*TOPICS COVERED:*

PHYSICS : Vectors, Kinematics, Laws of Motion, Friction, Circular Motion.

CHEMISTRY : Some Basic Concept : Mole Concept, Stoichiometry, Redox Reactions, Periodic Classification, Gaseous State, Structure of Atom, Periodic Table, Chemical Bonding.

Botany : Morphology, Families of Flowering Plants and Anatomy.

Zoology : Cell Biology.

Choose the correct answers :

1. An electron starting from rest has a velocity that increases linearly with time, that is, $v = Kt$ where $K = 2$ m/s². The distance covered in the first 3 sec will be
   (1) 9 m   (2) 16 m
   (3) 27 m   (4) 36 m

2. A river is flowing from west to east at a spped of 5m/minute. A man on the south bank of the river, capable of swimming at 10m/minute in still water, wants to swim across the river in the shortest time. He should swim in a direction
   (1) Due north   (2) 30° east of north
   (3) 30° west of north (4) 60° east of north

3. The position vector of a particle is
   $\vec{r} = (a\cos\omega t)\vec{i} + (a\sin\omega t)\vec{j}$
   The velocity of the particle is
   (1) Parallel to position vector
   (2) Perpendicular to position vector
   (3) Directed towards the origin
   (4) Directed away from the origin

4. If $|\vec{A}\times\vec{B}| = \sqrt{3}\,\vec{A}\Box\vec{B}$ then the value of $|\vec{A}+\vec{B}|$ is
   (1) $(A^2 + B^2 + \sqrt{3}AB)^{1/2}$
   (2) $(A^2 + B^2 + AB)^{1/2}$
   (3) $\left(A^2 + B^2 + \dfrac{AB}{\sqrt{3}}\right)^{1/2}$
   (4) $A + B$

5. The velocity *versus* time graph of a linear motion is shown in the figure. The displacement from the origin after 8 sec is
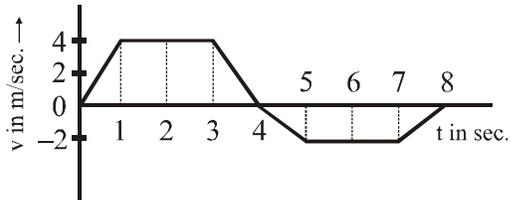

   (1) 18 m   (2) 16 m
   (3) 8 m   (4) 6 m

6. A particle's position as a function of time is described as $y(t) = 2t^2 + 3t + 4$. What is the average velocity of the particle from $t = 0$ to $t = 3$ sec?
   (1) 3 m/sec   (2) 6 m/sec
   (3) 9 m/sec   (4) 12 m/sec

7. A particle moving in a straight line has velocity and displacement equation as, $v = 4\sqrt{1+s}$, where v is in m/s and s is in m. The initial veiocity of the particle is
   (1) 4 m/s   (2) 16 m/s
   (3) 2 m/s   (4) Zero

8. A machine gun is mounted on a 200 kg vehicle on a horizontal smooth road (friction negligible). The gun fires 10 bullets per sec with a velocity of 500 m/s. If the mass of each bullet be 10 g, what is the acceleration produced in the vehicle ?
   (1) 25 cm/s²   (2) 25 m/s²
   (3) 50 cm/s²   (4) 50 m/s²

9. A body is released from a great height and falls freely towards the earth. Exactly one sec later another body is released. What is the distance between the two bodies 2 sec after the release of the second body?
   (1) 4.9 m   (2) 9.8 m
   (3) 24.5 m   (4) 50 m

10. A force of F N is applied as shown in the figure. Find the tensions in the string between BC, if the friction force is negligible.
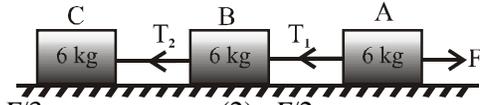
    (1) $F/3$ (2) $F/2$
    (3) F (4) none of these

11. Same spring is attached with 2 kg, 3 kg and 1 kg blocks in three different cases as shown in figure. If x_1, x_2 and x_3 be the extensions in the spring in these three cases, then
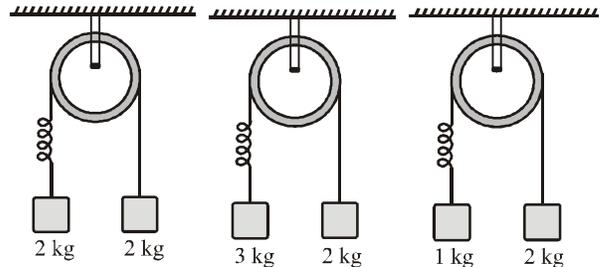
    (1) $x_1 = 0$, $x_3 > x_2$ (2) $x_2 > x_1 > x_3$
    (3) $x_3 > x_1 > x_2$ (4) $x_1 > x_2 > x_3$

12. A projectile can have the same range R for two angles of projection. If t_1 and t_2 are the times of fight in the two cases, then
    (1) $t_1 t_2 \propto R^2$ (2) $t_1 t_2 \propto \dfrac{1}{R^2}$
   (3) $t_1 t_2 \propto R$ (4) $t_1 t_2 \propto \dfrac{1}{R}$

13. A body is thrown up in a lift with a velocity u relative to the lift and the time of flight is found to be t. The acceleration with which the lift is moving up is

    (1) $\dfrac{u - gt}{t}$ (2) $\dfrac{2u - gt}{t}$

    (3) $\dfrac{u + gt}{t}$ (4) $\dfrac{2u + gt}{t}$

14. The heart is pumping blodd at x kg per unit time, with constant velocity v. The force needed is

    (1) $x\,v$ (2) $v\dfrac{dx}{dt}$

    (3) $x\dfrac{dv}{dt}$ (4) Zero

15. A block is kept on a frictionless inclined surface with angle of inclination 'α', as shown in figure. The incline is given an acceleration 'a' to keep the block stationary. Then a is equal to
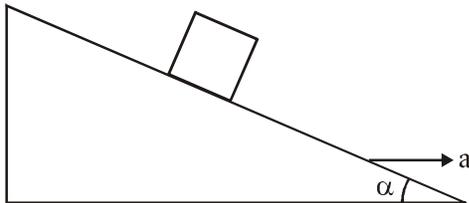
    (1) $g \tan \alpha$ (2) g
    (3) $g \operatorname{cosec} \alpha$ (4) $g/\tan\alpha$

16. A wooden block of mass M resting on a rough horizontal surface is pulled with a force F at an angle with the horizontal. If μ is the the coefficient of kinetic friction between the block and the surface, then acceleration of the block is

    (1) $\dfrac{F}{M}(\cos\phi + \mu\sin\phi) - \mu g$

    (2) $F\sin\phi / M$

    (3) $\mu F \cos\phi$

    (4) $\mu F \sin\phi$

17. A balloon of mass M is descending down with an acceleration a $(< g)$. What mass m be detached from it so that it starts moving up with an acceleration a ?

    (1) $\dfrac{2Ma}{g}$ (2) $\dfrac{2Mg}{a}$

    (3) $\dfrac{2Ma}{g + a}$ (4) $\dfrac{Ma}{g + a}$

18. The horizontal range of a projectile is $4\sqrt{3}$ times the maximum height achieved by it, then the angle of projection is

    (1) 30°   (2) 45°
    (3) 60°   (4) 90°

19. A particle is projected at 60° to the horizontal with a kinetic energy K. The kinetic energy at the highest point is
    (1) K   (2) Zero
    (3) K/4   (4) K/2

20. A body is moving in a circular path with acceleration a. If its velocity gets doubled, fidn the ratio of acceleration after and before the change

    (1) $1 : 4$ (2) $\dfrac{1}{2} : 1$

    (3) $2 : 1$ (4) $4 : 1$

21. Find the velocity of the particle moving in a circular path having a centripetal force of 10 N, whose mass is 100 g and radius of circular path is 50 cm
    (1) $\sqrt{500}$ m/s   (2) $\sqrt{50}$ m/s
    (3) $\sqrt{60}$ m/s   (4) $\sqrt{30}$ m/s

22. A particle starts from rest and moves with an acceleration a which varies with time t according to the equation $a = kt$, where k is a constant. The displacement S of the particle at time t is

    (1) $\dfrac{1}{2}kt^2$ (2) $\dfrac{1}{2}at^2$

    (3) $\dfrac{1}{6}at^2$ (4) kt^3

23. A woman of mass 50 kg is driving a 500 kg vehicle. Going around a circular arc of radius 10 m at 36 km/hr, she experiences
    (1) a force anti parallel to the direction of motion
    (2) a force of 500 N directed radially outward
    (3) a force of 500 N parallel to the direction of motion
   (4) a force of 500 N directed radially inward

24. Two bodies are thrown at angles of 45° and 60° with the horizontal such that maximum height attained is same. The ratio of velocity of projection is
    (1) $3/2$ (2) $\sqrt{3/2}$
   (3) $2/3$ (4) $\sqrt{2/3}$

25. Five forces inclined at an angle of 72° to each other are acting on a particle of mass m placed at origin of coordinates. Four forces are of magnitude F_1 and one of F_2. Resulting acceleration of particle will be

    (1) $\dfrac{F_2 - F_1}{m}$ (2) $\dfrac{F_2 + F_1}{m}$

    (3) zero   (4) $\dfrac{F_2 - 4F_1}{m}$

26. A body is dropped from a plane moving with constant horizontal velocity. The path of the body as seen by a person on the plane will be
    (1) straight line   (2) parabolic
    (3) hyperbolic   (4) None of these
27. A particle is in uniform circular motion. The equation of motion of the foot of perpendicular on diameter is
    (1) $R \cos (\omega t + \phi)$ (2) $R \cos (2\omega t + \phi)$
    (3) $R \cos^2 (\omega t + \phi)$ (4) $R \cos^2 (2\omega t + \phi)$
28. A body takes time t to reach the bottom of an inclined plane of angle θ with the horizontal. If the plane is made rough, time taken now is $2t$. The coefficient of friction of the rough surface is
    (1) $^3/_4 \tan \theta$ (2) $^2/_3 \tan \theta$
    (3) $^1/_4 \tan \theta$ (4) $^1/_2 \tan \theta$
29. A ball bounces up and down on a floor with a time period of oscillation of 1 second. The ball bounces upto a height of
    (1) 2.5 m   (2) 1.25 m
    (3) 5.0 m   (4) 1.0 m
30. If $\vec{P} + \vec{Q} = \vec{R}$ and $|\vec{P}| = |\vec{Q}| = |\vec{R}|$, then angle between $\vec{P}$ and $\vec{Q}$ is
    (1) 30°   (2) 60°
    (3) 90°   (4) 120°
31. Two bodies of masses 5 kg and 4 kg are arranged in two positions as shown in figure A and B below, if the pulleys and the table are perfectly smooth, the accelerations of the 5 kg body in case (A) and (B) are :
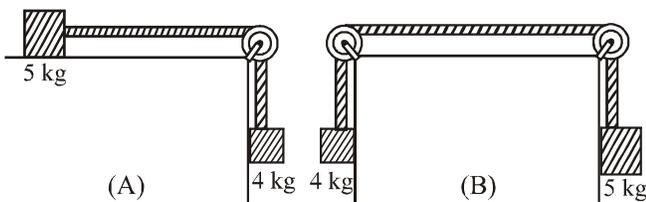

