CMMC-2020

STD XI – MATHS, PHYSICS, CHEMISTRY | TAMIL NADU STATE BOARD

Multiple Choice Questions | Number of questions: 120 | Max Marks: 120 | Time: 120 Minutes

MATHEMATICS (40 x 1 = 40 marks)

1) The number of students who take both the subjects Mathematics and Chemistry is 70. This represents 10% of the enrolment in Mathematics and 14% of the enrolment in Chemistry.

The number of students takes at least one of these two subjects, is……..

A) 1120 B) 1130 C) 1100 D) Insufficient data

2) If 8 and 2 are the roots of $x^2 + ax + c = 0$ and 3,3 are the roots of $x^2 + dx + b = 0$, then the roots of the equation $x^2 + ax + b = 0$ are ……..

A) 1, 2 B) -1, 1 C) 9,1 D) -1,2

3) If $\tan 40° = \lambda$ then $\frac{\tan 140° - tan130°}{1 + tan140° tan130°} =$ ……..

A) $\frac{1-\lambda^2}{\lambda}$ B) $\frac{1+\lambda^2}{\lambda}$ C) $\frac{1+\lambda^2}{2\lambda}$ D) $\frac{1-\lambda^2}{2\lambda}$

4) The value of 2 sin A $cos^3 A - 2 \cos A\ sin^3 A$ is ……..

A) $\sin 4A$ B) $\cos 4A$ C) $\frac{1}{2} \sin 4A$ D) $\frac{1}{2} \cos 4A$

5) In a triangle ABC, $\sin^2 A + \sin^2 B + \sin^2 C = 2$ then the triangle is …….. triangle

A) Equilateral B) Isosceles C) Right D) Scalene

6) The number of ways in which a host lady invite 8 people for a party of out of 12 people of

whom two do not want to attend the party together is ……..

A) $2 \times 11C_7 + 10C_8$ B) $11C_7 + 10C_8$

C) $12C_8 - 10C_6$ D) $10C_6 + 2!$

7) If a is the arithmetic mean and g is the geometric mean of two numbers then ……..

A) $a \leq g$ B) $a \geq g$ C) $a = g$ D) $a > g$

8) The number of rectangles that a chessboard has ……..

A) 81 B) 9^9 C)1296 D) 6561

9) The intercepts of the perpendicular bisector of the line segment joining (1,2) and (3,4) with

coordinate axes are ……. …

A) 5,-5 B) 5,5 C) 5,3 D) 5,-4

10) The coordinates of the four vertices of a quadrilateral are (-2,4), (-1,2), (1,2) and (2,4) taken in order. The equation of the line passing through the vertex (-1, 2) and dividing the quadrilateral in the equal area is ……

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

11) The range of the function $\frac{1}{1-2sinx}$ is ……

A) $(-\infty,-1)\cup\left(\frac{1}{3},\infty\right)$ B) $(-1,-\infty)$

C) $\left[-1,\frac{1}{3}\right]$ D) $\left(-\infty,-1\right]\cup[\frac{1}{3},\infty)$

12) The value of $\log_{\sqrt{2}}\ 512$ is……

A) 16 B) 18 C) 9 D) 12

13) If a and b are the roots of the equation $x^2-kx+16=0$ and satisfy $a^2+b^2=32$ then

the value of k is ……

A) 10 B) -8 C) -8,8 D) 6

14) The value of $log_9 27$ is ……

A) $\frac{2}{3}$ B) $\frac{3}{2}$ C) $\frac{3}{4}$ D) $\frac{4}{3}$

15) The value of $\frac{\sin 3\theta+sin5\theta+sin7\theta+sin9\theta}{cos3\theta+cos5\theta+cos7\theta+cos9\theta}=$……

A) $tan3\theta$ B) $tan6\theta$ C) $\cot 3\theta$ D) $cot6\theta$

16) In 3 fingers the number of ways 4 rings can be worn in …… ways.

A) 4^3-1 B) 3^4 C) 68 D) 64

17) Everybody in a room shakes hands with everybody else. The total number of shake hands is 66. The number of persons in the room is…….

