PHYSICS Section A

1. Two point charges of magnitude +q and –q are placed at $(-d/2, 0, 0)$ and $(d/2, 0, 0)$, respectively. The equation of the equipotential surface where the potential is zero is
   (a) $x = 0$ (b) $x = d/2$
   (c) $y = 0$ (d) $z = 0$

2. Consider a thin spherical shell of radius R with its centre at the origin, carrying uniform positive surface charge density. The variation of the magnitude of the electric field $|E(r)|$ and the electric potential $V(r)$ with the distance r from the centre, is best represented by graph? $[V = \_\_, E = ----]$
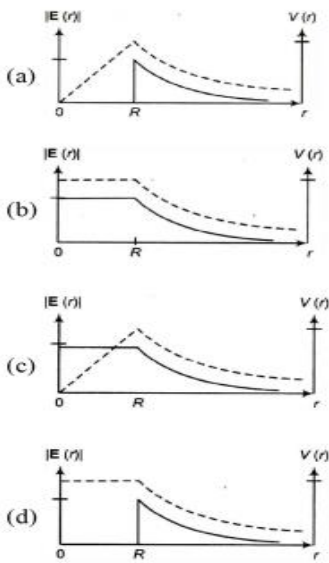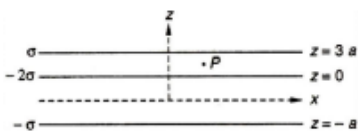

3. A metallic solid sphere is placed in a uniform electric field. The lines of force follow the path shown in figure as
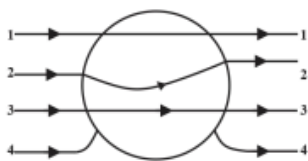
   (a) 1   (b) 2
   (c) 3   (d) 4

4. Three infinitely long charged sheets are placed as shown in figure. The electric field at point P is

   (a) $\dfrac{2\sigma}{\varepsilon_0}\,\hat{k}$ (b) $-\dfrac{2\sigma}{\varepsilon_0}\,\hat{k}$
   (c) $\dfrac{4\sigma}{\varepsilon_0}\,\hat{k}$ (d) $-\dfrac{4\sigma}{\varepsilon_0}\,\hat{k}$

5. Electric field inside the capacitor is E and dielectric constant of material is k. Then the charge density σ on the plates is (Given $E = 6 \times 10^5 V/m$, $k = 6$)

   (a) $4.18 \times 10^{-5} C/m^2$
   (b) $5.18 \times 10^{-5} C/m^2$
   (c) $6.18 \times 10^{-5} C/m^2$
   (d) $3.18 \times 10^{-5} C/m^2$

6. Force of attraction between the plates of a parallel plate capacitor (field with dielectric of constant K) is
   (a) $\dfrac{q^2}{2\varepsilon_0 AK}$ (b) $\dfrac{q^2}{\varepsilon_0 AK}$
   (c) $\dfrac{q^2}{2\varepsilon_0 A}$ (d) $\dfrac{q^2}{2\varepsilon_0 A^2 K}$

7. Two identical charged spheres suspended from common point by two massless strings of length l, are initially at a distance d (d<<1) apart because of their mutual repulsion. The charges begin to leak from both the spheres at a constant rate. As a result, the spheres approach each other with a velocity v, Then v varies as a function of the distance x between the spheres, as:
   (a) $v \propto x^{-1}$ (b) $v \propto x^{\frac{1}{2}}$
   (c) $v \propto x$ (d) $v \propto x^{\frac{-1}{2}}$

8. A water particle of mass 100 mg and having a charge of 1.50×10^{-6} C stays suspended in a room. The magnitude and direction of electric field in the room will be?
   (a) $\dfrac{2000}{3} V/m$ upwards
   (b) $\dfrac{2000}{3} V/m$ downwards
   (c) $1.5 \times 10^3 V/m$ upward
   (d) $1.5 \times 10^3 V/m$ downward

9. The force between the plates of a parallel plate capacitor of capacitance C and distance of separation of the plates d with a potential difference V between the plates, is
   (a) $\dfrac{CV^2}{2d}$ (b) $\dfrac{C^2 V^2}{2d^2}$
   (c) $\dfrac{C^2 V^2}{d^2}$ (d) $\dfrac{V^2 d}{C}$

10. Figure shows the electric lines of force emerging from a charged body. If the electric field A and B are E_A and E_B respectively and if the displacement between A and B is then
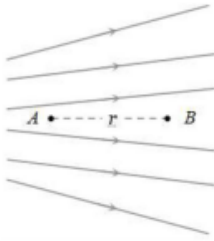
(a) $E_A > E_B$ (b) $E_A < E_B$
(c) $E_A = \dfrac{E_B}{r}$ (d) $E_A = \dfrac{E_B}{r^2}$

11. A conducting sphere of radius 10 cm has an unknown charge. If the electric field 20cm from the centre of the sphere is $1.5 \times 10^3 N/C$ and points radially inward. The net charge on the sphere will be
(a) $6.67 \times 10^{-9}C$
(b) $-6.67 \times 10^{-9}C$
(c) $1.67 \times 10^{-9}C$
(d) $-1.67 \times 10^{-9}C$

12. In a certain region of space, electric field is along the z-direction throughout. The magnetic of electric field is, however, not constant but increases uniformly along the positive z-direction, at the rate of 10^5 NC^{-1} per meter. The force experienced by a system having a total dipole moment equal to 10^{-7} Cm in the negative z-direction will be
(a) 200 N   (b) 100 N
(c) Zero   (d) None of these

13. Figure shows tracks of three charged particles in a uniform electrostatic field. The signs of the three charges.
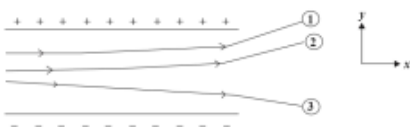
(a) All are +Ve
(b) All are – Ve
(c) (1) and (2) are +ve but (3) is –ve
(d) (3) is +ve but (1) and (2) are –ve

14. Two large, thin metal plates are parallel and close to each other. On their inner faces, the plates have surface charge densities of opposite signs and of magnitude $17.0 \times 10^{-22}C/m^2$. Electric field between the plates will be

(a) $1.9 \times 10^{-10}N/C$
(b) $1.9 \times 10^{10}N/C$
(c) $9.9 \times 10^{-9}N/C$
(d) Zero

15. A parallel plate capacitor with air between the plates has a capacitance of 8 pF (1 pF = $10^{-12}F$). What will be the capacitance if the distance between the plates is reduced by half, and the space between them is filled with a substance of dielectric constant 6?
(a) 48 pF   (b) 96 pF
(c) 4 pF   (d) 16 pF

16. The energy of a charged capacitor is given by the expression (q = charge on the conductor and C = its capacity)
(a) $\dfrac{q^2}{2C}$ (b) $\dfrac{q^2}{C}$
(c) $2qC$ (d) $\dfrac{q}{2C^2}$

17. Two charges q and $-$ 3q are placed fixed on $x - axis$ separated by distance 'd'. Where should a third charge 2q be placed such that it will not experience any force?

(a) $-\dfrac{d}{\sqrt{3}-1}$from q   (b) $\dfrac{d}{\sqrt{3}-1}$from -3q
(c) $\dfrac{d}{\sqrt{3}+1}$ from q   (d) $\dfrac{d}{\sqrt{3}+1}$from -3q

18. Total charge $-$ Q is uniformly spread along length of a ring of radius R. A small test charge +q of mass m is kept at the centre of the ring and is given a gentle push along the axis of the ring. The particle executes a simple harmonic oscillation. Its time period will be.
(a) $2\pi\sqrt{\dfrac{Qq}{4\pi\varepsilon mR^3}}$ (b) $-\sqrt{\dfrac{4\pi\varepsilon_0 mR^3}{Qq}}$
(c) $\sqrt{\dfrac{Qq}{4\pi\varepsilon_0 mR^3}}$ (d) $2\pi\sqrt{\dfrac{4\pi\varepsilon_0 mR^3}{Qq}}$

19. Separation between the plates of a parallel plate capacitor is d and the area of each plate is A. When a slab of material of dielectric constant K and thickness t (t < d) is introduced between the plates, its capacitance becomes.
(a) $\dfrac{\varepsilon_0 A}{d+t\left(1-\frac{1}{k}\right)}$ (b) $\dfrac{\varepsilon_0 A}{d+t\left(1+\frac{1}{k}\right)}$
(c) $\dfrac{\varepsilon_0 A}{d-t\left(1-\frac{1}{k}\right)}$ (d) $\dfrac{\varepsilon_0 A}{d-t\left(1+\frac{1}{k}\right)}$

20. A positively charged particle is released from rest in an uniform electric field. The electic potention energy of the charge.
(a) remains constant because the electric field is uniform.
(b) increases because the charge moves along the electric field
(c) decreases because the charge moves along the electric field.
(d) decreases because the charge moves opposite to the electric field.

