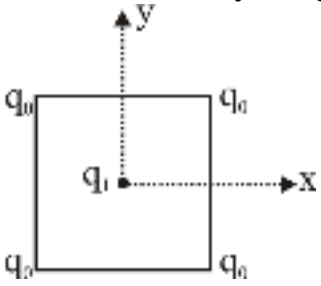
PHYSICS

1) Four equal charges q_0 each, are kept fixed on the vertices of a square of side 'a'. Charge q_1 is kept at the center of the square as shown in the figure. Then which statement is correct. (here charge q_1 is free to move only along perpendicular to XY plane i.e. along z-axis)



(1) charge q_1 is always in stable equilibrium.

(2) charge q_1 is in unstable equilibrium.

(3) charge q_1 is always in stable equilibrium only if q_1 and q_0 have different (opposite) signs.

(4) charge q_1 is always in stable equilibrium only if q_1 and q_0 have same signs.

2) The potential of electrostatic field is given by $\phi = xy$, where x & y are coordinate. Which of the following is correct :-

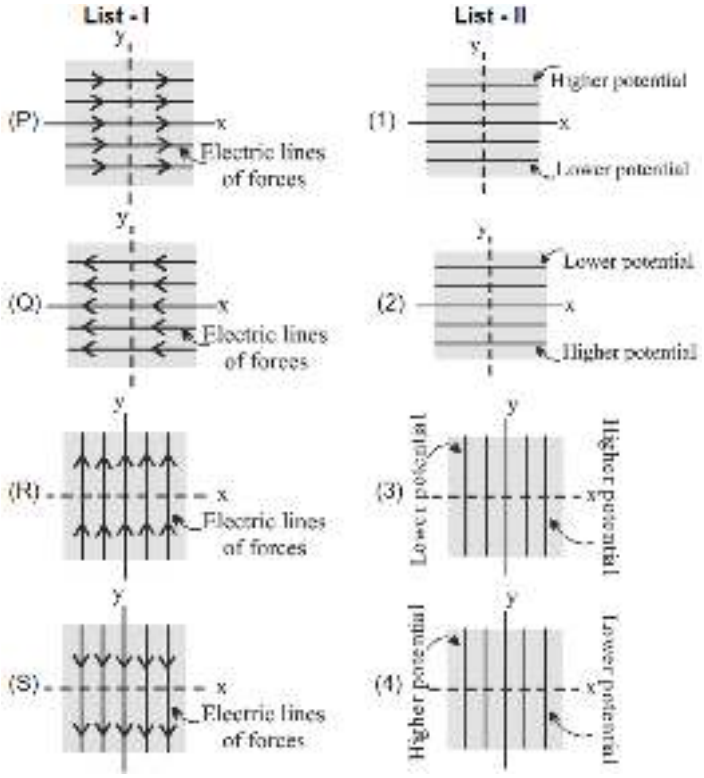
(1) Electric field at all points on positive x-axis is in positive y-direction.

(2) Electric field at all point of positive y-axis is in negative x-direction.

(3) Electric field at (2, 2) is $\sqrt{2}$N/m

(4) Electric field at x, y makes an angle $\theta = \tan^{-1}\left(\frac{y}{x}\right)$ with x-axis.

3) List I gives certain situations in which electric field is represented by electric lines of forces in x-y plane. List II gives corresponding representation of equipotential lines in x-y plane. Match the figures in List I with the figures in List II and indicate your answer.



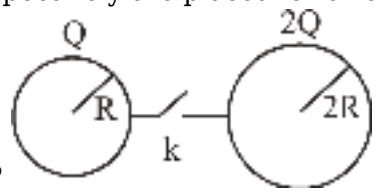
(1) P-1, Q-2, R-3, S-4

(2) P-4, Q-3, R-2, S-1

(3) P-3, Q-4, R-2, S-1

(4) P-2, Q-1, R-3, S-4

4) Two spheres of radius R & 2R having charge Q & 2Q respectively are placed far away from each other. How much charge will flow when key 'k' is pressed ?



(1) Q

(2) $\frac{Q}{2}$

(3) $\frac{Q}{3}$

(4) Zero

5) Match the Column :

Column I		**Column II**	
A.	Inside a spherical conductor placed in an external electric field	**P.**	$KQ_1 Q_2 / r$
B.	At the centre of a electric dipole	**Q.**	Electric field = 0
C.	Flux through a closed surface enclosing a dipole	**R.**	Electric potential = 0

D.	Potential energy of two charge system	**S.**	Zero

(1) A-Q, B-R, C-S, D-P

(2) A-P, B-Q, C-R, D-S

(3) A-R, B-S, C-P, D-Q

(4) A-S, B-P, C-Q, D-R

6)

Charge density of non uniformly charged rod 'AB' is $\lambda = \frac{1}{\alpha + \beta x}$ where α and β are constants and x is distance of point from end 'A' on the rod. Find total charge on the rod :-

(1) $\ln\left(\frac{\alpha+\beta L}{\alpha}\right)$

(2) $\frac{1}{\alpha}\ln\left(\frac{\alpha+\beta L}{\alpha}\right)$

(3) $\frac{1}{\beta}\ln\left(\frac{\alpha+\beta L}{\alpha}\right)$

(4) $\frac{1}{\beta}\ln\left(\frac{\alpha}{\alpha+\beta L}\right)$

7) Two point charges + 9e and + e are at 16 cm away from each other. Where should another charge q be placed between them so that the system remains in equilibrium

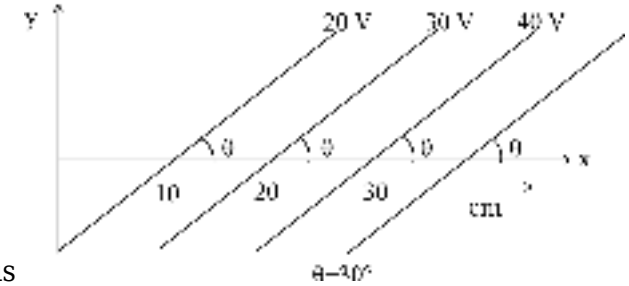
(1) 24 cm from + 9e

(2) 12 cm from + 9e

(3) 24 cm from + e

(4) 12 cm from + e

8) Some equipotential surface are shown in the figure. The magnitude and direction of the electric field is



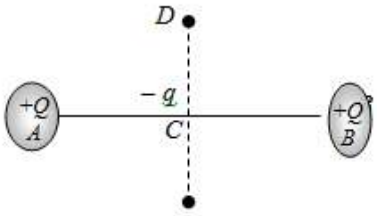
(1) 100 V/m making angle 120° with the x-axis

(2) 100 V/m making angle 60° with the x-axis

(3) 200 V/m making angle 120° with the x-axis

(4) None of the above

9) Two similar charges of +Q as shown in figure are placed at points A and B. – q charge is placed at



point C midway between A and B. – q charge will oscillate if

(1) It is moved towards A

(2) It is moved towards B

(3) It is moved along CD

(4) Distance between A and B is reduced

10) A long string with a charge of λ per unit length passes through an imaginary cube of edge □. The maximum possible flux of the electric field through the cube will be -

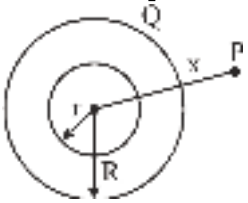
(1) $\lambda\ell/\varepsilon_0$

(2) $\sqrt{2}\lambda\ell/\varepsilon_0$

(3) $6\lambda\ell^2/\varepsilon_0$

(4) $\sqrt{3}\lambda\ell/\varepsilon_0$

11) Two concentric hollow conducting spheres of radius r and R are shown. The charge on outer shell is Q. What charge should be given to inner sphere so that the potential at any point P outside the outer sphere is zero ?



(1) $-\frac{Qr}{R}$

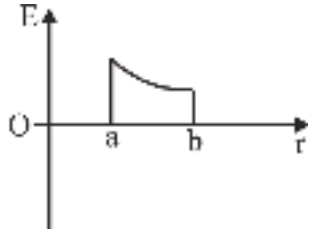
(2) $-\frac{QR}{r}$

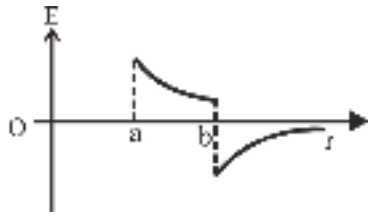
(3) – Q

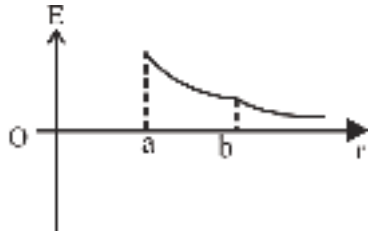
(4) $-\frac{2QR}{r}$

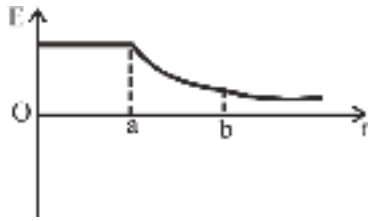
12) Two concentric conducting shells of radius a and b (>a) carry charges Q and –2Q respectively. The correct variation of electric intensity E as a function of r is given by :-

(1)



(2) 

(3) 

(4) 

13) A regular polygon has 20 sides. Equal charges, each Q, are placed at 19 vertices of the polygon and a charge q is placed at the centre of polygon. If the distance of each vertex from the centre is 'a', net force experienced by q is :-

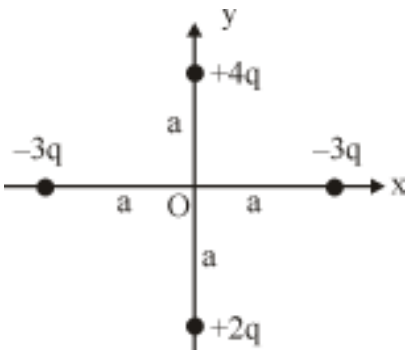
(1) $\frac{1}{4\pi\varepsilon_0}\frac{20Qq}{a^2}$

(2) $\frac{1}{4\pi\varepsilon_0}\frac{Qq}{a^2}$

(3) $\frac{1}{4\pi\varepsilon_0}\frac{19Qq}{a^2}$

(4) Zero

14) Dipole moment of the system of charges is



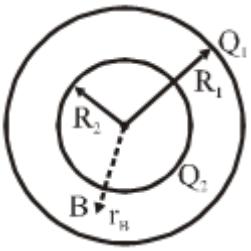
(1) $qa(+\hat{i})$

(2) $2qa(-\hat{i})$

(3) $2qa(+\hat{j})$

(4) $-2qa(+\hat{j})$

15) You are given two concentric charged conducting spheres of radii R_1 and R_2 such that $R_1 > R_2$, having charges Q_1 and Q_2 respectively and uniformly distributed over its surface. Calculate E and V at point B whose distance from the centre is r_B as shown in figure :-



(1) $E = \frac{Q_1}{4\pi\in_0 r_B^2}, V = \frac{Q_1}{4\pi\in_0 R_1}$

(2) $E = \frac{Q_2}{4\pi\in_0 r_B^2}, V = \frac{Q_1}{4\pi\in_0 R_1} + \frac{Q_2}{4\pi\in_0 r_B}$

(3) $E = \frac{(Q_1 + Q_2)}{4\pi\in_0 r_B^2}, V = \frac{Q_1}{4\pi\in_0 R_1} + \frac{Q_2}{4\pi\in_0 r_B}$

(4) E = 0, V = 0

16) Charge q_2 of mass m revolves around a stationary charge q_1 in a circular orbit of radius r. The orbital periodic time of q_2 would be :-

(1) $\left[\frac{4\pi^2 mr^3}{kq_1q_2}\right]^{1/2}$

(2) $\left[\frac{kq_1q_2}{4\pi^2 mr^3}\right]^{1/2}$

(3) $\left[\frac{4\pi^2 mr^4}{kq_1q_2}\right]^{1/2}$

(4) $\left[\frac{4\pi^2 mr^2}{kq_1q_2}\right]^{1/2}$

17) Match the columns:

Column-I	Column-II
(a) Electric field due to point charge	(p) $\propto \frac{1}{r}$
(b) Electric field due to line charge	(q) $\propto \frac{1}{r^2}$
(c) Electric field due to line dipole	(r) $\propto r^0$
(d) Electric field due to a charge sheet	(s) $\propto \frac{1}{r^3}$

