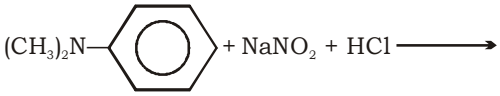
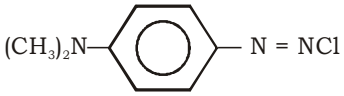
CHEMISTRY

Single correct Choice Type

This section contains 45 questions numbered 1 to 45. Each question has 4 choices (a), (b), (c) and (d) out of which ONLY ONE is correct.

1. Which of the following is not a condensation polymer?
   (a) Melamine (b) Glyptal
   (c) Dacron (d) Neoprene
2. **Assertion:** All naturally occuring α – amino acids except glycine are optically active.
   Reason: Most naturally occuring amino acids have L-configuration.
   (a) Assertion and reason both are correct statements and reason explain the assertion.
   (b) Both assertion and reason are wrong statements.
   (c) Assertion is correct statement and reason is wrong statement.
   (d) Assertion and reason both are correct statements but reason does not explain assertion.
3. Some reaction of amines are given, which one is not correct?

   (a) 

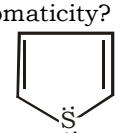
   (b) $CH_3CH_2NH_2 + HNO_2 \longrightarrow CH_3CH_2OH + N_2$

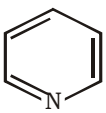
   (c) $CH_3NH_2 + C_6H_5SO_2Cl \longrightarrow CH_3NHSO_2C_6H_5$

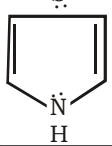
   (c) $(CH_3)_2NH + NaNO_2 + HCl \longrightarrow (CH_3)_2N - N = O$
4. Match the column I with column II and mark the appropriate choice.

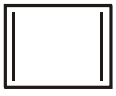
Column I	Column II
(A) Williamson's synthesis	(i) $C_6H_5OH + CH_3COCl$ in presence of pyridine
(B) *ROR'*	(ii) $C_2H_5ONa + C_2H_5Br$
(C) *p*-Nitrophenol	(iii) Unsymmetrical ether
(D) Acetylation	(iv) Intermolecular hydrogen bonding

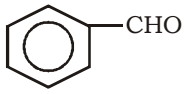
   (a) (A) → (i), (B) → (iii), (C) → (ii), (D) → (iv)
   (b) (A) → (iii), (B) → (i), (C) → (ii), (D) → (iv)
   (c) (A) → (ii), (B) → (iii), (C) → (iv), (D) → (i)
   (d) (A) → (iv), (B) → (i), (C) → (ii), (D) → (iii)
5. Among the following, the optically active compound is
   (a) CH_3CH_2OH (b) $CH_3CH = CHCH_3$
   (c) CH_3CHDOH (d) $CH_3CH_2COCH_3$
6. Which of the following species does not show aromaticity?

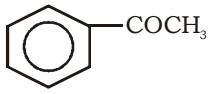
   (a) 

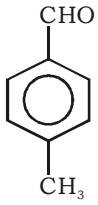
   (b) 

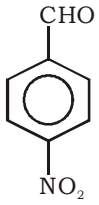
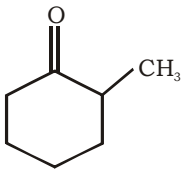
   (c) 

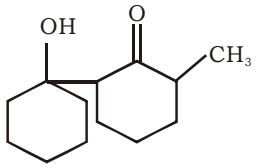
   (d) 
7. Which one is most reactive towards nucleophilic addition reaction?

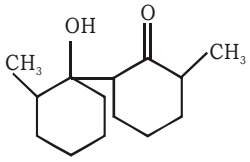
   (a) 

   (b) 

   (c) 

   (d) 
8.  product is:

   (a) 

   (b) 

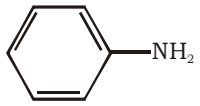
   (c) both (a) and (b) (d) None of these
9. Which of the following S_{N^2} reactions is the fastest?

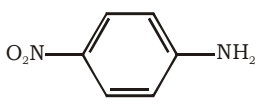
   (a) $CH_3\underset{\underset{Br}{|}}{C}HCH_3 + HO^- \longrightarrow CH_3\underset{\underset{OH}{|}}{C}HCH_3 + Br^-$

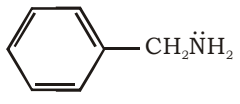
   (b) $CH_3CH_2CH_2I + HO^- \longrightarrow CH_3CH_2CH_2OH + I^-$

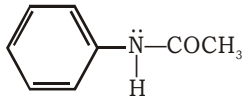
   (c) $CH_3\underset{\underset{I}{|}}{C}HCH_3 + HO^- \longrightarrow CH_3\underset{\underset{OH}{|}}{C}HCH_3 + I^-$

   (d) $CH_3CH_2CH_3Br + HO^- \longrightarrow CH_3CH_2CH_3OH + Br^-$
10. Which of the following compounds is most basic:

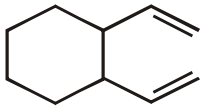
    (a) 

    (b) 

    (c) 

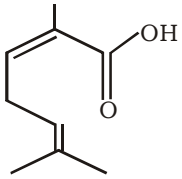
    (d) 
11. Given are cyclohexanol (I), acetic acid (II), 2, 4, 6-trinitrophenol (III) and phenol (IV). In the these the order of decreasing acidic character will be:
    (a) III > IV > II > I (b) III > II > IV > I
    (c) II > III > I > IV (d) II > III > IV > I
12. How many geometrical isomer are possible for the given

compound?



(a) 0 (b) 1
(c) 2 (d) 3

13. The IUPAC name of the compound



is:

(a) 2-ethyl-3-methyl cyclohexa-1, 3-diene
(b) 2, 5-dimethyl hepta-2, 6-dienoic acid
(c) 2, 6-dimethyl hepta-2, 5-dienoic acid
(d) 2, 3-dimethyl epoxyethane

14. Which of the following statements about the interstitial compounds is incorrect?
(a) They are much harder than the pure metal.
(b) They have higher melting points than the pure metal.
(c) They retain the metallic conductivity
(d) They are chemically reactive.