21. The plate separation in a parallel plate condenser is d and plate area is A. If it is charged to V volt & battery is disconnected then the work done in increasing the plate separation to 2d will be:
(a) $\frac{3}{2}\frac{\varepsilon_0 AV^2}{d}$
(b) $\frac{\varepsilon_0 AV^2}{d}$
(c) $\frac{2\varepsilon_0 AV^2}{d}$
(d) $\frac{\varepsilon_0 AV^2}{2d}$

22. Find the equivalent capacitance of the infinite ladder shown in the figure between the points A and B.


(a) $4\mu F$
(b) $6\mu F$
(c) $1\mu F$
(d) $2\mu F$
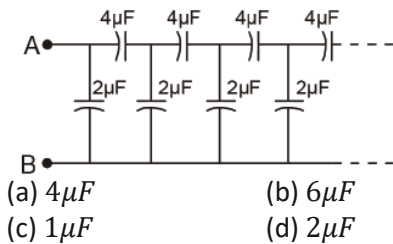
23. A capacitor is made of a flat plate of area A and a second plate having a stair-like structure as shown in figure. The width of each stair is a and the height is d. Find the capacitance of the assembly.
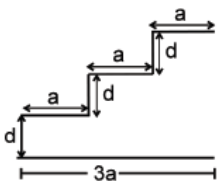
(a) $\frac{18\varepsilon_0 A}{11d}$
(b) $\frac{11\varepsilon_0 A}{18d}$
(c) $\frac{13\varepsilon_0 A}{16d}$
(d) $\frac{16\varepsilon_0 A}{13d}$

24. Two metal spheres, one of radius R and the other of radius 2R, both have same surface charge density σ. They are bought in contact and separated. What will be new surface charge densities on them?
(a) $\frac{5\sigma}{6}, \frac{5\sigma}{3}$
(b) $\frac{3\sigma}{5}, \frac{5\sigma}{6}$
(c) $\frac{5\sigma}{3}, \frac{5\sigma}{6}$
(d) $\frac{5\sigma}{3}, \frac{6\sigma}{5}$

25. We have a combination as shown in following figure. Choose the correct options:
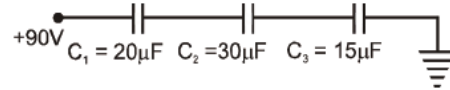

(a) Total charge in this series combination is $600\mu C$
(b) The potential difference between the plates of C_3 is 30 V
(c) The potential difference between the plate of C_1 is 20V
(d) The potential difference between the plates of C_2 is 40V

26. There are two metallic spheres of same radii but one is solid and the other is hollow, then
(a) Solid sphere can be given more charge
(b) Hollow sphere can be given more charge
(c) They can be charged equally (maximum)
(d) None of the above

27. Two parallel plates have equal and opposige charge. When the space between them is evacuated, the electric field between the plates is $2 \times 10^5 V/m$. When the space is filled with dielectric, the electric field becomes $1 \times 10^5 V/m$. The electric constant of the diselectric material
(a) 1/2
(b) 1
(c) 2
(d) 3

28. Three equal charges are placed on the three corners of a square. If the force between q_1 and q_2 is F_{12} and that between q_1 and q_3 is F_{13}, the ratio of magnitude F_{12}/F_{13} is
(a) 1/2
(b) 2
(c) $1/\sqrt{2}$
(d) $\sqrt{2}$

29. A total charge Q is broken in two parts Q_1 and Q_2 and they are placed at a distance R from each other. The maximum force of repulsion between them will occur, when
(a) $Q_2 = \frac{Q}{R}, Q_1 = Q - \frac{Q}{R}$
(b) $Q_2 = \frac{Q}{4}, Q_1 = Q - \frac{2Q}{3}$
(c) $Q_2 = \frac{Q}{4}, Q_1 = \frac{3Q}{4}$
(d) $Q_1 = \frac{Q}{2}, Q_2 = \frac{Q}{2}$

30. $Ohm's$ law is true
    (a) For metallic conductors at low temperature
    (b) For metallic conductors at high temperature
    (c) For electrolytes when current passes through them
    (d) For diode when current flows.

31. An uncharged sphere of metal is placed in between two charged plates as shown. The lines of force look like
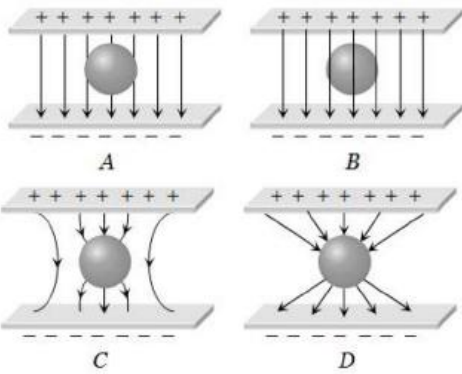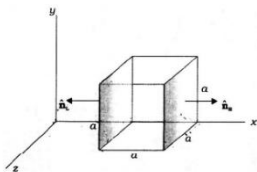

    (a) A   (b) B
    (c) C   (d) D

32. Three equal charges (q) are placed at corners of a equilateral triangle. The force on any charge is:

    (a) Zero   (b) $\sqrt{3}\dfrac{Kq^2}{a^2}$
    (c) $\dfrac{Kq^2}{\sqrt{3}a^2}$ (d) $\dfrac{3\sqrt{3}Kq^2}{a^2}$

33. The electric field components in Fig. are $E_x = ax^{\frac{1}{2}}, E_y = E_z = 0$, in which $\alpha = 800\ N/CM^{1/2}$. Calculate (a) the flux through the cube, and (b) the charge within the cube. Assume that $a = 0.1m$.

    (a) $\phi = 1.05\ Nm^2 C^{-1}$,
        $Q = 9.27 \times 10^{-12} C$
    (b) $\phi = 9.27 \times 10^{-12} C$,
        $Q = 1.05\ Nm^2\ C^{-1}$
    (c) $\phi = 2.10\ Nm^2 C^{-1}$,
        $Q = 4.63 \times 10^{-12} C$
    (d) $\phi = 4.63\ Nm^2\ C^{-1}$,
        $Q = 2.10 \times 10^{-12}\ C$

34. The variation of electric field on the y-axis as a function of 'y' is best represented by: [for the given figure]
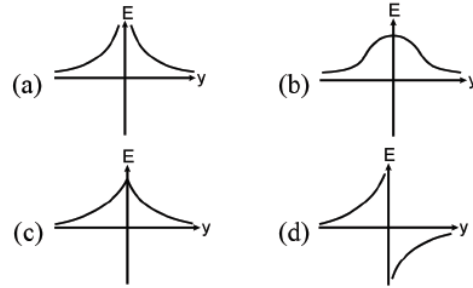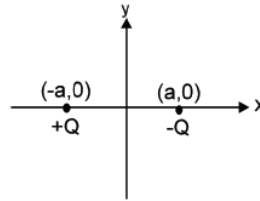
35. A point charge $50\mu C$ is located in the $x-y$ plane at the position vector $\vec{r}_0 = (2\ \hat{\imath} + 3\ \hat{\jmath})m$. The electric field at the point of position vector $\vec{r} = (8\ \hat{\imath} - 5\ \hat{\jmath})m$, in vector from is equal to:
    (a) $90(-3\ \hat{\imath} + 4\ \hat{\jmath})V/m$
    (b) $90\ (3\ \hat{\imath} - 4\ \hat{\jmath})V/m$
    (c) $900(-3\ \hat{\imath} + 4\ \hat{\jmath})V/m$
    (d) $900\ (3\ \hat{\imath} - 4\ \hat{\jmath})V/m$

Section B

36. Which of the following graphs shown the correct variation of electric field as a function of x along the axis of a uniformly and positively charged ring of radius R and charge Q.
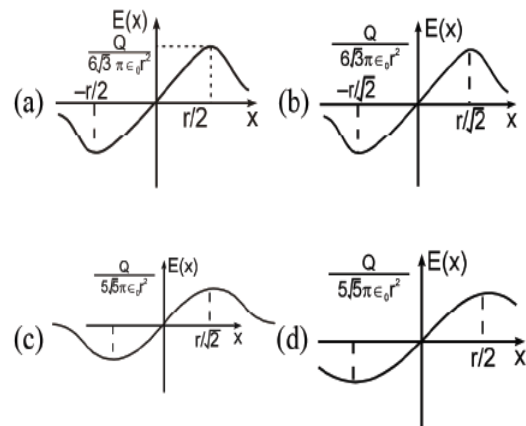
37. Consider two thin uniformly charged concentric shells of radii r and 2r having charges Q and − Q respectively, as shown. Three points A, B and C are marked at distances $\frac{r}{2}, \frac{3r}{2} \; and \; \frac{5r}{2}$ respectively from their common centre. If E_A, E_B and E_C are magnitudes of the electric fields at point A, B and C respectively then.
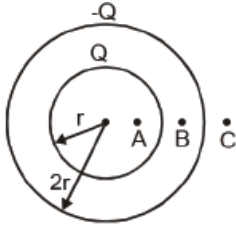
(a) $E_A > E_B > E_C$ (b) $E_C > E_B > E_A$
(c) $E_B > E_A = E_C$ (d) $E_B > E_A > E_C$

38. A point charge q is brought from infinity (slowly so that heat developed in the shell is negligible) and is placed at the cnetre of a conducting neutral spherical shel of inner radius a and outer radius b, then work done by external agent is:

(a) 0   (b) $\frac{kq^2}{2b}$
(c) $\frac{kq^2}{b} - \frac{kq^2}{a}$ (d) $\frac{kq^2}{2a} - \frac{kq^2}{2b}$

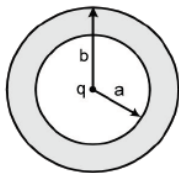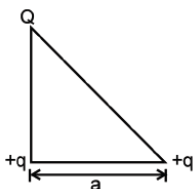39. Three charges Q, +q and +q are placed at the vertices of a right − angled isosceles triangle as shown. The net electrostatic energy of the configuration is zero if Q is equal to:

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

40. A few electric field lines for a system of two charges $Q_1 \; and \; Q_2$ fixed at two different points on the x − axis are shown in the figure. These lines suggest that
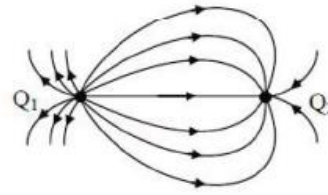
(a) $|Q_1| = |Q_2|$
(b) $|Q_1| < |Q_2|$
(c) at a finite distance to the left of Q_1 the electric field is zero
(d) at a finite distance to the right Q_2 the electric field is zero

41. The work done in taking a unit positive charge from P to A is W_A and from P to B is W_B then
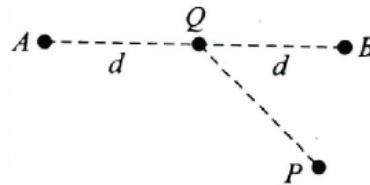
(a) $W_A > W_B$ (b) $W_A < W_B$
(c) $W_A = W_B$ (d) $W_A + W_B = 0$

42. The electric potential field depends on the x − and y − coordinates as V = $x^2 - y^2$. The corresponding electric field lines in xy plane are as
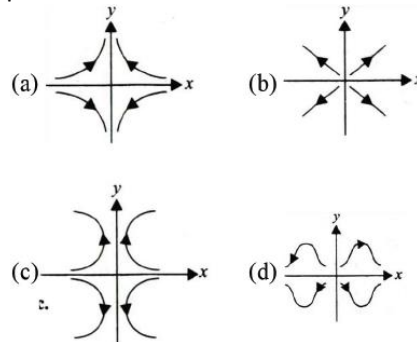
43. A parallel plate capacity is connected across a battery. Now, keeping the battery connected, a dielectrici slab is inserted between the plates. In this process,
(a) no work is done
(b) Work is done by the battery, and the stored energy increases
(c) Work is done by the external agent, and the stored energy decreases.
(d) Work is done by the battery as well as the external agent, but the stored energy does not change.

44. If there were only one type of charge in the universe, then

(a) $\oiint_S E.dS \neq 0$, on any surface

(b) $\oiint_S E.dS = 0$, if net charge of system is zero

(c) $\oiint_S E.dS$ could not be defined.

(d) $\oiint_S E.dS = \frac{q}{\varepsilon_0}$ if charges of magnitude q were inside the surface.

45. Refer to the arrangement of charges in Fig. and a Gaussian surface of radius R with Q at the centre. Then
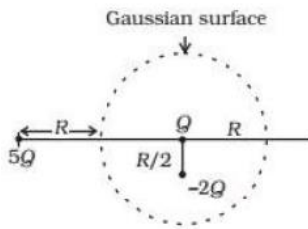
(a) Total flux through the surface of the sphere is $\frac{-Q}{\varepsilon_0}$

(b) Field on the surface of the sphere is $\frac{Q}{4\pi\varepsilon_0 R^2}$

(c) Flux through the surface of sphere due to $5Q$ is $5Q/\varepsilon_0$

(d) Field on the surface of sphere due to $-2Q$ is same everywhere.

46. A positive charge Q is uniformly distributed along a circular ring of radius R. A small test charge q is placed at the centre of the ring (Fig.). Then incorrect is

(a) If q>0 and is displaced away from the centre in the plane of the ring, it will be pushed back towards the centre.

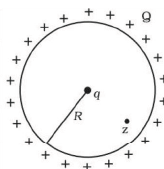(b) If q<0 and is displaced away from the centre in the plane of the ring, it will never return to the centre and will continue moving till it hits the ring.

(c) If q<0, it will perform SHM for small displacement along the axis.

(d) q at the centre of the ring is in an unstable equilibrium within the plane of the ring for q>0

47. Consider a sphere of radius R with charge density distribution as

$\rho(r) = kr$ for $r \leq R$

      $= 0$ for $r > R$

Find the electric field at all points r < R

(a) $\frac{kr}{2\epsilon_0}$ (b) $\frac{k \cdot r^2}{4\,\epsilon_0}$

(c) $\frac{k \cdot R^2}{2\,\epsilon_0}$ (d) $\frac{kR}{4\epsilon_0}$

48. In the electric field of a point charge q, a certain charge is carried from point   A to B, C, D and E. Then the work done.
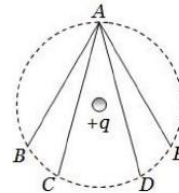
(a) Is least along the path AB

(b) Is least along the path AD

(c) Is zero along all the paths AB, AC, AD and AE

(d) Is least along

49. If a conductor has a potential $V \neq O$ and there are no charges anywhere else outside, then

(a) there must be charges on the surface or inside itself

(b) there may be any charge in the body of the conductor

(c) there must be charges only on the surface

(d) there must be charges inside the surface.

50. Choose the correct statements

(i) Electrons move away from a region of lower potential. Since an e^- has negative charge

(ii) If a point charge q is placed in front of an infinite grounded conducting plane surface, the point charge will experience a force. The force is due to the induced charge on the conducting surface which is at zero potential.

(iii) Charge is invariant. Charge does not depends on speed or frame of reference.

(iv) Mass of ion slightly differed from its element. Ion is formed, when some

electrons are removed or added so mass changes.

(v) Farad is too big a unit of capacity. Capacity of earth – which is the largest sphere is in microfarad.

(vi) In a series combination of capacitors, charge on each capacitor is same. In which a combination, charge can move only along one route

(vii) A dielectric slab is inserted between the plates of an isolated charged capacitor. The charge on the capacitor will remain the same. Charge on a isolated system is conserved.

(a) All statement is correct.
(b) Only (iv) & (v) is correct
(c) only (i), (ii), (iii), (iv), (ix) correct
(d) Only (ii) & (v) is correct

CHEMISTRY Section A

51. An emulsifier is an agent which
(a) Accelerates the dispersion
(b) Homogenizes an emulsion
(c) Stabilizes an emulsion
(d) Aids the flocculation of an emulsion

52. Tyndall effect is not observed in
(a) Suspension   (b) True solution
(c) Emulsions   (d) Colloidal solution

53. The reaction
$\frac{1}{2}H_2(g) + AgCl(s) \rightarrow H^+(aq) + Cl^-(aq) + Ag(s)$
occurs in the galvanic cell
(a $Ag|AgCl(s)|$ KCl(soln) $||$ $AgNO_3$ $(soln)|Ag$
(b) $Pt|H_2(g)|$ HCl(soln)$||$ $AgNO_3$(soln) $|$ Ag
(c) $Pt|H_2$ (g) $|HCl$ (soln) $||$ $AgCl$(s) $|$Ag
(d) $Pt|$ H_2 (g) $|KCl$ (soln) $||$ $AgCl$(s)$|$ Ag

54. For the chemical reaction
$N_2(g) + 3H_2(g) \rightleftharpoons 2NH_3(g)$ the correct option is:
(a) $-\frac{d[N_2]}{dt} = \frac{1}{2}\frac{d[NH_3]}{dt}$
(b) $3\frac{d[H_2]}{dt} = 2\frac{d[NH_3]}{dt}$
(c) $-\frac{1}{3}\frac{d[H_2]}{dt} = -\frac{1}{2}\frac{d[NH_3]}{dt}$
(d) $-\frac{d[N_2]}{dt} = 2\frac{d[NH_3]}{dt}$

55. Calculate the equilibrium constant of the reaction
$Cu(s) + 2Ag^+(aq) \rightarrow Cu^{2+}(aq) + 2Ag(s)$
$E^0_{(Cell)} = 0.46V \ at \ 298K$
(a) 4×10^5 (b) 4×10^{17}
(c) 4×10^{15} (d) 4×10^{21}

56. The conductivity of 0.001028 mol L^{-1} acetic acid is $4.95 \times 10^{-5}S \ \ cm^{-1}$. Calculate its dissociation constant if Λ^0_m for acetic acid is 390S $cm^2 \ mol^{-1}$
(a) 48× 10^{15} (b) 0.12×10^5
(c) 1.78×10^{-5} (d) 1.78×10^5

57. Consider the reaction:
$Cr_2O_7^{2-} + 14H^+ + 6e^- \rightarrow 2Cr^{3+} + 7H_2O$
What is the quantity of electricity in columbs needed to reduce 1 mol of $Cr_2O_7^{2-}$:
(a) 96500   (b) 289500
(c) 579000   (d) 19300

58. T_{50} (Half – life period) of first – order reaction is 10 minutes. Starting with 10 mol L^{-1}, rate after 20 minute is:
(a) 0.0693 mol L^{-1} min^{-1}
(b) $0.0693 \times 2.5 \ mol \ L^{-1}$ min^{-1}
(c) $0.0693 \times 5 \ mol \ L^{-1}$ min^{-1}
(d) $0.0693 \times 10 \ mol \ L^{-1}$ min^{-1}

59. The rate constant of a reaction at 500K and 700K are $0.02 \ s^{-1}$ and $0.07 \ s^{-1}$ respectively. Calculate the values of E_a.
(a) 18.23 kJ   (b) 3.23 KJ
(c) 51.23 KJ   (d) 118.23 KJ