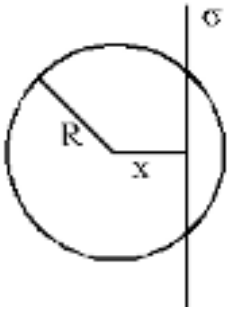
(1) a – p; b – q; c – r; d – s

(2) a – q; b – p; c – s; d – r

(3) a – s; b – p; c – q; d – r

(4) a – r; b – p; c – q; d – s

18) An infinite, uniformly charged sheet with surface charge density σ cuts through a spherical Gaussian surface of radius R at a distance x from its center, as shown in the figure. The electric flux



Φ through the Gaussian surface is

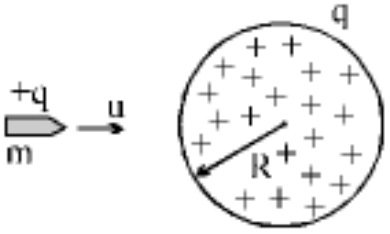
(1) $\frac{\pi R^2 \sigma}{\varepsilon_0}$

(2) $\frac{2\pi\left(R^2 - x^2\right)\sigma}{\varepsilon_0}$

(3) $\frac{\pi (R-x)^2 \sigma}{\varepsilon_0}$

(4) $\frac{\pi\left(R^2 - x^2\right)\sigma}{\varepsilon_0}$

19) A bullet of mass m and charge q is fired towards a fixed solid uniformly charged sphere of radius R and total charge +q. If it strikes the surface of sphere with speed u, find the minimum speed u so that it can penetrate through the sphere. (Neglect all resistance forces or friction acting on bullet



except electrostatic forces)

(1) $\frac{q}{\sqrt{2\pi\varepsilon_0 mR}}$

(2) $\frac{q}{\sqrt{4\pi\varepsilon_0 mR}}$

(3) $\frac{q}{\sqrt{8\pi\varepsilon_0 mR}}$

(4) $\frac{\sqrt{3}q}{\sqrt{4\pi\varepsilon_0 mR}}$

20) An electric dipole is placed at an angle of 30° to a non-uniform electric field. The dipole will experience :-

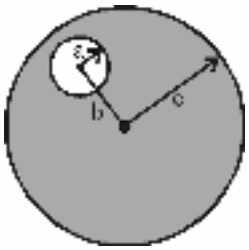
(1) a torque only.

(2) a translational force only in the direction of the field.

(3) a translational force only in a direction normal to the direction of the field.

(4) a torque as well as a translational force.

21) A spherical conductor have a cavity of radius ‘a’. If radius of conductor have radius ‘c’ and the distance between centre of conductor and center of cavity is ‘b’. Charge given to conductor is Q.



Then select the correct statement :-

(1) Electric field in the cavity is non zero and uniform

(2) Electric field in the cavity is zero through out the volume

(3) Electric field intensity in the cavity depends on b

(4) Electric field intensity depends on radius of cavity ‘a’

22) Dipole is placed parallel to the electric field. If W is the work done in rotating the dipole by 60°, then work done in rotating it by 180° is :-

(1) 2 W

(2) 3 W

(3) 4 W

(4) W/2

23) Two charged spherical conductors of radii R_1 and R_2 are connected by a wire. The ratio of surface charge densities of the spheres σ_1/σ_2 will be:-

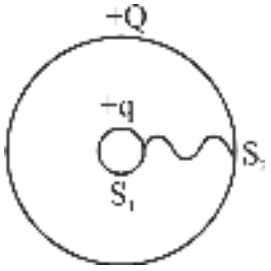
(1) $\frac{R_1}{R_2}$

(2) $\frac{R_2}{R_1}$

(3) $\sqrt{\left(\frac{R_1}{R_2}\right)}$

(4) $\frac{R_1^2}{R_2^2}$

24) Charge q on a small conducting sphere S_1 is placed inside a large hollow metallic spheres S_2 having a charge Q as shown in figure. The sphere is connected to shell by a conducting wire. The charge on S_1 will then be :-



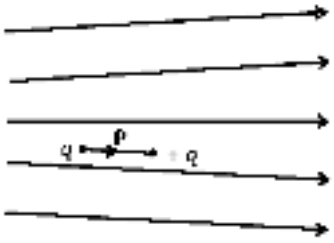
(1) Q – q

(2) $\frac{qQ}{2}$

(3) $\frac{(Q+q)}{2}$

(4) Zero

25) Figure shows electric field lines in which an electric dipole p is placed as shown. Which of the following statements is correct?



(1) The dipole will not experience any force.

(2) The dipole will experience a force towards right.

(3) The dipole will experience a force towards left.

(4) The dipole will experience a force upwards.

26) An electric dipole with dipole moment $\vec{p} = (3\hat{i} + 4\hat{j}) \times 10^{-30}$ C-m is placed in an electric field $\vec{E} = 4000\hat{i}$ (N/C). An external agent turns the dipole slowly until its electric dipole moment becomes $\left(-4\hat{i} + 3\hat{j}\right)$ × 10^{-30}C-m. The work done by the external agent is equal to :-

(1) 4×10^{-28} J

(2) -4×10^{-28} J

(3) 2.8×10^{-26} J

(4) -2.8×10^{-26} J

27) 8 small droplets of water of same size and same charge form a large spherical drop. The potential of the large drop, in comparision to potential of a small drop will be -

(1) 2 times

(2) 4 times

(3) 8 times

(4) same

28) For a dipole with charge q = 2×10^{-6} C ; d = 0.01m; find the maximum torque on the dipole if E = 5×10^{5} N/C :–

(1) 1×10^{-3} Nm^{-1}

(2) 10×10^{-3} Nm^{-1}

(3) 10×10^{-3} Nm

(4) 1×10^{-4} Nm

29) A mass m is placed at point P lying on the axis of a ring of mass M and radius R at a distance R from its centre. The gravitational force on mass m is :-

(1) $\frac{GMm}{\sqrt{2}R^2}$

(2) $\frac{GMm}{2R^2}$

(3) $\frac{GMm}{2\sqrt{2}R^2}$

(4) $\frac{GMm}{4R^2}$

30) An object is taken to a height above the surface of earth at a distance $\frac{5}{4}$R from the centre of the earth. Where radius of earth, R = 6400 km. The percentage decrease in the weight of the object will be : -

(1) 36%

(2) 50%

(3) 64%

(4) 25%

31) According to Kepler's second law of planetary motion, "the line joining the sun and the planet sweeps out equal areas in equal intervals of time" This law is a consequences of the conservation of : -

(1) linear momentum

(2) angular momentum

(3) mechanical energy

(4) mass

32) Escape velocity of a 1 kg object on a planet is 10 m/sec, then potential energy of body at that planet will be : -

(1) 100 J

(2) –100 J

(3) 50 J

(4) –50 J

33) The satellites of mass m is orbiting around the earth in a circular orbit with a velocity v. What will be its total energy?

(1) (3/4) mv^2

(2) (1/2) mv^2

(3) mv^2

(4) –(1/2) mv^2

34) By what amount, the energy of a satellite of mass m has to be increased to shift it from an orbit of radius r to orbit of radius $\frac{3}{2}$r ? (mass of earth is M)

(1) $\frac{GMm}{r}$

(2) $\frac{GMm}{2r}$

(3) $\frac{GMm}{4r}$

(4) $\frac{GMm}{6r}$

35) Maximum height reached by an object projected perpendicular to the surface of the earth with a speed equal to 50% of the escape velocity from earth surface is - (R = Radius of Earth) :-

(1) $\frac{R}{2}$

(2) $\frac{16R}{9}$

(3) $\frac{R}{3}$

(4) $\frac{R}{8}$

36) Escape velocity at the surface of earth is 11.2 km/sec. If radius of planet is double that of earth but mean density same as that of earth then the escape velocity will be :-

(1) 11.2 km/sec

(2) 5.5 km/sec

(3) 15.5 km/sec

(4) 22.4 km/sec

37) Three particles of equal mass m are situated at the vertices of an equilateral triangle of side □. They are moving in a circle in influence of their mutual gravitational interaction. Then their time period of revolution is directly proportional to :-

(1) $□^{1/2}$

(2) $□^{-1/2}$

(3) $□^{3/2}$

(4) $□^{-3/2}$

38) Two bodies of mass 100 kg and 10^4 kg are lying one meter apart. At what distance from 100 kg body will the gravitational force be zero :-

(1) $\frac{1}{9}m$

(2) $\frac{1}{10}m$

(3) $\frac{1}{11}m$

(4) $\frac{10}{11}m$

39) In case of a solid sphere, where is its gravitational potential minimum ?

(1) At the centre of the sphere
(2) At the surface of the sphere
(3) At infinity
(4) At mid-point between the centre and surface of the sphere

40)

The work done to raise a mass m from the surface of the earth to a height h, which is equal to the radius of the earth, is :

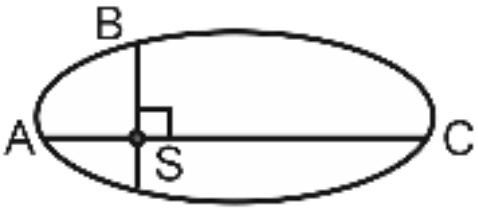
(1) $\frac{3}{2}mgR$
(2) mgR
(3) 2 mgR
(4) $\frac{1}{2}mgR$

41)

A body weighs 200 N on the surface of the earth. How much will it weigh half way down to the centre of the earth ?

(1) 150 N
(2) 200 N
(3) 250 N
(4) 100 N

42) The kinetic energies of a planet in an elliptical orbit about the Sun, at positions A, B and C are K_A, K_B and K_C respectively. AC is the major axis and SB is perpendicular to AC at the position of the Sun S as shown in the figure. Then



(1) $K_A < K_B < K_C$
(2) $K_A > K_B > K_C$
(3) $K_B < K_A < K_C$
(4) $K_B > K_A > K_C$

43)

A missile be fired with a velocity less than escape velocity. The sum of its kinetic energy and potential energy is :

(1) Positive

(2) Zero

(3) Negative

(4) Positive or negative will depend upon its initial velocity

44) Two spheres of masses m and M are situated in air and the gravitational force between them is F. The space around the masses is now filled with a liquid of specific gravity 3. The gravitational force will now be-

(1) 3 F

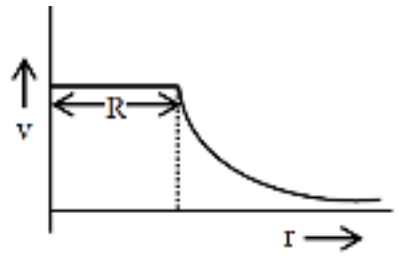
(2) F

(3) $\frac{F}{3}$

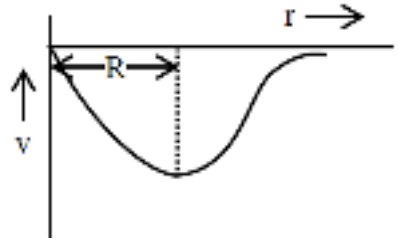
(4) $\frac{F}{9}$

45) Which of the following graphs expresses the variation of gravitational potential with distance for a hollow sphere of radius R ?

