be drawn from the box so that one of the balls is black is
 (a) 84 (b) 74
 (c) 64 (d) 20
14. A coin with tail on both sides is tossed twice. The probability of getting a "head" is
 (a) $\frac{1}{2}$ (b) 1
 (c) 0 (d) $\frac{3}{4}$
15. The chance that an event "occur" or does not occur is
 (a) 0 (b) 1
 (c) $\frac{3}{4}$ (d) none of these
16. If $(1 + x - 2x^2)^6 = 1 + a_1x + a_2x^2 + \dots + a_{12}x^{12}$, then $a_2 + a_4 + a_6 + \dots + a_{12}$ is equal to
 (a) 30 (b) 31
 (c) 32 (d) 0
17. If 2nd, 3rd and 4th terms in the expansion of $(x+a)^n$ are 240, 720 and 1080 respectively, then the value of r is
 (a) 20 (b) 15
 (c) 10 (d) 1.5

18. If the first three terms in the expansion of $(x+a)^n$ are 729, 7290, and 30375 respectively, then the value of n is

- (a) a (b) 6
(c) 8 (d) none of these

19. If a, b, c , are in A.P., then $\begin{vmatrix} x+1 & x+2 & x+a \\ x+2 & x+3 & x+b \\ x+3 & x+4 & x+c \end{vmatrix}$

is equal to

- (a) 0 (b) x^2
(c) 3 (d) none of these

20. $\begin{vmatrix} 1 & 1 & 1 \\ {}^n C_1 & {}^{n-1} C_1 & {}^{n-2} C_1 \\ {}^n C_2 & {}^{n-1} C_2 & {}^{n-2} C_2 \end{vmatrix} =$

- (a) 0 (b) 1
(c) -1 (d) none of these

21. If $f(x) = \begin{vmatrix} 2\cos x & 1 & 0 \\ 1 & 2\cos x & 1 \\ 0 & 1 & 2\cos x \end{vmatrix}$, then $f\left(\frac{\pi}{3}\right) =$

- (a) 0 (b) 1
(c) -1 (d) none of these

22. The determinant

$\begin{vmatrix} -a+b+c & -2a & -2a \\ -2b & -b+c+a & -2b \\ -2c & -2c & -c+a+b \end{vmatrix}$ is

- (a) 0 (b) a perfect square
(c) a perfect cube (d) none of these

23. If $\tan A = \frac{1}{2}$ and $\tan B = \frac{1}{3}$, then a value of $A + B$ is

- (a) 135° (b) 45°
(c) 315° (d) none of these

24. The maximum value of $\sin\left(x + \frac{\pi}{6}\right) + \cos\left(x + \frac{\pi}{6}\right)$

in the interval $\left[0, \frac{\pi}{2}\right]$ is attained at $x =$

- (a) $\frac{\pi}{6}$ (b) $\frac{\pi}{3}$
(c) $\frac{\pi}{12}$ (d) $\frac{\pi}{2}$

25. $\frac{1 - \tan^2 \frac{\pi}{8}}{1 + \tan^2 \frac{\pi}{8}}$ is equal to

- (a) $\frac{1}{2}$ (b) 2
(c) 0 (d) $\frac{1}{\sqrt{2}}$

26. The value of $\cos \frac{\pi}{5} \cos \frac{2\pi}{5} \cos \frac{4\pi}{5} \cos \frac{\pi}{5}$ is

- (a) $\frac{1}{16}$ (b) 0
(c) $-\frac{1}{8}$ (d) $-\frac{1}{16}$

27. Value of $\tan 81^\circ - \tan 63^\circ - \tan 27^\circ + \tan 9^\circ$ is equal to

- (a) 1 (b) 2
(c) 3 (d) 4

28. The range of the function $f(x) = \frac{1}{\sqrt{3x-4}}$ is

- (a) \mathbb{R} (b) $[0, \infty)$
(c) $(0, \infty)$ (d) none of these

29. Range of the function $f(x) = \sqrt{x^2+x+1}$ is equal to

- (a) $[0, \infty)$ (b) $\left[\frac{\sqrt{3}}{2}, \infty\right)$
(c) $\left(-\frac{\sqrt{3}}{2}, \infty\right)$ (d) none of these