A) 11 B) 12 C) 10 D) 6

18) The H.M. of two positive number whose AM and G.M. are 16, 8 respectively is ……

A) 10 B) 6 C) 5 D) 4

19) The co-efficient of the term independent of x in the expansion of $\left(2x+\frac{1}{3x}\right)^6$ is ……

A) $\frac{160}{27}$ B) $\frac{160}{37}$ C) $\frac{80}{3}$ D) $\frac{80}{9}$

20) The value of $\begin{vmatrix} a & 0 & 0 \\ 0 & b & 0 \\ 0 & 0 & c \end{vmatrix}^2$ is ……

A) abc B) –abc C) 0 D) $a^2b^2c^2$

21) Let A and B be subsets of the universal set N, the set of natural numbers.

Then $A' \cup [(A \cap B) \cup B']$ Is ……..

A) A B) A' C) B D) N

22) For any two sets A and B if $(A - B) \cup (B - A)$=……..

A) $(A - B) \cup A$ B) $(B - A) \cup B$

C) $(A \cup B) - (A \cap B)$ D) $(A \cup B) \cap (A \cap B)$

23) The equations whose roots are numerically equal but opposite in sign to the roots of $3x^2 - 5x - 7 = 0$ is ……..

A) $3x^2 - 5x - 7 = 0$ B) $3x^2 + 5x - 7 = 0$

C) $3x^2 - 5x + 7 = 0$ D) $3x^2 + x - 7 = 0$

24) The value of $sin(45° + \theta) - cos(45° - \theta)$ is ……

A) $2\cos\theta$ B) 1 C) 0 D) $2\sin\theta$

25) If $\tan\propto$ and $tan\beta$ are the roots of $x^2 + ax + b = 0$ then $\frac{\sin(\alpha+\beta)}{sin\alpha sin\beta}$ is equal to ……

A) $\frac{b}{a}$ B) $\frac{a}{b}$ C) $-\frac{a}{b}$ D) $-\frac{b}{a}$

26) If $a^2 - aC_2 = a^2 - aC_4$ then the value of a is ……

A) 2 B) 3 C) 4 D) 5

27) If ${}^nP_r = 840$, ${}^nC_r$=35 then n =……..

A) 7 B) 6 C) 5 D) 4

28) If $2x^2 + 3xy - cy^2 = 0$ represents a pair of perpendicular lines then c = ……..

A) -2 B) $\frac{1}{2}$ C)$-\frac{1}{2}$ D) 2

29) If the n^{th} term of an A.P is 2n-1 then sum to n terms of that A.P. is ……

A) n^2 B) n^{2+1} C) $2n - 1$ D) n^{2-1}

30) If $A = \begin{pmatrix} 1 & -1 \\ 2 & -1 \end{pmatrix}$, B= $\begin{pmatrix} a & 1 \\ b & -1 \end{pmatrix}$ & $(A+B)^2 = A^2 + B^2$ then the values of a and b are

A) $a = 4, b = 1$ B) $a = 1, b = 4$ C) $a = 0, b = 4$ D) $a = 2, b = 4$

31) If $\left|\underset{a}{\rightarrow} + \underset{b}{\rightarrow}\right|$=60, $\left|\underset{a}{\rightarrow} - \underset{b}{\rightarrow}\right|$ =40 and $\left|\underset{b}{\rightarrow}\right|$=46, then $\left|\underset{a}{\rightarrow}\right|$ is ……..

A) 42 B) 12 C) 22 D 32

32) $\frac{d}{dx}(e^{x+5logx})$ is ……

A) $e^x x^4(x+5)$ B) $e^x x(x+5)$

C) $e^x + \frac{5}{x}$ D) $e^x - \frac{5}{x}$

33) The number of relations on a set containing 3 elements is ……..

A) 9 B) 81 C) 512 D) 1024

34) If $n[(A \times B) \cap (A \times C)] = 12$ and $n(B \cap C) = 2$ then $n(A)$ is……..

A)2 B) 3 C) 4 D) 6

35) If $|x-3| \leq 5$ *then* x belongs to ……

A) $[-2,8]$ B) $(-2,8)$ C) $[-2,\infty]$ D) $(-\infty,8)$

36) The number of solutions of $x^2 + |x-1| = 1$ is ……

A) 1 B) 0 C) 2 D) 3

37) If a, 8, b are in A.P. a, 4, b are in G.P. and a, x, b are in H.P then x =……..

A) 2 B) 1 C) 4 D) 16

38) If 10 lines are drawn in a plane such that no two of them are parallel and no three are concurrent, then the total number of points of intersection are ……..