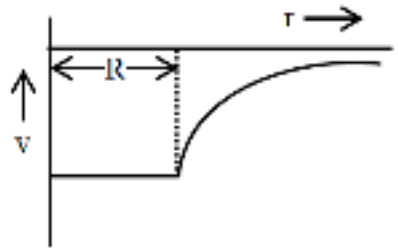
(1)



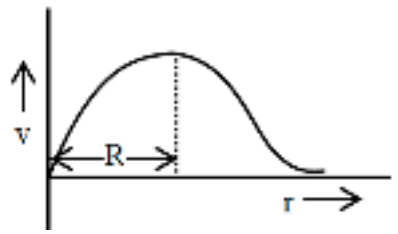
(2)



(3)



(4)



CHEMISTRY

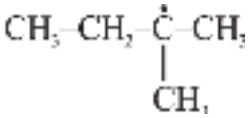
1) Rank the following free radicasls in order of decreasing stability :-

(I) $C_6H_5\dot{C}HC_6H_5$

(II) $C_6H_5-\dot{C}H-CH=CH_2$

(III) $CH_3-\dot{C}H-CH_3$

(IV) $C_6H_5\dot{C}H-CH_3$ (V) $CH_3CH=CHCH_2\dot{C}H_2$

(VI) 

(1) I > II > III > IV > V > VI

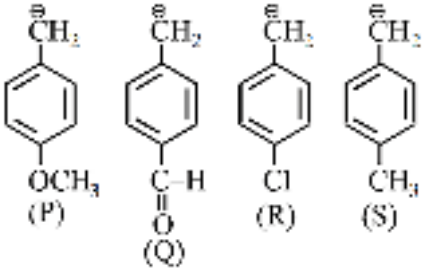
(2) VI > V > IV > III > II > I

(3) I > II > IV > VI > III > V

(4) I > IV > VI > V > II > III

2)

The decreasing order of stability of following anions is :-



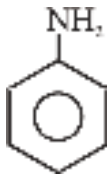
(1) S > P > R > Q

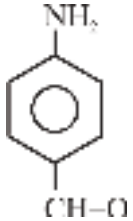
(2) R > Q > P > S

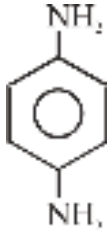
(3) Q > R > S > P

(4) P > Q > R > S

3) C–N bond length is minimum in :-

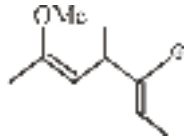
(1) 

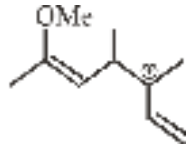
(2) 

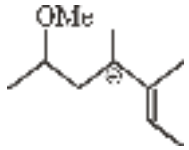
(3) 

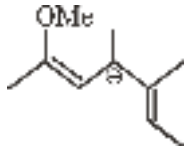
(4) 

4) Most stable carbocation is :-

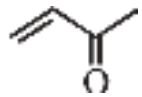
(1) 

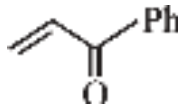
(2) 

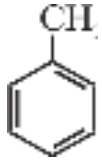
(3) 

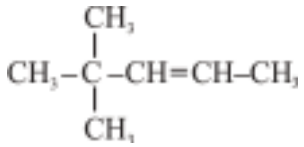
(4) 

5) In which of the following compound all effect, namely resonance, Inductive and H-effect present.

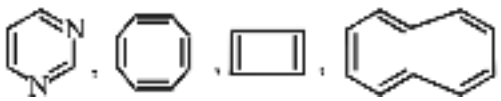
(1) 

(2) 

(3) 

(4) 

6) Total no. of aromatic and non-aromatic compound are respectively :-



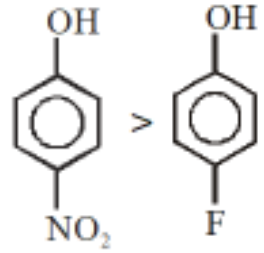
(1) 3, 4

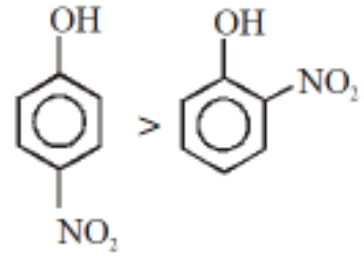
(2) 3, 2

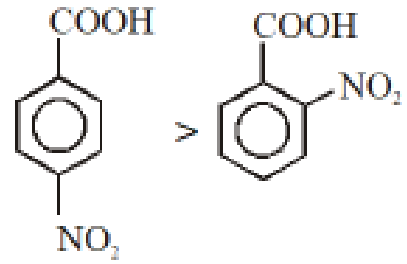
(3) 2, 6

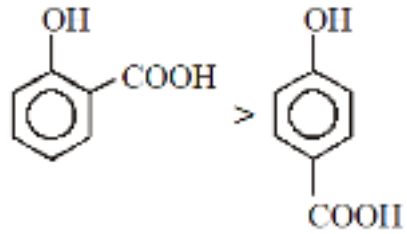
(4) 3, 5

7) Which of the following show incorrect relation?

(1)  = Acidic strength

(2)  = Acidic strength

(3)  = Acidic strength

(4)  = Acidic strength

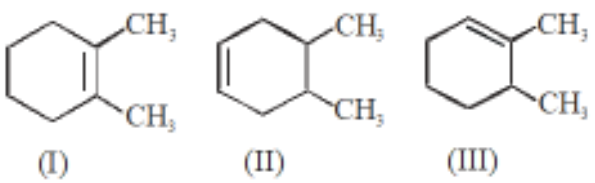
8) Select the correct statement about carbon free-radical.

(1) Number of valence shell $e^{\ominus}$ in carbon free radical is 6.

(2) It is diamagnetic in nature

(3) Number of bond pair $e^{\ominus}$ in carbon free radical is 4

(4) Geometry of carbon-free radical is trigonal planar

9) 
(I) (II) (III)

Which of the following orders is correct for heat of hydrogenation of these compounds ?

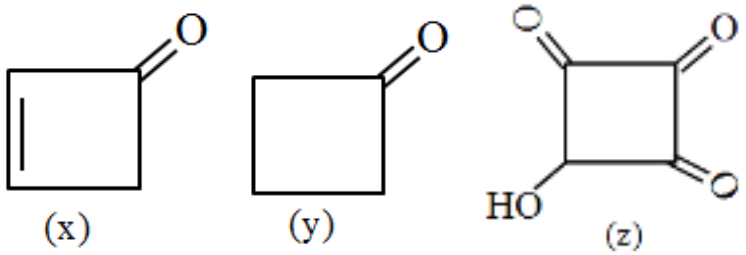
(1) I > II > III

(2) III > II > I

(3) II > III > I

(4) III > I > II

10) Correct order of percentage enol in given molecules is :-



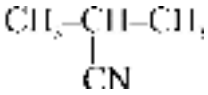
(x) (y) (z)

(1) x > y > z

(2) x > z > y

(3) z > y > x

(4) z > x > y

11) $CH_3–CH_2–CH_2–C\equiv N$; 

(A) (B)

Relation between (A) and (B) is :-

(1) Chain isomer

(2) Positional isomer

(3) Identical

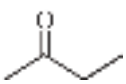
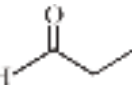
(4) Homologous

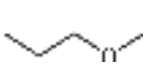
12)

Which is correctly matched ?

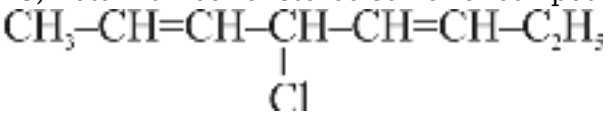
(1)  and  Position isomers

(2)  and 
Functional group isomers

(3)  and  Functional isomers

(4)  and  Chain isomers

13) Total number of stereoisomer of compound is given below :-



(1) 2

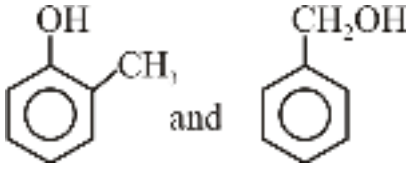
(2) 4

(3) 6

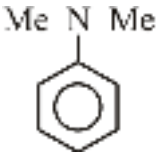
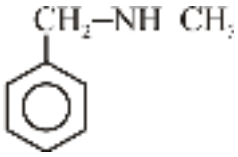
(4) 8

14)

Number of correct statement in following :

(a)  and

Functional group isomers

(b)  and 

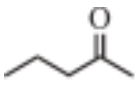
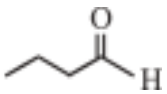
Metamers

(c) CH_3–C≡C–CH_3 and 

Ring chain isomer

(d)  and 

Chain isomers

(e)  and 

Functional group isomers

(1) 2

(2) 5

(3) 4

(4) 3

15) Match Column - I with Column - II and select the correct answer using the codes given below:

	Column - I		**Column - II**
(A)	Meso compound	(P)	An equimolar mixture of enantiomers
(B)	Enantiomers	(Q)	Stereoisomers that are not mirror images
(C)	Diastereomers	(R)	Non- superim-posable mirror image

(D)	Racemates (Racemic mixture)	(S)	An optically inactive compound whose molecule is achiral even though they contain chiral centres

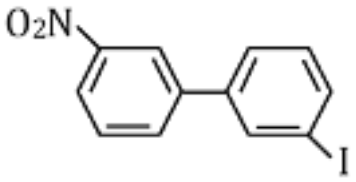
(1) A-S, B-R, C-Q, D-P

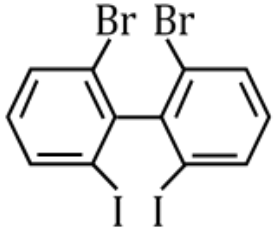
(2) A-S, B-R, C-P, D-Q

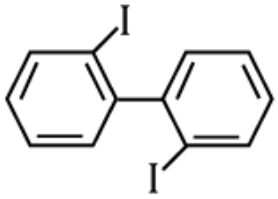
(3) A-R, B-S, C-Q, D-P

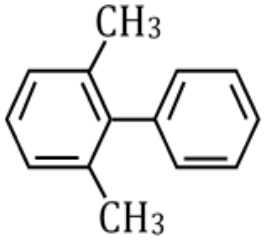
(4) A-R, B-S, C-P, D-Q

16) Which of the following biphenyls is optically active?

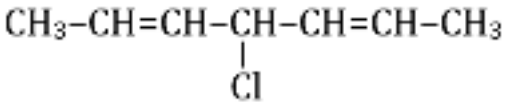
(1) 

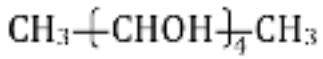
(2) 

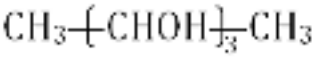
(3) 

(4) 

17) The sum of chiral carbon in

(a) 

(b) 

(c) 

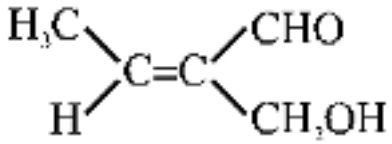
(1) 8

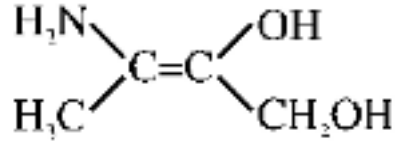
(2) 4

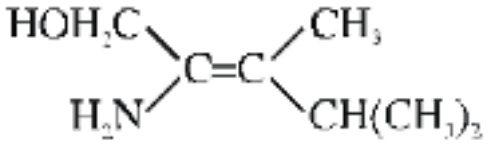
(3) 7

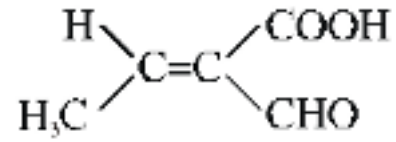
(4) 6

18) Which of the following has E-configuration :-

(1) 

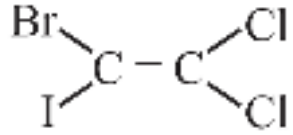
(2) 

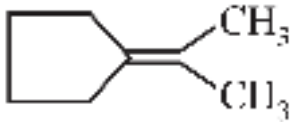
(3) 

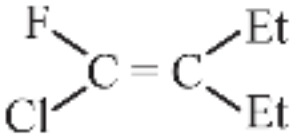
(4) 

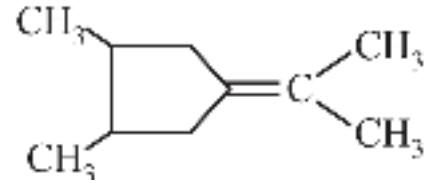
19)

Which of the following compound can show geometrical isomerism?