30. Range of the function $f(x) = \sqrt{\frac{x}{1+x}}$ is

- (a) $(0, \infty)$ (b) $[0, \infty)$
(c) $[-0, \infty) - \{1\}$ (d) none of these

31. Domain of the function $\sin^{-1}(2x+1)$ is

- (a) $[-1, 0]$ (b) $[-1, 1]$
(c) $[0, 1]$ (d) none of these

32. The function $2x^3 - 3x - 12 + 4$ has

- (a) two maxima
(b) two minima
(c) one maximum and one minimum
(d) two maxima and no minima

33. If $y = \frac{x}{2} \sqrt{x^2+1} + \frac{1}{2} \log(x + \sqrt{x^2+1})$, then

$\frac{dy}{dx}$ is equal to

- (a) $2\sqrt{x^2+1}$ (b) $\sqrt{x^2+1}$
 (c) $\frac{1}{\sqrt{x^2+1}}$ (d) none of these

34. $\lim_{x \rightarrow 0} 2^{-2x-1}$ is equal to

- (a) 0 (b) 1
 (c) does not exist (d) none of these

35. Let $f(x) = \begin{cases} x & \text{if } x \in \theta \\ 1-x & \text{if } x \in (R-\theta) \end{cases}$, then

- (a) f is only right continuous at $x = \frac{1}{2}$
 (b) f is only left continuous at $x = \frac{1}{2}$
 (c) f is continuous at $x = \frac{1}{2}$
 (d) f is not continuous at $x = \frac{1}{2}$

36. $\int_a^b \frac{|x|}{x} dx =$

- (a) $b - a$ (b) $a - b$
 (c) $a + b$ (d) $|b| - |a|$

37. $\int_1^{\sqrt{3}} \frac{1}{1+x^2} dx$ is equal to

- (a) $\frac{\pi}{12}$ (b) $\frac{\pi}{6}$
 (c) $\frac{\pi}{4}$ (d) $\frac{\pi}{3}$

38. The general solution of differential equation

$\frac{dy}{dx} = \frac{y}{x}$ is

- (a) $y = \frac{k}{x}$, k constant
 (b) $y = k \log x$
 (c) $y = kx$
 (d) $\log y = kx$

39. $\int \frac{1}{f(x)} dx = \log f(x)^2 + c$, then $f(x)$ is equal to

- (a) $2x + \alpha$ (b) $\frac{x}{2} + \alpha$
 (c) $x + \alpha$ (d) $x^2 + \alpha$

40. The general solution of the differential

equation $\frac{d^2y}{dx^2} = e^{-2x}$ is

- (a) $y = \frac{1}{4} e^{-2x} + c$
 (b) $y = e^{-2x} + cx + d$
 (c) $y = \frac{1}{4} e^{-2x} + cx + d$
 (d) $y = \frac{1}{4} e^{-2x} + cx^2 + d$

41. $\lim_{x \rightarrow \infty} \left[\frac{x}{x^2+1} + \frac{x}{x^2+2^2} + \frac{x}{x^2+3^2} \dots + \frac{x}{x^2+m^2} \right]$ is equal to

- (a) $\frac{\pi}{4}$ (b) $\log 2$
 (c) 0 (d) 1

42. The volume of parallelepiped whose continuous edges are $-12i + \alpha k$, $3j - k$, $2i + j - 15k$ is 546, then α is equal to

- (a) 3 (b) -3
 (c) 2 (d) -2

43. The vectors $2i - m\hat{j} + 3m\hat{k}$ and

$(1+m)i - 2m\hat{j} + \hat{k}$

- (a) all real m (b) $m < -2$ or $m > -\frac{1}{2}$
 (c) $m = -\frac{1}{2}$ (d) $m \in [-2, -\frac{1}{2}]$

44. If $\vec{a}, \vec{b}, \vec{c}$ are any three non-coplanar vectors,

then $\frac{\vec{a} \cdot (\vec{b} \times \vec{c})}{(\vec{c} \times \vec{a}) \cdot \vec{b}} + \frac{\vec{b} \cdot (\vec{a} \times \vec{c})}{\vec{c} \cdot (\vec{a} \times \vec{b})}$ is equal to