A) 45 B) 40 C) 10! D) 2^{10}

39) The value of e^{2logx} = ……..

A) 2x B x^2 C) $\sqrt{x}$ D) $\frac{x}{2}$

40) The n^{th} term of the sequence 1, 2, 4, 7, 11…. is ……..

A) $n^3 + 3n^2 + 2n$ B) $n^3 - 3n^2 + 3n$ C) $\frac{n(n+1)(n+2)}{3}$ D) $\frac{n^2-n+2}{2}$

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PHYSICS (40 x 1 = 40 marks)

1. The magnitude of average velocity is equal to average speed when the particle moving with .....
   A. Variable speed
   B. Constant velocity
   C. Variable velocity
   D. Constant acceleration

2. The instantaneous angular position of a point on a rotating wheel is given by the equation $\Theta(t) = 2t^3 - 6t^2$. The torque on the wheel becomes zero at .....
   A. $t = 1$ s
   B. $t = 0.5$ s
   C. $t = 0.25$ s
   D. $t = 2$ s

3. The rain drops are spherical in shape due to .....
   A. Gravity
   B. due to contraction
   C. Surface tension
   D. Viscosity

4. In a simple harmonic oscillation, the acceleration against displacement for one complete oscillation will be .....
   A. an ellipse
   B. a circle
   C. a parabola
   D. a straight line

5. Water does not freeze at the bottom of lakes in winter because .....
   A. Ice is a good conductor of heat
   B. ice reflects heat and light
   C. of anomalous expansion of water between 4^o C to 0^o C
   D. Nothing can be said

6. According to Stefan Boltzmann law, the heat radiated by a black body is directly proportional to .....
   A. T^2
   B. T^3
   C. T^4
   D. T^8

7. When the axis of rotation passes through its centre of gravity, then the moment of inertia of a rigid body is .....
   A. reduced to its minimum value
   B. zero
   C. increased to its maximum value
   D. infinity

8. Power (P) is given by .....
   A. $\frac{\vec{F}}{\vec{V}}$
   B. $\frac{\vec{F}^2}{\vec{V}}$
   C. $\frac{F\rightarrow}{\vec{V}^2}$
   D. $\underset{\vec{F}}{\rightarrow}\ \underset{V}{\rightarrow}$

9. The moment of inertia of a disc of mass M and radius R about an axis which is tangential to the circumference of the disc and parallel to the diameter is .....
   A. 5/4 MR^2
   B. 3/2 MR^2
   C. 4/5 MR^2
   D. 2/3 MR^2

10. A swimmer's speed in the direction of flow of river is 16 km h^{-1}, against the direction of flow of river, the swimmer's speed is 8 km h^{-1} . The swimmer's speed in still water and the velocity of flow of the river respectively are .....
    A. 12 km h^{-1}, 4 km h^{-1}
    B. 4 km h^{-1}, 12 km h^{-1}
    C. 24 km h^{-1} , 16 km h^{1}
    D. 16 km h^{-1}, 24 km h^{-1}

11. Shear modulus is zero for .....
    A. solids
    B. liquids
    C. gases
    D. Liquids and gases

12. A light string passing over a smooth light pulley connects two blocks of masses m_1 and m_2 (vertically). If the acceleration of the system is g/8 then the ratio of the masses is .....
    A. 8 : 1 B. 9 : 7 C. 4 : 3 D. 5 : 3

13. The magnitude of a vector is given by .....
    A. $|\vec{A}| = Ax^2 + Ay^2 + Az^2$
    B. $|\vec{A}| = (Ax^2 + Ay^2 + Az^2)^{½}$
    C. $(A_1 + A_2 + A_3)^2$
    D. $A_1 \cos\theta + A_2 \cos\theta + A_1 A_2 \cos\theta$

14. A uniform force of $(2\hat{i} + \hat{j})$ N acts on particle of mass 1 kg. The particle displaces from position $(3\hat{j} + \hat{k})$ m to $(5\hat{i} + 3\hat{j})$ m. The work done by the force on the particle is .....
    A. 9 J
    B. 6 J
    C. 10 J
    D. 12 J