15. Which of the following is employed in flash tubes in photography?
(a) Ar (b) Ne
(c) Kr (d) None of these

16. The oxidation number of Fe in brown ring $[Fe(H_2O)_5NO]^{2+}$ is:
(a) 0 (b) +1
(c) +2 (d) +3

17. Correct order of stability of group II A metal carbonates is:
(a) $MgCO_3 > CaCO_3 > SrCO_3 > BaCO_3$
(b) $BaCO_3 > SrCO_3 > CaCO_3 > MgCO_3$
(c) $SrCO_3 > BaCO_3 > CaCO_3 > MgCO_3$
(d) $CaCO_3 > MgCO_3 > BaCO_3 > SrCO_3$

18. Which of the following are diamagnetic?
(I) $K_4[Fe(CN)_6]$ (II) $K_3[Cr(CN)_6]$
(III) $K_3[Co(CN)_6]$ (IV) $K_2[Ni(CN)_4]$
Select the correct answer using the codes given below:
(a) I, II and IV (b) I, III and IV
(c) II and III (d) I and IV

19. In the following compounds of manganese what is the distribution of electrons on *d*-orbitals of manganese?
(i) $[Mn(H_2O)_6]^{2+}$ (ii) $[Mn(CN)_6]^{4-}$
(a) $t_{2g}^3 e_g^2$ in both (b) $t_{2g}^5 e_g^0$ in both
(c) $t_{2g}^3 e_{gs}^2$ in (i) and $t_{2g}^5 e_g^0$ in (ii)
(d) $t_{2g}^5 e_g^0$ in (i) and $t_{2g}^3 e_g^2$ (ii)

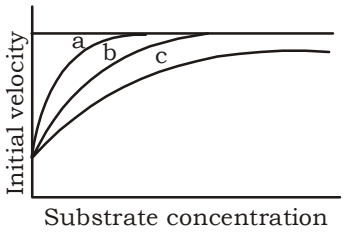
20. The higher lattice energy corresponds to:
(a) MgO (b) CaO
(c) SrO (d) BaO

21. What is the geometry of the IBr_2^- ion?
(a) Linear
(b) Bent shape with bond angle of about 90^0
(c) Bent shape with bond angle of about 109^0
(d) Bent shape with bond angle of about 120^0

22. The elements with the lowest atomic number that has a ground state electronic configuration of $(n-1)d^6ns^2$ is located in the:
(a) fifth period (b) sixth period
(c) fourth period (d) third period

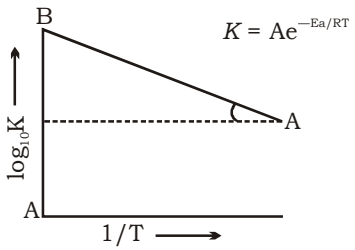
23. Dust storm is:
(a) Dispersion of a gas in solid
(b) Dispersion of a gas in liquid
(c) Dispersion of solid in gas
(d) Dispersion of solid in liquid

24. The figure given below shows three velocity-substrate concentration curves for an enzyme reaction. What do the curve *a, b* and *c* depict respectively?



(a) *a*-normal enzyme reaction, *b*-competitive inhibition, *c*-non-competitive inhibition.
(b) *a*-enzyme with an allosteric modulator added, *b*-normal enzyme activity, *c*-competitive inhibitation
(c) *a*-enzyme with an allosteric stimulator, *b*-competitive inhibitor added, *c*-normal enzyme reaction
(d) *a*-normal enzyme reaction, *b*-non-competitive inhibitor added, *c*-allosteric inhibitor added

25. Figure shows a graph in $\log_{10}$ K vs $\frac{1}{T}$ where *K* is rate constant and *T* is temperature. The straight line BC has slope, $\tan\theta = -\frac{1}{2.303}$ and an intercept of 5 on *y*-axis. Thus E_a, the energy of activation is:



(a) 2.303 × 2 cal (b) 2/2.303 cal
(c) 2 cal (d) None of these

26. In a reaction $2A \longrightarrow$ products, the concentration of *A* decreases from 0.5 mol L^{-1} to 0.4 mol L^{-1} in 10 minutes, rate of reaction is:
(a) 0.005 mol L^{-1} min^{-1} (b) 0.002 mol L^{-1} min^{-1}
(c) 0.05 mol L^{-1} min^{-1} (d) 0.02 mol L^{-1} min^{-1}

27. The electrical properties and their respective SI units are given below. Identify the wrongly matched pair

Electrical Property	SI Unit
(a) Specific conductance	Sm^{-1}
(b) Conductance	S
(c) Equivalent Conductance	$Sm^2(gm\ equiv)^{-1}$
(d) Cell constant	m

28. The oxidation potential of a hydrogen electrode at $pH = 10$ and $P_{H_2} = 1$ is:
(a) 0.51 V (b) 0.00 V
(c) +0.59 V (d) 0.059 V

29. At higher altitude, boiling point of water is 95^0C. The amount of NaCl added to 1 kg water ($K_b = 0.52$ K kg/ mol^{-1}) in order to raise the b.pt. of solution to 100^0C is (assume 90% ionsiation of NaCl):
(a) 296.5 g (b) 281.25 g
(c) 270 g (d) 310 g

30. An alloy of copper, silver and gold is found to have copper constituting the ccp lattice. If silver atoms occupy the edge centers and gold is present at body centre, the alloy will have the formula:
(a) Cu_4Ag_2Au (b) Cu_4Ag_4Au
(c) Cu_2Ag_3Au (d) CuAgAu

31. pH for the solution of salt undergoing anionic hydrolysis (say CH_3COONa) is given by:
(a) $pH = {}^{1/2}[pK_w + pK_a + \log C]$
(b) $pH = {}^{1/2}[pK_w + pK_a - \log C]$
(c) $pH = {}^{1/2}[pK_w - pK_a - \log C]$
(d) None of these