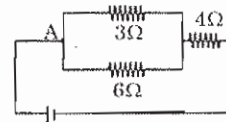
- (a) 2
 (b) 0
 (c) 1
 (d) none of these

45. The magnitude length of the projection of the vectors $i + 2i + \hat{k}$ on the vector $4i - 4j + 7\hat{k}$ is

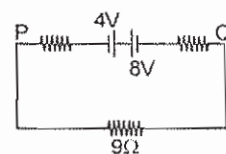
- (a) 3 (b) $\frac{3}{\sqrt{6}}$
 (c) $\frac{\sqrt{6}}{3}$ (d) $\frac{1}{3}$

PHYSICS

46. A body is vibrating in simple harmonic motion with an amplitude of 0.06 m and frequency of 15 Hz. The maximum velocity and acceleration of the body is
 (a) 9.80 m/s and $9.03 \times 10^2 \text{ m/s}^2$
 (b) 8.90 m/s and $8.21 \times 10^2 \text{ m/s}^2$
 (c) 6.82 m/s and $7.62 \times 10^2 \text{ m/s}^2$
 (d) 5.65 m/s and $5.32 \times 10^2 \text{ m/s}^2$
47. Kinetic energy of an electron accelerated in a potential difference of 100 V is
 (a) $1.6 \times 10^{-34} \text{ J}$ (b) $1.6 \times 10^{-29} \text{ J}$
 (c) $1.6 \times 10^{21} \text{ J}$ (d) $1.6 \times 10^{-17} \text{ J}$
48. If the equation of motion of standing wave is $y = 0.3 \sin(314t - 1.57x)$, then the velocity of standing wave is
 (a) 400 unit (b) 250 unit
 (c) 200 unit (d) 150 unit
49. On producing the waves of frequency 1000 Hz in a Kundt's tube, the total distance between 6 successive nodes is 85 cm. Speed of sound in the gas filled in the tube is
 (a) 300 m/s (b) 350 m/s
 (c) 340 m/s (d) 330 m/s
50. A particle executes simple harmonic motion of amplitude A. At what distance from the mean position its kinetic energy is equal to its potential energy?
 (a) 0.81 A (b) 0.71 A
 (c) 0.61 A (d) 0.51 A
51. For driving current of 2A for 6 minute in a circuit 1000 J of work is to be done. The e.m.f. of the source in the circuit is
 (a) 1.38 V (b) 1.68 V
 (c) 2.03 V (d) 3.10 V
52. A resonance air column of length 20 cm resonates with a tuning fork of frequency 250 Hz. The speed of the air is
 (a) 75 m/s (b) 150 m/s
 (c) 200 m/s (d) 300 m/s
53. An iron rod of length 2 m and cross-sectional area of 50 mm^2 stretched by 0.5 mm, when a mass of 250 kg is hung from its lower end. Young's modulus of iron rod is
 (a) $19.6 \times 10^{20} \text{ N/m}^2$ (b) $19.6 \times 10^{18} \text{ N/m}^2$
 (c) $19.6 \times 10^{10} \text{ N/m}^2$ (d) $19.6 \times 10^{15} \text{ N/m}^2$
54. Two parallel wires in free space are 10 cm apart and each carries a current of 10 A in the same direction. The force exerted by one wire on other per metre of length of the wire is
 (a) $2 \times 10^{-6} \text{ N}$ (b) $2 \times 10^{-4} \text{ N}$
 (c) $2 \times 10^{-3} \text{ N}$ (d) $2 \times 10^{-2} \text{ N}$
55. A wire has resistance of 3.1Ω at 30°C and resistance 4.5Ω at 100°C . The temperature coefficient of resistance of the wire is
 (a) $0.0012^\circ \text{C}^{-1}$ (b) $0.0024^\circ \text{C}^{-1}$
 (c) $0.0032^\circ \text{C}^{-1}$ (d) $0.0064^\circ \text{C}^{-1}$
56. If the current through 30 resistor is 0.8 A, then potential drop through 40 resistor is
 (a) 1.2 V (b) 2.6 V
 (c) 4.8 V (d) 9.6 V