    (1) g and (5/9) g   (2) (4/9)g and (1/9)g
    (3) g/5 and g/5   (4) (5/9)g and (1/9)g
32. Two bodies A and B each of mass M are fixed together by a massless spring. A force F acts on the mass B as shown in the figure below. At the instant shown the mass A has acceleration a. What is the acceleration of mass B ?
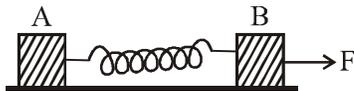

    (1) $(F/M) - a$ (2) a
    (3) $-a$ (4) (F/M)

33. A 40 kg slab rests on a frictionless floor. A 10 kg block rests on top of the slab (figure below). The static coefficient of friction between the block and the slab is 0.60 while the kinetic coefficient is 0.40. The 10 kg block is acted upon by a horizontal force of 100 N. If $g = 9.8$ m/s^2 the resulting acceleration of the slab will be
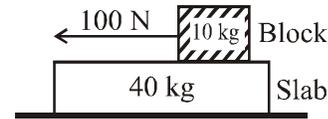
    (1) 0.98 m/s^2 (2) 1.47 m/s^2
    (3) 1.52 m/s^2 (4) 0.1 m/s^2
34. A mass m rests on a horizontal surface. The coefficient of friction between the mass and the surface is μ. If the mass is pulled by a force F as shown below, the limiting friction between the mass and the surface will be
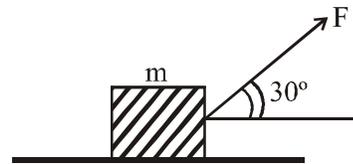
    (1) μmg (2) $\mu[mg - (\sqrt{3}/2)F]$
    (3) $\mu[mg - (F/2)]$ (4) $\mu[mg - (F/2)]$
35. A boat which has a speed of 5 km/hr in still water crosses a river of width 1 km along the shortest possible path in 15 minute. The velocity of the water in km/hr is
    (1) 1   (2) 3
    (3) 4   (4) $\sqrt{14}$
36. What is the value of linear velocity, if $\vec{\omega} = 3\hat{i} - 4\hat{j} + \hat{k}$ and $\vec{r} = 5\hat{i} - 6\hat{j} + 6\hat{k}$?
    (1) $6\hat{i} + 2\hat{j} - 3\hat{k}$ (2) $6\hat{i} - 2\hat{j} + 8\hat{k}$
    (3) $4\hat{i} - 13\hat{j} + 6\hat{k}$ (4) $-18\hat{i} - 13\hat{j} + 2\hat{k}$
37. A small sphere is suspended by a string from the ceiling of a car. If the car begins to move with a constant acceleration a, the inclination of the string to the vertical is
    (1) $\tan^{-1} (a/g)$ in the direction of motion
    (2) $\tan^{-1} (a/g)$ opposite to the direction of motion
    (3) $\tan^{-1} (g/a)$ in the direction of motion
    (4) $\tan^{-1} (g/a)$ opposite to the direction of motion

[4]

38. The angle between $\left(\vec{A} \times \vec{B}\right)$ and $\left(\vec{B} \times \vec{A}\right)$ is

   (1) zero   (2) π

   (3) $\pi/4$ (4) $\pi/2$

39. If $\vec{A} = 5\vec{i} + 7\vec{j} - 3\vec{k}$ and $\vec{B} = 2\vec{i} + 2\vec{j} - c\vec{k}$ are perpendicular vectors, the value of c is

   (1) -2 (2) 8

   (3) -7 (4) -8

40. Two blocks A and B of masses $2m$ and m, respectively, are connected by a massless and inextensible string. The whole system is suspended by a massless spring as shown in the figure. The magnitudes of acceleration of A and B, immediately after the string is cut, are respectively
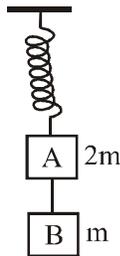
   (1) $g, g/2$ (2) $g/2, g$

   (3) g, g (4) $g/2, g/2$

41. A pebble is thrown vertically upwards from a bridge with an initial velocity of 4.9 m/s. It strikes the water after 2 s. The height of the bridge is

   (1) 19.6 m   (2) 14.7 m

   (3) 9.8 m   (4) 4.9 m

42. The height y and distance x along a horizontal plane of a projectile on a certain planet are given by

$$x = 6t \text{ m} \quad \text{and} \quad y = (8t - 5t^2) \text{ m}$$

The velocity with which the projectile is projected is

   (1) 8 m/s   (2) 6 m/s

   (3) 10 m/s   (4) zero

43. A ball is dropped vertically from a height d above the ground. It hits the ground and bounces up vertically to a height $d/2$. Neglecting subsequent motion and air resistance, its velocity v varies with the height h above the ground as
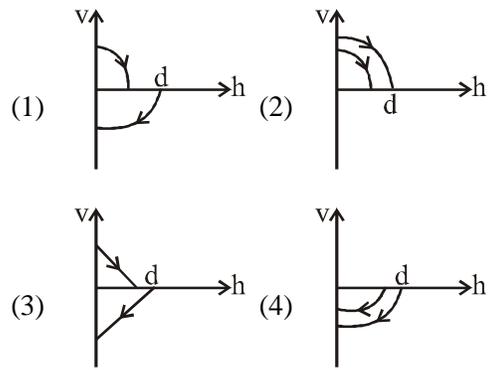
44. The graph between the displacement x and time t for a particle moving in a straight line is shown in the diagram. During the intervals OA, AB, BC and CD the acceleration of the particle is
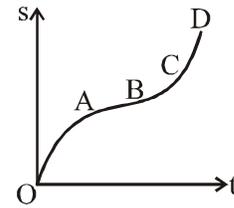
	OA	AB	BC	CD
(1)	+	0	+	+
(2)	−	0	+	+
(3)	+	0	−	+
(4)	−	0	−	0

45. A swimmer crosses a flowing stream of breadth b to and fro in time T_1. The time taken to cover the same distance up and down the stream is T_2. If T_3 is the time the swimmer would take to swim a distance $2b$ in still water, then

   (1) $T_1 = T_2 \cdot T_3$ (2) $T_1^2 = T_2 \cdot T_3$

   (3) $T_2^2 = T_1 \cdot T_3$ (4) $T_3^2 = T_1 \cdot T_2$

46. An aeroplane is flying horizontally with a velocity of 600 km/h and at a height of 1960 m. When it is vertically above a point A on the ground a bomb is released from it. The bomb strikes the ground at point B. The distance AB is

   (1) 1200 m   (2) 0.33 km

   (3) 333.3 km   (4) 3.33 km

47. The velocity of a particle is $v = v_0 + gt + ft^2$. If its position is $x = 0$ at $t = 0$, then its displacement after unit time ($t = 1$) is

   (1) $v_0 + g/2 + f$ (2) $v_0 + 2g + 3f$

   (3) $v_0 + g/2 + f/3$ (4) $v_0 + g + f$

48. The speed of a car was 50 km/hr for the first 900 s, then 40 km/hr for the next 50 km and then the car decelerated uniformly at 10 km/hr^2 till it came to rest. The average speed of the car was
    (1) 50 km/hr   (2) 7.2 m/s
    (3) 30 km/hr   (4) 9.0 m/s

49. A parachutist steps from an aircraft, falls freely for two second, and then opens his parachute. Which of the following acceleration time (a-t) graphs best represents his downward acceleration a during the first 5 second?

    (1)   (2)
    (3)   (4)
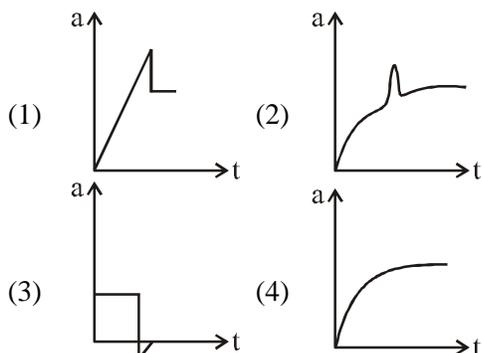
50. A man of weight W is standing on a lift which is moving upward with an acceleration 'a'; the apparent weight of the man is
    (1) $W(1 + a/g)$ (2) W
    (3) $W(1 - a/g)$ (4) $W(1 - a^2/g^2)$

51. 5.6 litres of a gas at NTP are found to have a mass of 11 g. The molecular mass of the gas is
    (1) 22   (2) 44
    (3) 88   (4) 32

52. Which of the following has maximum mass ?
    (1) 0.1 g atom of carbon
    (2) 0.1 mol of ammonia
    (3) 6.02×10^{22} molecules of hydrogen gas
    (4) 1120 mL of carbon dioxide

53. Volume of NTP of 0.22 g of CO_2 is same as that of
    (1) 0.01 g of hydrogen
    (2) 0.085 g of NH_3
    (3) 320 mg of gaseous SO_2
    (4) All of these

54. The oxide of an element possesses the formula M_2O_3. If the equivalent weight of the metal is 9, then the atomic weight of the metal will be
    (1) 9   (2) 18
    (3) 27   (4) none of these

55. If 224 mL of a triatomic gas has a mass of 1 g at 273 K and 1 atm pressure, then the mass of one atom is

    (1) 8.30×10^{-23} g   (2) 2.08×10^{-23} g
    (3) 5.53×10^{-23} g   (4) 6.24×10^{-23} g

56. If isotopic distribution of C-12 and C-14 is 98% and 2% respectively, then the number of C-14 atoms in 12 g of carbon is
    (1) 1.032×10^{22} (2) 3.01×10^{22}
    (3) 5.88×10^{23} (4) 6.023×10^{23}

57. At STP the density of CCl_4 vapour in g/L will be nearest to
    (1) 6.84   (2) 3.42
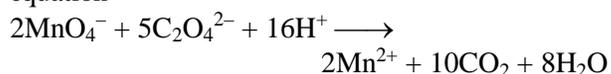   (3) 10.26   (4) 4.57

58. 100 mL of 0.1 M solution of solute A are mixed with 200 mL of 0.2 M solution of solute B and the solution diluted to 500 mL. If A and B are non-interacting substances, the molarity of the final solution will be
    (1) 0.10 M   (2) 0.15 M
    (3) 0.20 M   (4) 0.25 M