60. Corrosion of iron is essentially an electrochemical phenomenon where the reactions are
(a) Fe is oxidized to Fe^{2+} and dissolved oxygen in water is reduced to O^{2-}
(b) Fe is oxidized to Fe^{3+} and H_2O is reduced to O_2^{2-}
(c) Fe is oxidized to Fe^{2+} and H_2O is reduced to O_2^-
(d) Fe is oxidized to Fe^{2+} and H_2O is reduced to O_2

61. Represent the cell in which the following reaction takes places
$Mg(s) + 2Ag^+$ (0.0001 M) $\rightarrow Mg^{2+}$ (0.130 M) $+$ 2Ag (s)
Calculate its $E_{(cell)}$ if $E^0_{(Cell)}$ = 3.17 V
(a) 3.17   (b) 2.96
(c) 0.21   (d) 3.38

62. A certain zero order reaction has K = 0.025 $M \ s^{-1}$ for th disappearance of A. What will be the concentration of A after 15 seconds if the initial concentration is 0.50 M –
(a) 0.50 M   (b) 0.375 M
(c) 0.125 M   (d) 0.060 M

63. According to Arrhenius equation rate constant K is equal to $Ae^{-E_a/RT}$. Which of the following options represents the graph of ln K vs 1/T –
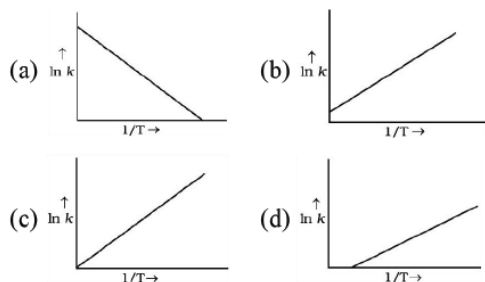
64. The standard EMF for the given cell reaction $Zn + Cu^{2+} \rightarrow Cu + Zn^{2+}$ is, 1.10V at $25°C$. The for the cell reaction, when 0.1 M Cu^{2+} and 0.1 M Zn^{2+} solutions are used, at $25°C$ is
(a) 1.10 V
(b) 0.110 V
(c) -1.10 V
(d) -0.110 V

65. Calculate the potential of hydrogen electrode in contact with a solution whose pH is 10.
(a) -0.591
(b) $+0.591$
(c) -0.0591
(d) $+0.0591$

66. Calculate the emf of the cell $E^0_{(Cell)}$ = 1.05 V in which of the following reaction takes places
Ni (s) + $2Ag^+$(0.002M) $\rightarrow Ni^{2+}$(0.160M) + 2 Ag (s)
(a) 1.9   (b) 3.36   (c) 2.9   (d) 0.9
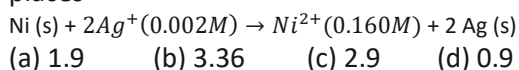
67. How much will the reduction potential of a hydrogen electrode change when its solution initially at pH = 0 is neutralized to pH = 7 –
(a) Increase by 0.059V
(b) Decrease by 0.59 V
(c) Increase by 0.41 V
(d) Decrease by 0.41 V

68. At a certain temperature, the first order rate constant k_1 is found to be smaller than the second order rate constant k_2 .If $E_a(1)$ of the first order reaction is greater than E_a (2) of the second order reaction, then as temperature is raised:
(a) k_2 will increase faster than k_1
(b) k_1 will increase faster than k_2 and become equal to k_2
(c) k_1 will increase faster than k_2 and become equal to k_2

(d) k_1 will increase faster than k_2 and become greater than k_2

69. $A \rightarrow B, \Delta H = -10 \, kJ \, mol^{-1}$, $E_{a(f)} = 50 kJ \, mol^{-1}$ then E_a of B $\rightarrow$ A will be
(a) $40 \, kJ \, mol^{-1}$
(b) $50 \, kJ \, mol^{-1}$
(c) $-50 \, kJ \, mol^{-1}$
(d) $60 \, kJ \, mol^{-1}$

70. Which one of the following statement is wrong about adsorption-
(a) It is selective and specific process
(b) It is a reversible process
(c) An increase in the gaseous adsorbate causes an increase in a adsorption. However, at high pressure, the adsorption becomes constant.
(d) It is an endothermic process

71. The conversion of molecules X to Y follows second order kinetics. If concentration of X is increased to three times how will it affect the rate of formation of Y
(a) Increase by 9 times
(b) Increase by 6 times
(c) Increase by 18 times
(d) Increase by 3 times

72. The initial concentration of N_2O_5 in the following first order reaction
$N_2O_5 \, (g) \rightarrow 2NO_2(g) + \frac{1}{2}O_2(g)$ was $1.24 \times 10^{-2} \, mol \, L^{-1}$. Calculate the rate constant of the reaction at 318 K
(a) 0.304
(b) 30.4
(c) 3.04
(d) 0.0354
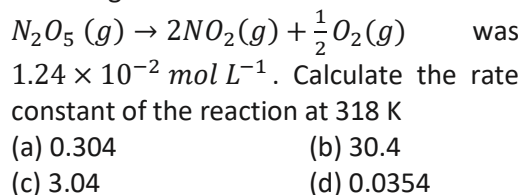
73. A first order reaction is found to have a rate constant, $k = 5.5 \times 10^{-14} \, s^{-1}$. Find the half-life of the reaction.
(a) 1.26×10^{13}
(b) 2.25×10^{13}
(c) 1.26×10^{11}
(d) 2.52×10^{11}

74. A first order reaction has a rate constant $1.15 \times 10^{-3} \, s^{-1}$. How long will 5 g of this reactant take to reduce to 3g –
(a) 444
(b) 222
(c) 400
(d) 333

75. The electronic configuration of Cu (II) is $3d^9$ whereas that of $Cu(I) is 3d^{10}$. Which of the following is correct.
(a) Cu (II) is more stable
(b) Cu (II) is less stable
(c) Cu (I) and Cu (II) are equally stable
(d) Stability of Cu (I) and Cu (II) depends on nature of copper salts

76. On addition of small amount of $KMnO_4$ to concentrated H_2SO_4 , a green oily compound is obtained which is highly explosive in nature. Identify the compound from the following.
(a) Mn_2O_7 (b) MnO_2
(c) $MnSO_4$ (d) Mn_2O_3

77. Which of the following oxidation state is common for all lanthanoids –
(a) + 2   (b) + 3
(c) + 4   (d) +5

78. Which of the following is amphoteric oxide.
$Mn_2O_7, CrO_3, Cr_2O_3, CrO, V_2O_5, V_2O_4$
(a) V_2O_5, Cr_2O_3 (b) Mn_2O_7, CrO_3
(c) CrO, V_2O_5 (d) V_2O_5, V_2O_4

79. Gadolinium belongs to 4f series. It's atomic number is 64. Which of the following is the gadolininum configuration of –
(a) $[Xe]4f^7\ 5d^1\ 6s^2$
(b) $[Xe]4f^6\ 5d^2 6s^2$
(c) $[Xe]4f^8\ 6d^2$
(d) $[Xe]4f^9\ 5s^1$

80. When acidified $K_2Cr_2O_7$ solution is added to Sn^{2+} salts then Sn^{2+} changes to
(a) Sn (b) Sn^{3+}
(c) Sn^{4+} (d) Sn^+

81. How much electricity in terms of Faraday is required to produce. 20.0 g of Ca from molten $CaCl_2$ –
(a) 4F   (b) 2 F
(c) 3 F   (d) 1 F

82. A first order reaction is 50% completed in $1.26 \times 10^{14}s$. How much time would it take for 100% completion –
(a) $1.26 \times 10^{15}s$ (b) $2.52 \times 10^{14}g$
(c) $2.5 \times 10^{28}g$ (d) infinite

83. Which of the following process does not occur at the interface of phases:
(a) crystallisation
(b) heterogenous catalysis
(c) homogeneous catalysis
(d) corrosion

84. On the basis of data given below predict which of the following gases shows least adsorption on a definite amount of charcoal-Gas

Critical temp./K $\begin{array}{cccc} CO_2 & SO_4 & CH_4 & H_2 \\ 304 & 630 & 190 & 33 \end{array}$
(a) CO_2 (b) SO_2
(c) CH_4 (d) H_2

85. Predict the products of electrolysis in each of the following. An aqueous solution of $AgNO_3$ with silver electrodes.
(a) Ag, Ag (b) Ag, O_2
(c) H_2, Ag (d) H_2, O_2

Section B

86. The coagulation values in milimoles per litre of the electrolytes used for the coagulation of As_2S_3 are given below:
I. $(NaCl) = 52$ II. $(BaCl_2) = 0.69$
III. $(MgSO_4) = 0.22$
The correct order of their coagulation power is
(a) I > II > III   (b) II > I > III
(c) III > II > I   (d) III > I > II

87. The decomposition of N_2O_5 in CCl_4 at 318 K has been studied by measuring the concentration of N_2O_5 in the solution. Initially the concentration of N_2O_5 is 2.33 mol L^{-1} and after 184 minutes it is reduced to 2.08 mol L^{-1} . The reaction takes place according to the equation.
$$2N_2O_5(g) \rightarrow 4NO_2(g) + O_2(g)$$
What is the rate of production of NO_2 during this period –
(a) 9.7×10^{-5} (b) $2.7 \times 10^{+3}$
(c) 9.7×10^{-7} (d) 2.7×10^{-3}