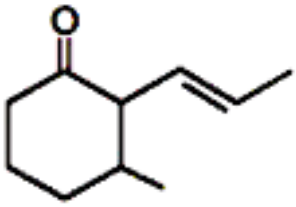
(1) 

(2) 

(3) 

(4) 

20) Calculate the total number of stereoisomers when alkene having trans configuration :

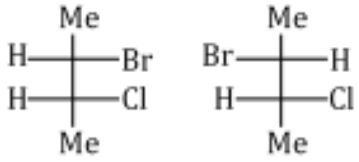


(1) 2

(2) 3

(3) 4

(4) 8



21)

A and B are :-

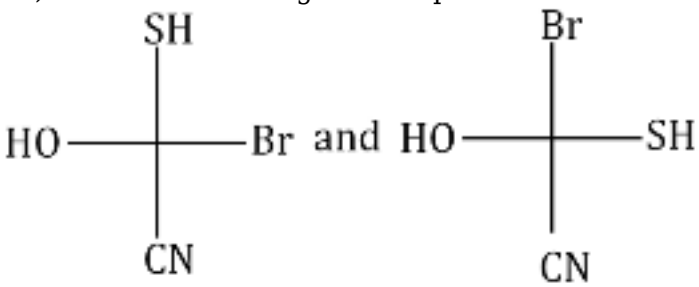
(1) Homomer

(2) Enantiomer

(3) Diastereomer

(4) Not isomer

22) Relation between given compound :



(1) Diastereomers

(2) Homomers

(3) Enantiomers

(4) Structural isomers

23) At a certain temperature when some amount of glucose is dissolved in water it is observed that lowering in vapour pressure is 0.6 mm Hg for this solution. What will be the vapour pressure of same glucose solution if its molality is $\left(\frac{1}{18}\right)$ mol kg^{-1} ?

(1) 200 mm Hg

(2) 300 mm Hg

(3) 600 mm Hg

(4) 720 mm Hg

24) The vapour pressure of pure benzene and toulene 100 mm and 50 mm respectively. Then calculate mole fraction of benzene in vapour phase. (Note: Both benzene and toulene is equimolar in solutions)

(1) 0.66
(2) 0.5
(3) 0.88
(4) 0.44

25) Which of the following mixtures shows negative deviation from Raoult's law?
I. $CHCl_3 + (CH_3)_2CO$
II. $(CH_3)_2CO + C_6H_5NH_2$
III. $C_2H_5OH + (CH_3)_2CO$
IV. $C_6H_6 + C_6H_5CH_3$

(1) II and III only
(2) III and IV only
(3) I and II only
(4) I and III only

26) At 100°C the vapour pressure of a solution of 6.5 g of a solute in 100 g water is 732 mm. If Kb = 0.52, the boiling point of this solution will be

(1) 102°C
(2) 103°C
(3) 101°C
(4) 100°C

27) An ideal solution is formed when its components
(a) Can be converted into gases
(b) Obey Raoult's law
(c) Have no change of volume
(d) Have zero heat of mixing
Which of the above statements is/are correct?

(1) (a) only
(2) (b), (c) and (d)
(3) (b) only
(4) (c) and (d) only

28) Choose the correct statement:
When concentration of a salt solution is increased

(1) Boiling point increases while vapour pressure decreases
(2) Boiling point decreases while vapour pressure increases.
(3) Freezing point decreases while vapour pressure increases.
(4) Freezing point increases while vapour pressure increases

29) Liquid M and liquid N form an ideal solution. The vapour pressures of pure liquids M and N are 450 and 700 mmHg respectively, at the same temperature. Then correct statement is
x_M = Mole fraction of M in solution
x_N = Mole fraction of N in solution
y_M = Mole fraction of M in vapour phase
y_N = Mole fraction of N in vapour phase

(1) $\frac{x_M}{x_N} > \frac{y_M}{y_N}$

(2) $\frac{x_M}{x_N} = \frac{y_M}{y_N}$

(3) $\frac{x_M}{x_N} < \frac{y_M}{y_N}$

(4) $(x_M - y_M) < (x_N - y_N)$

30) Assertion (A):- Molality of solution increases with temperature.
Reason (R):- Molality expression does not involve any volume term.

(1) Both A and R correct and R is the correct explanation of A.

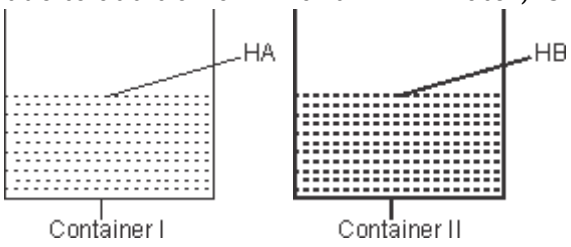
(2) Both A and R are correct, R is not the correct explanation of A.

(3) A is correct, R is not correct

(4) A is not correct, R is correct

31)

If both containers have 540 g of water each at 90°C. If 2 mole of HA is added in container I and 3 mole of HB is added in container II, then lowering in vapour pressure of both solutions is same. The correct statement (HA and HB are electrolytic and non -volatile solute. Assume no change in volume due to addition of HA and HB in water) is



(1) Boiling point of solution of container I is more than boilling point of solution of container II.

(2) Boiling point of solution of container II is more than boiling point of solution of container I.

(3) Both solution have same boiling point.

(4) Both solution have different freezing point.

32) Osmotic pressure of a sugar solution at 24ºC is 2.5 atm. The concentration of the solution in mole per litre is

(1) 10.25

(2) 1.025

(3) 1025

(4) 0.1025

33) If Raoult's law is obeyed, the vapour pressure of the solvent in a solution is directly proportional to :

(1) Mole fraction of the solvent

(2) Mole fraction of the solute

(3) Mole fraction of the solvent and solute

(4) The volume of the solution.

34) What is the molarity of 1 N H_2SO_4

(1) 1 M

(2) 2 M

(3) 0.5 M

(4) 3 M

35) 3.7 g of calcium hydroxide is dissolved in 100 g of water. Assuming the base to be 80% ionised, the freezing point of the solution will be
(K_f for water = 1.86 K $mole^{-1}$ kg)

(1) -2.79^oC

(2) -0.9^oC

(3) -2.418^oC

(4) -0.744^oC

36) **Assertion (A):** Vapour pressure of 0.1M aqueous NaCl is less than 0.1M aqueous urea solution at 25^oC
Reason (R): More the surface area, more will be the vapour pressure of a liquid at a fixed temeprature.

(1) Both Assertion and Reason are true and the reason is the correct explanation of the assertion

(2) Both assertion and reason are true but the reason is not the correct explanation of the assertion

(3) Assertion is true statement but reason is false

(4) Both Assertion and Reason are false statements

37) 0.5 M, 100 ml A and 0.2 M, 500 ml B are mixed at 27^oC. Vapour presure of pure A and pure B is 200 mm Hg and 50 mm Hg respectively at 27^oC. Then ratio of partial pressures of A and B (in vapour phase) after mixing is

(1) 2 : 1

(2) 1 : 2

(3) 2 : 3

(4) 4 : 1

38) Which one of the following is correct for non-ideal solution?

(1) $\Delta H_{mix} = 0$
(2) $\Delta V_{mix} = 0$
(3) $\Delta S_{mix} = 0$
(4) $\Delta G_{mix} = 0$

39) The van't Hoff factor for 0.1 M $AlCl_3$ solution is found to be 2.74. The percentage dissociation of the salt is

(1) 85%
(2) 58%
(3) 65%
(4) 50%

40) One mole of NaCl solute is dissolved in 10 moles of water. The vapour pressure of solution relative to that of water would be

(1) 2/3
(2) 1/6
(3) 1/10
(4) 1/11

41) The tanks used by scuba divers are filled with

(1) He
(2) N_2
(3) O_2
(4) All of these

42) Which colligative property is widely used to determine molar masses of biomolecules?

(1) Osmotic pressure
(2) Depression in freezing point
(3) Elevation in boiling point
(4) Relative lowering of vapour pressure

43) The relative lowering of vapour pressure of aqueous solution containing a non-volatile solute is 0.0125. The molality of the solution is nearly

(1) 0.70
(2) 0.50
(3) 0.80
(4) 0.40

44) Consider the following

Gas	Henry's law constant (K_H/bar) at 298 K
He	144.97
H_2	69.16
O_2	34.86
N_2	76.48

The correct order of increasing solubility is

(1) $He < N_2 < H_2 < O_2$

(2) $O_2 < H_2 < N_2 < He$

(3) $N_2 < H_2 < He < O_2$

(4) $N_2 < He < O_2 < He$

45) 100 ml 2 M glucose solution is diluted by adding 700 ml of water. Molarity of the resultant solution becomes

(1) 0.35 M

(2) 0.75 M

(3) 0.25 M

(4) 1.2 M

BIOLOGY

1) Hybrid seeds tremendously increases productivity yet has created problems for farmer like loss of hybrid vigour from generation to generation. This is because of :-

(1) Autogamy

(2) Segregation of characters

(3) Poor adaptability

(4) Recombination of characters

2) In the cross AaBb × Aabb, the genotype AABb: AaBB: aabb and aaBb will be obtained in the ratio :-

(1) 1 : 0 : 2 : 1

(2) 2 : 1 : 4 : 0

(3) 1 : 0 : 1 : 1

(4) 1 : 2 : 1 : 2

3) How many genotype and phenotype are respectively seen in an individual at a time (w.r.t. ABO blood groups).

(1) 6 and 4

(2) 4 and 6

(3) 3 and 4
(4) 1 and 1

4) Which of the following cross gives 3 : 1 phenotypic ratio ?

(1) AABb × AaBB
(2) AaBBCcDDEE × AaBBCcDDEE
(3) AaBB × aabb
(4) aaBBCc × AAbbCc

5) Which of the following scientific invention helped scientists to explain Mendal's law of inheritance of the basis of chromosomal movement-

(1) Electron microscopy
(2) Light microscopy
(3) Chromatography
(4) X-ray differection

6) A single point mutation in gene 'X' results in breathing difficulty, hypertension as well as partial sterility. Which among the following phenomenon best explains the observed phenotypes?

(1) Pleiotropy
(2) Incomplete dominance
(3) Linkage
(4) Partial dominance

7) Law of segregation is also known as :-

(1) Law of dominance
(2) Law of Independent assortment
(3) Law of purity of gametes
(4) Incomplete dominance

8) Phenotype/trait will only be depend on functioning of-

(1) Unmodified allele
(2) Mutant allele
(3) Modified allele
(4) Recessive allele

9) Morgan's experiment the F_2 ratio deviated very significantly from 9 : 3 : 3 : 1. This is due to :-

(1) Independent assortment
(2) Segregation
(3) Linkage
(4) Dominance

10) All genes located on the same chromosome:

(1) Form different groups depending upon their relative distance

(2) Form one linkage group

(3) Will not from any linkage groups

(4) Form interactive groups that affect the phenotype

11) Read the following statements about hybridization technique of Mendel and select the correct statement :-
(A) Emasculation of both male and female parents is required.
(B) Emasculation of only male parent is required.
(C) Emasculation of female parent is required.
(D) Emasculation is not necessary.

(1) A

(2) B

(3) C

(4) D

12) **Assertion:** A gene can be dominant, or co-dominant.
Reason: Dominance is not only depend on feature and product but also depend on particular phenotype that we choose to examine

(1) If both assertion and reason are true and the reason is the correct explanation of the assertion

(2) If both assertion and reason are true and the reason is not the correct explanation of the assertion

(3) If assertion is true but reason is false

(4) If both assertion and reason are false

13) Find the correct matching in the following given option

(a)	1:1	(i)	Two alleles
(b)	3 : 1	(ii)	Pea characters
(c)	1 : 2 : 1	(iii)	Genotype ratio
(d)	7	(iv)	Phenotype ratio
(e)	1 gene	(v)	True breeding Pea plant variety

(1) a-iv, b-v, c-iii, d-i, e-ii

(2) a-v, b-iv, c-ii, d-i, e-iii

(3) a-i, b-iv, c-iii, d-ii, e-v

(4) a-v, b-iv, c-iii, d-ii, e-i

14) Radish flowers may be red, purple, or white. A cross between a red-flowered plant and a white-flowered plant yields all-purple offspring. The part of the radish we eat may be oval or long, with long being the dominant trait. If true-breeding red long radishes are crossed with true-breeding white oval radishes, the F_1 will be expected to exhibit which of the following phenotypes ?

(1) Red and long

(2) White and long

(3) Purple and long

(4) Purple and oval

15) In a cross between individuals of the genotypes PpQQRrSS and ppqqRrSS, what will be the expected number of progenies with the genotype ppQQRrSS in a population of 400 individuals, assuming independent assortment?