59. 100 mL of PH_3 when decomposed produces phosphorus and hydrogen. The change in volume is
    (1) 50 mL increase
    (2) 500 mL decrease
    (3) 900 mL decrease
    (4) nil

60. $KMnO_4$ reacts with oxalic acid according to the equation
    $2MnO_4^- + 5C_2O_4^{2-} + 16H^+ \longrightarrow$
    $\qquad\qquad 2Mn^{2+} + 10CO_2 + 8H_2O$
    Here 20 mL of 0.1 M $KMnO_4$ is equivalent to
    (1) 20 mL of 0.5 M oxalic acid
    (2) 20 mL of 0.1 M oxalic acid
    (3) 50 mL of 0.5 M oxalic acid
    (4) 50 mL of 0.1 M oxalic acid

61. 4 moles each of SO_2 and O_2 gases are allowed to react to form SO_3 in a closed vessel. At the end of the reaction, 25% of O_2 is used up. The total number of moles of all the gases at the end of the reaction is
    (1) 6.5   (2) 7.0
    (3) 8.0   (4) 2.0

62. In the reaction
    $4NH_3(g) + 5O_2(g) \longrightarrow 4NO(g) + 6H_2O(l)$,
    when 1 mole of ammonia and 1 mole of O_2 are made to react to completion
    (1) 1.0 mole of H_2O is produced
    (2) 1.0 mole of NO will be produced
    (3) all the oxygen will be consumed
    (4) all the ammonia will be consumed

[6]

63. Energy will be absorbed in the process of separating
    (1) An electron from an electron
    (2) An electron from a proton
    (3) A neutron from a neutron
    (4) A proton from a proton

64. Which of the following is discreted in Bohr's theory?
    (1) Potential energy
    (2) Kinetic energy
    (3) Velocity
    (4) Angular momentum

65. An electron travels with a velocity of v ms^{-1}. For a proton to have the same de Broglie wavelength, the velocity will be approximately
    (1) $\dfrac{v}{1840}$
    (2) $\dfrac{1840}{v}$
    (3) $1840\ v$
    (4) v

66. The quantum numbers for the electrons present in the valence shell of an element are given below :
    $n = 2, l = 0, m = 0, s = +1/2$. The atom is
    (1) Lithium
    (2) Beryllium
    (3) Hydrogen
    (4) Boron

67. Which of the following represents the correct set of quantum numbers of a $4d$ electron ?
    (1) $4, 3, 2, +\dfrac{1}{2}$
    (2) $4, 2, 1, 0$
    (3) $4, 3, -2, +\dfrac{1}{2}$
    (4) $4, 2, 1, -\dfrac{1}{2}$

68. If electron has spin quantum number of $+1/2$ and a magnetic quantum number -1, it cannot be present in
    (1) d-orbital
    (2) f-orbital
    (3) p-orbital
    (4) s-orbital

69. The increasing order for the values of e/m (charge/mass) is
    (1) e, p, n, α
    (2) n, p, e, α
    (3) n, p, α, e
    (4) n, α, p, e

70. The number of radial nodes in $3s$ and $2p$ respectively are
    (1) 2 and 0
    (2) 1 and 2
    (3) 0 and 2
    (4) 2 and 1

71. The electronic configuration,
    $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 3d^9$, represents a
    (1) Metal atom
    (2) Non-metal atom
    (3) Non-metallic anion
    (4) Metallic cation

72. The oxidation number of C in sucrose ($C_{12}H_{22}O_{11}$) is
    (1) $+4$
    (2) $+3$
    (3) $+2$
    (4) zero

73. Which one of the following has both positive and negative oxidation states ?
    (1) F
    (2) Cl
    (3) He
    (4) Na

74. Which of the following represents a disproportionation reaction ?
    (1) $Cl_2 + 2OH^- \longrightarrow ClO^- + Cl^- + H_2O$
    (2) $Cu_2O + H^+ \longrightarrow Cu + Cu^{2+} + OH^-$
    (3) $2HCuCl_2 \xrightarrow[\text{with } H_2O]{\text{dilution}} Cu + Cu^{2+} + 4Cl^- + 2H^+$
    (4) All the three above

75. In the reaction,
    $H_2O_2 + Na_2CO_3 \longrightarrow Na_2O_2 + CO_2 + H_2O$
    the substance undergoing oxidation is
    (1) H_2O_2
    (2) None
    (3) Na_2CO_3
    (4) Na_2O_2

76. For the redox reaction,
    $Zn + NO_3^- \longrightarrow Zn^{2+} + NH_4^+$
    in basic medium, coefficients of Zn, NO_3^- and OH^- in the balanced equation respectively are
    (1) 4, 1, 7
    (2) 7, 4, 1
    (3) 4, 1, 10
    (4) 1, 4, 10

77. The equivalent weight of $MnSO_4$ is half its molecular weight when it is converted into
    (1) Mn_2O_3
    (2) MnO_4^-
    (3) MnO_2
    (4) MnO_4^{2-}

78. Which of the following statements about LiCl and NaCl is wrong ?
    (1) LiCl has lower melting point that NaCl
    (2) LiCl dissolves more in organic solvents whereas NaCl does not
    (3) LiCl would ionise in water more than NaCl
    (4) Fused LiCl would be less conducting than fused NaCl

79. In the electronic structure of H_2SO_4, the total number of unshared electrons is
    (1) 20
    (2) 16
    (3) 12
    (4) 8

80. Which of the following pairs will form the most stable ionic bond ?
    (1) Na and Cl
    (2) Mg and F
    (3) Li and F
    (4) Na and F

81. Which of the following has maximum dipole moment ?
    (1) NCl_3
    (2) NBr_3
    (3) NH_3
    (4) NI_3

82. The molecule ML_x is planar with six pairs of electrons around M in the valence shell. The value of x is
    (1) 6   (2) 2
    (3) 4   (4) 3

83. Which of the following has a shape different from others ?
    (1) PCl_3 (2) NH_3
    (3) PH_3 (4) BF_3

84. Two hybrid orbitals have a bond angle of 120°. The percentage of s character in the hybrid orbital is nearly
    (1) 25%   (2) 33%
    (3) 50%   (4) 66%

85. The bond angles of NH_3, NH_4^+ and NH_2^- are in the order
    (1) $NH_2^- > NH_3 > NH_4^+$
    (2) $NH_4^+ > NH_3 > NH_2^-$
    (3) $NH_3 > NH_2^- > NH_4^+$
    (4) $NH_3 > NH_4^+ > NH_2^-$

86. Mark the incorrect statement in the following :
    (1) The bond order in the species O_2, O_2^+ and O_2^- decreases as $O_2^+ > O_2 > O_2^-$
    (2) The bond energy in a diatomic molecule always increases when an electron is lost
    (3) Electrons in antibonding M.O. contribute to repulsion between two atoms
    (4) With increase in bond order, bond length decreases and bond strength increases

87. Which of the following species has lowest ionization potential ?
    (1) O   (2) O_2
    (3) O_2^+ (4) O_2^-

88. Which of the following is the correct order of interactions ?
    (1) Covalent < hydrogen bonding < van der Waals < dipole-dipole
    (2) van der Waals < hydrogen bonding < dipole-dipole < covalent
    (3) van der Waals < dipole-dipole < hydrogen bonding < covalent
    (4) Dipole-dipole < van der Waals < hydrogen bonding < covalent

89. When the universal gas constant (R) is divided by Avogadro's number (N_0), their ratio is called
    (1) Planck's constant
    (2) Rydberg constant
    (3) Boltzmann constant
    (4) van der Waals constant

90. The vapour density of a gas is 11.2. The volume occupied by 11.2 g of this gas at NTP is
    (1) 1 L   (2) 11.2 L
    (3) 22.4 L   (4) 20 L

91. Which of the following pairs will diffuse at the same rate through a porous plug ?
    (1) CO, N_2 (2) NO_2, CO_2
    (3) NH_3, PH_3 (4) NO, C_2H_6

92. Molecular velocities of the two gases at the same temperature are u_1 and u_2. Their masses are m_1 and m_2 respectively. Which of the following expressions is correct ?
    (1) $\dfrac{m_1}{u_1^2} = \dfrac{m_2}{u_2^2}$ (2) $m_1u_1 = m_2u_2$

    (3) $\dfrac{m_1}{u_1} = \dfrac{m_2}{u_2}$ (4) $m_1u_1^2 = m_2u_2^2$

93. NH_3 can be liquefied at ordinary temperature without the application of pressure. But O_2 cannot, because
    (1) its critical temperature is very high
    (2) its critical temperature is low
    (3) its critical temperature is moderate
    (4) its critical temperature is higher than that of ammonia

94. A flask containing air (open to atmosphere) is heated from 300 K to 500 K. The percentage of air escaped to the atmosphere is nearly
    (1) 16.6   (2) 40
    (3) 60   (4) 20

95. 16 g of oxygen and 3 g of hydrogen are mixed and kept at 760 mm pressure and 0°C. The total volume occupied by the mixture will be nearly
    (1) 22.4 L   (2) 33.6 L
    (3) 448 L   (4) 44800 mL

96. A gas container observes Maxwell distribution of speeds. If the number of molecules between the speed 5 and 5.1 km sec^{-1} at 25°C be 'n', what would be the number of molecules between this range of speed if the total number of molecules in the vessel are doubled ?
    (1) n^2 (2) n
    (3) $n/2$ (4) $2n$

97. Arrange in the increasing order atomic radii of following elements O, C, F, Cl, Br
    (1) F, O, C, Cl, Br
    (2) F, C,. O, Cl, Br
    (3) F, Cl, Br, O, C
    (4) C, O, F, Cl, Br

98. Which of the following structures is associated with the biggest jump between the second and third ionization enthalpies ?
    (1) $1s^2\,2s^2\,2p^2$ (2) $1s^2\,2s^2\,2p^6\,3s^1$
    (3) $1s^2\,2s^2\,2p^6\,3s^2$ (4) $1s^2\,2s^2\,2p^1$

99. The values of IE_1, IE_2, IE_3, IE_4 and IE_5 of an element are 7.1, 14.3, 34.5, 46.8 and 162.2 eV respectively. The element is likely to be

    (1) Na   (2) Si
    (3) F   (4) Ca

100. Which indicates the correct variation in electronegativities.
    (1) $F > N < O > C$ (2) $F > N > O > C$
    (3) $F < N < O < C$ (4) $F > N > O < C$

BOTANY & ZOOLOGY

101. Crystals of calcium carbonate appearing in parenchyma cells are described as
    (1) Cystolith   (2) Inulin
    (3) Raphides   (4) Druses

102. Which one of the following is incorrect about sclereids ?
    (1) These are commonly found in the shells of nuts and in pulp of guava, pear etc.
    (2) These are much elongated and flexible with tapered ends
    (3) These are called as the stone cells
    (4) These are reduced sclerenchyma cells with highly thickened lignified walls