57. The direction of the null points is on the equatorial line of a bar magnet, when the north pole of the magnet is pointing to
 (a) west (b) east
 (c) south (d) north
58. Two batteries of e.m.f. 4V and 8V having the internal resistance of 1Ω and 2Ω respectively are connected in circuit with a resistance of 9Ω as shown in the figure. The current and potential difference between the points P and Q are

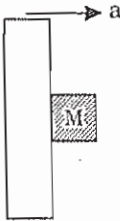


- (a) $\frac{1}{12} \text{ A}$ and 12 V
 (b) $\frac{1}{9} \text{ A}$ and 9 V
 (c) $\frac{1}{6} \text{ A}$ and 4 V
 (d) $\frac{1}{3} \text{ A}$ and 3 V
59. A 30 gm bullet initially travelling at 120 m/s penetrates 12 cm into wooden block. The average resistance exerted by the wooden block is
 (a) 1800 N (b) 2000 N
 (c) 2200 N (d) 2850 N
60. A bar magnet of magnetic moment 2200 A-m^2 is suspended in a magnetic field of intensity 0.25 N/Am the couple required to deflect it through 30° is
 (a) 15 N-m (b) 20 N-m
 (c) 25 N-m (d) 50 N-m

61. Two magnets each of magnetic moment M are placed so as to form a cross at right angles to each other. The magnetic moment of the system will be
 (a) M (b) $0.5M$
 (c) $\sqrt{2}M$ (d) $2M$
62. Sodium has body centered packing. Distance between two nearest atoms is 3.7 \AA . The lattice parameter is
 (a) 4.9 \AA (b) 4.3 \AA
 (c) 3.8 \AA (d) 3.4 \AA
63. Which of the following are not the transverse wave ?
 (a) sound waves in the gas
 (b) visible light waves
 (c) X-rays
 (d) γ -rays
64. The displacement x of a particle moving along a straight line at time t is given by

$$x = a_0 + a_1 t + a_2 t^2$$
 The acceleration of the particle is
 (a) $4a_2$ (b) $2a_2$
 (c) $2a_1$ (d) a_2
65. A bomb is dropped from an aeroplane moving horizontally at constant speed. If air resistance is taken into consideration, then the bomb
 (a) falls on earth exactly below the aeroplane
 (b) falls on the earth exactly behind the aeroplane
 (c) falls on the earth ahead of the aeroplane
 (d) flies with the aeroplane
66. In a p-type semi-conductor germanium is doped with
 (a) aluminium (b) boron
 (c) gallium (d) all of these
67. In a triode valve, the current in the plate circuit is controlled by
 (a) ammeter (b) grid
 (c) cathode (d) anode
68. When a bus suddenly take a turn, the passengers are thrown outwards because of
 (a) speed of motion
 (b) inertia of motion
 (c) acceleration of motion
 (d) none of these
69. The logic behind NOR gate is that which gives
 (a) high output when both inputs are high
 (b) low output when both inputs are low
 (c) high output when both inputs are low
 (d) none of these
70. Which of the following statement is not correct ?
 (a) Infra-red photons have more energy than photons of visible light
 (b) Infra-red rays are invisible but can cast shadows like visible light
 (c) Photographic plates are sensitive to ultraviolet rays
 (d) Photographic plates are sensitive to infra-red rays
71. In which sequence the radioactive radiations are emitted in the following nuclear reaction

$${}_Z X^A \rightarrow {}_{Z+1} Y^A \rightarrow {}_{Z-1} K^{A-4} \rightarrow {}_{Z-1} K^{A-4}$$
 (a) γ , α and β (b) α , β and γ
 (c) β , α and γ (d) β , γ and α
72. In red light and violet light rays are of focal lengths f_R and f_V . Then which one of the following is true ?
 (a) $\lambda_R \leq \lambda_V$ (b) $\mu_R > \mu_V$
 (c) $\lambda_R = \lambda_V$ (d) $\mu_R < \mu_V$
73. The large scale destruction, that would be caused due to the use of nuclear weapons is known as
 (a) neutron-reproduction factor
 (b) nuclear holocaust
 (c) thermo nuclear reaction
 (d) none of these
74. If in Ramsden's eye piece, the field lens have focal length f_1 and f_2 respectively and separated by a distance d then
 (a) $f_1 = 3f_2$ and $d = f_1 + f_2$
 (b) $f_1 = f_2$ and $d = \frac{2}{3} f_1$
 (c) $f_1 = \frac{2}{3} f_2$ and $d = \frac{2}{3} f_1$
 (d) $f_1 = f_2$ and $d = f_1 + f_2$
75. Hygen's wave theory of light could not explain
 (a) photoelectric effect
 (b) polarisation
 (c) diffraction
 (d) interference