32. XY_2 dissociates as; $XY_{2(g)} \rightleftharpoons XY_{(g)} + Y_{(g)}$
when the intial pressure of XY_2 is 600 mm Hg, the total equilibrium pressure is 800 mm Hg. Calculate K for the reaction assuming that, the volume of the system remains unchanged.
(a) 50 (b) 100
(c) 166.6 (d) 400

33. The heats of neutralisation of four acids A, B, C, D are $-13.7, -9.4, -11.2$ and -12.4 kcal respectively when they are neutralised by a common base. The acidic character obeys the order:
(a) A > B > C > D (b) A > D > C > B
(c) D < C < B < A (d) D > B > C > A

34. The temperature of an ideal gas increases in an:
(a) Adiabatic expansion
(b) Isothermal expansion
(c) Adiabatic compression
(d) Isothermal compression

35. Select the wrong statement about real gases:
(a) Larger is T_c/P_c, larger will be excluded volume
(b) $T_c > T_i > T_b$
(c) $\left(\frac{\partial p}{\partial V_M}\right)_{T_c} = 0$
(d) The compressibility factor at critical conditions is 8/3.

36. The ratio of average speed of an oxygen molecule to the RMS speed of a nitrogen molecule at the same temperature is:
(a) $\left(\frac{3\pi}{7}\right)^{1/2}$ (b) $\left(\frac{7}{3\pi}\right)^{1/2}$
(c) $\left(\frac{3}{7\pi}\right)^{1/2}$ (d) $\left(\frac{7\pi}{3}\right)^{1/2}$

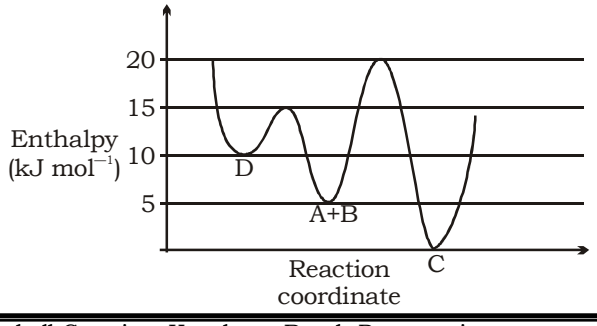
37. Of the following, which of the statement(s) regarding Bohr's theory is wrong?
(a) Kinetic energy of an electron is half of the magnitude of its potential energy.
(b) Kinetic energy of an electron is negative of total energy of electron.
(c) Energy of electron decreases with increase in the value of the principal quantum number.
(d) The ionization energy of H-atom in the first excited state is negative of one-fourth of the energy of an electron in the ground state.

38. The line spectrum of two elements can never be identical because:
(a) They do not have same number of neutrons
(b) They have dissimilar mass number
(c) They have different energy level schemes
(d) They have different number of valence electrons

39. Rakesh needs 1.71 g of sugar ($C_{12}H_{22}O_{11}$) to sweeten his tea. What would be the number of carbon atoms present in his tea?
(a) 3.6×10^{22} (b) 7.2×10^{21}
(c) 0.05×10^{23} (d) 6.6×10^{22}

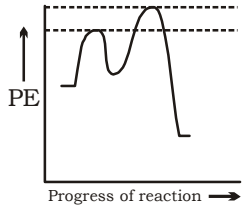
40. The vapour pressure of two miscible liquids *A* and *B* are 300 and 500 mm of Hg respectively. In a flask 10 moles of *A* is mixed with 12 moles of B. However, as soon as B is added, A starts polymerising into a completely insoluble solid. The polymerisation follows first-order kinetics. After 100 min, 0.525 mole of a solute is dissolved which arrests the polymerisation completely. The final vapour pressure of the solution is 400 mm of Hg. Estimate the rate constant of the polymerisation reaction. Assume negligible volume change on mixing and polymerisation and ideal behaviour for the final solution.
(a) $1.005\times10^{-4}\ min^{-1}$ (b) $0.105\times10^{-4}\ min^{-1}$
(c) $1.005\times10^{-2}\ min^{-1}$ (d) $0.105\times10^{-2}\ min^{-1}$

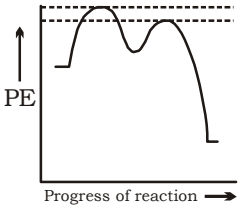
41. Consider the given plot of enthalpy of the following reaction between A and B. $A + B \longrightarrow C + D$

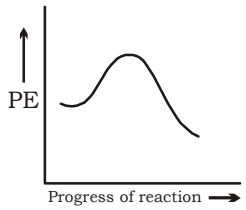


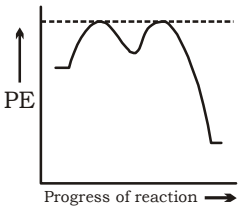
Identify the incorrect statement.
(a) *D* is kinetically stable product.
(b) Formation of *A* and *B* from *C* has highest enthalpy of activation.
(c) *C* is the thermodynamically stable product
(d) Activation enthalpy to from *C* is 5 kJ mol^{-1} less than that to form D.

42. Which of the following potential energy (PE) diagrams represents the S_N1 reaction?

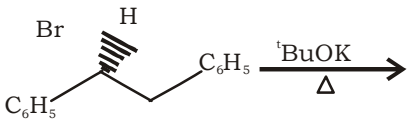
(a) 

(b) 

(c) 

(d) 

43. The major product obtained in the following reaction is



(a) $(\pm)C_6H_5CH(O^tBu)CH_2C_6H_5$
(b) $C_6H_5CH = CHC_6H_5$
(c) $(+)C_6H_5CH(O^tBu)CH_2C_6H_5$
(d) $(-)C_6H_5CH(O^tBu)CH_2C_6H_5$

44. A solution of urea (mil. mass 56 g mol^{-1}) boils at 100.18^0 C at one atmospheric pressure. If K_f and K_b for water are 1.86 and 0.512 K kg mol^{-1} respectively, the above solution will freeze at:
(a) -6.54^0C (b) 6.54^0C
(c) -0.654^0C (d) 0.654^0C

45. If three elements *X, Y* and *Z* crystallise in a ccp lattice with *X* atoms at the corners, *Y* atoms at the cube centre and *Z* atoms at the edges, the formula of the compound will be:
(a) XYZ (b) XYZ_2
(c) XYZ_3 (d) X_2Y_2Z

PHYSICS

Single correct Choice Type

This section contains 45 questions numbered 46 to 90. Each question has 4 choices (a), (b), (c) and (d) out of which ONLY ONE is correct.