103. Which living cells provide tensile and mechanical strength ?
    (1) Sclerenchyma
    (2) Parenchyma with air spaces
    (3) Collenchyma only
    (4) Sieve tube of phloem

104. Centrifugal and centripetal xylem are characteristic features of
    (1) Root and stem   (2) Stem and root
    (3) Stem and leaves (4) Root and leaves

105. Bordered pits are very common in tracheids of
    (1) Pteridophytes   (2) Dicotyledons
    (3) Monocotyledons   (4) Gymnosperms

106. The meristematic cells are characterized by the presence of
    (1) Thick wall of cellulose
    (2) Large vacuoles
    (3) Prominent nucleus
    (4) Large intercellular spaces

107. Which of the following is a secondary meristem?
    (1) Intrafascicular cambium
    (2) Interfascicular cambium
    (3) Procambium
    (4) Only (1) and (3)

108. The cortex of stem is derived from
    (1) Calyptrogen
    (2) Periblem
    (3) Dermatogen and periblem
    (4) Plerome

109. The hypodermis in monocot stem is
    (1) Sclerenchymatous
    (2) Collenchymatous
    (3) Parenchymatous
    (4) Chlorenchymatous

110. Lateral root branches normally arise from parent root by formation of root primordia by division in
    (1) Pericycle cells lying in areas between two protoxylem points
    (2) Pericycle cells lying opposite to protoxylem group
    (3) Cortical cells opposite to protoxylem group
    (4) Endodermal cells situated opposite to protoxylem group

111. Velamen tissue is present in the aerial roots of
    (1) Parasites   (2) Saprophytes
    (3) Halophytes   (4) Epiphytes

112. Multiple epidermis occurs in the leaves of
    (1) Cotton   (2) Oleander
    (3) Sunflower   (4) Grasses

113. *In Arachis hypogea* the corolla is
    (1) Bilabiate   (2) Paplionaceous
    (3) Cruciform   (4) Infundibuliform

114. The division of a family Leguminosae in to sub-families. Papilionaceae, Caesalpinioideae and Mimosoideae is base upon
    (1) Number of calyx and corolla
    (2) Condition of andoroecium
    (3) Condition of corolla
    (4) Condition of corolla and androecium

115. In which of the following families calyx is modified into pappus?

(1) Cruciferae   (2) Compositae
(3) Leguminosae   (4) Solanaceae

116. Scutellum is an/an
  (1) Endosperm of gymnosperms
  (2) Shield-shaped cotyledon of cereals
  (3) Protective covering of radicle
  (4) Protective covering of plumule

117. The gymnosperms have wrongly been placed between the dicotyledons and monocotyledons by
  (1) Bentham and Hooker
  (2) Hutchinson
  (3) Engler and Prantl
  (4) Hutchinson, Bentham and Hooker

118. Apocarpous gynoecium is seen is
  (1) Family Liliaceae   (2) Family Malvaceae
  (3) Order Ranales   (4) Families Cucurbitaceae

119. One of the important distinguishing feature of family Poaceae is
  (1) Leaves sessile
  (2) Anthers adnate
  (3) Perianth reduced to lodicules
  (4) Ovary monocarpellary

120. A falsely two chambered dehiscent fruit derived from a bicarpellary superior ovary with parietal placentation is a characteristic of the family
  (1) Solanaceae   (2) Cruciferae
  (3) Malvaceae   (4) Cucurbitaceae

121. The floral for family Fabaceae is
  (1) $\%\ \oplus\ K_{(5)}\ C_{1+2+(2)}\ A_{1+(9)}\ \underline{G}_1$
  (2) $\%\ \oplus\ K_{(5)}\ C_{1+2+(2)}\ A_{(9)+1}\ \underline{G}_1$
  (3) $\%\ \oplus\ K_{(5)}\ C_{1+2+(2)}\ A_{(5)+5}\ \underline{G}_1$
  (4) $\%\ \oplus\ K_{(5)}\ C_{1+2+(2)}\ A_{(5+5)}\ \underline{G}_1$

122. Plant with mucliagenous leaves, alternate with free lateral stipules, epicalyx present; flowers actinomorphic, hypogynous, stamen numerous, monoadelphous is a characteristic of a family
  (1) Caesalpinoideae   (2) Apocyanaceae
  (3) Rutaceae   (4) Malvaceae

123. Mark the false statement for compositae
  (1) Syngenesious anthers
  (2) Epigynous flowers
  (3) Head inflorescence
  (4) Achene fruit

124. The flowers of solanaceae are
  (1) Actinmorphic, bisexual and epigynous
  (2) Zygomorphic, unisexual and hypogynous
  (3) Actinomorphic, bisexual and hypogynous
  (4) Actinmorphic, bisexual and perigynous

125. In India many taxonomists follow the classification given by
  (1) Engler and Prantl
  (2) Bentham and Hooker
  (3) Hutchinson
  (4) Charles Edwin Bessy

126. In homogamous capitulum
  (1) Both ray and disc florets are found
  (2) Only ray florets are present
  (3) Either ray or disc florets are present
  (4) Only disc florets are present

127. Floral diagram represents the
  (1) Structure of the flower
  (2) Number and arrangement of floral parts in the flower
  (3) Position of flower
  (4) Habit of the plant

128. In Malvaceae the androecium is characterically
  (1) Monoadelphous and epipetalous
  (2) Diadelphous and free
  (3) Monoadelphous and free
  (4) Diadelphous and epipetalous

129. In compositae, the placentation is
  (1) Basal   (2) Axile
  (3) Free central   (4) Marginal

130. In poppy fruit, dehiscence is
  (1) Transverse   (2) Loculicidal
  (3) Porous   (4) Valvular

131. Epigeal germination is found in
  (1) Castor   (2) Bean
  (3) Cotton   (4) All of these

132. The fruit of cashewnut is
  (1) Nut   (2) Drupe
  (3) Cypsela   (4) Caryopsis

133. The seeds of orchids are
  (1) Large and heavy   (2) Small and sticky
  (3) Light and dry   (4) Large and hairy

134. Gynobasic style is found in
  (1) *Ocimum sanctum*
  (2) *Allium cepa*
  (3) *Gossypium herbaceum*
  (4) *Colchicum autumanale*

135. Which of the following is mismatched ?
  (1) *Nepenthes* and *Utricularia*
  (2) *Monotropa* and *Neottia*
  (3) *Viscum* and *Loranthus*
  (4) *Rafflesia* and *Saracennia*

136. The floating roots are found in
  (1) Eicchornia   (2) *Bryophyllum*
  (3) Orchids   (4) Jussiea

137. Which of the following is an example of homologous organs ?
    (1) Thorn of *Bougainvillea* and tendril of *Cucurbita*
    (2) Stipules of *Lathyrus aphaca* and petiole of *Acacia*
    (3) Tendrils of *Passiflora* and *Gloriosa*
    (4) Both (1) and (3)

138. Numerous male flowers and a single carpel are found in
    (1) Head
    (2) Verticillaster
    (3) Cyathium
    (4) Hypanthodium

139. In *Calotropis* the phyllotaxy is
    (1) Alternate
    (2) Whorled
    (3) Opposite and superposed
    (4) Opposite and decussate

140. A compound leaf differs from a branch in
    (1) Lacking axillary buds but having terminal bud
    (2) Having axillary bud but lacking terminal bud
    (3) Arising in the axil of a leaf
    (4) Having nodes and internodes

141. Which of the following is an incorrect statement?
    (1) *Orobanche* is a total root parasite
    (2) *Bryophyllum* bears foliar buds
    (3) *Santalum album* is a total stem parasite
    (4) *Arcethobium* is the smallest parasitic angiosperm

142. The food stored in the fleshy leaves of onion is
    (1) Starch
    (2) Sugar
    (3) Protein
    (4) Amino acids

143. Trees with excurrent habit show
    (1) Cymose branching and umbrella shaped appearance
    (2) Racemose branching and conical appearance
    (3) Acropetal branching and umbrella shaped appearance
    (4) Growth by lateral buds

144. Zoochory occurs in
    (1) *Xanthium* and *Urena*
    (2) *Oxalis* and *Ricinus*
    (3) *Ruellia* and *Barleria*
    (4) *Impatiens* and *Nyctanthes*

145. Tubers of potatoes arise from the tip of
    (1) Adventitious roots
    (2) Tap roots
    (3) Suckers
    (4) Stolons

146. Pseudobulb and pseudostem occur in
    (1) *Smilax* and *Citrus*
    (2) *Clitoria* and *Acacia*
    (3) *Eicchornia* and *Musa*
    (4) *Calotropis* and *Jussiac*

147. What is the edible part in cucumber?
    (1) Epicarp, mesocarp and endocarp and seeds
    (2) Mesocarp and endocarp
    (3) Endocarp, placentae and seeds
    (4) Mesocarp, endocarp, placentae and seeds

148. Banana plants multiply by means of
    (1) Stolon
    (2) Rhizome
    (3) Sucker
    (4) Seed

149. Buds present on the root of *Dalbergia* are
    (1) Axillary buds
    (2) Accessory buds
    (3) Extraxillary buds
    (4) Adventitious buds

150. Thorns are modification of stem in
    (1) *Passsiflora*, *Duranta*, *Agave*
    (2) *Passiflora*, *Vitis*, *Cocoloba*
    (3) *Citrus*, *Duranta*, wood apple
    (4) *Citrus*, *Duranta*, *Cocoloba*

151. 'Protoplasm is the physical basis of life' was stated by
    (1) Huxley
    (2) Haeckel
    (3) Robertson
    (4) Goldacre

152. Mitosis and meiosis both take place in
    (1) Small intestine
    (2) Liver
    (3) Testes
    (4) Skin

153. E.R. is the centre of
    (1) Excretion
    (2) Protein synthesis
    (3) Digestion
    (4) None

154. The pairing of bivalents, synapsis, occurs in
    (1) Leptotene
    (2) Zygotene
    (3) Pachytene
    (4) None

155. Mitotic apparatus is formed by
    (1) Astral rays
    (2) Centrioles
    (3) Spindle fibres
    (4) All of the above

156. Chiasmata formation takes place in
    (1) Leptotene
    (2) Diplotene
    (3) Pachytene
    (4) Diakinesis

157. Microvilli are
    (1) Secondary finger like projections on the intestinal villi
    (2) Finger like projections on cell surface responsible for ulta-absorption of liquids
    (3) Finger like projections of nuclear membrane for obtaining nutrients for nucleus
    (4) None of the above

158. Dyad is pair of
    (1) Non sister chromatids
    (2) Homologous chromosomes
    (3) Sister chromatids
    (4) Sex chromosomes