76. The work done in pulling up a block of wood weighing 2 kN for a length of 10 m on a smooth plane inclined at an angle of 15° with the horizontal is
 (a) 9.82 kJ (b) 8.91 kJ
 (c) 5.17 kJ (d) 4.36 kJ
77. The internal resistance of cell of e.m.f. 2V is 0.1Ω . It is connected to a resistance of 3.9Ω . The voltage across the cell is
 (a) 2.71 V (b) 1.95 V
 (c) 1.68 V (d) 0.52 V
78. The earth of mass 6×10^{24} kg revolves around the sun with an angular velocity of 2×10^{-7} rad/sec. in a circular orbit of radius 1.5×10^8 km. The force exerted by the sun, on the earth is
 (a) 27×10^{39} N (b) 36×10^{21} N
 (c) 18×10^{25} N (d) 6×10^{19} N
79. A ball of mass 150 gm moving with an acceleration 20 m/s^2 is hit by a force, which acts on it for 0.1 sec. The impulsive force is
 (a) 1.2 Ns (b) 0.3 Ns
 (c) 0.1 Ns (d) 0.5 Ns
80. If the heat of 110 J is added to a gaseous system, whose internal energy is 40 J, then the amount of external work done is
 (a) 80 J (b) 70 J
 (c) 115 J (d) 140 J
81. The substances in which the magnetic moment of a single atom is not zero, is called as
 (a) ferrimagnetism (b) paramagnetism
 (c) ferromagnetism (d) diamagnetism
82. A luminous efficiency of a lamp is 4 lumen/ watt and its luminous intensity is 30 candela. The power of lamp is
 (a) 60 W (b) 78 W
 (c) 94 W (d) 136 W
83. Two vectors \vec{A} and \vec{B} are such that $\vec{A} + \vec{B} = \vec{C}$ and $A^2 + B^2 = C^2$. If θ is the angle between positive direction of \vec{A} and \vec{B} then the correct statement is
 (a) $\theta = \pi$ (b) $\theta = \frac{2\pi}{3}$
 (c) $\theta = 0$ (d) $\theta = \frac{\pi}{2}$
84. A rough vertical board has an acceleration a along the horizontal so that a block of mass M pressing against it does not fall. The coefficient of friction between block and the board is
 (a) $> \frac{a}{g}$
 (b) $< \frac{g}{a}$
 (c) $= \frac{a}{g}$
 (d) $> \frac{g}{a}$
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85. An aeroplane is moving with a horizontal velocity u at a height h . The velocity of packet dropped from it on the earth's surface will be
 (a) $\sqrt{u^2 - 2gh}$ (b) $2gh$
 (c) $\sqrt{2gh}$ (d) $\sqrt{u^2 + 2gh}$

CHEMISTRY

86. The correct order of dipole moments of HF, H_2S and H_2O is.
 (a) $\text{HF} < \text{H}_2\text{S} < \text{H}_2\text{O}$ (b) $\text{HF} < \text{H}_2\text{S} > \text{H}_2\text{O}$
 (c) $\text{HF} > \text{H}_2\text{S} > \text{H}_2\text{O}$ (d) $\text{HF} > \text{H}_2\text{O} < \text{H}_2\text{S}$
87. Heat exchanged in a chemical reaction at the constant temperature and pressure is known as
 (a) internal energy
 (b) entropy
 (c) enthalpy
 (d) free energy
88. Which of the following electronic configuration is a correct explanation of Aufbau principle ?
 (a) $1s^2, 3s^2, 4s^2$
 (b) $1s^2, 2p^2, 3p^2$
 (c) $1s^2, 2s^2, 3s^2$
 (d) $1s^2, 2s^2, 2p^6$
89. A mole of any substance is related to
 (a) number of particles
 (b) volume of gaseous substances
 (c) mass of a substance
 (d) all of above