15. An ideal gas heat engine operators in a carnot's cycle between 227° C and 127° C. It absorbs 6×10^4 J at high temperature. The amount of heat converted into work is .....
    A. 2.4×10^4J
    B. 4.8×10^4J
    C. 1.2×10^4J
    D. 6×10^4 J

16. Four round objects namely a ring, a disc, a hollow sphere and a solid sphere with same radius R start to roll down an incline at the same time. Find out the order of objects reaching the bottom first?
    A. Solid sphere, disc, hollow sphere, ring
    B. ring, disc, hollow sphere, solid sphere
    C. disc, ring, solid sphere, hollow sphere
    D. hollow sphere, disc, ring, solid sphere

17. If V_0 and V denote the sound velocity and the *rms* velocity of the molecules in a gas, then .....
    A. $V_0 = V\,(3/r)^{1/2}$
    B. $V_0 = 0$
    C. $V_0 = V(r/3)^{1/2}$
    D. V_0 and V are not related

18. The internal energy of an ideal gas depends on .....
    A. pressure
    B. volume
    C. temperature
    D. size of molecules

19. A force F is applied on a square plate of side L. If the percentage error in determination of L is 2% and that in F is 4%, the permissible error in pressure is .....
    A. 2%
    B. 4%
    C. 6%
    D. 8%

20. The potential energy of the system increases if work is done .....
    A. upon the system by a non-conservative force
    B. by the system against a conservative force
    C. by the system against a non-conservative force
    D. upon the system by a conservative force

21. If $x = at^2 + bt + c$ where x is displacement as a function of time. The dimensions of 'a' and 'b' are respectively .....
    A. LT^{-1} and LT^{-2}
    B. LT^{-2} and LT^{-1}
    C. L and LT^{-2}
    D. LT^{-1} and L

22. A sphere of radius r cm falls from rest in a viscous liquid. Heat is produced due to viscous force. The rate of production of heat when the sphere attains its terminal velocity is proportional to .....
    A. r^2
    B. r^3
    C. r^4
    D. r^5

23. A body of weight *mg* is hanging on a string which extends its length, *l*. The work done in extending the string is .....
    A. *mgl*
    B. $\frac{mgl}{2}$
    C. 2 *mgl*
    D. None of these

24. If S_p and S_v denote the specific heat of nitrogen gas per unit mass at constant pressure and constant volume respectively then .....
    A. $S_p - S_v = 28\ R$
    B. $S_p - S_v = R / 28$
    C. $S_p - S_v = R / 14$
    D. $S_p - S_v = R$

25. In an isochoric process, we have ……..
    A. $W \neq 0, U = 0, Q = 0, T = 0$
    B. $W \neq 0, U \neq 0, Q = 0, T = 0$
    C. $W = 0, U = 0, Q \neq 0, T \neq 0$
    D. $W = 0, U \neq 0, Q \neq 0, T \neq 0$

26. Bernoulli's equation is consequences of conservation of ……..
    A. energy
    B. linear momentum
    C. angular momentum
    D. mass

27. By what velocity a ball be projected vertically upwards so that the distance covered in 5^{th} second is twice of that covered in 6m second (tale $g = 10\ ms^{-2}$)
    A. 19.6 ms^{-1}
    B. 58.8 ms^{-1}
    C. 49 ms^{-1}
    D. 65 ms^{-1}

28. Unit of Stefan's constant is ……..
    A. watt m^2 k^4
    B. watt m^2 / k^4
    C. watt k^4 / m^2
    D. watt / m^2 k^4

29. The direction of the angular velocity vector is along ……..
    A. the tangent to the circular path
    B. the inward radius
    C. the outward radius
    D. the axis of rotation

30. The breaking stress of a wire depends on ……..
    A. length of a wire
    B. nature of the wire
    C. diameter of the wire
    D. shape of the cross section

31. The stress versus strain graphs for wires of two materials A and B are as shown in the graph. If Y_A and Y_B are the young's moduli of the materials then ……..
    A. $Y_B = 2Y_A$
    B. $Y_A = Y_B$
    C. $Y_B = 3Y_A$
    D. $Y_A = 3Y_B$

32. A sound wave whose frequency is 5000 Hz travels in air and then hits the water surface. The ratio of its wavelengths in water surface. The ratio of its wavelengths in water and air is .....
    A. 4.30
    B. 0.23
    C. 5.30
    D. 1.23