159. Longest phase in meiosis
    (1) Prophase   (2) Metaphase
    (3) Anaphase   (4) Telophase
160. Which of the following have a molecular weight less than 1000 daltons but still considered as macromolecule.
    (1) Proteins   (2) Lipids
    (3) Enzymes   (4) Polysaccharides
161. Which of the following represents the third class of enzymatic classification ?
    (1) Hydrolases   (2) Oxidoreductases
    (3) Demolases   (4) Ligases
162. In mitochondria the term Cristae is used for
    (1) Particles present on the surface of mitochondria
    (2) Particles present on the folds of inner membrane of mitochondria
    (3) Folds of the inner membrane of mitochondria
    (4) Fluid present in the lumen of mitochondria
163. Which of the following is described as "Energy currency of the cell" ?
    (1) DNA   (2) RNA
    (3) ATP   (4) Vitamins
164. Meiosis involves
    (1) Two nuclear division
    (2) One nuclear and one cytoplasm division
    (3) Division of cytoplasm only
    (4) None of the above
165. Cyclin is associated with which one of the following
    (1) Glycolysis   (2) Cyclosis
    (3) Haemolysis   (4) Mitosis
166. During cell division nuclear membrane reappears in
    (1) Interphase   (2) S-phase
    (3) Metaphse   (4) Telophase
167. Which of the following cells, are without endoplasmic reticulum ?
    (1) Amphibian monocytes
    (2) Matured erythrocytes of mammals
    (3) Matured leucocytes of mammals
    (4) Mammalian monocytes
168. The main difference between prokaryotic and eukaryotic cells is that in the prokaryotic cell, there is no
    (1) Ribosomes
    (2) Cell wall
    (3) Genetic system
    (4) Nucleus with a nuclear membrane

169. RNA controls the synthesis of
    (1) Amino acid   (2) Enzyme
    (3) Cytoplasm   (4) Nucleotide
170. Chromosome number is reduced to half during
    (1) Metaphase - I   (2) Anaphase - I
    (3) Prophase - II   (4) Telophase - II
171. Enzymes are absent in
    (1) Algae   (2) Fungi
    (3) Bacteria   (4) Virus
172. Main difference between animal cell and plant cell lies in
    (1) Nutrition   (2) Growth
    (3) Movement   (4) Respiration
173. Chromosomes appear as long thin threads during
    (1) Leptotene   (2) Zygotene
    (3) Pachytene   (4) Diplotene
174. Cellular organelles containing hydrolytic enzymes are
    (1) Lysosomes   (2) Microsomes
    (3) Both   (4) None
175. The chief significance of mitosis is that it
    (1) Insures genetic homogeneity of the cells
    (2) Reduces the chromosome number of half
    (3) Causes transformation of DNA to RNA
    (4) Increases the water content of the cell
176. Repulsion of homologous chromosomes begins during
    (1) Diakinesis   (2) Diplotene
    (3) Zygotene   (4) Leptotene.
177. Which one of the following is not a fibrillar protein
    (1) Elastin   (2) Collagen
    (3) Myosin   (4) Albumin
178. Bouquet stage occurs during
    (1) Leptotene   (2) Zygotene
    (3) Pachytene   (4) Diplotene.
179. Carbonic anhydrase enhances the rate of reaction by how many times ?
    (1) 10 lakh   (2) 10 thousand
    (3) 10 million   (4) 10
180. Cyanide kills an animal by inhibiting the enzyme cytochrome oxidase. This is an example of
    (1) Competitive inhibition
    (2) Non-competitive inhibition
    (3) Allosteric modulation
    (4) Feedback inhibition
181. In addition to essential amino acids, children require two more amino acids (in their diet) namely
    (1) Arginine and leucine
    (2) Histidine and valine
    (3) Arginine and phenylalanine
    (4) Arginine and histidine.

182. A complex formed by deoxyribose sugar, phosphate and nitrogenous base is
    (1) Amino acid   (2) Polypeptide
    (3) Nucleoside   (4) Nucleotide
183. Which of the following is not made up of monosaccharide units?
    (1) Cellulose   (2) Haemoglobin
    (3) Starch   (4) Glycogen
184. Membrane bound Krebs cycle enzyme is
    (1) Flumarase
    (2) Cis-aconitase
    (3) Succinic dehydrogenase
    (4) Malate dehydrogenase
185. Which of the following organelle/s is/are polymorphic?
    (1) Lysosomes   (2) Mitochondria
    (3) Plastids   (4) All of the above
186. Select the correct statement
    I.   rRNA of large subunit are 23S and 5S in 70S ribosomes
    II. rRNA of larger subunit are 28S in 80S ribosomes
    III. Leucocyte granules are derived from lysosomes
    IV. Storage diseases like hepatitis, polynephritis, lung fibrosis are concerned with lysosomal activity
    (1) I and IV correct
    (2) II and III correct
    (3) I, II and III correct
    (4) All of the above
187. Select the character which satisfies similarity between chloroplast and mitochondria.
    (1) Both have 55-70S ribosomes, take part in energy transduction and the membranes are selectively permeable
    (2) Both have only 55S ribosomes, involved in glycosylotion and only outer membrane is selectively permeable
    (3) Both have only 70S ribosomes, involved in storage and supply of energy and only inner membrane is selectively permeable
    (4) Both have 55S, 70S and 80S ribosomes, take part in the synthesis of fatty acids and amino acids and their both membranes are impermeable to ions and minerals
188. What is the term used for chromosome having centromere in the centre ?
    (1) Submetacentric chromosome
    (2) Metacentric chromosome
    (3) Acrocentric chromosome
    (4) Telocentric chromosome
189. What sort of change will occur when erythrocytes are placed in 0.89% NaCl solution?
    (1) Crenation   (2) Brusting
    (3) Slight swelling   (4) No change
190. Nucleolus consists of
    (1) DNA and RNA
    (2) DNA, RNA and proteins
    (3) RNA and proteins
    (4) None of the above
191. Which of the following has four double bonds?
    (1) Linoleic acid   (2) Linolenic acid
    (3) Arachidonic acid   (4) All of the above
192. Which of the following sets of fatty acids are solid at room temperature?
    (1) Stearic acid and linoleic acid
    (2) Stearic acid and palmitic acid
    (3) Palmitic acid and linolenic acid
    (4) Palmitic acid and arachidonic acid
193. Glucoronic acid and acetyl glucosamine condense to form
    (1) Heparin   (2) Hyaluronic acid
    (3) Keratin sulphate   (4) Chondroitin sulphate
194. In which of the following types of inhibition, K_m remains unchanged but V_{max} is decreased ?
    (1) Competitive inhibition
    (2) Non-competitive inhibition
    (3) Feed back inhibition
    (4) Allosteric inhibition
195. Which one of the following statements is correct ?
    (1) Meiosis–I occurs in secondary spermatocyte
    (2) Meiosis–I occurs in primary spermatocyte
    (3) Meiosis–II occurs in spermatids
    (4) Meiosis–I occurs in spermatids
196. Human insulin consists of
    (1) Two chains with 22 and 31 amino acids
    (2) Two chains with 21 and 30 amino acids
    (3) Single chain with 29 amino acids
    (4) Single chain with 30 amino acids
197. Q_{10} of enzymes is the temperature at which
    (1) Rate of reaction increases 2–3 times for every 10ºC increment
    (2) Rate of reaction decreases 10–12 times for every 2–3ºC increment
    (3) Rate of reaction decreases 2–3 times for every 20ºC increment
    (4) Rate of reaction increases 10–12 times for every 2–3ºC increment

198. Select the correct statement/s
   A. Many vitamins act as the coenzymes of oxidative enzymes
   B. K_m is the measurement of affinity of the enzyme for its substrate
   C. Some antibodies acting as enzymes are called as abzyme
   (1) All are correct
   (2) (B) and (C) correct
   (3) (A) and (C) correct
   (4) (A) and (B) correct
199. Select the correct statements
   (1) In amylopectin two molecules of glucose are jointed by α-1,6-glycosidic bond at branching point
   (2) Starch gives purple colour with iodine while amylose gives blue colour with iodine due to amylase

(3) Tryptophan is a semi-essential amino acid for human
(4) Phospholipid of bio-membrane have a hydrophobic polar group and hydrophilic non-polar group

200. The number of chromatids in a chromosome at metaphse is
   (1) 2 each in mitosis and meiosis
   (2) 2 in mitosis and 1 in meiosis
   (3) 2 in mitosis and 4 in meiosis
   (4) 1 in mitosis and 2 in meiosis

✦✦✦✦✦

ANSWERS

Physics

1.	(1)	2.	(1)	3.	(2)	4.	(2)	5.	(4)
6.	(3)	7.	(1)	8.	(1)	9.	(3)	10.	(1)
11.	(2)	12.	(3)	13.	(2)	14.	(1)	15.	(1)
16.	(1)	17.	(3)	18.	(1)	19.	(3)	20.	(4)
21.	(2)	22.	(3)	23.	(4)	24.	(2)	25.	(1)
26.	(1)	27.	(1)	28.	(1)	29.	(2)	30.	(4)
31.	(2)	32.	(1)	33.	(1)	34.	(3)	35.	(2)
36.	(4)	37.	(2)	38.	(2)	39.	(4)	40.	(2)
41.	(3)	42.	(3)	43.	(1)	44.	(2)	45.	(2)
46.	(4)	47.	(3)	48.	(2)	49.	(3)	50.	(1)

Chemistry

51.	(2)	52.	(4)	53.	(4)	54.	(3)	55.	(3)
56.	(1)	57.	(1)	58.	(1)	59.	(1)	60.	(4)
61.	(2)	62.	(3)	63.	(2)	64.	(4)	65.	(1)
66.	(1)	67.	(4)	68.	(4)	69.	(4)	70.	(1)
71.	(4)	72.	(4)	73.	(2)	74.	(4)	75.	(2)
76.	(3)	77.	(3)	78.	(3)	79.	(2)	80.	(2)
81.	(3)	82.	(3)	83.	(4)	84.	(2)	85.	(2)
86.	(2)	87.	(4)	88.	(3)	89.	(3)	90.	(2)
91.	(4)	92.	(4)	93.	(2)	94.	(2)	95.	(4)
96.	(4)	97.	(1)	98.	(3)	99.	(2)	100.	(1)

Botany

101.	(1)	102.	(2)	103.	(3)	104.	(2)	105.	(4)
106.	(3)	107.	(2)	108.	(2)	109.	(1)	110.	(2)
111.	(4)	112.	(2)	113.	(2)	114.	(4)	115.	(2)
116.	(2)	117.	(1)	118.	(3)	119.	(3)	120.	(2)
121.	(2)	122.	(4)	123.	(4)	124.	(3)	125.	(2)
126.	(3)	127.	(2)	128.	(1)	129.	(1)	130.	(3)
131.	(4)	132.	(1)	133.	(3)	134.	(1)	135.	(4)
136.	(4)	137.	(1)	138.	(3)	139.	(4)	140.	(2)
141.	(3)	142.	(2)	143.	(2)	144.	(1)	145.	(4)
146.	(3)	147.	(4)	148.	(3)	149.	(4)	150.	(3)

Zoology

151	(1)	152	(3)	153	(2)	154	(2)	155	(4)
156	(3)	157	(2)	158	(3)	159	(1)	160	(2)
161	(1)	162	(3)	163	(3)	164	(1)	165	(4)
166	(4)	167	(2)	168	(4)	169	(2)	170	(2)
171	(4)	172	(1)	173	(1)	174	(1)	175	(1)
176	(2)	177	(4)	178	(1)	179	(3)	180	(2)
181	(4)	182	(4)	183	(2)	184	(3)	185	(1)
186	(4)	187	(1)	188	(2)	189	(3)	190	(2)
191	(3)	192	(2)	193	(2)	194	(2)	195	(2)
196	(2)	197	(1)	198	(1)	199	(1)	200	(1)

SOLUTIONS

1. **(1)** $v = \dfrac{ds}{dt} = Kt \Rightarrow \int ds = \int Kt\,dt$

   $s = \left[K\dfrac{t^2}{2} \right]_0^3 \Rightarrow s = 2 \times \dfrac{9}{2} = 9\ \text{m}$

2. **(1)** Factual. For shortest time one should move perpendicular to the flow of river.