(1) 0

(2) 100

(3) 200

(4) 25

16) According to Mendel,.....segregate and ..... assort independently

(1) Alleles of a gene; alleles of different genes

(2) Alleles of different genes' alleles of a gene

(3) Dominant traits; recessive traits

(4) Recessive traits; recessive traits

17)

Female is heterogametic and has one more chromosome than male in -

(1) Female honey bee (n, 2n) method

(2) Hen (zz - zw) method

(3) Female grass hopper (xx -xo) method

(4) Female butterfly (zz - zo) method

18) **Assertion :** Formation of fully mature male gametophyte requires one meiotic and one mitotic division.
Reason : Pollination occurs in three celled condition in majority of angiosperms.

(1) Both (A) and (R) are true and (R) is the correct explanation of (A)

(2) Both (A) and (R) are true and (R) is not the correct explanation of (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

19) A gene is said to be dominant if

(1) It expresses its effect only in homozygous state

(2) It expresses its effect only in heterozygous condition

(3) It expresses its effect both in homozygous and heterocygous condition

(4) It never expresses its effect in any condition

20) The basis of heredity is :-

(1) variation
(2) inheritance
(3) mutation
(4) linkage

21) Diameter of Pollen grain in flowering plant is

(1) 25–50 micrometers
(2) 50–75 micrometers
(3) 75–100 micrometers
(4) 100–150 micrometers

22)

Yucca is pollinated by :-

(1) Insects
(2) Wind
(3) Water
(4) Self pollination

23) Formation of embryo sac directly from any diploid cell of the sporophyte except megaspore mother cell without meiosis is known as :-

(1) Diplospory
(2) Apospory
(3) Apogamy
(4) Adventitive embryony

24) Endosperm may persist in the mature seed of :-

(1) Castor, Orchid, Maize
(2) Maize, Rice, Bean
(3) Castor, Cotton, Orchid
(4) Castor, Maize, Rice

25) The proteinaceous layer formed in maize grain is called _____ :-

(1) Scutellum
(2) Aleurone layer
(3) Coleoptile
(4) Coleorrhiza

26) Arrange the following events of sexual reproduction in correct sequence :-
(a) Triple fusion
(b) Microsporogenesis
(c) Pollination

(d) Embryogeny

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

27) In an angiosperm how many microspore mother cells are required to produce 200 pollen grains ?

(1) 150
(2) 200
(3) 50
(4) 100

28) If the number of chromosomes in gametes of angiosperm is 12. What will be the number of chromosome in primary endosperm cell, embryo and synergids, respectively ?

(1) 36, 24, 12
(2) 24, 36, 12
(3) 12, 36, 24
(4) 36, 12, 24

29)

Crossing over between genes a and b is 30% find the distance between genes A and b is -

(1) 30 cM
(2) 15 cM
(3) 60 cM
(4) 1 cM

30)

Micropyle of seed facilitates entry of ____

(1) Pollen tube
(2) male gametes
(3) Water
(4) Both (1) and (2)

31)

If male plant is tt and female plant is TT; genotype of PEN in a embryo sac-

(1) TTt
(2) ttT
(3) ttt

(4) TTT

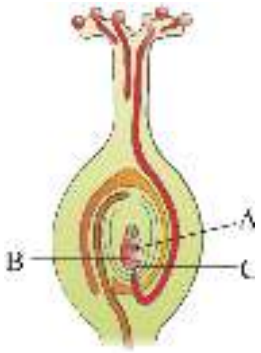
32) How many autosomes are present in sperm and ova in human-

(1) 22 + 0
(2) 22 + X
(3) 22 + Y
(4) Both (2) and (3)

33) In *castor*, unisexual male and female flowers are present on the same plant, the plant is said to be monoecios. This condition prevents -

(1) Both autogamy and geitonogamy
(2) Geitonogamy only
(3) Autogamy only
(4) Rarely autogamy and rarely geitonogamy

34) Given figure is longitudinal section of a flower shows growth of pollen tube in which labelled



parts A, B and C are respectively.

(1) Egg cell, Polar nuclei, Antipodal cell
(2) Polar nuclei, Egg cell, Synergid
(3) Egg cell, Antipodal cell, Synergid
(4) Pollen tube, Synergid, Egg cell

35) Which of the following is not an adaptation for Autogamy in plants ?

(1) Production of cleistogamous flowers
(2) Synchrony in pollen release and stigma receptivity.
(3) Presence of male and female flowers on different plants
(4) Pollination in bud stage (bud pollination)

36) Pollinating agents are required in :-

(1) Autogamy and geitonogamy
(2) Autogamy and xenogamy
(3) Geitonogamy and xenogamy
(4) Only in xenogamy

37) Match the following -

	(A)		(B)
(i)	Ovary	(a)	Seed
(ii)	Ovule	(b)	Fruit
(iii)	Double fertilization	(c)	Embryo
(iv)	Fertilize egg/zygote	(d)	Angiosperm

(1) (i) - a (ii) - b (iii) - c (iv) - d

(2) (i) - b (ii) - c (iii) - d (iv) - a

(3) (i) - b (ii) - a (iii) - d (iv) - c

(4) (i) - d (ii) - c (iii) - a (iv) - b

38) Given below are two statements :
Statement-I :- Majority of angiosperm plants use biotic agents for pollination.
Statement-II :- Pollination by wind is more common amongst abiotic pollinations.

(1) Statement-I is correct but Statement-II is incorrect

(2) Statement-I is incorrect but Statement-II is correct

(3) Both Statement-I and Statement-II are correct

(4) Both Statement-I and Statement-II are incorrect

39) Given below are two statements : one is labelled as Assertion (A) and other is labelled as Reason (R)
Assertion (A) :- Endosperm development precedes embryo development.
Reason (R) :- The cells of endosperm are filled with reserve food materials and are used for the nutrition of the developing embryo.

(1) Both Assertion and Reason are true but Reason is not correct explanation of the Assertion

(2) Both Assertion and Reason are true and the Reason is a correct explanation of the Assertion

(3) Assertion is true but the Reason is false

(4) Both Assertion and Reason are false

40) **Assertion :** Visit of insect to any flower always result into pollination.
Reason : Insect never come to flower for pollen or nectar robbery in return they always perform pollination.

(1) Both Assertion and Reason are true and Reason is the correct explanation of Assertion.

(2) Both Assertion and Reason are true but Reason is not the correct explanation of Assertion.

(3) Assertion is true but Reason is false.

(4) Both Assertion and Reason are false.

41) If leaf cell of Maiz has 20 chromosome find out following–
(i) Number of chromosome in endosperm.
(ii) Number of chromosomes in egg.

(iii) Number of chromosome in zygote.

(1) (i)-10, (ii)-10, (iii)-20
(2) (i)-30, (ii)-20, (iii)-10
(3) (i)-10, (ii)-20, (iii)-30
(4) (i)-30, (ii)-10, (iii)-20

42) Transfer of pollen grains from the anther to the stigma of another flower of same plant is called

(1) Xenogamy
(2) Autogamy
(3) Geitonogamy
(4) Allogamy

43) Two species of a flowering plant, P (2n = 20 chromosomes) and Q (2n = 30 chromosomes) are reciprocally crossed with each other as male or female as shown below to produce F1 seeds.

Which of the following seed tissues from both the F1 seeds (R and S) will have the same chromosome numbers?

(1) Embryo
(2) Endosperm
(3) Embryo and seed coat
(4) Embryo and endosperm

44) Which is the correct sequence?

(1) microspore tetrad → PMC → Sporogenous tissue
(2) Sporogenous tissue → microspore tetrad → PMC
(3) PMC → microspore tetrad → sporogenous tissue
(4) Sporogenous tissue → PMC → microspore tetrad

45) **Assertion (A):** Multinucleated condition in tapetal cells increase metabolism in cells.
Reason (R): Tapetum is nutritive tissue and nurish developing embryo.

(1) Both (A) and (R) are true and (R) is the correct explanation of (A)
(2) Both (A) and (R) are true and (R) is not the correct explanation of (A)
(3) (A) is true but (R) is false
(4) (A) is false but (R) is true

46) Arrange the following event in the correct sequence it occurs.
a. Semination

b. Spermiation
c. Insemination
d. Ejaculation

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

47) During spermatogenesis, “A” is formed after completion of Equational division and it is “B” in nature.

(1) A = sperm B = Diploid
(2) A = 2^{o} spermatocyte B = Diploid
(3) A = 1^{o} spermatocyte B = Haploid
(4) A = Spermatid B = Haploid

48) Arrange the reproductive event in humans in correct sequence.
(a) Gametogenesis
(b) Insemination
(c) Fertilization
(d) Implantation
(e) Gestation
(f) Parturition

(1) a → b → d → c → e → f
(2) b → a → c → d → e → f
(3) a → b → c → d → f → e
(4) a → b → c → d → e → f

49) Read the following statement–
Statement – I: There are no remarkable differences between the reproductive events in male and in the female.
Statement – II: Sperm formation continues even in old men but formation of secondary oocyte ceases in women around the age of fifty years.

(1) Statement I and statement II is false
(2) Statement I and statement II is true
(3) Statement I is true and statement II is false
(4) Statement I is false and statement II is true

50) Choose the **incorrect** statement-

(1) Each ovary is covered by a thin epithelium which encloses the ovarian stroma.
(2) Stroma is divided into outer medulla and inner cortex
(3) Oviducts, uterus and Vagina constitute the female accessory ducts.
(4) Edge of the infundibulum posses finger like projections called fimbriae

51) Read the following statement –
Statement – I: Female reproductive system along with a pair of the mammary glands are integrated structurally and functionally to support the process of ovulation, fertilization, pregnancy, birth and child care.
Statement – II: A functional mammary gland is characteristic of all female mammals.

(1) Statement I and statement II is false
(2) Statement I and statement II is true
(3) Statement I is true and statement II is false
(4) Statement I is false and statement II is true

52) Which of the following structure is formed by the fusion of anterior end of Labia minora?

(1) Hymen
(2) Fourchette
(3) Clitoris
(4) Mons pubis

53) If 40 sperms are formed, then how many primary spermatocytes completed the spermatogenesis process?

(1) 10
(2) 20
(3) 60
(4) 40

54) Which of the following is not component of seminal plasma?

(1) Fructose
(2) Sperms
(3) Calcium
(4) Enzymes

55) During oogenesis, the meiotic divisions occur in
(a) Primary oocyte
(b) Oogonia
(c) Secondary oocyte
(d) Ootid
Select the **correct** option.

(1) (b) and (d)
(2) (a), (b) and (c)
(3) (c), and (d)
(4) (a) and (c)

56) In female external genitalia, “A” are fleshy fold of tissue covered by pubic hair and “B” are paired folds of tissue under the “A”.

Identify “A” and “B”

(1) A = Mons pubis B = Clitoris
(2) A = Labia minora B = Labia majora
(3) A = Mons pubis B = Labia majora
(4) Labia majora B = Labia minora

57) Complete the analogy w.r.t. copulatory structures and select the **correct** option.
Human male : Penis : : Human female _____

(1) Vagina
(2) Labia majora
(3) Labia majora
(4) Mons pubis

58) **Assertion (A):** At the start of oogenesis, there are few million oogonia in each ovary and at puberty only 60,000 – 80,000 primary follicles are left in each ovary. **Reason (R):** There is degeneration of the primary follicles from birth to puberty by follicular atresia.

(1) Both **(A)** and **(R)** are true and **(R)** is the correct explanation of **(A)**
(2) Both **(A)** and **(R)** are true and **(R)** is not the correct explanation of **(A)**
(3) **(A)** is true but **(R)** is false (4) **(A)** is false but **(R)** is true
(4) **(A)** is false but **(R)** is true

59) **Assertion (A):** Spermatogenesis and oogenesis starts at the age of puberty.
Reason (R): There is significant increase in the secretion of gonadotropin – releasing hormone (GnRH) from hypothalamus at the time of puberty.

(1) Both **(A)** and **(R)** are true and **(R)** is the correct explanation of **(A)**
(2) Both **(A)** and **(R)** are true and **(R)** is not the correct explanation of **(A)**
(3) **(A)** is true but **(R)** is false
(4) **(A)** is false but **(R)** is true

60) If a female has a menstrual cycle of 35 days then at 14^{th} day she is in which phase of her menstrual cycle?