90. The alkane is not obtained from
 (a) hydroxylation of ethyne
 (b) $C_2H_5OH \xrightarrow[150^\circ C]{HI/PbO_2}$
 (c) butanone $\xrightarrow[\text{Reflux}]{Zn/Hg-HCl}$
 (d) sodium propionate solution electrolysis
91. According to Bronsted, a base is a substance which
 (a) accept proton
 (b) donate electron
 (c) lose a pair of electron
 (d) gain a pair of electron
92. A mixture of sodium benzoate and sodalime on heating produce
 (a) CH_4 (b) C_6H_6
 (c) both a, b (d) none of these
93. The de-Broglie wavelength of a particle with mass 1 gm and velocity 100 m/s is
 (a) 6.6×10^{-33} m (b) 6.6×10^{-35} m
 (c) 6.6×10^{-36} m (d) 6.6×10^{-37} m
94. Baeyer's reagent is used
 (a) in Benedict solution
 (b) for oxidation
 (c) for detection of unsaturation
 (d) for reduction
95. The number of electrons in $[_{19}K^{40}]^{-1}$
 (a) 18 (b) 19
 (c) 20 (d) 21
96. The molecular weight of a compound is 180. If its empirical formula is CH_2O then the molecular formula of compound is
 (a) $C_2H_4O_2$ (b) $C_3H_6O_3$
 (c) $C_6H_{12}O_6$ (d) $C_{12}H_{24}O_{12}$
97. The weight of lime obtained by heating 200 kg of 95% pure lime stone is
 (a) 98.4 kg (b) 106.4 kg
 (c) 112.8 kg (d) 122.6 kg
98. In a reaction $A + B \rightleftharpoons C + B$, if the concentration of A and B is doubled, then the equilibrium constant is
 (a) remains same
 (b) halved
 (c) doubled
 (d) increased four times
99. The oxidation state of chromium in potassium dichromate is
 (a) + 4 (b) - 4
 (c) + 6 (d) - 6
100. The percentage of carbon in anthracite is
 (a) 60% (b) 70%
 (c) 80% (d) 90%
101. The reactivity of metals with water is in the order of
 (a) $Na > Mg > Zn > Fe > Cu$
 (b) $Cu > Fe > Zn > Mg > Na$
 (c) $Mg > Zn > Na > Fe > Cu$
 (d) $Zn > Na > Mg > Fe > Cu$
102. Magnalium contains
 (a) Al + Mg (b) Mg + Cu
 (c) Mg + Fe (d) Mg + Ag
103. Graphite is a good conductor of heat and electricity because it contains
 (a) layers of carbon atoms
 (b) sheet like structure
 (c) free electrons
 (d) no free electrons
104. The boiling point of three saturated hydrocarbons A, B and C are $-102^\circ C$, $-43.4^\circ C$ and $-0.6^\circ C$ respectively. The hydrocarbon having the maximum number of carbon atoms in its molecule is
 (a) A (b) B
 (c) C (d) none of these
105. The volume of a gas measured at $27^\circ C$ and 1 atm pressure is 10 litres. To reduce the volume to 5 litres at 1 atm pressure, the temperature required is
 (a) 75 K (b) 150 K
 (c) 225 K (d) 300 K
106. The coordinate bond is found in
 (a) SO_3 (b) H_2SO_4
 (c) O_3 (d) all the above
107. Which of the following isomerism is exhibited by $CH_3 - O - C_3H_7$ and $C_2H_5OC_2H_5$?
 (a) optical isomerism
 (b) chain isomerism
 (c) metamerism
 (d) position isomerism