3. **(2)** $\vec{v} = \dfrac{d\vec{r}}{dt} = -a\omega\sin\omega t\ \hat{i} + a\omega\cos\omega t\ \hat{j}$

   $\vec{r}.\vec{v} = 0 \quad \therefore \vec{r} \perp \vec{v}$

4. **(2)** $AB\sin\theta = \sqrt{3}AB\cos\theta$

   $\tan\theta = \sqrt{3} \Rightarrow \theta = 60°$

   $|\vec{A} \times \vec{B}| = \sqrt{A^2 + B^2 + 2AB\cos 60°}$

5. **(4)** Distance = Area under the curve of $v - t$ graph and area below the time axis represent –ve displacement.

6. **(3)** Average velocity $= \dfrac{\text{total displacement}}{\text{total time}} = \dfrac{y(3) - y(0)}{3 - 0} = 9\ \text{m/s}$

7. **(1)** Factual

8. **(1)** $Ma = \dfrac{dm}{dt}.v \Rightarrow 2000 \times a = \dfrac{100}{1000} \times 500$

   $a = \dfrac{5}{20} \times 100 = 25\ \text{cm/s}^2$

9. **(3)** $S_1 = 0 + \dfrac{1}{2}g(3)^2$

   $S_2 = 0 + \dfrac{1}{2}g(2)^2$

   $\Delta S = S_1 - S_2 = \dfrac{1}{2}g[9 - 4] = \dfrac{5}{2}g = \dfrac{5}{2} \times 9.8 = 24.5\ \text{m}$

10. **(1)** $T_2 = 6a \qquad a = \dfrac{F}{6 + 6 + 6}$

    $T_2 = 6 \times \dfrac{F}{18} \qquad a = \dfrac{F}{18}$

    $T_2 = \dfrac{F}{3}$

11. **(2)** $x \propto T$ and tension is max. in 2

    So, $x_2 > x_1 > x_3 \qquad T = \dfrac{2m_1 m_2 g}{m_1 + m_2}$

12. **(3)** $t_1 = \dfrac{2u\sin\theta}{g}$ and $t_2 = \dfrac{2u\cos\theta}{g}$
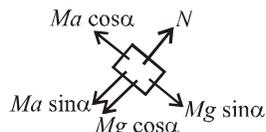
    So, $t_1 t_2 \propto R$

13. **(2)** Rel. displacement = Rel. vel. $t + \dfrac{1}{2}$ relative acceleration t^2
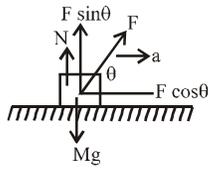
    $0 = u.t. - \dfrac{1}{2}(a + g)t^2 \Rightarrow a = \dfrac{2u - gt}{t}$

14. **(1)** $F = v.\dfrac{dm}{dt} = v.x$

15. **(1)** F.B.D.

    $\therefore\quad Ma\cos\alpha = Mg\sin\alpha \Rightarrow a = g\tan\alpha$

16. (1)

$Ma = F \cos \theta - \mu N$

$Ma = F \cos \theta - \mu[Mg - F \sin \theta]$

$a = \dfrac{F[\cos\theta + \mu \sin \theta] - \mu Mg}{M} \implies a = \dfrac{F}{M}(\cos\theta + \mu \sin\theta) - \mu g$

17. (3)

$Mg - f = Ma \qquad \dots \text{(i)}$

$f - (M - m)g = (M - m)a \qquad \dots\text{(ii)}$

adding eq. (i) and (ii)

$Mg - (M - m)g = Ma + (M - m)a$

$mg = (2M - m)a$

$\implies m(g + a) = 2Ma \implies m = \dfrac{2Ma}{(g + a)}$

18. (1)

$R = 4\sqrt{3}\, H.$

$\dfrac{u^2 2\sin\theta \cos\theta}{g} = \dfrac{4\sqrt{3}\, u^2 \sin^2\theta}{2g} \implies \cot\theta = \sqrt{3} \implies \theta = 30°$

19. (3) Horizontal component of velocity at highest point is same as lowest point

$\dfrac{K_{\text{Highest point}}}{K_{\text{Point of Projection}}} = \dfrac{\frac{1}{2}mu^2 \cos^2\theta}{\frac{1}{2}mu^2} = \cos^2 60° : 1 = \dfrac{1}{4}$

$K_{\text{Highest point}} = \dfrac{K}{4}$

20. (4)

$a = \dfrac{v^2}{R} \qquad a_{\text{after}} : a_{\text{before}} = 4 : 1$

21. (2)

$F = \dfrac{mv^2}{R} \implies v = \sqrt{\dfrac{FR}{m}} \implies v = \sqrt{50}\ \text{m/s}$

22. (3)

$v = \int a\, dt$

$v = K\dfrac{t^2}{2} + c$

$S = \int v\, dt = \dfrac{Kt^3}{6} + c$

23. (4) Friction will provide centripetal force inwardly

24. (2)

$h_{\max} = \dfrac{u^2 \sin^2\theta}{2g}$

25. (1) The resultant of four equal forces will act opposite to F_2.

26. (1) Factual

27. (1) Factual

28. (1)

$L = \dfrac{1}{2}g\sin\theta . t^2 \qquad\qquad \dots\text{(i)}$

$L = \dfrac{1}{2}a.(2t)^2 \qquad\qquad \dots\text{(ii)}$

from (i) and (ii)

$a = \dfrac{g\sin\theta}{4}$

Then, $g\sin\theta - mg\cos\theta = \dfrac{g\sin\theta}{4}$

29. (2)

$S = \dfrac{1}{2}g\left(\dfrac{1}{2}\right)^2$

30. (4) Factual

31. (2) Case I : $a = \dfrac{4g}{4+5} = \dfrac{4}{9}g$

Case II : $a = \left(\dfrac{m_2 - m_1}{m_2 + m_1}\right)g = \left(\dfrac{5-4}{5+4}\right)g = \dfrac{g}{9}$

32. (1) $a = \dfrac{F-T}{M} \Rightarrow a' = \dfrac{F}{M} - \dfrac{T}{M} \Rightarrow a' = \dfrac{F}{M} - a$

33. (1) Kinetic friction will act on the block
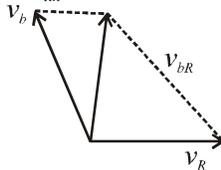
$.4 \times 10 \times 9.8 = 40a$

$.98 \text{ m/s}^2 = a$

34. (3) $f_s = \mu N = \mu[Mg - F\sin\theta] \Rightarrow f_{lin} = \mu[Mg - F/2]$

35. (2) $v_{bR} = \dfrac{1 \times 60}{15} = 4 \, km/h$

$\vec{v}_{bR} = \vec{v}_b + \vec{v}_R$

$v_R = 3 \text{ km/h}$

36. (4) $\vec{v} = \vec{\omega} \times \vec{r} = \begin{vmatrix} \hat{i} & \hat{j} & \hat{k} \\ 3 & -4 & 1 \\ 5 & -6 & +6 \end{vmatrix} = -18\hat{i} - 13\hat{j} + 2\hat{k}$

37. (2) $\tan\theta = \dfrac{a}{g}$

$\theta = \tan^{-1}(a/g)$ opposite to the direction of motion.

38. (2) Factual

39. (4) $\vec{A} \perp \vec{B}$

$\therefore \vec{A}.\vec{B} = 0$

$10 + 14 + 3C = 0$

$3C = -24 \Rightarrow C = -8$

40. (2) When string is cut Block B moves under gravity (g) and accelreation of block $A = \dfrac{mg}{2m} = g/2$

$\therefore g/2, g$

41. (3) $h = -4.9 \times 2 + \dfrac{1}{2} \times 9.8 \times 4^2 = -9.8 + 19.6 = 9.8 \text{ m}$

42. (3) $v_x = 6 \quad v_y = 8 - 10t$

at $t = 0 \ v_y \ (t = 0) = 8 - v$

$v = \sqrt{v_x^2 + v_y^2} = \sqrt{6^2 + 8^2} = 10 \text{ m/s}$

43. (1) $v^2 = 2gh$

Factual

44. (2) Factual

OA $\quad -$

AB $\quad 0$

BC $\quad +$

CD $\quad +$

45. (2) $T_1 = \dfrac{2b}{\sqrt{v^2 - u^2}}$ ...(i)

$T_2 = \dfrac{b}{u+v} + \dfrac{b}{v-u} = \dfrac{2vb}{v^2 - u^2}$ ...(ii)

$T_3 = \dfrac{2b}{v}$ ...(iii)

$T_1^2 = \dfrac{4b^2}{v^2 - u^2}$

$$T_2T_3 = \frac{2vb}{v^2 - u^2} \times \frac{2b}{v} = \frac{4b^2}{v^2 - u^2}$$

$$\therefore \quad T_1^2 = T_2T_3$$

46. **(4)** $\quad 1960 = \dfrac{1}{2} 9.8 \times t^2$

$$t = \sqrt{\frac{19600}{49}} = \frac{140}{7} = 20 \ s.$$

$$AB = 600 \times \frac{5}{18} \times \frac{20}{1000} \ K = \frac{10}{3} = 3.33 \ \text{km}$$

47. **(3)** $\quad \int ds = \int v \, dt$

$$s = \left[v_0 t + g\frac{t^2}{2} + f\frac{t^3}{3} \right]_0^1 = v_0 + \frac{g}{2} + \frac{f}{3}$$

48. **(2)** $\quad$ Average speed $= \dfrac{\text{total distance}}{\text{total time}}$

49. **(3)** $\quad$ Factual

50. **(1)** $\quad R = M(g + a) = Mg(1 + a/g)$

$\quad\quad\quad R = W(1 + a/g)$

51. **(2)** $\quad$ Molecular mass is the mass of 22.4 L of the gas at NTP.