(1) Menstruation
(2) Proliferative phase
(3) Luteal phase
(4) Secretory phase

61) Which one of the following statements about human sperm is **incorrect**?

(1) Acrosome has a conical pointed structure used for piercing and penetrating the egg resulting in fertilization.
(2) Sperm lysins in the acrosome dissolve the egg envelope facilitating fertilization
(3) Viability of sperm is determined by its motility

(4) Sperm must be concentrated in thick suspension

62) Match the following columns and choose the **correct** option?

(a)	Ecotopic pregnancy	(i)	Changes in the sperm before fertilization
(b)	Oophrectomy	(ii)	Urino – genital duct
(c)	Capacitation	(iii)	Extra uterine implantation
(d)	Urethra	(iv)	Surgical removal of ovaries

(1) a – iv, b – iii, c – ii, d – i

(2) a – iv, b – iii, c – i, d – ii

(3) a – iii, b – iv, c – i, d – ii

(4) a – iii, b – iv, c – ii, d – i

63) Match the column – I with column – II and select the **correct** option using the codes given below-

(a)	Mons pubis	(i)	Seminal vesicle
(b)	Infundibulum	(ii)	Mitochondrial sheath
(c)	Fructose	(iii)	Fallopian tube closest to the ovary
(d)	Nabenkern	(iv)	Cushion of fatty tissue covered by skin and hairs.

(1) a – iv, b – iii, c – i, d – ii

(2) a – ii, b – i, c – iii, d – iv

(3) a – i, b – ii, c – iii, d – iv

(4) a – iv, b – iii, c – ii, d – i

64) The correct travelling pathway of secondary oocyte in human-

(1) Ovary → coelom → infundibulum → ampulla → isthmus → uterus

(2) Ovary → infundibulum → ampulla → isthmus → coelom → uterus

(3) Ovary → coelom → ampulla → infundibulum → isthmus → uterus

(4) Ovary → coelom → isthmus → ampulla → infundibulum → uterus

65) Several __A__ join to form a wider __B__ which is connected to __C__

(1) A = Mammary ampulla, B = Mammary duct, C = Lactiferous duct

(2) A = Lactiferous duct, B = Mammary ampulla, C = Mammary duct

(3) A = Mammary ampulla, B = Lactiferous duct, C = Mammary duct

(4) A = Mammary duct, B = Mammary ampulla, C = Lactiferous duct

66) Extrusion of second polar body from egg nucleus occurs-

(1) After entry of sperm, but before fertilization

(2) After fertilization

(3) Before entry of sperm into ovum

(4) Simultaneously with first cleavage

67) Consider the following:-
A. The reductional division for the human female gametogenesis starts earlier than that of the male gametogenesis.
B. The gap between the first meiotic division and the second meiotic division is much shorter for males compared to females.
C. The first polar body is associated with the formation of the primary oocyte.
D. Luteinizing hormone (LH) surge lead to disintegration of the endometrium and onset of menstrual bleeding.
Choose the **correct** answer from the options given below-

(1) A and B are true
(2) A and C are true
(3) A and D are true
(4) B and C are true

68) Which of the following hormone released from the pituitary is actually synthesized in the hypothalamus?

(1) Luteinizing hormone (LH)
(2) Oxytocin
(3) Follicle – stimulating hormone (FSH)
(4) Prolactin

69) How many polar body is formed during oogenesis in a sexually mature virgin female?

(1) 2
(2) 3
(3) 1
(4) 0

70) Throughout childhood, the granulosa cells are believed to provide nourishment for the primary oocyte and secrete _____X_____ that keeps the primary oocyte suspended in its prophase stage of meiotic division.
Identify X.

(1) Oocyte maturation stimulating factor
(2) Oocyte maturation inhibiting factor
(3) Anaphase promoting complex
(4) Metaphase promoting factor.

71) **Assertion (A):** LH is called as luteinizing hormone.
Reason (R): The change of granulose and theca interna cells into lutein cells is dependent mainly on LH secreted by the anterior pituitary gland.

(1) Both **(A)** and **(R)** are true and **(R)** is the correct explanation of **(A)**
(2) Both **(A)** and **(R)** are true and **(R)** is not the correct explanation of **(A)**
(3) **(A)** is true but **(R)** is false

(4) **(A)** is false but **(R)** is true

72) To initiate spermatogenesis which of the following is necessary?

(1) FSH and testosterone
(2) LH and testosterone
(3) FSH and LH
(4) Testosterone and progesterone

73) Which of the following statements are **correct** regarding female reproductive cycle?
A. In non-primate mammals cyclical changes during reproduction are called oestrus cycle?
B. First menstrual cycle begins at puberty and is called menopause.
C. Lack of menstruation may be indicative of pregnancy.
D. Uterine changes is dependent on ovarian changes.
Choose the **most appropriate** answer from the following options given below-

(1) A and B only
(2) A, B and C only
(3) A, C and D only
(4) A and D only

74) Given below are two statements : one is labelled as Assertion (A) and the other is labelled as Reason (R),
Assertion (A): Endometrium is necessary for implantation of blastocyst.
Reason (R): In the absence of fertilization, the corpus luteum degenerates that causes disintegration of endometrium
In the light of the above statement, choose the correct answer from the options given below

(1) Both **(A)** and **(R)** are true and **(R)** is the correct explanation of **(A)**
(2) Both **(A)** and **(R)** are true and **(R)** is not the correct explanation of **(A)**
(3) **(A)** is true but **(R)** is false
(4) **(A)** is false but **(R)** is true

75) Maximum thickness of the endometrium occurs during?

(1) In the end of postovulatory phase
(2) In the mid of postovulatory phase
(3) In the bleeding phase
(4) In the mid of menstrual cycle

76) Which of the following hormone increases the secretory nature of the endometrium?

(1) Prolactin
(2) Estrogen
(3) Progesterone
(4) Relaxin

77) After hypophysectomy what will be the consequences in a adult female?

(1) Ovarian changes will be affected but uterine changes will be unaffected

(2) Ovarian changes will be unaffected but uterine changes will be affected

(3) Both ovarian and uterine changes will be unaffected

(4) Both ovarian and uterine changes will be affected

78) Which of the following statements are **correct** regarding function of progesterone?
(A) It inhibit the myometrial contraction during pregnancy.
(B) It maintains the thickness of the endometrium
(C) Endometrial hyperplasia(D) Increases vascularity of endometrium
(E) Increases secretory nature of endometrium
Choose the **most appropriate** answer from the options given below:

(1) A and B only

(2) A, B and E only

(3) A, B, C and D

(4) A, D and E only

79) Polyspermy is normally prevented by-

(1) Phagocytosis of sperm

(2) Entry of excess number of sperm in ova

(3) Inability of some sperm to penetrate ova

(4) Formation of fertilization membrane

80) Antrum of tertiary follicle in ovary can be found in which phase of menstrual cycle?

(1) Bleeding phase

(2) Proliferative phase

(3) Progesteronic phase

(4) Ovulatory phase

81) Which of the following is **incorrect** statement?

(1) HCG is similar in structure and function to LH of pituitary gland (HCG act like pituitary LH)

(2) If the corpus luteum is removed before approximately the 7^{th} week of pregnancy abortion almost occurs.

(3) Corpus luteum is temporary endocrine gland.

(4) Ovarian changes is controlled by estrogen and progesterone.

82) Which of the following is the **correct** sequence regarding breast feeding in humans?

(1) Impulse to hypothalamus → suckling of baby → relayed to pituitary gland $\xrightarrow{Prolactine\ \&\ oxytocin}$ mammary glands → milk synthesis by prolactin and ejection by oxytocin.

Suckling of baby → impulse to hypothalamus → relayed to pituitary gland

(2) $\xrightarrow{\text{Prolactine \& oxytocin}}$ mammary glands → milk synthesis by prolactin and ejection by oxytocin

(3) Relayed to pituitary gland $\xrightarrow{\text{Prolactine \& oxytocin}}$ impulse to hypothalamus → suckling of baby → mammary glands → milk synthesis by prolactin and ejection by oxytocin.

(4) Mammary gland → Milk synthesis by prolactin and ejection by oxytocin → suckling of baby → Impulse to hypothalamus → Relayed to pituitary gland

83) Given below are two statements:

Statement I: Sperm receptor (ZP_3 receptor) present on zona pellucida.

Statement II: HCG maintains corpus luteum and stimulate it for the secretion of progesterone and estrogen.

In the light of the above statements, choose the **correct** answer from the option given below:

(1) Both statement I and statement II are false.

(2) Statement I is true and Statement II is false.

(3) Statement I is false and Statement II is true.

(4) Both statement I and statement II are true.

84) Main source of estrogen during preovulatory phase is-

(a) Theca interna (b) Granulosa cell

(c) Corpus luteum (d) Placenta

Choose the **most appropriate** option among the following

(1) a and b only

(2) c and d only

(3) a, b and c only

(4) a, b and d only

85) During cleavage, the amount of DNA and cytoplasm in blastomere as compare to uncleaved zygote will be

(1) Constant and increases respectively

(2) Increases and increases respectively

(3) Decreases and increase respectively

(4) Constant and decrease respectively

86) If the corpus luteum is removed before approximately in the seventh week of pregnancy then what will be the effect?

(1) Spontaneous abortion almost always occurs.

(2) Pregnancy will be normal.

(3) Extra uterine implantation occurs.

(4) More than one option is correct.

87) Which of the following will be affected after oophorectomy (Both) in a female?

(a) Uterine changes
(b) Ovarian changes
(c) Menstrual cycle
(d) Fertilization
Choose the **most appropriate** option among the following?

(1) a and b only
(2) a and d only
(3) a, b and c only
(4) a, b, c and d only

88) Doctors inject which of the following hormone to induce delivery?

(1) Cortisol
(2) Estrogen
(3) Oxytocin (Pitocin)
(4) Prolactin

89) The mammary glands of the female undergo differentiation ___A___ pregnancy and starts producing milk towards the ___B___ of pregnancy by process called as lactation.
Identify 'A' and 'B'?

(1) A = Before B = Beginning
(2) A = After B = end
(3) A = during B = end
(4) A = After B = Mid

90) Limbs and external genital organ well developed during?

(1) 1st month of pregnancy
(2) 2nd month of pregnancy
(3) 3rd month of pregnancy
(4) 5th month of pregnancy

ANSWER KEYS

PHYSICS

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

CHEMISTRY

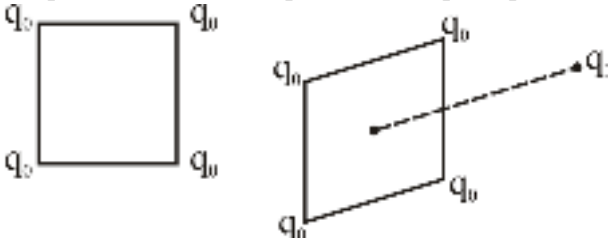
Q.	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65
A.	3	3	2	4	3	1	3	4	3	3	1	1	4	1	1	2	1	4	4	3
Q.	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85
A.	3	3	3	1	3	3	2	1	1	4	3	4	1	3	3	3	1	3	2	2
Q.	86	87	88	89	90															
A.	4	1	1	1	3															

BIOLOGY

Q.	91	92	93	94	95	96	97	98	99	100	101	102	103	104	105	106	107	108	109	110
A.	2	3	4	4	2	1	3	1	3	2	3	1	4	3	1	1	4	4	3	2
Q.	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130
A.	1	1	2	4	2	2	3	1	1	3	1	1	3	2	3	3	3	3	2	4
Q.	131	132	133	134	135	136	137	138	139	140	141	142	143	144	145	146	147	148	149	150
A.	4	3	1	4	3	3	4	4	4	2	2	3	1	2	4	4	1	1	4	2
Q.	151	152	153	154	155	156	157	158	159	160	161	162	163	164	165	166	167	168	169	170
A.	1	3	1	1	4	1	1	2	3	2	1	1	3	1	2	3	4	2	4	2
Q.	171	172	173	174	175	176	177	178	179	180										
A.	4	2	4	1	4	1	4	3	3	3										

PHYSICS

1) q_1 is in unstable eqilibrium if q_0 & q_1 have same signs.