33. Force acting on the particle moving with constant speed is .....
    A. always zero
    B. need not be zero
    C. always non zero
    D. cannot be concluded

34. If the origin of co-ordinate system lies at the centre of mass. The sum of the moments of the masses of the system about the centre of mass is .....
    A. may be greater than zero
    B. may be less than zero
    C. may be equal to zero
    D. always zero

35. A spring is stretched by applying load to its free end. The strain produced in the spring is .....
    A. volumetric
    B. shear
    C. longitudinal
    D. longitudinal and shear

36. If the tension and diameter of a sonometer wire of fundamental frequency n is doubled and density is halved, then its fundamental frequency will become .....
    A. n / 4
    B. $\sqrt{2n}$
    C. n
    D. n / $\sqrt{2}$

37. When a lift is moving upwards with acceleration a, then time period of simple pendulum in it will be .....
    A. $2\pi\sqrt{\frac{l}{g+a}}$ B. $2\pi\sqrt{\frac{g+a}{l}}$ C) $\frac{1}{2\pi}\sqrt{\frac{l}{g+a}}$ D. $\frac{1}{2\pi}\sqrt{\frac{g+a}{l}}$

38. The vectors $\underset{A}{\rightarrow}$ and $\underset{B}{\rightarrow}$ are such that $|\underset{A}{\rightarrow} + \underset{B}{\rightarrow}| = |\underset{A}{\rightarrow} - \underset{B}{\rightarrow}|$ .The angle between the two vector is .....
A. 45^o B. 60^o C. 75^o D. 90^o

39. The efficiency of a heat engine working between the freezing point and boiling point of water is .....
A. 6.25%
B. 20%
C. 26.8%
D. 12.5%

40. A man pushes a wall and fails to displace it. He does .....
A. negative work
B. positive but not maximum work
C. no work at all
D. maximum work

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CHEMISTRY (40 x 1 = 40 marks)

1. Electronic configuration of species M^{2+} is $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 3d^6$ and its atomic weight is 56. The number of neutrons in the nucleus of species M is .....
A. 26 B. 22 C. 30 D. 24

2. At room temperature normal hydrogen consists of .....
A. 25% ortho form + 75% para form B. 50% ortho form + 50% para form
C. 75% ortho form + 25% para form D. 60% ortho form + 40% para form

3. An ideal gas expands from the volume of $1 \times 10^{-3}\ m^3$ to $1 \times 10^{-2}\ m^3$ at 300K against a constant pressure at $1 \times 10^5\ Nm^{-2}$. The work done is .....
A. - 900 J B. 900 kJ C. 270 kJ D. - 900 kJ

4. Consider the following statements.
(i) Henry's law is applicable at moderate temperature and pressure only
(ii) Highly soluble gases obey Henry's law
(iii) The gases react with the solvent do not obey Henry's law
Which of the above statements is / are not correct?
A. (i) only B. (ii) only C. (iii) only D. (i) and (ii)

5. The method used to estimate nitrogen in foods and fertilisers is .....
A. Dumas method B. Kjeldahl's method C. Carius method D. Oxide method

6. Which one of the following is used as a soil sterilizing agent?
A. Chloroform B. Chloral C. Iodoform D. Chloropicrin

7. Which of the following pair of oxides is responsible for acid rain ?
A. $SO_3 + NO_2$ B. $CO_s + CO$ C. $N_2O + CH_4$ D. $O_2 + H_2$

8. How many equivalents of Sodium sulphate is formed when Sulphuric acid is completely neutralized with a base NaOH ?
A. 0.2 B. 2 C. 0.1 D. 1

9. The law of triads is obeyed by .....
A. Fe, Co, Ni B. C, N, O C. He, Ne, Ar D. Al, Si, P

10. Zeolite used to soften the hardness of water is hydrated .....
A. Sodium aluminium silicate B. Calcium aluminium silicate
C. Zinc aluminium borate D. Lithium aluminium hydride

11. Rate of diffusion of a gas is .....
A. directly proportional to its density
B. directly proportional to its molecular weight.
C. directly proportional to its square root of its molecular weight
D. inversely proportional to the square root of its molecular weight

12. The values of ΔH and ΔS for a reaction are respectively 30 KJ mol^{-1} and 100 JK^{-1} mol^{-1} . Then the temperature above which the reaction will become spontaneous is .....
A. 300 K B. 30 K C. 100 K D. 20° C