88. Which plot is the adsorption isobar for physical adsorption-
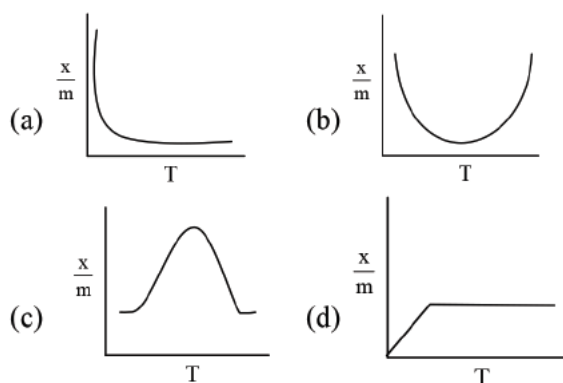
89. Rate law of the reaction $A \rightarrow$ Product is, rate = K [A]. Graphically it is represented as
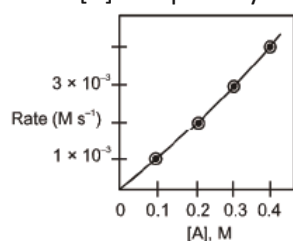
Hence, rate the constant is:
(a) $3 \times 10^{-4} \, s^{-1}$ (b) $1 \times 10^{-2} s^{-1}$
(c) $3 \times 10^{-2} s^{-1}$ (d) $1 \times 10^{-4} s^{-1}$

90. Calculate the over all order of a reaction which has the rate expression
Rate = $K \, [A]^{1/2} \, [B]^{3/2}$
(a) 1 (b) 3
(c) 2 (d) 4

91. $E°$ of a cell aA + bB $\rightarrow$ cC + dD is
(a) $-\frac{RT}{nF} \log \frac{[C]^c [D]^d}{[A]^a [B]^b}$
(b) $-RT \log \frac{[a]^A [b]^B}{[a]^C [d]^D}$
(c) $-\frac{RT}{nF} \log \frac{[C]^c [d]^D}{[A]^a [B]^b}$
(d) $-\frac{RT}{nF} \log \frac{[C]^c [d]^D}{[a]^A [B]^b}$

92. An example of micelle is
(a) $As_2 O_3$ sol.
(b) Ruby glass
(c) $Na_2 CO_3$ solution
(d) Sodium stearate concentrated solution

93. **Assertion:** According to Freundlich adsorption: $\frac{X}{m} = k. P^{1/n}$
Reason: The isotherm shown variation of the amount of gas adsorbed by the adsorbent with temperature.

(a) Assertion and reason both are true and the reason is correct explanation of assertion
(b) Assertion and reason both are ture but reason is not correct explanation of assertion
(c) Assertion is true but reason is wrong
(d) Assertion and reason both are wrong.

94. First IE of 5d series elements are higher than those of 3d and 4d series elements. This is due to:
(a) bigger size of atoms of 5d – series elements thant 3d-series elements
(b) greater effective nuclear charge is experienced by valence electrons because of the weak shielding of the nucleus of $4f$ – electrons in 5d series.
(c) (a) and (b) both
(d) None of these

95. **Assertion:** Transition metals show variable valence.
Reason: Due to a large energy difference between the ns^2 and (n - 1)d electrons.
(a) Assertion and reason both are true and the reason is correct explanation of assertion.
(b) Assertion and reason both are true but reason is not correct explanation of assertion.
(c) Assertion is true but reason is wrong.
(d) Assertion and reason both are wrong.

96. Which of the following statement is false:
(a) Of the d^4 species, manganese (III) is strongly reducing while Cr^{2+} is strongly oxidizing
(b) Cobalt (II) is stable in aqueous solution but in the presence of complexing reagents it is easily oxidized
(c) The d^1 configuration is very unstable in ions.
(d) None of these

97. Which of the following statement is correct
(a) Transition metals and their many compounds act as good catalyst.
(b) The enthalpies of atomistation of the transition metals are high
(c) The transition metals generally form interstitial compounds with small atoms like C, B, H etc.
(d) All are correct.

98. The solubility of silver bromide in hypo solution (excess) is due to the formation of:
     (a) Ag_2SO_3 (b) $Ag_2S_2O_3$
     (c) $[Ag(S_2O_3)]^-$ (d) $[Ag(S_2O_3)_2]^{3-}$

99. The cell constant of a conductivity cell
     (a) Changes with change of electrolyte
     (b) Changes with change of concentration of electrolyte.
     (c) Changes with temperature of electrolyte
     (d) remains constant for a cell.

100. Which of the following options are correct
     (i) Cuprous ion is colourless where as cupric ion is blue in the aqueous solution.
     (ii) The enthalpy of physisorption is greater than chemisorption.
     (iii) Molecules of adsorbate and adsorbent are held by van der Waals forces in physisorption and by chemical bonds in chemisorption.
     (iv) ZSM – 5 is used as a catalyst in petrochemical industries.
     (v) Zeolites are three dimensional network silicates in which some silicon atoms are replaced by aluminium atoms.
     (vi) For the coagulation of sols carrying positive charge, PO_4^{3-} ions are more efficient than SO_4^{2-} or Cl^- ions.
     (vii) The overall molecularity of a complex reaction is equal to the molecularity of the slowest step.
     (viii) Copper reacts with hydrochloric acid and liberates hydrogen from the solution of dilute hydrochloric aicd.
     (ix) When acidified zinc sulphate solution is electrolyzed between zinc electrodes, it is zinc that is deposited at the cathode and hydrogen evolution does not take place.
     (x) If $\lambda_{Na^+}^0 + \lambda_{Cl^-}^0$ are molar limiting conductivity of the sodium and chloride ions respectively, then the limiting molar conducting for sodium chloride is given by the equation:
     $\Lambda_{NaCl}^0 = \lambda_{Na^+}^0 + \lambda_{Cl^-}^0$
     (xi) For a cell reaction $Zn(s) + Cu^{2+}(aq) \rightarrow Zn^2(aq) + Cu(s)$; at the equilibrium voltmeter gives zero reading. At the equilibrium, there is no change in the concentration of Cu^{2+} and Zn^{2+} ions.
     (xii) A negative value of standard reduction potential means that reduction take place on this electrode with reference to standard hydrogen electrode.

     (a) (i) (ii) (iii) (iv) (v) (vi) (vii) (ix) (x) (xi)
     (b) (ii) (iii) (v) (vi) (vii) (ix) (xi) (xii)
     (c) (i) (ii) (iii) (iv) (v) (vi) (viii) (ix) (xi)
     (d) (i) (iii) (iv) (vi) (vii) (viii) (ix) (x) (xii)

BIOLOGY Section A

101. The human male ejaculates about 200-300 million sperms during coitus. For normal fertility, how many sperms must be with high motility?
     (a) 60%   (b) 40%
     (c) 20%   (d) 10%

102. Find the **incorrect** statement
     (a) Fertilization can only occur if sperms and ovum are transported simultaneously to the ampulla
     (b) All the copulations lead to fertilization and pregnany
     (c) Cyclic menstruation is an indicator of normal reproductive phase
     (d) LH surge induces rupture of Graafian follicle

103. **Statement I :** Periodic abstinence is a method in which couples avoid from coitus from day 17 to 27 of menstrual cycle.
     Statement II: It is a very effective method and 100% sure of birth control.
     (a) Both statements are correct
     (b) Statement I is correct & II is incorrect
     (c) Statement I is incorrect & II is correct.
     (d) Both statements are incorrect

104. Match the following list of bioactive substances and their roles

Bioactive Substance	Role
(i) Statin	(A) Removal of oil stains
(ii) Cyclosporin A	(B) Removal of clots from blood vessels
(iii) Streptokinase	(C) Lowering of bloodcholestrol
(iv) Lipase	(D) Immunosuppressive agent

     (a) i-(B), ii- (C), iii – (A), iv – (D)
     (b) i-(D), ii- (B), iii – (A), iv- (C)
     (c) i–(D), ii – (A), iii – (B), iv – (C)
     (d) i–(C), ii – (D), iii – (B), iv – (A)

105. Mark the **incorrect** match
    (a) Genital warts – *Human papilloma virus*
    (b) Chlamydiasis – *Trichomonas vaginalis*
    (c) Syphllis – *Treponema pallidum*
    (d) Gonorrhoea – *Neisseria gonorrhea*

106. Heart sound of the foetus can be felt through the stethoscope as early as the end of
    (a) 1st month   (b) 3rd month
    (c) 5th month   (d) 4th month

107. Till approx. 48 hrs after birth, the mothers breast releases colostrum, it is rich in
    (a) IgA   (b) Albumin
    (c) Prolactin   (d) Oxytocin

108. The first movement of foetus observed by mother is called quickening. It is usually observed during
    (a) End of 1st trimester
    (b) Early 5th month
    (c) End of 3rd trimester
    (d) Early 3rd month

109. Pills are very effective with lesser side effects and are well accepted by the females. They prevent conception by following means
    (a) Inhibit ovulation
    (b) Inhibit implantation
    (c) Alter quality of cervix mucus to prevent/retard entry of sperms
    (d) All of these

110. Family planning programmes were initiated in 1951 and were periodically assessted over past decades. Improved programmes are currently in operation under popular name
    (a) Child welfare programme
    (b) Child and health care programmes
    (c) Reproductive and child health care programmes
    (d) Women emancipation programme