46. A ball falls vertically onto a floor, with momentum p, and then bounces repeatedly. The coeeficient of restitution is e. The total momentum imparted by hte ball to the floor is

(a) $p(1+e)$ (b) $\dfrac{p}{(1+e)}$
(c) $p\left(1+\dfrac{1}{e}\right)$ (d) $p\left(\dfrac{1+e}{1-e}\right)$

47. Two identical spheres move in opposite directions with speeds v_1 and v_2 and pass behind an opaque screen, where they may either cross without touching (Event 1) or make an elastic head on collision (Event 2)
(a) We can never make out which event has occured.
(b) We cannot make out which event has occured only if $v_1 = v_2$
(c) We can always make out which event has occured.
(d) We can make out which event has occured only if $v_1 = v_2$

48. Let v and a denote the velocity and acceleration respectively of a body.
(a) a can be non zero when v=0
(b) a must be zero when v=0
(c) The direction of a must have some correlation with the direction of v
(d) None of these

49. A man on a moving cart, facing the direction of motion, throws a ball straight up with respect to himself
(a) The ball will always return to him
(b) The ball will never return to him
(c) The ball will return to him if the cart moves with a constant velocity
(d) all of these

50. A block of mass 1 kg moves under the influence of external forces on a rough horizontal surface. At some instant, it has a speed of 1m/s due east and an acceleration of $1m/s^2$ due north. The force of friction acting on it is F.
(a) F acts due west
(b) F acts due south
(c) F acts in the south -west direction
(d) None of these.

51. A stick is thrown in the air and lands at some distance from the thorwer. The centre of mass of the stick will move along a parabolic path
(a) in all cases
(b) only if the stick is uniform
(c) only if the stick does not have any rotational motion
(d) only if the centre of mass of the stick lies at some point on it and not outside it.

52. A particle of mass m is tied to a light string of length l and rotated along a vertical circular path. What should be the minimum speed at the highest point of its path

so that the string does not become slack at any position?

(a) $\sqrt{2gl}$ (b) $\sqrt{gl}$

(c) zero (d) $\sqrt{gl/2}$

53. A uniform horizontal metre scale of mass m is suspended by two vertical strings attached to its two ends. A body of mass 2m is palced on the 75 cm mark. The tension in the two strings are in the ratio.
(a) 1:2 (b) 1:3
(c) 2:3 (d) 3:4

54. A small ball strikes a stationary uniform rod, which is free to rotate, in gravity free space. The ball does not stick to the rod. The rod will rotate about
(a) its centre of mass
(b) the centre of mass of 'rod plus ball'
(c) the point of impact of the ball on the rod
(d) the point about which the moment of inertia of the 'rod plus ball' is minimum

55. P is the centre of mass of four point masses A, B, C and D coplanar but not collinear.
(a) P may or may not coincide with one of the point masses.
(b) P must lie within the quadrilateral ABCD
(c) P must lie within or on the edge of at least one of the triangles formed by taking A,B,C and D three at a time.
(d) P must lie on a line joining two of the points A,B,C,D

56. A thin uniform rod of mass m and length l is free to rotate about its upper end. When it is at rest, it receives an impulse J at its lowest point, normal to its length. Immediately after impact,
(a) the angular momentum of the rod is Jl
(b) the angular velocity of the rod is 3J/ml
(c) the kinetic energy of the rod is $3J^2/2m$
(d) All of these

57. Which of the following phenomena does not involve the viscosity of air at all?
(a) A meteorite burns up on enetring the earth's atmosphere
(b) Raindrops falling from a great height reach the ground with a relatively small velocity
(c) A ball spining through air can move sideways
(d) In air flowing through a tube of variable cross section, the pressure becomes different at different points.

58. A liquid whose coefficient of viscosity is η flows on a horizontal surface. Let dx represent the vertical distance between two layers of liquid and dv represent the difference in the velocities of the two layers. Then the quantity $\eta(dv/dx)$ has the same dimensions as
(a) acceleration (b) force
(c) momentum (d) pressure

59. The average translational kinetic energy of O_2 (molar mass 32) at a particular temperature is 0.048 eV. The average translational kinetic energy of N_2 (molar mass 28) molecules in eV at the same temperature is
(a) 0.0015 (b) 0.003
(c) 0.048 (d) 0.768

60. A cylinder of radius R, made of a materal of thermal conductivity k_1, is surrounded by a cylindrical shell of inner radius R and outer radius 2R.The shell is made of a material of thermal conductivity k_2. The ends of the combined system are maintained at two different temperatures. There is no loss of heat across the cylindrical sufrface and the system is in steady state The effective thermal conductivity of the system is

(a) $k_1 + k_2$ (b) $\frac{k_1 k_2}{k_1 + k_2}$

(c) $\frac{k_1 + 3k_2}{4}$ (d) $\frac{3k_1 + k_2}{4}$

61. A gas may expand either adiabatically or isothermally. A number of p-V curves are drawn for the two processes over different ranges of pressure and volume. It will be found that
(a) two adiabatic curves do not intersect
(b) two isothermal curves do not intersect
(c) the magnitude of the slope of anadiabatic curve is greater than the magnitude of the slope of an isothermal curve for the same values of pressure and volume
(d) all of these

62. A and B are two points on a uniform metal ring whose centre is C. The angle $ACB = \theta$. A and B are maintained at two different constant temperatures. When $\theta = 180^0$, the rate of total heat flow from A to B is 1.2 W . When $\theta = 90^0$, this rate will be
(a) 0.6 W (b) 0.9 W
(c) 1.6 W (d) 1.8 W

63. A sine wave has an amplitude A and a wavelength λ. Let V be the wave velocity, and v be maximum velocity of a particle in the medium.
(a) V cannot be equal to v
(b) $V = v, \text{if} A = \lambda/2\pi$
(c) $V = v, \text{if} A = 2\pi\lambda$
(d) $V = v, \text{if} \lambda = A/\pi$