13. If x is the fraction of PCI_5 dissociated at equilibrium in the reaction, $PCI_5 \leftrightharpoons PCI_3 + CI_2$, then starting with 0.5 mole of PCI_5 , the total number of moles of reactants and products at equilibrium is .....
A. 0.5 – x B. x + 0.5 C. 2x + 0.5 D. x + 1

14. Which of the following concentration terms is / are independent of temperature?
A. molality B. molarity C. mole fraction D. (A) and (C)

15. Which of the following is the correct order of the stability of carbocations ?
A. $^+CH_3 > {}^+CH_2\,CH_3 > {}^+CH(CH_3)_2 > {}^+C(CH_3)_3$
B. $^+CH_2\,CH_3 > {}^+CH_3 > {}^+CH\,(CH_3)_2 > {}^+C(CH_3)_3$
C. $^+C(CH_3)_3 > {}^+CH(CH_3)_2 > {}^+CH_2\,CH_3 > {}^+CH_3$
D. $^+CH(CH_3)_2 > {}^+CH_3 > {}^+CH_2\,CH_3 > {}^+C(CH_3)_3$

16. The equivalent mass of a trivalent metal element is 9 g eq^{-1} the molar mass of its anhydrous oxide is

A. 102 g B. 27 g C. 270 g D. 78 g

17. Based on equation E = - 2.178 x 10^{-18} J ($\frac{z^2}{n^2}$) certain conclusions are written. Which of them is not correct?

A. Equation can be used to calculate the change in energy when the electron changes orbit

B. For n = 1, the electron has a more negative energy than it does for n = 6 which means that the electron is more loosely bound in the smallest allowed orbit.

C. The negative sign in equation simply means that the energy of electron bound to the nucleus is lower than it would be if the electrons were at the infinite distance from the nucleus.

D. Larger the value of n, the larger is the orbit radius.

18. Which of the following is not an non-ideal solution showing negative deviation?

A. Phenol and aniline B. Ethanol and water
C. Acetone + Chloroform D. n-Heptane and n-Hexane

19. Major product of the below mentioned reaction is .....

$(CH_3)_2C = CH_2 \xrightarrow{ICl}$

A. 2-chloro -1- iodo – 2 – methylpropane B. 1-chloro -2-iodo–2– methylpropane
C. 1,2 - dichloro - 2 – methylpropane D. 1, 2 – diiodo – 2 – methylpropane

20. The energies E_1 and E_2 of two radiations are 25 $_eV$ and 50 $_eV$ respectively. The relation between their wavelengths i.e. λ_1 and λ_2 will be .....

A. $\frac{\lambda_1}{\lambda_2}=1$ B. $\lambda_1 = 2\lambda_2$ C. $\lambda_1 = \sqrt{25 \times 50\,\lambda_2}$ D. $2\lambda_1 = \lambda_2$

21. In which of the following options the order of arrangement does not agree with the variation of property indicated against it?

A. I < Br < CI < F (increasing electron gain enthalpy)
B. Li < Na < K < Rb (increasing metallic radius)
C. $AI^{3+} < Mg^{2+} < Na^{+} < F^{-1}$ (increasing ionic size)
D. B < C < O < N (increasing first ionization enthalpy)

22. Which of the following molecules have bond order equal to I?

A. NO, HF, HCI, Li_2, CO B. H_2, Li_2, HF, Br_2, HCI
C. Li_2, B_2, CO, NO, He_2^+ D. B_2, CO, He_2^+, NO, HF

23. CH_3MGI X + C_2H_5OMGI. The product X is .....

A. CH_4 B. C_2H_6 C. HCHO D. CH_3OH

24. Which of the following is arranged in order of increasing radius?

A. $K^+_{(aq)} < Na^+_{(aq)} < Li^+_{(aq)}$ B. $K^+_{(aq)} > Na^+_{(aq)} > Zn^{2+}_{(aq)}$
C. $K^+_{(aq)} > Li^+_{(aq)} > Na^+_{(aq)}$ D. $Li^+_{(aq)} < Na^+_{(aq)} < K^+_{(aq)}$

25. The Van't Hoff factor (i) for a dilute aqueous solution of the strong electrolyte barium hydroxide is .....
A. 0 B. 1 C. 2 D. 3