108. Chlorine oxidises ethyl alcohol to
 (a) CH_3CHO (b) CCl_3CHO
 (c) HCHO (d) CH_3COOH
109. Tyndall effect can be observed in
 (a) colloidal solution (b) solvent
 (c) solute (d) precipitate
110. $4\text{HNO}_3 + \text{P}_4\text{O}_{10} \longrightarrow 4\text{HPO}_3 + \text{X}$
 In the above reaction the product X is
 (a) NO_2 (b) N_2O_3
 (c) N_2O_4 (d) N_2O_5
111. Mg does not decompose
 (a) cold water (b) hot water
 (c) steam (d) boiled water
112. CaC_2 reacts with H_2O to produce
 (a) CH_4 (b) C_2H_6
 (c) C_2H_2 (d) C_2H_4
113. Which indicator is used to titrate Na_2CO_3 solution with HCl ?
 (a) methyl orange (b) phenolphthalein
 (c) dil. H_2SO_4 (d) none of the above
114. The amount of dibasic acid present in 100 ml of the aq. solution to give strength is [mol. wt. = 200, normality = 0.1]
 (a) 0.5 gm (b) 1 gm
 (c) 1.5 gm (d) 2 gm
115. Calcium formate on dry heating produce
 (a) HCHO (b) CH_3CHO
 (c) CH_3COCH_3 (d) CH_3COOH
116. Chromyl chloride oxidises toluene to benzaldehyde this reaction is known as
 (a) Rosenmund reaction
 (b) Wurtz reaction
 (c) Etard reaction
 (d) Fitting reaction
117. Which of the following have least pK_a value ?
 (a) CCl_3COOH
 (b) $\text{CCl}_2\text{ClCOOH}$
 (c) CF_3COOH
 (d) CH_3COOH
118. The shape of CO_2 molecule is
 (a) linear (b) tetrahedral
 (c) planar (d) pyramidal
119. The gas evolved by heating potassium ferrocyanide crystals with conc. H_2SO_4 is
 (a) CO (b) CO_2
 (c) SO_2 (d) SO_3
120. For an ideal gas Joule Thomson coefficient is
 (a) zero
 (b) negative
 (c) positive
 (d) depend on molecular weight
121. By which reaction a ketone can be converted into a hydrocarbon ?
 (a) Aldol condensation
 (b) Reimer-Tiemann reaction
 (c) Cannizzaro reaction
 (d) Wolf-Kishner reaction
122. The photo-chemical laws are applicable to
 (a) primary reaction (b) secondary reaction
 (c) both of these (d) none of these
123. A compound having molecular mass = 78 contains C = 92.31% and H = 7.69%. Its molecular formula is
 (a) C_5H_{12}
 (b) C_5H_{18}
 (c) $\text{C}_4\text{H}_3\text{O}$
 (d) C_6H_6
124. Half life of radium is 1580 years. Its average life will be
 (a) 1.832×10^3 yrs.
 (b) 2.5×10^3 yrs.
 (c) 2.275×10^3 yrs.
 (d) 8.825×10^2 yrs.
125. In lake test of Al^{3+} ion, there is formation of coloured floating lake. It is due to
 (a) adsorption of litmus by H_2O
 (b) adsorption of litmus by $\text{Al}(\text{OH})_3$
 (c) adsorption of litmus by $\text{Al}(\text{OH})_4^-$
 (d) none of these

INTELLIGENCE, LOGIC & REASONING

Directions (Q.126 – 128) : Answer the following questions :

126. A is the sister of B. B is the brother of C. C is the son of D. How is D related to B ?

- (a) mother (b) uncle
(c) daughter (d) son

127. B is C's husband. A is the sister of B. D is the sister of C. How is D related to B ?

- (a) son (b) sister-in-law
(c) uncle (d) brother

128. Sumitra, Jyoti and Kavita are the sisters. Anand is the son of Sumitra, Divya and Archana are the daughters of Jyoti and Kavita. Mona is the daughter of Anand. What is the relation between Mona and Kavita ?