64. A sound wave pases from a medium A to a medium B. The velocity of sound in B greater than that in A. Assume that there is no absorption or reflection at the boundary. As the wave moves across the boundry,
(i) the frequency of sound will not change
(ii) the wavelength will increase
(iii) the wavelength will decrease
(iv) the intensity of sound will not change
(a) i ii and iii (b) i ii and iv
(c) i iii and iv (d) None of these

65. In a compound microscope, maximum magnification is obtained when the final image
(a) is formed at infinity
(b) is formed at the least distance of distinct vision
(c) coincides with the object
(d) coincides with the objective lens

66. If a converging beam of light is incident on a concave mirror, the reflected light

(i) may form a real image
(ii) must form a real image
(iii) may form a virtual image
(iv) may be a parallel beam
(a) i ii and iii (b) i ii and iv
(c) i iii and iv (d) None of these

67. A half ring of radius R has a charge of λ per unit length. The potential at the centre of the half ring is
(a) $k\frac{\lambda}{R}$ (b) $k\frac{\lambda}{\pi R}$
(c) $k\frac{\pi\lambda}{R}$ (d) $k\pi\lambda$

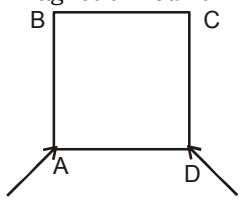
68. A parallel - plate capacitor is charged from a cell and then isolated from it. The separation between the plates is now increased.
(a) The force of attraction between the plates will decrease.
(b) The field in the region between the plates will not change
(c) The potential difference between the plates will decrease.
(d) all of these

69. 1000 identical drops of mercury are charged to a potential of 1V each. They join to form a single drop . The potential of this drop will be
(a) 0.01 V (b) 0.1 V
(c) 10 V (d) 100 V

70. The drift velocity of electroons in a metallic conductor carrying a current is usually of the order of
(a) 1 cm/s (b) 10m/s
(c) 10^4 m/s (d) 10^8 m/s

71. If the length of the filament of a heater is reduced by 10%, the power of the heater will
(a) increase by about 9%
(b) increase by about 11%
(c) increase by about 19%
(d) decrease by about 10%

72. ABCD is a square loop made of a uniform conducting wire. A current enters the loop at A and leaves at D. The magnetic filed is



(a) zero only at the centre of the loop
(b) maximum at the centre of the loop
(c) zero at all points outside the loop
(d) zero at all points inside the loop

73. A semicircular wire of radius r, carrying a current i, is placed in a magnetic field of magnitude B. The force acting on it
(a) can never be zero
(b) can have the maximum magnitude 2Bir
(c) can have the maximum magnitude $Bi\pi r$
(d) can have the maximum magnitude Bir

74. The SI unit of inductance, the henry, can be written as
(a) weber/ampere (b) volt second / ampere
(c) joule /ampere^2 (d) all of these

75. A neutral atom which is stationary at the origin in gravity free space emits an α-particle (A) in the z-direction. The product atom is P. A uniform magnetic field exists in the x-direction. Disregards the electrostatic forces between A and P.
(a) A and P will move along circular paths of equal radii
(b) A has greater time period of rotation than P.
(c) A has greater kinetic energy than P.
(d) A and P will meet again somewhere in the yz plane

76. A small bar magnet moves along the axis of a flat, closed coil. The magnet will attract the coil
(a) only when it moves towards the coil
(b) only when it moves away from the coil
(c) both a and b
(d) only if its south pole is facing the coil

77. In a cell, or accumulator battery, current flows inside the cell from the negative plate to the positive plate when
(a) it drives current through an external resistance
(b) it is being charged from an external source
(c) its emf is being measured by a potentiometer and the balance position has been reached
(d) when it is connected to a charged capacitor whose potential difference is greater than its emf, and its positive and negative plates are connected to the plates of similar polarities of the capacitor

78. An orbital electron in the ground state of hydrogen has an angular momentum L_1 and an orbital electron in the first orbit in the ground state of lithium has an angular momentum L_2
(a) $L_1 = L_2$ (b) $L_1 = 3L_2$
(c) $L_2 = 3L_1$ (d) $L_2 = 9L_1$

79. A number of spherical conductors of different radii are given charge such that the charge density of each conductors is inversely proportional to its radius. The conductors will have
(a) the same potential
(b) the same potential energy
(c) the same charge
(d) potentials inversely proportional to their radii

80. A real gas behaves like an ideal gas if its
(a) pressure and temperature are both high
(b) pressure and temperature are both low
(c) pressure is high and temperature is low
(d) pressure is low and temperature is high

81. A train of 150 meter length is going towards north direction at a speed of 10m/s. A parrot flies at the speed of 5m/s towards south direction parallel to the railways track. The time taken by the parrot to cross the train is
(a) 12s (b) 8s
(c) 15s (d) 10s

82. A body of mass M hits normally a rigid wall with velocity V and bounces back with the same velocity. The impulse experienced by the body is

(a) MV (b) 1.5 MV
(c) 2MV (d) zero

83. A mass of 1 kg is thrown up with a velocity of 100 m/s. After 5 seconds, it explodes into two parts. One part of mass 400 g comes down with a velocity 25m/s. The velocity of other part is (Take g=10 ms^{-2})
(a) 40 m/s (b) 80 m/s
(c) 100 m/s (d) 60 m/s

84. Two astronauts are floating in gravitational free space after having lost contact with their spaceship. The two will
(a) move towards each other
(b) move away from each other
(c) will become stationary
(d) keep floating at the same distance between them

85. The value of coefficient of volume expansion of glyserin is $5\times10^{-4}K^{-1}$. The fractional change in the density of glycerin for a rise of 40^0C in its temperature is
(a) 0.025 (b) 0.010
(c) 0.015 (d) 0.020

86. At constant volume temperature is increased then
(a) collision on walls will be less
(b) number of collision per unit time will increase
(c) collisions will be in straight lines
(d) collisions will not change