As charge moves toward the (+) ve z-axis or –ve z-axis, then net force on charge will be along the displace direction& would not come ever.
q_1 is in stable equlibrium if q_1 & q_0 have difference signes
In this case as charge moves away from centre then net force on the charge opposite to displace direction.

2) $E = -y\hat{i} - x\hat{j}$

$$\tan\theta = \frac{E_y}{E_x} = \frac{x}{y}$$

3)

Explanation:

We have to find out the suitable potential difference diagrams for given electric field line patterns.

Concept:

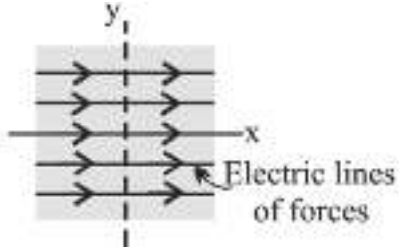
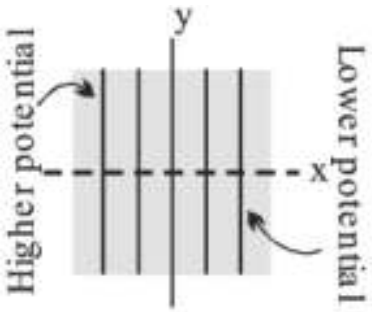
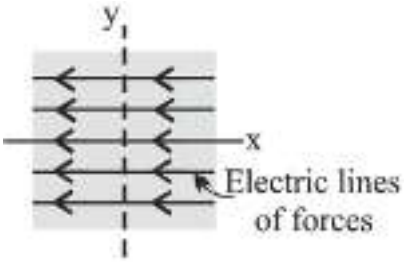
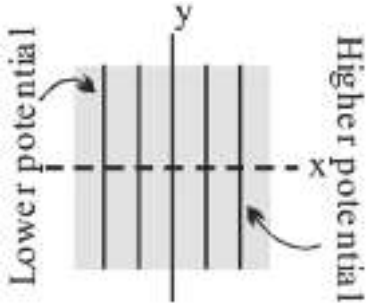
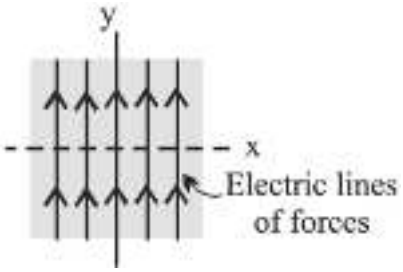
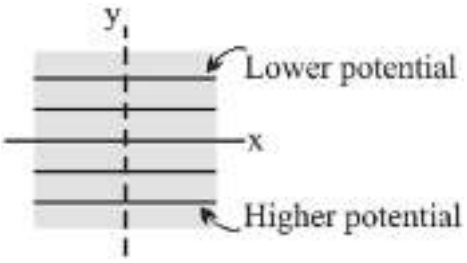
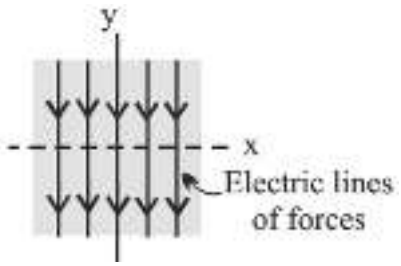
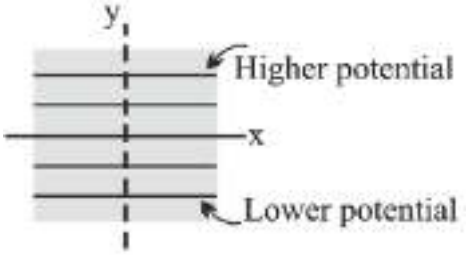
(i) Electric field line moves from higher potential to lower potential
(ii) Equipotential surface are perpendicular to electrical field lines.

Formula:

Not required

Visual diagram:

	Electric field lines		**Correct diagram of equipotential surface**

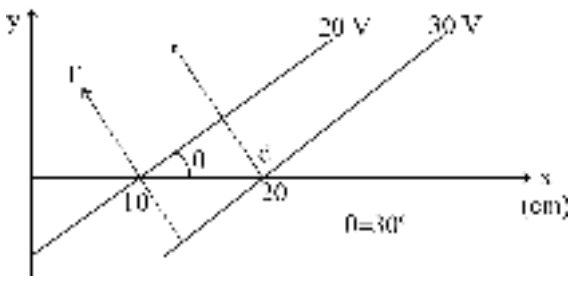
(P)		(4)	
(Q)		(3)	
(R)		(2)	
(S)		(1)	

Calculation:

In all these four diagram of electric field line, we saw the direction of electric field. It is always from higher potential to low potential with this equipotential surfaces (line) are perpendicular to electric field lines.

4)

Potential of both spheres are same, so no charge will flow.

8) 

d = (20 – 10) sin30° = 5 cm

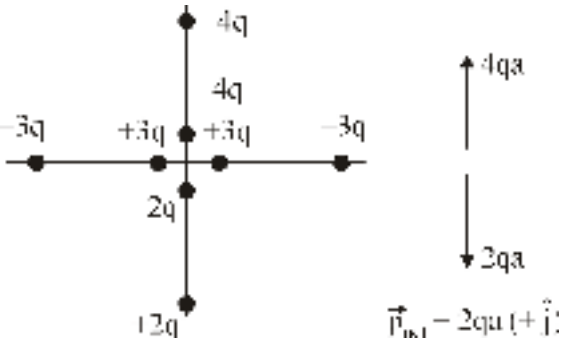
$|\vec{E}| = \left|\frac{d\vec{v}}{dr}\right| = \frac{30-20}{5 \times 10^{-2}} = 200\ vm^{-1}$

direction with x-axis

α = θ + 90 = 30 + 90

α = 120°

14)



15) by Gauss' law,

$E(4\pi r_B^2) = \frac{Q_2}{\varepsilon_0}$

$V = V_{R_1} + V_{R_2}$

$= \frac{kQ_1}{R_1} + \frac{kQ_2}{r_B}$

16) $\frac{1}{4\pi\varepsilon_0}\frac{q_1q_2}{r^2} = mr\omega^2 = \frac{4\pi^2 mr}{T^2}$

$T^2 = \frac{(4\pi\varepsilon_0)r^2(4\pi^2 mr)}{q_1q_2}$

$T = \left[\frac{4\pi^2 mr^3}{kq_1q_2}\right]^{1/2}$

17) Conceptual.

21) Electric field inside every position of conductor is zero.

22)

$W = PE(\cos\theta_1 - \cos\theta_2)$

$W = PE(\cos 0° - \cos 60°)$

$W = PE\left(1 - \frac{1}{2}\right) = \left(\frac{PE}{2}\right)$.....(1)

Now,

$W^1 = PE(\cos 0° - \cos 180°)$

$W^1 = PE(1 - (-1)) = 2PE$.....(2)

from (1) & (2) $W^1 = 4W$

23) Potential at the surface of spherical conductor of radius R carrying charge Q, $V_S = \frac{Q}{4\pi\varepsilon_0 R}$
Let Q_1 and Q_2 are the charges on two spherical conductors of radii R_1 and R_2 respectively.
When these two charged spherical conductors connected by a wire, the potential at their surfaces becomes equal.

$$\therefore V_{S_1} = V_{S_2} \Rightarrow \frac{\sigma_1 \times 4\pi R_1^2}{4\pi\varepsilon_0 R_1} = \frac{\sigma_2 \times 4\pi R_2^2}{4\pi\varepsilon_0 R_2}$$

$$\Rightarrow \frac{\sigma_1}{\sigma_2} = \frac{R_2}{R_1}$$

24) The whole charge remains on outer surface.

25) Force on negative charge is higher compared to positive charge as it is in stronger field.

26)

Work done = $U_f - U_i$ =

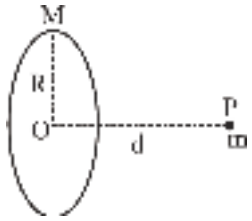
$= -(-16 \times 10^{-27}) - (-12 \times 10^{-27}) = 2.8 \times 10^{-26}$ J

27)

For bigger drop Q = 8q & R = $(8)^{1/3} r = 2r$

$$V_{big} = \frac{K(8q)}{2r} = 4\left(\frac{Kq}{r}\right) = 4V_{small}$$

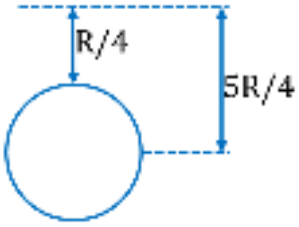
28) P = qd
$= 2 \times 10^{-8}$ (C–m)
for maximum $\theta = 90° \Rightarrow \sin\theta = 1$
$\tau = PE$
$= 10 \times 10^{-3}$ Nm

29) 

$$F_{axis} = \frac{GMmd}{(R^2 + d^2)^{3/2}}$$

when d = R then

$$F = \frac{GMmR}{(R^2 + R^2)^{3/2}} = \frac{GMm}{2\sqrt{2}R^2}$$



30)

$g_{eff} = \frac{g}{\left(1+\frac{h}{R}\right)^2}$; $g_{eff} = \frac{g}{\left(1+\frac{1}{4}\right)^2} = \frac{16g}{25}$

change $= \frac{g_{eff}-g}{g} \times 100 = \frac{\frac{16}{25}-1}{1} \times 100$

$= \frac{-9}{25} \times 100 = -36\%$

31) Kepler's second law is consequence of conservation of angular momentum.

32) At escape velocity total energy of body at planet will be zero.
so KE + PE = 0

$\frac{1}{2}(1)(10)^2 + PE = 0$

PE = – 50J

33) Total energy = –KE = $-\frac{1}{2}mv^2$

34)

$$\Delta E = E_f - E_i = -\frac{GMm}{2\left(\frac{3r}{2}\right)} - \left(-\frac{GMm}{2r}\right)$$

$= \frac{GMm}{6r}$

35) $\frac{1}{2}mV^2 = \frac{mgh}{1+\frac{h}{R}}$

$\frac{1}{2}m\left(\frac{v_e}{2}\right)^2 = \frac{mghR}{R+h}$

$\frac{1}{8} \times 2gR = \frac{ghR}{R+h}$

$\frac{h}{R+h} = \frac{1}{4} \Rightarrow \boxed{h = \frac{R}{3}}$

36) $V_e = \sqrt{2gR} = \sqrt{2 \times \frac{4}{3}\pi R\rho G \times R}$

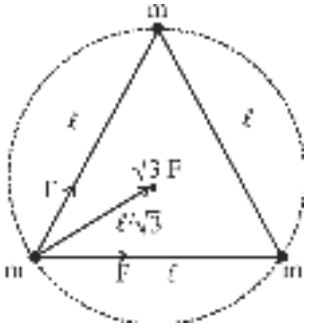
$V_e \propto R$

$\frac{V_e}{V_e^1} = \frac{R}{R^1} \Rightarrow V_e^1 = 2V_e = 2 \times 11.2$

V_e^1 = 22.4 km/s

37) $\frac{mV^2}{\frac{\ell}{\sqrt{3}}} = \frac{\sqrt{3}Gm^2}{\ell^2}$

$V = \sqrt{\frac{Gm}{\ell}}$



$T = \frac{2\pi r}{V} = \frac{2\pi \times \frac{\ell}{\sqrt{3}}}{\sqrt{\frac{Gm}{\ell}}}$

$\boxed{T \propto \ell^{3/2}}$

38) **A. Explanation:** The gravitational force will be zero at a point where the gravitational forces from the two masses cancel each other out. This point will be closer to the smaller mass (100 kg).

B. Concept: Newton's Law of Universal Gravitation: The force between two masses is directly proportional to the product of their masses and inversely proportional to the square of the distance between them.

$F = G \times \frac{(m_1 \times m_2)}{r^2}$

C. Mathematical Calculation: Let m_1 = 100 kg and $m_2 = 10^4$ kg= 10000 kg. Let the distance between them be 1 meter. Let 'x' be the distance from the 100 kg mass where the net force is zero. Then the distance from the 10000 kg mass will be (1 - x).