52. **(4)** $\quad$ 0.1 g atom of C = 1.2 g

$\quad\quad\quad$ 0.1 mol of NH_3 = 1.7 g.

$\quad\quad\quad 6.022 \times 10^{22}$ molecules of H_2 = 0.2 g

$$\frac{1120 \times 44}{22400} = 2.2 g$$

53. **(4)** $\quad$ 0.22 g $CO_2 = \dfrac{0.22}{44}$ mol $= 5 \times 10^{-3}$ mol $= 5 \times 10^3 \times 22400$ cc = 110 cc

$\quad\quad\quad$ (a) 0.01 g $H_2 = \dfrac{0.01}{2}$ mol $= 5 \times 10^{-3}$ mol

$\quad\quad\quad$ (b) 0.085 g $NH_3 = \dfrac{0.085}{17}$ mol $= 5 \times 10^{-3}$ mol

$\quad\quad\quad$ (c) 320 mg $SO_2 = \dfrac{0.320}{64}$ mol $= 5 \times 10^{-3}$ mol

54. **(3)** $\quad$ According to the formula M_2O_3, valency of M = 3.

$\quad\quad\quad$ Hence atomic weight = Eq. wt. × valency = 9 × 3 = 27

55. **(3)** $\quad$ Gram mol mass = Mass of 22400 cc = 100 g

$\quad\quad\quad 6.02 \times 10^{23}$ molecules, i.e., $3 \times 6.02 \times 10^{23}$ atoms have mass = 100 g

$\quad\quad\quad \therefore$ Mass of one atom $= 100/(3 \times 6.02 \times 10^{23}) = 5.53 \times 10^{-23}$ g

56. **(1)** $\quad$ C–14 in 12 g of C $= \dfrac{2}{100} \times 12 = 0.24 \ g = \dfrac{0.24}{14} \times 6.02 \times 10^{23}$ atoms $= 1.032 \times 10^{22}$ atoms

57. **(1)** $\quad$ Molar mass of $CCl_4 = 12 + 4(35.5) = 154 \ \text{g mol}^{-1}$

$\quad\quad\quad$ Molar volume at STP $= 22.4 \ \text{L mol}^{-1}$

$\quad\quad\quad \therefore$ Density $= \dfrac{154}{22.4} \text{g L}^{-1} = 6.875 \ \text{g L}^{-1}$

58. **(1)** $\quad M_1V_1 + M_2V_2 = M_3(V)$

$\quad\quad\quad 100 \times 0.1 + 200 \times 0.2 = M_3 \times 500$

$\quad\quad\quad$ or $\ M_3 = 50/500 \ M = 0.1 \ M$

59. **(1)** $\quad 2 \ PH_3 \longrightarrow \quad 2P \quad + \quad 3H_2$

$\quad\quad\quad$ 2 mL $\quad\quad\quad\quad$ (solid) $\quad\quad$ 3 mL

$\quad\quad\quad$ 100 mL $\quad\quad\quad\quad\quad\quad\quad\quad$ 150 mL

$\quad\quad\quad \therefore$ Increase in volume = 150 – 100 = 50 mL

60. **(4)** $\quad$ 20 mL of 0.1 M $KMnO_4 = 20 \times 0.1$ millimoles = 2 millimoles

$\quad\quad\quad$ 2 millimoles of $KMnO_4$ will react with $C_2O_4^{2-}$ = 5 millimoles

$\quad\quad\quad$ (4) contains 5 millimoles of oxalic acid

61. (2)

$$2\,SO_2 \;+\; O_2 \;\;\rightleftharpoons\;\; 2\,SO_3$$

Initial moles	4	4	0

Moles of eqm. $4-2$ $4-\dfrac{25}{100}\times 4$ 2 moles

$\qquad\qquad\qquad = 2\text{ moles}\qquad = 3$
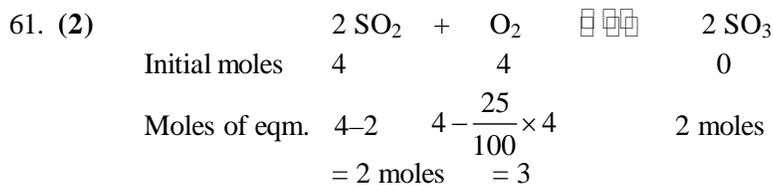
∴ Total no. of moles of all gases at eqm. $= 2 + 3 + 2 = 7$

62. (3) 4 moles of NH_3 combine with 5 moles of O_2

One mole of NH_3 requires 5/4 mole of O_2

63. (2) There is attraction between electrons and protons.

64. (4) Angular momentum has discrete values.

65. (1) $\lambda_e = h\,/\,m_e\,v_e,\ \lambda_p = h/m_p\,v_p$

As $\lambda_e = \lambda_p,\ h/m_e\,v_e = h/m_p\,v_p$

or $m_p\,v_p = m_e\,v_e = m_e\,v$

or $v_p = \dfrac{m_e}{m_p}v = \dfrac{1}{1840}v$

66. (1) E.C. of valence shell is $2s^1$. Complete E.C. will be

$1s^2\,2s^1$ ∴ $Z = 3$. Hence, the atom is Li.

67. (4) For $4d$, $n = 4$, $l = 2$, $m = -2, -1, 0, +1, +2$, $s = +\dfrac{1}{2}$ or $-\dfrac{1}{2}$.

68. (4) $m = -1$ means least value of $l = 1$. So it cannot be present in s-orbital.

69. (4) Charge/mass for $n = 0$, for $\alpha = 2/4$, for $p = 1/1$,
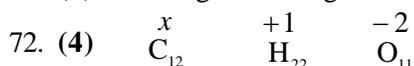
$e^- = \dfrac{1}{1/1837}.$

70. (1) Number of radial nodes $= n - l - 1$

For $3s$, radial nodes $= 3 - 0 - 1 = 2$
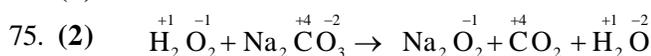
For $2p$, radial nodes $= 2 - 1 - 1 = 0$

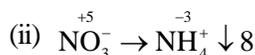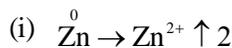**71. (4)** The given configuration represents the configuration of a Cu^{2+}, i.e., a metallic cation.

72. (4) $\overset{x}{C}_{12}\ \overset{+1}{H}_{22}\ \overset{-2}{O}_{11}$

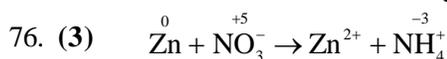∴ $12x + 22 \times (+1) + 11 \times (-2) = 0$ or $x = 0$

**73. (2)** Cl can have both negative (i.e., -1) and positive oxidation states (i.e., $+1, +3, +5$ or $+7$).

74. (4) In all these reactions the same substance is reduced as well as oxidised. Therefore, option (4) is correct.
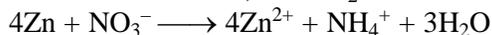
75. (2) $\overset{+1}{H_2}\overset{-1}{O_2} + Na_2\overset{+4}{C}\overset{-2}{O_3} \rightarrow Na_2\overset{-1}{O_2} + \overset{+4}{C}O_2 + \overset{+1}{H_2}\overset{-2}{O}$

None of the element changes its O.N. and hence option (2) is correct.

76. (3) $\overset{0}{Zn} + \overset{+5}{NO_3^-} \rightarrow Zn^{2+} + \overset{-3}{NH_4^+}$

(i) $\overset{0}{Zn} \rightarrow Zn^{2+} \uparrow 2$

(ii) $\overset{+5}{NO_3^-} \rightarrow \overset{-3}{NH_4^+} \downarrow 8$

To make increasing in O.N. = decrease, multiply eqn. (i) by 4 and add. Hence

$4\,Zn + NO_3^- \longrightarrow 4Zn^{2+} + NH_4^+$
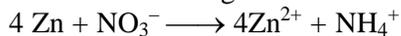
To balance O-atoms, add $3H_2O$ on RHS. Hence

$4Zn + NO_3^- \longrightarrow 4Zn^{2+} + NH_4^+ + 3H_2O$

To balance H-atoms, add H_2O on LHS and 10 H^- on RHS. Hence

$4Zn + NO_3^- + 10H_2O \longrightarrow 4Zn^{2+} + NH_4^+ + 3H_2O + 10OH^-$

or $4Zn + NO_3^- + 7H_2O \longrightarrow 4Zn^{2+} + NH_4^+ + 10\,OH^-$

77. (3) If a redox reaction involves two-electron change then the Eq. wt. of the substance is half the molecular weight, i.e.,

$\overset{+4}{Mn}O_2 \longrightarrow \overset{+2}{Mn}SO_4$
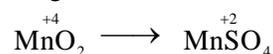
78. (3) LiCl would ionize more in water than NaCl is a wrong statement because LiCl has covalent character.

79. (2)

$$H-\overset{..}{\underset{..}{O}}-\overset{\overset{\displaystyle \overset{..}{O}:}{\|}}{\underset{\underset{\displaystyle \overset{..}{O}:}{\|}}{S}}-\overset{..}{\underset{..}{O}}-H$$
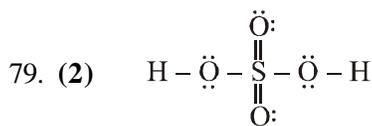
Total number of unshared electrons $= 4 \times 4 = 16$.

80. **(2)** The stability of the ionic bond depends upon the lattice energy which is expected to be more between Mg and F due to +2 charge on Mg atom.

81. **(3)** Electronegativity difference between N(3.0) and Cl(3.0) is zero and hence N–Cl bonds are non-polar. As a result, the overall dipole moment of NCl_3 molecule and its direction is just the dipole moment of the lone pair of electrons.
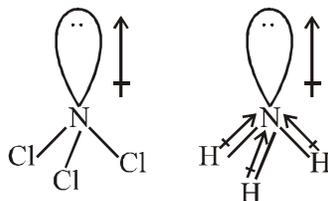
On the other hand, N–Br (3.0 – 2.8), N–I (3.0 – 2.5) and N–H (3.0 – 2.1) are polar and hence contribute towards the overall dipole moment of the respective molecules. Since the EN difference is highest in case of N–H bonds, therefore, NH_3 has the highest dipole moment.

82. **(3)** Since the molecule has six bond pairs, it should have octahedral geometry. As the structure is planar. It should have two lone pairs and four bond pairs. Therefore, value of x in ML_x is 4.

83. **(4)** BF_3 is triangular planar while all others are pyramidal.