111. Opioids are the drugs which bind to specific opoid receptors present in our CNS and GIT. Heroin, commonly called smack is chemically……, which is white, odourless, bitter crystalline compound, obtained by…… of morphine?
    (a) Diacetylmorphine, methylation
    (b) Diacetylmorphin, acetylation
    (c) Benzodiazepines, amination
    (d) Amphetamines, acetylation

112. **Statement I:** Pills are very effective contraceptive method with lesser side effect
    Statement II: Pils inhibit ovulation and implantation as well as retard entry of sperms.
    (a) Both statements are correct
    (b) Statement I is correct & II is incorrect
    (c) Statement I is incorrect & II is correct
    (d) Both Statements are incorrect

113. Match the column A with column B:

Column A	Column B
A. Peyer's patches	(i) Secondary lymphoid organ
B. Rheumatoid Arthritis	(ii) Colostrum
C. IgA	(iii) Autoimmunity
D. Gambusia	(iv) Mosquito Larvae

    (a) A- (i),   B- (iii),   C- (ii), D- (iv)
    (b) A – (ii),   B- (iii),   C- (iv), D – (i)
    (c) A – (iv),   B- (iii),   C- (i),   D – (ii)
    (d) A- (i),   B- (ii),   C- (iv), D- (iii)

114. Most cancers are treated by combination of:
    A. Surgery
    B. Radiotherapy
    C. Chemotherapy
    (a) A and B   (b) A and C
    (c) B and C   (d) A, B and C

115. Mark the **correct** statement:
    A. Yoga has been practiced to achieve physical and mental health
    B. Infectious diseases are very common and everyone of us suffers from these at sometime or other.
    C. AIDS is an infectious disease
    D. Cancer is non-infectious disease
    E. Healthy persons bring economic prosperity
    (a) A, B and C   (b) B, C, D and E
    (c) C and D   (d) A, B, C, D and E

116. Below are some statements related to life cycle of *plasmodium*. Which of the following is correct?
(a) Gametocyte stage infects human body
(b)It multiplies by sexual method of reproduction in human liver
(c) Human RBC are ruptured and releases a toxin hemozin
(d) Development of gametocyte possible only in female culex mosquito

117. Primary response is of ___A___ intensity. Subsequent encounter with the same pathogen elicit a ____ B _____ intensified _____C____ response, which is based on _____D____.

	A	B	C	D
a	High	Low	Anamnestic	Specificity
b	Low	High	Primary	Diversity
c	Low	High	Secondary	Memory
d	High	Low	Primary	Memory

118. **Statement I:** The regions outside the seminiferous tubules are called interstitial spacs, which contain Leydig's cell.
Statement II: Leydig's cells synthesise and screte testicular hormones called androgens.
(a) Both statements are correct
(b) Statement I is correct & II is incorrect
(c) Statement I is incorrect & II is correct
(d) Both Statements are incorrect

119. **Assertion:** Organ transplantation patients are given immunosuppressive drugs.
Reason: Transplanted tissue has antigens which stimulate the specific immune response of the recipient.
(a) Both assertion and reason are true and reason is the correct explanation of assertion
(b) Both assertion and reason are true but reason is not the correct explanation of assertion
(c) Assertion is true but reason is false
(d) Both assertion and reason are false

120. **Assertion:** Vigrous contraction of the uterus at the end of pregnancy cuases expulsion.
Reason: The stimulatory reflex between the uterine contraction and oxytocin results in weakning contractions.

(a) Both assertion and reason are true and reason is the correct explanation of assertion.
(b) Both assertion and reason are true but reason is not the correct explanation of assertion
(c) Assertion is true but reason is false
(d) Both assertion and reason are false

121. Match the items given in column I with those in Column II and select the correct option given below:

Column I	Column II
a.Proleferative phase	i.Breakdown of endometrial lining
b.Secretory phase	ii.Follicular Phase
c. Menstruation	iii. Luteal phase

	a	b	c		a	b	c
(a)	iii	ii	i	(b)	i	iii	ii
(c)	ii	iii	i	(d)	iii	i	ii

122. Several hormones like hCG, hPL, estrogen, progesterone is production by
(a) Ovary   (b) Placenta
(c) Fallopian tube (d)Adrenal gland

123. Which of the following contraceptive methods involve a role of hormone?
(a) Pills, Emergency contraceptives, Barrier methods
(b)Lactational amenorrhea, Pills, Emergency contraceptives
(c)Barrier method, Lactational amenorrhea, Pills
(d) CuT, Pills, Emergency contraceptive.

124. Which of the following sexually transmitted diseases is not completely curable?
(a) Chlamydiasis (b) Gonorrhoea
(c) Genital warts (d)Genital herpes

125. Identify the correct pair representing the causative agent of typhoid fever and the confirmatory test for typhoid fever and the confirmatory test for typhoid.
(a) *Salmonella typhi*/ Widal test
(b) *Plasmodium vivax*/UTI test
(c) *Streptococcus pneumoniae*/ Widal test
(d) *Salmonella typhi*/Anthrone test

126. MALT constitutes about _____ percent of the lymphoid tissue in human body
(a) 20%   (b) 70%
(c) 10%   (d) 50%

127. Which of the following sets of diseases is caused by bacteria?
(a) Cholera and tetanus
(b) Typhoid and smallpox
(c) Tetanus and mumps
(d) Herpes and influenza

128. Match the following organisms with the products they produce.
(A) *Lactobacillus*   (i) Cheese
(B) *Saccharomyces*   (ii) Curd
Cerevisiae
(C) *Aspergillus niger*   (iii) Citric acid
(D) *Acetobacter aceti*   (iv) Bread
                             (v) Acetic acid

Select the correct option
	A	B	C	D
(a)	ii	i	iii	v
(b)	ii	iv	v	iii
(c)	ii	iv	iii	v
(d)	iii	iv	v	i

129. Which of the following is sewage treatment removes suspended solids?
(a) Secondary treatment
(b) Primary treatment
(c) Sludge treatment
(d) Tertiary treatment

130. Which one of the following is not a biofertiliser?
(a) *Agrobacterium*   (b) *Rhizobium*
(c) *Nostoc*   (d) Mycorrhiza

131. Which of the following is an auto immune disease?
(a) Myasthenia gravies
(b) AIDS
(c) Asthma
(d) Alzheimer disease

132. Match the column:

Column - I		Column – II	
a	Morphine	i	Hallucinogen
b	LSD	ii	Stimulant
c	Marijuana	iii	Sedative & analgestic
d	Coke	iv	*Cannabis stiva*

(a) a – iii,   b – i,   c- iv,   d - ii
(b) a – i,   b – ii, c- iv,   d – iii
(c) a- ii,   b – i,   c – iii, d – iv
(d) a – iii,   b –i,   c- ii,   d – i

133. Which of the following is not a sexually transmitted disease?
(a) AIDS   (b) Hepatitis - B
(c) Dengue   (d) Syphilis

134. In which disease does mosquito transmitted pathogen cause chronic inflammation of lymphatic vessels?
(a) Elephantiasis   (b) Ringworm
(c) Ascariasis   (d) Amoebiasis

135. The masses of bacteria held together by slime and fungal filaments to form mesh like structures are called as
(a) Primary sludge
(b) Flocs
(c) Activated sludge
(d) Anaerobic sludge

Section B

136. Match the disease in column – I with the appropriate items (Pathogen/Prevention/ Treatment) in column – II

Column - I		Column – II	
a	Malaria	i	*Wuchereria*
b	Diphtheria	ii	Herpes simplex virus
c	Genital herpes	iii	Plasmodium
d	Elephantiasis	iv	DPT vaccine

(a) a – vi,   b – i,   c – iii, d- ii
(b) a – iii,   b – iv, c – ii, d – i
(c) a – i,   b – iv, c – iii, d – ii
(d) a – ii,   b – iv, c – iii, d – i

137. Match the following:

	Column - A		Column – B
a	Fever	i	Cellular immunity
b	Monocyte	ii	Humoral immunity
c	T-Cells	iii	Physiological barrier
d	B-Cells	iv	Cellular barrier

(a) A- iv,   B- i,   C – iv, D - ii
(b) A – iii,   B – iv, C – i, D – ii
(c) A – ii,   B – iv, C – i, D – iii
(d) A – ii,   B – i, C – iv, D – iii

138. Cirrhosis of liver is related to:
(a) Smoking   (b) Opium
(c) Cocaine   (d) Alcohol

139. The principal of immunization or vaccination is based on the property of _____ of the immune system:
(a) Memory
(b) Opsonization
(Second step of phagocytosis)
(c) Neutralisation
(d) Suppression

140. Which of the following steps is take by the Ministry of Environment and Forests to protect rivers from water pollution?
(a) Ganga Action plan
(b) Narmada Action Plan
(c) Yamuna Action Plan
(d) Both (a) and (c)

141. Choose the incorrect statement from the following:
(a) In birds and mammals internal fertilization take place
(b) Colostrum contains antibodies and nutrients
(c) Polyspermy is never prevented by the chemical changes in the egg surface of mammals.
(d) In the human female implantation occurs almost seven days after fertilization

142. Seminal plasma, the fluid part of semen, is contributed by:
i. Seminal vesicle   **ii.** Prostate
iii. Urethra   **iv.** Bulbourethral gland
(a) i only   (b) i, ii and iv

(c) ii, iii and iv   (d) i and iv

143. From the sexually transmitted diseases mentioned below, identify the one which does not specific affect the sex organs:
(a) Syphilis   (b) AIDS
(c) Gonorrhea   (d) Genital warts