87. A seconds pendulum is mounted in a rocket. its period of oscillation will decrease when rocket is
(a) moving down with uniform acceleration
(b) moving around the earth in geostationary orbit
(c) moving up with uniform velocity
(d) moving up with uniform acceleration

88. An electric dipole is placed at an angle of 30^0 with an electric field intensity $2\times10^5NC^{-1}$. It experiences a torque equal to 4Nm. The charge on the dipole, if the dipole length is 2cm, is
(a) 8 mC (b) 2mC
(c) 5mC (d) $7\mu C$

89. In good conductors of electricity, the type of bonding that exists is
(a) metallic (b) vander Waals
(c) ionic (d) covalent

90. Electromagnets are made of soft iron because soft iron has
(a) low retentivity and high coercive force
(b) high retentivity and high coercive force
(c) low retentivity and low coercive force
(d) high retentivity and low coercive force

BIOLOGY

Single correct Choice Type

This section contains 90 questions numbered 91 to 180. Each question has 4 choices (a), (b), (c) and (d) out of which ONLY ONE is correct.

91. In lymph nodes _____ organism is found
(a) plasmodium (b) Taenia
(c) Wuchereria (d) Diplococcus

92. _____ law states that "Gametes are never hybrid"
(a) law of dominance
(b) law of independent assortment
(c) law of random fertillisation
(d) law of segregation

93. Nothing about recombination and crossing over was told by Mendel because
(a) traits he choose were not linked and present on different chromosomes or were far apart
(b) he did not have a large and ultra microscope
(c) he choose only pure type
(d) traits he choose had lot of genes

94. Due to excessive pulling of _____ sprain occurs
(a) tendon (b) ligament
(c) muscle (d) fibres

95. Which hormone is released in the body, when a man suddenly sees a tiger, his heart beat goes up and blood pressure increases, etc.
(a) parathormone (b) LH
(c) adrenaline (d) FSH

96. Which of the following parts of the plant should be excluded if a scientist wants to study the viral effects on plants?
(a) shoot apex (b) pith
(c) cortex (d) xylem

97. A man suffers from ____ if he has enlarged breasts, sparse hair on body and sex compliment as XXY
(a) Turner's syndrome
(b) Klinefelters syndrome
(c) Edward's syndrome
(d) Down's syndrome

98. _____ refers to have raised check bones, oblique eyes and yellowish skin colours
(a) Adrenoids (b) Mongloids
(c) Africans (d) Americans

99. _____ transorts the urea
(a) RBC (b) Blood plasms
(c) Platelets (d) Erythrocytes

100. Propulsion in fast swimming fishes is due to
(a) pelvic fin (b) ventral fin
(c) dorsal fin (d) caudal fin

101. Which side should face you, while dissecting a rat when you are pinning the rat in the dissecting tray?
(a) dorso - ventral (b) anteriolateral
(c) ventral (d) anterior

102. _____ molecule converts light energy into chemical energy in photosynthesis mainly by absorption.
(a) carotenoids (b) chlorophyll a
(c) xanthophyll (d) chlorophyll b

103. Application of _____ can overcome the apical dominance
(a) auxin (b) gibberellin
(c) ethylene (d) cytokinin

104. _____ is thickning of arteries due to cholesterol deposition
(a) arteiosclerosis (b) cardiac arrest
(c) rheumatic heart (d) blood pressure

105. Blood vessels in Pheretima have valves which are
(a) integumentary (b) anterior
(c) hollow (d) dorsal

106. In _____ stinging capsules (nematocysts) are found
(a) sea pen and sea fan
(b) scorpion and cobra
(c) wasp and honeybee

(d) cactus and Venus flytrap

107. _____ is a cloning vector
(a) DNA of salmonella typhimurium
(b) Ti plasmid
(c) Ori minus pBR 322
(d) Amp^r and Tet^r loci

108. With _____ of genetic resources India is one of the twelve megadiversity countries, of the world
(a) 8.1 % (b) 21.2 %
(c) 17.1% (d) 12.1 %

109. _____ is not an invasive species
(a) Parthenium hysterophorus
(b) Lantana camara
(c) Nelumbo (lotus)
(d) None of the above

110. Muscles having characteristic of intercalated discs are found in
(a) heart (b) small intertine
(c) urinary bladder (d) thigh

111. External fertilization occurs in which of the following sets of organisms?
(a) Echinodermata and mosses
(b) Chordata and ferns
(c) Reptiles and gymnosperms
(d) Amphibians and algae

112. Based on the amount of secretion poured into urethra, starting from the maximum, arrange the following male reproductive accessory organs.
(i) Prostrate gland (ii) Seminal vesicle
(iii) Bulbourethral gland
(a) ii > i > iii (b) i > ii > iii
(c) i > iii > ii (d) i > ii > iii

113. _____ is the contraceptive device which makes the uterus unsuitable for implanatation?
(a) Progestasert (b) CuT
(c) Multiload (d) Lippe's loop

114. In Miller's experiment the temperature of ___ was kept in the flask containing the mixture of CH_4, NH_3, H_2 and water vapour in a closed flask to mimic early earth condition
(a) 800^0C (b) 700^0C
(c) 1200^0C (d) 150^0C

115. In _____ the sexual stage (gametocytes) of Plasmodium occurs
(a) Human RBC
(b) Salivary glands of mosquito
(c) Intestine of mosquito
(d) Human stomach

116. In _____ occurrence of triploid (3n) primary endosperm nucleus is a characteristic feature
(a) Angiosperms (b) Gymnosperms
(c) Fungi (d) Bryophytes

117. Secondary metabolites are only present in which of the following groups?
(a) Carotenoids, phenylalanine, curcumin, rubber
(b) Glycine, gums, serine, diterpenes
(c) Arbrin , cellulose, arginine, tyrosine
(d) Conclavin -A, morphine, coderine, vinblastin

118. In a diploid cell, the amount of DNA gets double at the _____ stage of cell cycle.
(a) S phase (b) G_0 phase
(c) S, G_2 and M phase (d) G_1 and G_2 phase