84. **(2)** sp^2-Hybrid orbitals are inclined at an angle of 120º and contain 33% s-character.

85. **(2)** Bond angles : $NH_4^+ > NH_3 > NH_2^-$. This is because NH_4^+ has no lone pair NH_3 has one lone pair while NH_2^- has two lone pairs to repel the bond pairs.

86. **(2)** The removal of an electron from a diatomic molecule may increase the bond order as in the conversion $O_2(2) \longrightarrow O_2^+ (2.5)$ or decrease the bond order as in the conversion, $N_2(3.0) \longrightarrow N_2^+ (2.5)$. As a result, the bond energy may increase or decrease. Thus, statement (2) is incorrect.

87. **(4)** O_2^- has three electrons in the antibonding orbitals and hence is least stable and therefore has least ionization potential.

88. **(3)** The strength of the interactions follows the order : van der Waal's < hydrogen – bonding < dipole–dipole < covalent.

89. **(3)** $k = \dfrac{R}{N_0}$

90. **(2)** V.D. = 11.2, Mol. wt. = 22.4
Hence, 22.4 g = 22.4 L
∴ 11.2 g = 11.2 L

91. **(4)** Rate of diffusion $\propto \sqrt{1/\text{Mol.mass}}$
In (4), NO and C_2H_6 have same molecular mass.

92. **(4)** $PV = \dfrac{1}{3}mnu^2$ or $u = \sqrt{\dfrac{3PV}{mn}} = \sqrt{\dfrac{3RT}{mn}}$

At same temperature, $u^2 \propto \dfrac{1}{\sqrt{m}}$

or $u_1^2 / u_2^2 = m_2 / m_1$ or $m_1 u_1^2 = m_2 u_2^2$

93. **(2)** O_2 has low critical temperature whereas NH_3 has critical temperature higher than room temperature.

94. **(2)** $\dfrac{V_1}{T_1} = \dfrac{V_2}{T_2}, \dfrac{V}{300} = \dfrac{V_2}{500}, V_2 = \dfrac{5}{3}V = 1.66\,V,$
Vol escaped = 1.66 V – V = 0.66 V

∴ % air escaped = $\dfrac{0.66\,V}{1.66\,V} \times 100 \square 40$

95. **(4)** 16 g O_2 = 0.5 mol, 3 g H_2 = 1.5 mol,
Total n = 2 moles.

$V = \dfrac{nRT}{P} = \dfrac{2 \times 0.082 \times 273}{1\,\text{atm}} = 44.8\,\text{L} = 44800\,\text{mL}$

96. **(4)** At a particular temperature the fraction of molecules possessing a particular speed remains constant. As the total number of molecules is doubled, to keep the fraction same, number of molecules possessing speed in the same range is also doubled.

97. **(1)** The atomic radii of C, O, F which lie in the second period increase in the order : F, O, C. Further, the atomic radii of F, Cl, Br which lie in the same group (group 17) increase in the order : F, Cl, Br. Thus, the overall increasing order is : F, O, C, Cl, Br.

98. **(3)** Biggest jump between IE_2 and IE_3 means that the element has two valence electrons, i.e., $1s^2\ 2s^2\ 2p^6\ 3s^2$

99. **(2)** The IE_1, IE_2, IE_3, IE_4 and IE_5 of an element are 7.1, 14.3, 34.5, 46.8 and 162.2 eV respectively. Therefore, the valency of the element is 4 and it is most likely to be silicon.

100.**(1)** $F(4.0) > N(3.0) < O(3.5)$ is next to $F(4.0)$.

101.**(1)** Calcium carbonated deposit as ergastic substance in parenchyuatous cells having cystolith are known as lithocyte.

102.**(2)** Sclereids are short and rigid. They provide rigidity to plant not flexibility.

103.**(3)** Collenchyma is found in stem. It is deposition of calcareous or pectin substance. It provide tensile strength to the plant.

104.**(2)** Centrifugal is endarch and centripetal is exarch xylem. They are found in stem and root respectively.

105.**(4)** In gymnosperm the tracheids are having deposition of lignin all over the surface except certain points known as pits. This type of thickening is known as pitted.

106.**(3)** These are actively dividing cells with prominent nucleus.

107.**(2)** Interfascicular cambium is produced by the de-differentiation of primary permanent tissue. Hence it is secondary meristem.

108.**(2)** Ground tissue develops from periblem and cortex is a ground tissue.

109.**(1)** In monocot secondary growth is absent. So hypodermis become sclerenchymatous and provide mechanical strength.

110.**(2)** Pericycle opposite to protoxylem become meristematic and gives rise to lateral root.

111.**(4)** Velamen is hygroscopic in nature. With the help of this tissue plant absorb the moisture from the atmosphere.

112.**(2)** In oleander the leaf epidermis become multilayer in order to check water loss.

113.**(2)** *Arachis hypogea* belongs to family paplionatae hence corolla is paplionaceous.

114.**(4)** These families are classified on the basis of symmetry of flower (corolla) and androecium.

115.**(2)** In family compositae the calyx are reduced into small hairy structure knwon as pappus. Pappus helps in dispersal of fruit.

116.**(2)** It is shield shape cotyledon of monocots.

117.**(1)** Bentham and Hooker has placed gymnosperm between dicot and monocot in his book 'Genera Plantrum'.

118.**(3)** In rananculaceae the carpels are arrnged spirally on the thalamus.

119. **(3)** In this family the parianth is reduced into small membranous structure known as lodicules.

120.**(2)** In family cruciferae the gynoecium is initially unilocular but later on become bilocular due to formation of a false septum known as replum.

121.**(2)** Factual

122.**(4)** The above mentioned character are characteristic to family malvaceae.

123.**(4)** In family compositae the fruit is cypsella.

124.**(3)** The flowers of solanaceae are actinomorphic, bisexual and are having superior ovary.

125.**(2)** In India and all the common wealth countries, the herbaria are arranged according to the classification of Bentham and Hooker.

126.**(3)** In homogamous capitulum only one type of florets are present while in heterogamous both ray and disk florets are present.

127.**(2)** The floral diagram represent aestivation and number of floral parts. It does not indicate position of gynoecium.

128.**(1)** Monoadelphous and epipetalous condition is characteristic to this family.

129.**(1)** Only one ovule develop from the base of gynoecium.

130.**(3)** Small pore develops on the crown of capsule from which the dehiscence of seed takes place through sensor mechanism.

131.**(4)** In this type of germination, the cotyledons comes out of soil surface.

132.**(1)** It is a true nut.

133.**(3)** The seeds of orchids are light in weight and are knwon as dust seed. The seeds of these plants are smallest in plant kingdom.

134.**(1)** Gynobasic style is characteristic to family labiatae. The *Ocimum* belongs to this family.

135.**(4)** Factual

136.**(4)** In this plant some adventitious branches develops the air cavities and helps the plant in floating.

137.**(1)** **Both are the modification of axillary buds.**

138.**(3)** In Cyathium inflorescence there is only one female flower which is surrounded by many achlamydous male flowers.

139.**(4)** Factual

140.**(2)** The axillary bud are not present in the axil of leaflet.

141.**(3)** *Santalum album* is a partial root parasite.

142.**(2)** In onion the reserve food material is sugars other than starch.

143.**(2)** It is a characteristic feature of coniferous plants.

144.**(1)** In *Xanthium* and *Urena* the fruits are spiny and get dispersed through animals.

145.**(4)** The special branches on the tip of which tuber are born are known as stolon.

146.**(3)** In *Eicchornia* the petiole become spongy and appears like bulb while in *Musa* the aerial stem is formed due to overlapping leafbases hence known as pseudostem.

147.**(4)** In these fruits (Pepo) the epicarp is not edible rest all the parts are edible.

148.**(3)** Factual

149.**(4)** The roots in these plants are having buds which helps in multiplication.

150.**(3)** In these plants the thorns act as defence organ.

151.**(1)** Factual

152.**(3)** In gonads during gametogenesis both mitosis and meiosis takes place whereas in somatic cells only mitosis occurs.

153.**(2)** Factual

154.**(2)** Factual

155.**(4)** It is formed during cell division which include centriole, astral rays and spindle fibres.

156.**(3)** Chiasmata are the knot like structures formed during pachytene.

157.**(2)** Microvilli present over cell surface forms brush bordered surface which increases surface area for absorption.

158.**(3)** Two chromatids over a chromosome is a condition called dyad.

159.**(1)** Factual

160.**(2)** Lipids have a molecular weight of 800 daltons but is formed of many monomers hence is a macromolecule.

161.**(1)** Factual

162.**(3)** Factual

163.**(3)** Factual

164.**(1)** Meiosis involves two nuclear division for the conversion of tetrad to monad.

165.**(4)** Factual

166.**(4)** During cell division nuclear membrane reappears in telophase from endoplasmic reticulum.

167.**(2)** Factual

168.**(4)** Factual

169.**(2)** RNA controls the synthesis of proteins and enzymes are proteins.

170.**(2)** Chromosome number is reduced to half during anaphase-I of meiosis-I.

171.**(4)** Factual

172.**(1)** Plant cells are autotrophic whereas animal cells are heterotrophic.

173.**(1)** Leptotene is the first stage of the prophase-I of meiosis-I hence much of the changes in chromatin had not occurred.

174.**(1)** Factual

175.**(1)** Mitotic divisions are homotypic divisions resulting in the formation of similar type of cells.

176.**(2)** Repulsion is due to the dissolution of synaptonemal complex.

177.**(4)** Factual

178.**(1)** Factual

179.**(3)** Carbonic anhydrase have a turnover number of 36×10^6 per second.

180.**(2)** Advance knowledge – Factual

181.**(4)** Advance knowledge – Factual

182.**(4)** Nucleoside is formed of nitrogenous base and deoxyribo sugar when phosphate attaches to nucleoside the structure formed is nucleotide.

183.**(2)** Haemoglobin is a protein.

184.**(3)** Succinic dehydrogenase is present in inner mitochondrial membrane.

185.**(1)** Factual

186.**(4)** Factual

187.**(1)** Factual

188.**(2)** Factual

189.**(3)** 0.89% NaCl solution is slightly hypotonic to the blood hence when RBC will be placed they will show slight swelling.

190.**(2)** Factual

191.**(3)** Linoleic acid have two double bonds, linolenic acid has three double bonds and arachidonic acid has four double bonds.

192.**(2)** Unsaturated fatty acids are solid at room temperature.
193.**(2)** Factual
194.**(2)** Incomplete inhibition V_{max} remains same whereas K_m increases.
195.**(2)** Meiosis–I occurs in primary spermatocyte whereas meiosis–II occurs in secondary spermatocyte.
196.**(2)** Factual
197.**(1)** Factual
198.**(1)** Factual
199.**(1)** Factual
200.**(1)** Factual