144. Diseases are broadly grouped into infectious and non-infectious diseases. In the list given below, identify the infectious diseases.
(i) Cancer   **(ii)** Influenza
(iii) Allergy   **(iv)** Small pox
(a) i and ii   (b) ii and iii
(c) iii and iv   (d) ii and iv

145. The genes causing cancer are:
(a) Structural genes
(b) Expressor genes
(c) Oncogenes
(d) Regulatory genes

146. In malignant tumors, the cells proliferate, grow rapidly and move to other parts of the body to form new tumors. This stage of disease is called:
(a) Metagenesis
(b) Metastasis
(c) Teratogenesis
(Congenital malformations prodused in an embryo/foetus)
(d) Mitosis

147. 'Smack' is a drug obtained from the
(a) Latex of *Papaver somniferum*
(b) Leaves of *Cannabis sativa*
(c) Flowers of *Dhatura*
(d) Fruits of *Erythroxyl coca*

148. The vitamin whose content increases following the conversion of milk into curd by lactic acid bacteria is:
(a) Vitamin C   (b) Vitamin D
(c) Vitamin B_{12} (d) Vitamine E

149. BOD of waste wateris estimated by measuring the amount of:
(a) Total organic matter
(b) Biodegradable organic matter
(c) Oxygen evolution
(d) Oxygen consumption

150. The technology of biogas production from cow dung was developed in India largely due to the efforts of:
    (a) Gas Authority of India
    (b) Oil and Natural Gas Commission
    (c) Indian Agricultural Research Institute and Khadi & Village Industries Commission
    (d) Indian Oil Corporation

Section A

151. Assisted reproductive techonology in which sperm is directly injected into the ovum is:
    (a) ICSI (in - vivo)   (b) IUI (in - vivo)
    (c) ZIFT (in - vitro)   (d) ICSI (in - vitro)
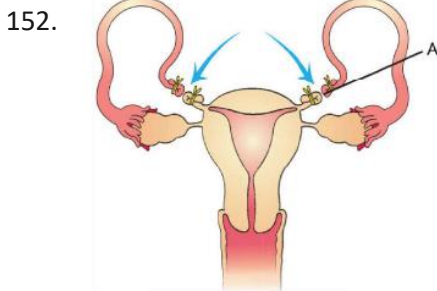
152.

    In above diagram which is shown and identify 'A'
    (a) Vasectomy, Vasdeferens
    (b) Tubectomy, Fallopian tube
    (c) Tubectomy, Ovary
    (d) Vasectomy, Epididymis

153. Consider the following statements with two blanks A and B. Select the option which correctly fills up these blanks.
    Government of India legalized MTP in <u>A</u> with some strict conditions to avoid its misuse. Such restrictions are all the more important to check indiscriminate and illegal <u>B</u> foeticides which are reported to tbe high in India.

	A	B		A	B
(a)	1951	Female	(b)	1971	Male
(c)	1971	Female	(d)	1951	Male

154. Which of the following route of sperm is correct from seminiferous tubules to outside?
    (a) $Rete\ testis \rightarrow Vas\ deferens \rightarrow Epididymis \rightarrow Ejaculatory\ duct$
    (b) $Vasa\ efferentia \rightarrow Vas\ deferens \rightarrow Rete\ testis \rightarrow Epididymes$
    (c) $Epididymes \rightarrow Rete\ testis \rightarrow Vasa\ efferentia \rightarrow Vas\ deferens$
    (d) $Rete\ testis \rightarrow Vasa\ efferentia \rightarrow Epididymis \rightarrow Vas\ deferens$

155. The figure below show four stage (A,B,C, D) of human development. Select the option giving correct identification together with site of occurance?
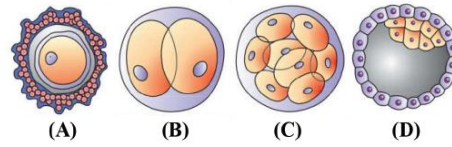

(A)   (B)   (C)   (D)

	Figure	Development stage	Site of occurrence
a	A	Fertilised egg	Isthmus part of fallopian tube
b	B	Zygote	End part of fallopian tube
c	C	Morula	Starting point of Fallopian tube
d	D	Blastocyst	Uterine cavity

156. Read the following
    (A) It is a thick layer of smooth muscles
    (B) It is highly glandular layer
    (C) It exhibits strong contraction during delivery of baby
    (D) Progesteron causes hypertrophy inn myometrium
    Which of the above statements are correct with respect to myometrium?
    (a) A and B   (b) B, C and D
    (c) A and C   (d) A, B and C

157. Given below are four statements (a-d) regarding assisted reproductive technologies (ART):
    (A) ZIFT – The zygote or early embryo (with upto 8 blastomere) transferred into the fallopian tube
    (B) ICSI – A sperm is directl injected into the fallopian tube to form an embryo in the laboratory
    (C) AI – The semen collected either from the husband or healthy donor is artificially introduced either into the vagina or into the uterus
    (D) GIFT – Transfer of zygote collected from a donor into the fallopian tube of another female who cannot produce one but can provide suitable environment for fertilization and development
    Which two of the above statement are correct?
    (a) A and D   (b) B and C
    (c) A and C   (d) B and D

158. **Assertion:** The female external genitalia included mons pubis, labia major and labia minora.
Reason: The glandular tissue of each breast is divided into 5 – 10 mammary lobes.
(a) Both assertion and reason are true and reason is the correct explanation of assertion.
(b) Both assertion and reason are true but reson is not the correct explanation of assertion
(c) Assertion is true but reason is false
(d) Both assertion and reason are false

159. Read the given sentances carefully
(A) 'A' is single
(B) the shape of 'A' is like n inverted pear
(C) 'A' opens into a vagina
(D) The wall of the 'A' has three layes of tissue
Here 'A' is :
(a) Ovary   (b) Uterus
(c) Urethra   (d) Fallopian tube

160. Use of which of the following has been found to be very effective as emergency contraceptive?
(A) IUD
(B) Progestogen – estrogen combinations
(C) Cervical cap
(d) Tubectomy
(a) A, B and C   (b) B, D and E
(c) A and B   (d) C, D and E

161. Receptors of opioids are present in:
(a) CNS   (b) GIT
(c) Both (a) & (b)   (d) Spleen

162. HIV that causes AIDS, first started destroying:
(a) N-K cell   (b) T-Killer cell
(c) T-helper cell   (d) B-Cell

163. A person had developed interferon in his body. He seems to carry infection of:
(a) Tetanus   (b) Malaria
(c) Measles   (d) Typhoid

164.

Choose the correct option about given below
     A   B
(a) Hallucinogen   Depressant
(b) Morphine   Datura
(c) Heroin   Cannabinoids
(d) Datura   Morphine

165. Read the following (A-D)
(A) Avoid stagnation of water in and around residential areas
(B) Regular cleaning of household coolers
(C) Intoducing fishes like Gambusia in ponds that feed on mosquito larvae
(D) Spraying of insecticides
Above preventive measures are used to control of
(a) Malaria   (b) Typhoid
(c) Pneumonia   (d) Amebiasis

166. The immediate adverse effects of drugs and alcohol abuse are manifested in the form of:
(a) Anxiety, Shakiness, Nausea, Sweating
(b) Reckless behavior, Vandalism, Violence
(c) Death
(d) Fever

167. Major part of the organic matter in the swage wate is decomposed in:
(a) Primary treatment
(b) Aeration tank/oxidation pond
(c) Anaerobic sludge diagester
(d) Tertiary treatement

168. _____ produces an army of proteins in response to pathogens into our blood to fight with them:
(a) Neutrophils   (b) Basophils
(c) B-lymphocytes   (d) Helper T-cell

169. Some times, due to genetic and other unknown reasons, the body attacks self-cells this results in damage to the body is called as?
(a) Anaphylactic shock
(b) Autoimmune disease
(c) Hyper sensitivity
(d) Immunopotentiation

170. Where immature lymphocytes differentiate into antigen sensitive lymphocyte:
(a) M.A.L.T
(b) Primary lymphoid organs
(c) Secondary lymphoid organs
(d) Spleen

171. Which of the following is a bacterial disease?
(a) Dysentery   (b) Dengue
(c) Malaria   (d) Chicken pox

172. After getting into the body of the person HIV virus enters into macrophages where RNA genome of the virus replicates to form viral DNA with the help of?
(a) DNA polymerase
(b) Transcriptase
(c) Reverse transcriptase
(d) Protease

173. Which of the following is correct about malaria?
(a)Malignant malaria is caused by Plasmodium falciparum
(b)Plasmodium enters the human body as sporzoites
(c)It is caused through the bite of infected female Anopheles
(d) The rupture of R.B.Cs is associated with released of a toxic substance, haemozoin
(a) Only B and C   (b) Only A, C and D
(c) A, B, C and D   (d) Only C and D

174.
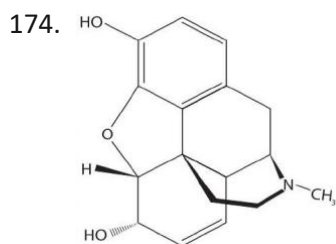
What is the correct about given above:
(a) Pain killer   (b) Stimulant
(c) Hallucinogen   (d) Hypnotic

175. Which one of the following is a wrong matching of a microbe and its industrial product, while the remaining three are correct?
(a) Yeast   – statins
(b) *Acetobacter aceti*   – acetic acid
(c) *Clostridium butylicum*–lactic acid
(d) *Aspergillus niger*   – citric acid