119. By the action of _____ sporopollenin a constituent of pollen exine can be degraded
(a) cannot be degraded (b) low temperature
(c) strong bases (d) enzymes

120. In _____ minutes, the pollen grains of rice and wheat lose viability of their release
(a) 30 (b) 80
(c) 50 (d) 10

121. A mature ovule has _____ after double fertilization
(a) 1 diploid and 2 haploid cell
(b) 2 haploid and 1 triploid cell
(c) 1 diploid and 1 triploid cell
(d) 1 haploid and 2 triploid cell

122. Through _____ genetically modified (GM) cropos can be hybridization
(a) somatic hybridization
(b) recombinant DNA technology
(c) micropropagation
(d) cross breeding

123. Among the following is the palindromic sequence
(a) 5' -CGTATG-3' (b) 5' -CGAATG-3'
3' - GCATC-5' 3' - CGAATG-5'
(c) 5' -GACTAC-3' (d) 5' -GAATTC-3'
3' -TACGAC-5' 3' -CTTAAG-5

124. Due to _____ the C_4 plants have better productivity
(a) C_4 plants does not carry photorepiration
(b) C_4 plants absorb more CO_2
(c) C_4 plants absorb more light
(d) C_4 plants have more amount of RuBisCO

125. Among the following, correctly match the microbes with its function
(a) Aspergillus niger - Production of lactic acid
(b) Trichoderma polysporum -Lowers blood chloesterol polysporum
(c) Saccharomyces cerevisiae - Production of citric acid
(d) Methanogenic bacteria - Gobar gas formation

126. Among the following correctly match the gastric secretions with its source.
(a) Mucus - Oxyntic cells
(b) Chymotrypsin - Parietal cells
(c) HCl - Goblet cells
(d) Pepsin - Chief cells

127. _____ is true for excretion in humans
(a) Glucose and amino acids are reabsorbed in PCT by simple diffusion
(b) On an average, 25-30 gm of urea is excreted out per day
(c) DCT is impermeable to water
(d) Maximum reabsorption occurs in the loop of Henle

128. For inbreeding, which of the following is not true?
(a) It causes inbreeding depression after a few generations
(b) It leads to heterozygosity
(c) It is used to produce a pure line
(d) It always increases the productivity

129. Without exception in regard to plant classification, which of the following is correclty matched?
(a) Family - Poaceae - ae
(b) Division - Pteridophyta -phyta
(c) Class - Bryopsida - sida
(d) Genus - Salanum -um

130. The oxidation state of iron in haemoglobin is
(a) Fe^{4+} (b) Fe^{2+}
(c) Fe^{3+} (d) Fe^-

131. Amongst the following select the correct pair
(a) Autumn wood - dark colour, high density
(b) Spring wood - dark colour, high density

(c) Autumn wood - light colour, low density
(d) Spring wood - light colour, low density

132. _____ among the following organelles contain DNA
(i) Mitochondria (ii) Chloroplasts
(iii) Golgi bodies (iv) Ribosomes
(a) iii only (b) ii and iv
(c) i only (d) i and ii

133. In the form of _____ carbon dioxide (CO_2) diffuses into blood from tissue site and passes to alveolor site.
(a) bicarbonate; 80 %
(b) carbaminohaemoglobin ; 60-70 %
(c) bicarbonate; 20-25%
(d) carbaminohaemoglobin ; 9%

134. _____ makes up the chromatin
(a) RNA and protein
(b) DNA, histone and oil bodies
(c) DNA, RNA protein
(d) DNA and histone

135. Root initiation, flowering and induced parthenocarpy is promoted by which of the following plant growth regulators (PGRs)?
(a) Gibberellin (b) Ethylene
(c) Cytokinin (d) Auxin

136. _____ is also called vitamin B_6.
(a) Citric acid (b) thiamine
(c) retinol (d) pyridoxine

137. In having _____ Protista differs from Monera
(a) heterotropic nutirtion
(b) flagella
(c) nuclear membrane
(d) cell pressure

138. T stands for _____ in DPT veccine
(a) tubercluosis (b) tetanus
(c) trachoma (d) typhoid

139. In monocos vascular bundles are closed due to
(a) vascular cambium is absent between xylem and phloem
(b) xylem and phloem occur in separate absent
(c) xylem and phloem are absent
(d) vascular cambium is not present

140. In which of the follwing groups, gametophyte and sporophyte are independent of each other?
(a) gymnosperms (b) angiosperms
(c) pteridophytes (d) none of these

141. Among the following which one is correct?
(a) chief cells secrete gastrin
(b) parietal cells secrete hydrochloric acid
(c) argentaffin cells secrete mucus
(d) paneth cells secrete pepsinogen

142. In india which of the following has highest diversity?
(a) mango (b) flamingo
(c) lion (d) dolphine

143. Due to recessive autosomal mutations, which of the following disorders are caused?
(a) Edward's syndrome and Down's syndrome
(b) Turner's syndrome and sickle cell anaemia
(c) Only A
(d) cystic fibrosis and phenylketonuria

144. Among the following the correct statement about the movement of substance across the membrane in faciliated diffusion is
(a) it doesn't cause transport of molecules from high concentration to low concentration
(b) it is active trnasport
(c) it is not insensitive to inhibitors
(d) it is a very specific transport

145. _____ among the following is correct
(a) Wuchereria causes enterbiasis
(b) ELISA test is done for malaria
(c) Salmonella typhi and Haemophilus influenzae cause pneumonia
(d) Entamoeba histolytica causes amoebiasis

146. _____ is the greek word for ecology
(a) oekologie (b) ethology
(c) synecology (d) all of them

147. Regarding the genetic code, which of the following is corect?
(a) AUG is the intiation codon which also codes for phenylalanine
(b) UUU is the nonsense codon whihc also codes for methionine
(c) three random nitrogen bases specify the placement of ne amino acid
(d) there are 64 triplet codons and only 20 amino

148. Singer and Nicolson are known for?
(a) Structure of RNA
(b) plasma membrane modifications
(c) fluid - mosaic model fo plasma membrane
(d) one- gene -two -enzyme hypothesis