- (a) sister (b) mother
(c) daughter (d) grand-mother

Directions (Q.129 – 130) : Select the pair of words, which are related in the same way as the capitalised words are related to each other

129. ARGUMENT : DISAGREEMENT : : ?

- (a) ignore : judgment (b) mitigate : repent
(c) punish : criminal (d) thought : thinking

130. KICK: FOOTBALL: : ?

- (a) smoke : cigar (b) boat : fisherman
(c) wine : bottle (d) table : chair

Directions (Q. 131 – 133) : Solve the following problems

131. If $1 + x + x^2 + x^3 = 40$, then value of x is

- (a) 1 (b) 2
(c) 3 (d) 4

132. The value of $7 \times 0.8 \div 4 + 3 \times 8 - 2$ is

- (a) 24.6 (b) 13.4
(c) 23.4 (d) 28.4

133. Simplify : $\frac{0.0028 \times 1.5}{0.0056}$

- (a) 0.75 (b) 1.25
(c) 1.75 (d) 2.25

Directions (Q. 134 – 135) : Complete the series

134. 1, 2, 3, 5, 7, 11, 13, 17,

- (a) 19 (b) 23
(c) 29 (d) 33

135. 7, 11, 17, 19, 23

- (a) 15 (b) 19
(c) 13 (d) 4

ENGLISH LANGUAGE & COMPREHENSION

Directions (Q. 136 – 140) : Read the following passage carefully and answer the questions given below the passage. Certain words/phrases in the passage are given in bold to focus them while answering some of the questions.

A man may usually be known by the books he reads as well as by the company he keeps; for there is a companionship of books as well as of men and one should always live in the best company, whether it be of books or of men. A good book may be among the best of friends. It is the same today that it always was and it will never change. It is the most patient and cheerful of companions. It does not turn its back upon us in times of adversity or distress. It always receives us with the same kindness; amusing and interesting us in youth, comforting and consoling us in age.

136. "A man may usually be known by the books he reads" because

- (a) books provide him a lot of knowledge
(b) the books he reads affect his thinking and character
(c) his selection of books generally reveals his temperament and character
(d) his reading habit shows that he is a scholar

137. Which one of the following would be the most suitable title for the passage ?

- (a) books are useful for our youth
(b) books as man's abiding friends
(c) books show the reader's character
(d) the importance of books in old age

138. Which of the following statement is not true?
 (a) good books as well as good men always provide the finest company.
 (b) we have sometimes to be patient with a book as it may bore us
 (c) a good book serves as a permanent friend
 (d) a good book never betrays us

139. Which of the following is opposite in meaning to the word "adversity" occurring in the passage ?

- (a) progress (b) happiness
 (c) prosperity (d) misfortune

140. The statement "A good book may be among the best friend" in the middle of the passage, means that,

- (a) a good book can be included among the best friends of mankind
 (b) our best friends read the same good books
 (c) there can not be a better friend than a good book
 (d) books may be good friends, but not better than good man

Directions (Q. 141 – 143) : In the following questions, the first and last parts of the sentence are numbered 1 and 6. The rest part of the sentence is spilt into four parts and named P, Q, R and S. These four parts are not given in their proper order. Read the sentence and find out which of the four combination is correct.

141. 1 : There is

- P : no such thing
 Q : from one nation
 R : as the gift
 S : of independence
 6 : to another.

- (a) QPRS (b) RSPQ
 (c) PRSQ (d) SPQR

142. 1 : It was all

- P : that seemed
 Q : and glamorus here
 R : very wonderful
 S : in the old places
 6 : so ordinary

- (a) RQSP (b) PRSQ
 (c) QSPR (d) SPRQ

143. 1 : The rain drops

- P : and they fell to the ground
 Q : in a shower of
 R : to stay in the cloud
 S : were to large and heavy
 6 : large rain drops

- (a) SQRP (b) PRSQ
 (c) SRPQ (d) RPSQ

Directions (Q. 144 – 146) : Choose the correct form of verb from the given choice:

144. Each of the sister clever.

- (a) were (b) has
 (c) are (d) is

145. The Governor with his aide-de-camp, arrived.

- (a) has (b) have
 (c) are (d) were

146. Hari and Ram here.

- (a) was (b) are
 (c) is (d) were

Directions (Q. 147 – 148) : In each of the following questions, choose the word with opposite meaning to the given word out of the given alternatives

147. Minor

- (a) heighted (b) big
 (c) tall (d) major

148. Former

- (a) later (b) latter
 (c) primer (d) subsequent

Directions (Q. 149 – 150) : Choose the correct word to complete the sentences from the given choice

149. Neither of the boys could express ideas.

- (a) these (b) there
 (c) his (d) him

150. goes there?

- (a) how
 (b) what
 (c) whom
 (d) who