176. **Assertion:** *Streptococcus pneumoniae* and *Haemophilus influenza* are responsible for causing infectious disease in human beings.
Reason: A healthy person acquires the infection by inhailing the droplets/aerosols released by an infected person
(a) Both assertion and reason are ture and reason is the correct explanation of assertion
(b) Both assertion and reason are true but reason is not the correct explanation of assertion
(c) Assertion is true but reason is false
(d) Both assertion and reason are false

177. During copulation, semen is released by penis into which of the following labelled parts as A, B, C, D in the given diagram?
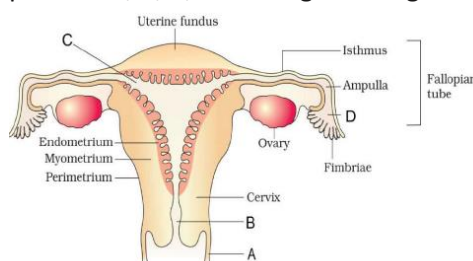
(a) A – Vagina   (b)B – Cervix
(c) C – Uterine cavity   (d)D – Infundibulum

178. Decline in the level of which hormone of menstrual cycle is directly responsible for degeneration of corpus luteum?
(a) Estrogen   (b) Progesterone
(c) LH   (d) FSH

179. Placenta acts as endocrine tissue and produces several hormones. Following are hormones produced in women only during pregnancy except
(a) hCG   (b) hPL
(c) hCS   (d) Estrogen

180. In the structure of blastocyst, the stem cells for the formation of whole embryo are from
(a) Trophoblast cells
(b) Cells of Blastocoel
(c) Inner cell mass
(d) Granulosa cells

181. **Assertion:** Virus – inflected cells secrete proteins known as interferons.
Reason: Interferons protect the non-infected cells from bacterial infection.
(a) Both assertion and reason are true and reason is the correct explanation of assertion.
(b) Both assertion and reason are true but reason is not the correct explanation of assertion
(c) Assertion is true but reason is false
(d) Both assertion and reason are false

182. How many of the following are copper releasing IUD's?
LNG -20, CuT, Cu7, Progestasert, Multiload – 375
(a) 2   (b) 1
(c) 3   (d) 4

183. Which of the following is a Cu releasing IUD and its function?
(a) Mutiload 375- Suppose sperm motility and fertilizing capacity of sperms
(b) Progestasert – Makes uterus unsuitable for implantation and cervix hostile to sperms
(c) Lippes loop- Increase phagocytosis of sperms
(d)LNG–20–Inhibits ovulation and implantation as well as aler the quality of cervical mucus to prevent/retard entry of sperms

184. After some time of ejaculation, semon liquefies dut to presence of an enzyme which is found in secretion of:
(a) Vagina   (b) Seminal vesicle
(c) Prostate   (d) Cowpers gland

185. It is diagrammatic view of male reproductive system. Choose the correct option about A, B, C and D
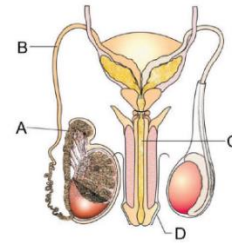
	A	B	C	D
a	Vasa efferentia	Vas deferens	Prostate	Fore – skin
b	Epididymis	Vasa efferentia	Seminal vesicle	Glans penis
c	Rete testis	Ureter	Bulbo-urethral gland	Glans penis
d	Epididymis	Vas defrens	Urethra	Fore skin

Section B

186. The first sign of growing foetus may be noticed by
(a) Movement of fetus
(b) Appearance of hair on head
(c) Listening to the heart sound carefully through the stethoscope
(d) Formation of limbs

187. Extrusion of second polar from egg occurs
(a)Simultaneously with first cleavage
(b)after entry of sperm but before fertilization
(c)after fertilization
(d)before entry of sperm into ovum

188. The cellular layer that disintegrates and regenerates again and again in humans is:
(a) Endothelium of blood vessels
(b) Germinal cpithclium of ovary
(c) Tunica propria of seminiferous tubules
(d) Endometrium of uterus

189. Choose the correct option for filling up the blanks:
The human male ejaculates about ___ million sperms during a coitus of which, for normal fertility, at least _____ percent sperms must have normal shape and size and least _____ percent of them must show vigorous motility
(a) 100-200, 40, 60
(b) 200 – 300, 60, 40
(c) 300 – 400, 50, 30
(d) 500, 70, 70

190. Which of the following is incorrectly paired with its function?

(a) Ovary	Synthesis and secretion of steroid hormones
(b) Fimbriae	Collection of the ovum after ovulation
(c) Seminal	Produces a sugar Vesicle containing fluid to nourish sperm
(d)Bulbourethral Glands	Secret alkaline fluid to destroys the acidity of the urethra

191. Identify the contraceptive device shown below as well as the related right place of its implantation into a woman and select the correct option for the two together:
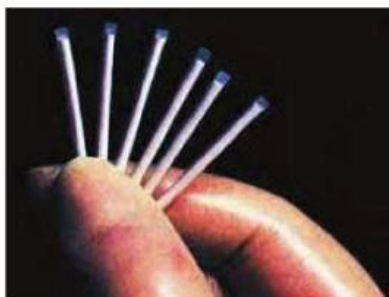
	Contraceptive	Site of implant
a	LNG-20	F al lopian tube
b	Lippes loop	Uterine wall
c	Implants	Subcutanceous
d	Multiload - 375	Uterine wall

192. Which of the following is not correct about pneumonia?
(A)It is caused by Streptococcus pneumoniae
(B)Infects the alveoli of the lungs
(C)Symptoms of pneumonia include fever, chills, cough and headache
(D)In all case the lips and finger nails turn blue to grayish in colour
(a) A, B and D   (b) B and D
(c) D only   (d) A, B, C and D

193. A plant, native of south America is a source of a drug of addiction which is CNS stimulant this drug inhibits transport of
(a) Acetylcholine   (b) Dopamine
(c) Serotonin   (d) Adrenaline

194. **Statemnet I**: Proto-oncogenes are cellular genes require: for normal growth
Statement II: Under normal conditions they could lead to the oncogenic transformation of the cell.
(a) Both statements are correct
(b) Statement I is correct and II is incorrect
(c) Statement I is incorrect and II is correct
(d) Both statements are incorrect

195. According to the 2011 census report, the population growth rate was still around ____ and could double in ____ years
(a) 11/1000/yr, 35
(b) 20/1000/yr,33
(c) 25/1000/yr,18
(d) 17/100/yr,33

196. Mature Graafian follicle is generally present in the ovary of a healthy human female around.
(a) 5 – 8 day of menstrual cycle
(b) 11 – 17 day of menstrual cycle
(c) 18 – 23 day of menstrual cycle
(d) 24 – 28 day of menstrual cycle

197. **Statement I:** Morphine is very effective and sedative painkiller
Statement II: It is very useful for the patients who have depression.
(a) Both statements are correct
(b) Statement I is correct & II is incorrect
(c) Statement I is incorrect & II is correct
(d) Both statements are incorrect

198. Match the following list of bacteria and their commercially important products

Bacterium	Products
i) *Aspergillus niger*	(a) Lactic acid
ii) *Acetobacter aceti*	(b)Butyric acid
iii)*Clostridium butylicum*	(c)Acetic acid
iv) *Lactobacillus*	(d) Citric acid

Choose the correct match
(a) i - (b), ii – (c) , iii – (d), iv – (a)
(b) i – (b), ii – (d), iii – (c), iv – (a)
(c) i – (d), ii – (c), iii – (b), iv – (a)
(d) i – (d), ii – (a), iii – (c), iv – (b)

199. Which of the following statements regarding antibiotic is correct?
    (i)Penicillin was the first antibiotic discovered by Alexander Fleming (1928) while working on bacterium S*treptococcus*
    (ii) Fleming, chain and Florey were awarded the Nobel Prize in 1945
    (iii) The full potential of penicillin as an effective antibiotic was established by Ernest chain and Howard Florey
    (iv) Antibiotics are the chemicals secreted from microorganisms which can kill or retard the growth of other harmful microorganisms.
    (a) (i) only   (b) (i), (ii) and (iii)
    (c) (ii) and (iii)   (d) (ii), (iii) and (iv)

200. Mark the given statements True (T) or False (F)
    (i) The human male ejaculates about 50 – 100 million sperms during a coitus
    (ii) For normal fertility at least 40 percent sperms must have normal shape and size
    (iii) Subsequent encounter with the same pathogen elicits a highly intensified anamnestic response
    (iv) This is based on the fact that our body appears to have memory of the first encounter.
    (v) Malignant tumors remain in place to form compactmass by a process known as metastasis
    (vi) Syphilis, gonorrhea and AIDS are STDs.
    (vii) Syphilis, gonorrhea and AIDS are transmitted through sexual intercourse.
    (viii) Streptococcus thermophilus increases nutritional value of milk
    (ix) Curd and yoghurt have higher vitamin content than milk.

	(i)	(ii)	(iii)	(iv)	(v)	(vi)	(vii)	(viii)	(ix)
(a)	F	F	T	T	F	T	T	T	T
(b)	T	F	T	F	F	T	T	F	T
(c)	T	T	T	T	T	T	T	F	T
(d)	F	F	T	T	T	T	F	T	T