149. Choose the correct statement
(a) Penicillium notatum restrict the growth of staphylococci
(b) Acetobacter aceti produces lactic acid
(c) Saccharomyces cerevisiae is used as clot buster
(d) Methanogens are foud in anaerobic conditions

150. Among the following which one is correct?
(a) all fungi are non-filametous
(b) protists reproduce sexually only
(c) virus cannot have both DNA and RNA
(d) transfer of DNA from one bacteria to another bacteria cannot take place

151. _____ have porous body and are diploblastic
(a) Aurelia and Obelia
(b) Leucosolenia and Spongilla
(c) Only A
(d) All of these

152. With _____ CD-4 receptor is associated
(a) AIDS (b) pneumonia
(c) dengue (d) cancer

153. Regarding electrocardiograph (ECG) which statement is correct ?
(a) T-wave represents the electrical excitation of the ventricle
(b) by counting the number of QRS complexes one can determine the pulse rate
(c) S-wave represents repolarisation of the atria
(d) QRS complex represents repolarisation of the Ventricles

154. Herbivores obtain phosphorus from
(a) air (b) plants
(c) rocks (d) soil

155. GnRH produced by hypothalamus has ____ effect
(a) stimulates synthesis of carbohydrates from non-carbohydrates in liver
(b) stimulates secretion of milk in mammary glands
(c) stimulates foetal ejection reflex
(d) stimulates the synthesis and secretion of androgens

156. In medulla, chemosensitive area of respiratory centre is affected by
(a) less H^+ and CO_2 ions
(b) excess CO_2 and H^+ ions

(c) less O_2 and H+ ions
(d) excess O_2 and CO_2 ion

157. In intestinal epithelium, microvilli are similar in function with
(a) typhlosole in cockroach
(b) malpighian tubules in earthworm
(c) intestinal caecum in earthworm
(d) hepatic caecae in cockroach

158. _____ are the type of epithelial cells which line the inner surface of Fallopian tubes, bronchi and brochiodes
(a) cubical epithelium
(b) ciliated epithelium
(c) columnar epithelium
(d) squamous epithelium

159. _____ is involved in cyclic photophosphorylation
(a) P_{700} (b) PSII
(c) PS I and PS II (d) P I

160. _____ has the longest gestation period
(a) lizard (b) walrus
(c) dog (d) elephant

161. _____ is a plasmid
(a) bacterial, circular, dsDNA
(b) autonomously replicating circular RNA
(c) extrachromosomal circular dsDNA
(d) extrachromosomal circular RNA

162. Ovary is half inferior in the flowers of
(a) guava (b) plum
(c) brinjal (d) cucumber

163. Chemical evolution is based on the concept of
(a) interaction of water, air and clay under intense light
(b) crystallization of chemicals
(c) possible origin of life by combination of chemicals under suitable environmental conditions
(d) effect of solar radiation on chemicals

164. Correclty matched crop, variety and resistance to disease among the following is

	Crop	Variety	Resistance to diseases
(a)	cowpea	Pusa komal	bacterial blight
(b)	Brassica	Pusa sadabahar	black rot
(c)	wheat	himgiri	white rust
(d)	maize	Pusa swarnim	Chilly mosaic virus

165. Recombinant DNA technology involves several steps in which intial step is of isolation of the DNA. The enzyme _____ are used in the processs for the break down of fungal cell, bacterial cell and plant cell respectively.
(a) trypsin, lysozyme, cellulase
(b) chitinase, cellulase, lysozyme
(c) chitinase, cellulase, pepsin
(d) lysozyme, lipases, trypsin

166. _____ is the taxon which includes related species
(a) class (b) species
(c) genus (d) family

167. Regarding respiration in adult frog which of the following is correct?
(a) On land skin, buccal cavity
(b) In water -skin, gills
(c) In water - Skin, buccal cavity
(d) None of the above

168. _____ is correctly matched among the following
(a) Basil prop roots
(b) Dahlia - Fasciculated root
(c) Azadirchta - Adventitious root
(d) Monstera - Fibrous root

169. _____ are the "cells of Rauber"
(a) cells of tropoblast, in contact with inner cell mass of blastocyst
(b) outer cells mass of blastocoel
(c) inner cels of tropoblast in contact with uterine wall
(d) secretary cells of endometrium in uterus

170. Due to _____ deuteromycetes are known as fungi imperfecti
(a) their zygote undergoes meroblastic and holoblastic cleavage
(b) they are phototrophic
(c) they are have aseptate mycelium
(d) only sexual stages are known

171. Due to _____ abscisic acid is known as stress hormone
(a) induces flowering
(b) promotes seed dormancy
(c) breaks leaf fall
(d) promotes closure of stomata

172. The correct statement among the following is _____
(a) hPL plays a major role in parturition
(b) Feotus shows movements first time in the 8th month of pregenancy
(c) Embryo's heart is formed by the 2nd month of pregnancy
(d) Signal for parturition comes from fully developed foetus and placenta

173. Most poisonous fish toxins is released by
(a) eel fish (b) Clown fish
(c) Both a and b (d) puffer fish

174. ____ is associated with Na^+/K^+ pump
(a) active transport (b) passive transport
(c) guttation (d) Reverse osmosis

175. _____ has the largest species variety in India?
(a) Corn (b) Barley
(c) Rice (d) Potato

176. The formation of _____ is shown by photorespiration
(a) neither ATP nor sugar
(b) ADP but not sugar
(c) both ADP nor sugar
(d) sugar but not ADP

177. Living cells or tissues are viewed through ____ microscope
(a) compound microscope
(b) phase contrast microscope
(c) light microscope
(d) None of the above

178. Form 1 glucose molecule in aerobic respiration total number of ATP molecules formed will be
(a) 26 (b) 34
(c) 30 (d) 36

179. _____ is the cartoon character that does not share its name with that of gene
(a) popeye (B) Obelix
(c) Asterix (d) Tintin

180. With _____ group of plants apiculture is associated
(a) Pineapple, sugarcane, guvava
(b) Sugarcane , paddy, banana
(c) Guvava, sunflower, strawberry
(d) Grapes, maize, tomato