26. Statement – I: Boiling point of methane is lower than that of butane.
Statement – II: The boiling point of continuous chain alkanes increases with increase in length of carbon chain.
A. Statement I and II are correct and statement II is correct explanation of statement I
B. Statement I and II are correct but statement II is not correct explanation of statement I
C. Statement I is correct but statement II is wrong
D. Statement II is wrong but statement I is correct

27. The electronic configuration of Eu (atomic no. 63) Gd (atomic no. 64) and Tb (atomic no. 65) are .....
A. [Xe] $4f^6\,5d^1\,6s^2$, [Xe] $4f^7\,5d^1\,6s^2$ and [Xe] $4f^8\,5d^1\,6s^2$
B. [Xe] $4f^7\,6s^2$, [Xe] $4f^7\,5d^1\,6s^2$ and [Xe] $4f^9\,6s^2$
C. [Xe] $4f^7\,6s^2$, [Xe] $4f^8\,6s^2$ and [Xe] $4f^8\,5d^1\,6s^2$
D. [Xe] $4f^6\,5d^1\,6s^2$, [Xe] $4f^7\,5d^1\,6s^2$ and [Xe] $4f^9\,6s^2$

Hint- Eu : [Xe] $4f^7\,5d^0\,6s^2$
Gd: [Xe] $4f^7\,5d^1\,6s^2$
Tb: [Xe] $4f^9\,5d^0\,6s^2$

28. Match the following.

List-I	List-II
i. Principal quantum number	1. Represents the directional orientation of orbital
ii. Azimuthal quantum number	2. Represents the spin of the electron
iii. Magnetic quantum number	3. Represents the main shell
iv. Spin quantum number	4. Represents the subshell

Code:	i	ii	iii	iv
A.	3	4	1	2
B.	4	2	3	1
C.	2	1	4	3
D.	1	3	2	4

29. Which one of the following is an example for free radical initiators?

A. Benzoyl peroxide B. Benzyl alcohol

C. Benzyl acetate D. Benzaldehyde

30. Which of the following is not used in writing electronic configuration of an atom?

A. Aufbau principle B. Hund's rule

C. Pauli's exclusion principle D. Heisenberg's uncertainty principle

31. Shape and hybridisation of IF_5 are .....

A. Trigonal bipyramidal, sp^3d^2 B. Trigonal bipyramidal, sp^3d

C. Square pyramidal, sp^3d^2 D. Octahedral, sp^3d^2

32. The number of possible isomers of C_6H_{12} is .....

A. 2 B. 3 C. 5 D. 6

33. What are the values of *n, l, m and s* for 3p, electron?

A. 3, 2, 1, 0 B. 3, 1, -1, + ½ C. 3, 2, +1, - ½ D. 3, 0, 0, + ½

34. If in a mixture where Q = K, then what happens?

A. the reaction shift towards products

B. the reaction shift towards reactants

C. nothing appears to happen, but forward and reverse reactions are continuing at the same rate

D. nothing happens

36. Enzyme present in the apple is .....

A. Polyphenol oxidase B. Polyphenol reductase

C. Polyphenol D. Polyphenol hydrolase

37. Match the following

List-I	List-II
i. Boyle's Law	1. V / T = constant
ii. Charles's Law	2. $\frac{r_1}{r_2} = \sqrt{\frac{M_2}{M_1}}$
iii. Boyle's law	3. PV = constant
iv. Graham's law	4. P / T = constant

Code :	i	ii	iii	iv
A.	3	1	4	2
B.	2	4	3	1
C.	1	3	2	4
D.	4	2	1	3

38. Which of the following is a non-aqueous solution?
A. Salt solution B. Sugar solution
C. Br_2 in CCI_4 D. Ethanol dissolved in water

39. Consider the following statements:
(i) E_2 reaction is a bimolecular elimination reaction of second order.
(ii) E_2 reaction takes place in two steps.
(iii) E_2 reaction generally takes place in primary alkyl halides
Which of the above statements is /are not correct?
A. (i) only B. (ii) only C. (iii) only D. (i) & (iii)

40. Photochemical smog formed in congested metropolitan cities mainly consists of
A. Ozone, SO_2 and hydrocarbons B. Ozone, PAN and NO_2
C. PAN, smoke and SO_2 D. Hydrocarbons, SO_2 and CO_2

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