$F_1 = G \times \frac{(100 \times m)}{x^2}$

$F_2 = G \times \frac{(1000 \times m)}{(1-x)^2}$

For the net force to be zero, $F_1 = F_2$:

$\frac{100}{x^2} = \frac{10000}{(1-x)^2}$

Taking the square root of both sides (and taking the positive root as before):

$\frac{10}{x} = \frac{100}{(1-x)}$

10 (1 - x) = 100 x

10 - 10 x = 100 x

10 = 110 x

$x = \frac{10}{110}$

$x = \frac{1}{11}$ m

D. Final Answer: 3. $\frac{1}{11}$ m

39) **1. Question Explanation (in 30 words)**
The gravitational potential of a solid sphere varies with distance. The question asks where the minimum gravitational potential occurs, considering that gravitational potential is always negative and decreases as we go deeper.

2. Concept Based (Name of Subtopic in 30 words)
Gravitational Potential Inside a Solid Sphere
For a solid sphere of mass M and radius R, the gravitational potential is most negative where the gravitational field is strongest, i.e., at the center of the sphere.

3. Formula Used

A. Potential outside ($r \geq R$):

$$V = -\frac{GM}{r}$$

A. Potential inside ($r \leq R$):

$$V = -\frac{3GM}{2R} + \frac{GMr^2}{2R^3}$$

A. Since gravitational potential is always negative, the minimum occurs where V is most negative.

4. Calculation and Answer

A. At r = R (surface): $V = -\frac{GM}{R}$
B. At r = 0 (center): $V = -\frac{3GM}{2R}$
C. Since $-\frac{3GM}{2R} < -\frac{GM}{R}$, the most negative value is at the center.

Correct Answer: "At the centre of the sphere" (Option 1)

40) $W = \frac{mgh}{1 + \frac{h}{R}}$
$= \frac{mg\,R}{2}$

$mg=200$

$g'=g(1-\frac{R}{2R})$

$= g/2$

$mg' = \frac{mg}{2} = 100N$

41)

42) $v_A > v_B > v_C$
$K_A > K_B > K_C$

43)

When $v = v_{es}$, then KE + PE = 0
For $v > v_{es}$, KE + PE is +VE
And For $v > v_{es}$, KE + PE is +VE

44) Gravitation force is a universal force. It does not depend upon the medium between to particals.

45) $V = \frac{-GM}{R}$ for $r \le R$
$V = \frac{-GM}{r}$ for $r > R$

CHEMISTRY

46) Stability decided by more resonance.

47)

Solution/Explanation/Calculation:

Key Concept:

Carbanion

A carbon intermediate which contains three bond pair and a negative charge on it, is called carbanion.

Stability of carbanion ∝ E.N. (across the period) ∝ Size (down the group)

Hybridization: Carbanions are more stable when the negative charge is on a carbon atom with higher s-character in its hybrid orbitals. This is because s-orbitals are closer to the nucleus, leading to better charge stabilization.

sp^3 hybridization: 25% s-character, 75% p-character. E.N. = 2.50

sp^2 hybridization: 33.3% s-character, 66.7% p-character. E.N. = 2.75

sp hybridization: 50% s-character, 50% p-character. E.N. = 3.25

As the s-character increases ($sp > sp^2 > sp^3$), the carbon atom becomes more electronegative. A more electronegative carbon will exert a stronger -I effect, pulling electron density towards itself more effectively.

If %s-character same than stability = delocalised -ve charge > localised -ve charge

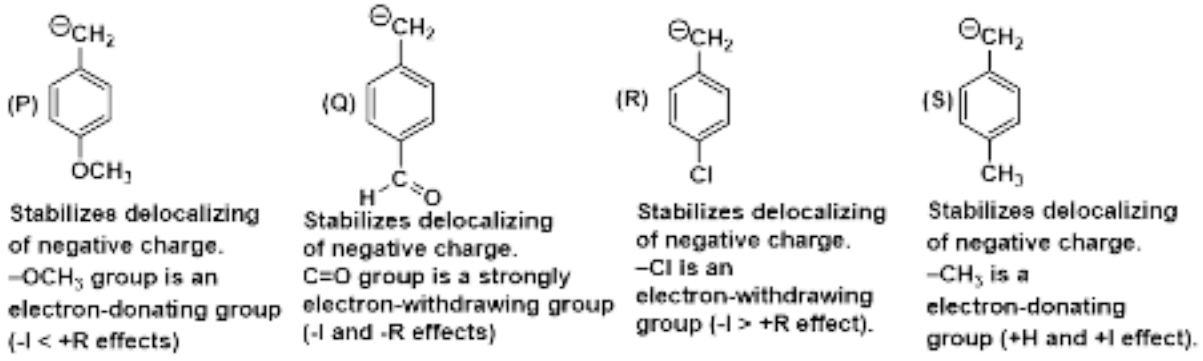
Electron-donating groups (EDGs) destabilize carbanions by increasing electron density, while electron- withdrawing groups (EWGs) stabilize carbanions by decreasing electron density.

$$\text{Stability of carbanion} \propto \frac{-\text{I-effect}, -\text{M-effect}}{+\text{I-effect}, +\text{M-effect}}$$

If a-position of a carbanion has a functional group which contains multiple bond (C = C, C = O, C ≡ N, NO_2

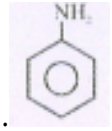
etc) or carries an electronegative atom, such carbanions are stabilised by resonance hence more stable than simple aryl carbanion.

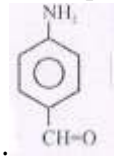
Explanation:

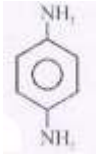


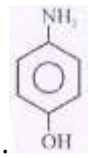
over all stability order = Q > R > S > P
Final Answer: 3

48) **A. Question Explanation:** The question asks C-N bond length is minimum in.
B. Given Data: Options are

1. 

2. 

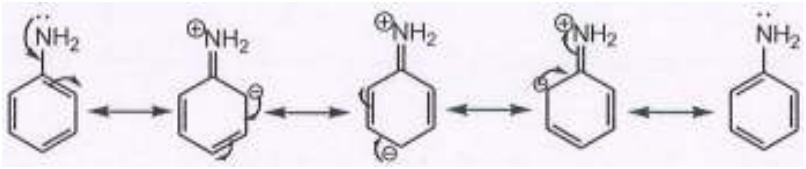
3. 

4. 

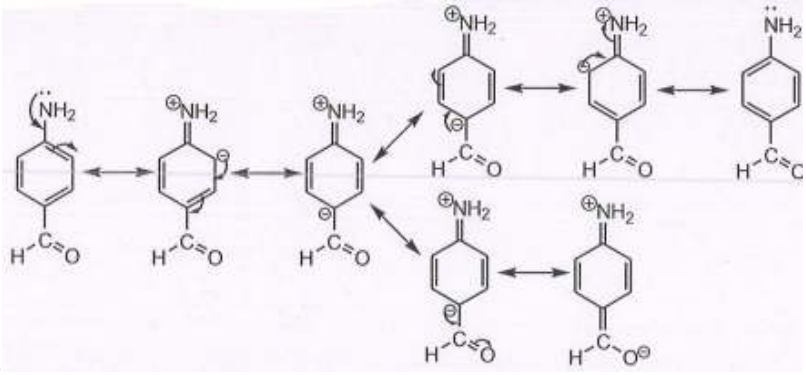
C. Concept:

A. The C-N bond length due to resonance the single bond gets double bond character. More is the resonance, more will be double bond character and less will be the bond length.

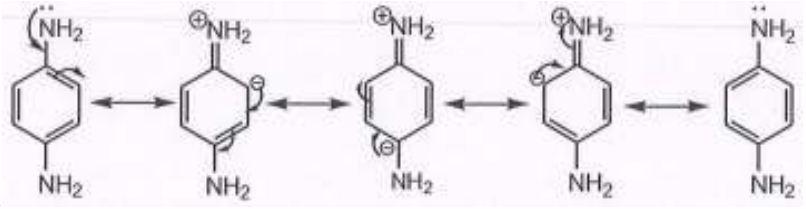
D. Explanation:

1. 

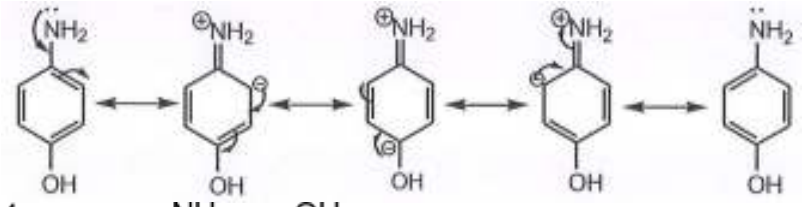
Only-NH_2 group in conjugation 5 resonating structures are form than C-N bond length decreases.

2. 

Along -NH_2 group, -CHO group gives additional resonating structures than C-N bond length more decreases than aniline due to additional conjugation.

3. 

Only one -NH_2 group in conjugation at a time so 5 resonating structures are form than C-N bond length decreases.

4. 

$+m = -NH_2 > -OH$

Only -NH_2 group in conjugation 5 resonating structures are form than C-N bond length decreases.

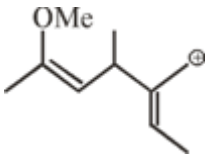
E. Final Answer: 2

49)

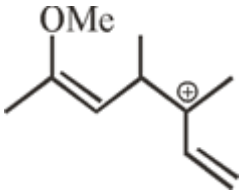
Solution

A. Question Explanation: -
The question asks most stable carbocations is.

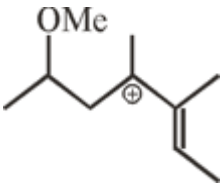
B. Given Data: - Options are



1

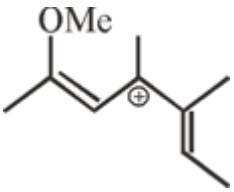


2



3

4



C. Concept

Carbocation: -

Cation in which positive charge is present on carbon atom is called carbocation.

It is incomplete octet species because it has six electrons in outer most shell.

The stability of carbocations is influenced by resonance, hyperconjugation and inductive effects.

A. **Inductive effect: - An alkyl group has +I effect. An alkyl group attached, to the positively charged carbon of a carbocation tends to release electrons towards that carbon. In doing so it reduces positive charge on the carbon. In other words, the positive charge gets dispersed as the alkyl group becomes somewhat positively charged itself. This dispersal of the charge stabilizes the carbocation. More the "number of alkyl groups, the greater the dispersal of positive charge and, therefore, more the stability of carbocation is observed.**

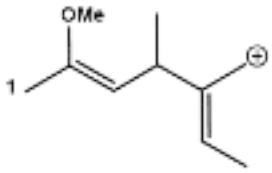
B. **Resonance: - Allyl and benzyl carbocations are conjugated species, hence their stability can be compared by the number of resonating structures.**

If a-hydrogen with respect to carbocation carbon has one or more than one lone pair of electrons, then lone pair of electrons strongly stabilise a carbocation due to the delocalization of lone pair and carbocation is more stable Due to complete octet.

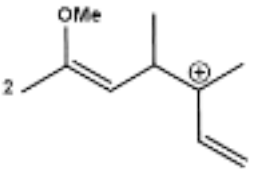
Stability of carbcation µ $\frac{+\text{I - effect}, +\text{M - effect}}{-\text{I - effect}\ , -\text{M - effect}}$

A. **Hyperconjugation: - In general, the greater the number of H-atoms present on the a-carbon atoms to carbocation, the more resonating forms are possible due to hyperconjugation and thus greater is the stability of carbocation.**

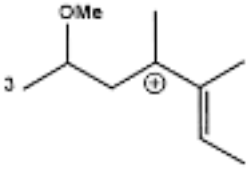
D. Explanation



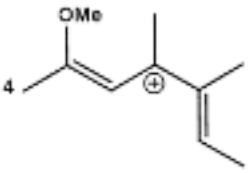
stabilized by resonance 2 π-electron.



stabilized by resonance 2 π-electron, hyperconjugation (with the adjacent 4 C-H bonds) and the inductive effect (+I) of the alkyl groups.



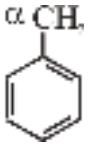
stabilized by resonance 2 π-electron, hyperconjugation (with the adjacent 5 C-H bonds) and the inductive effect (+I) of the alkyl groups.



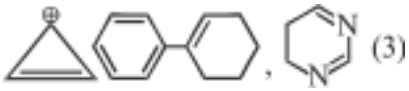
stabilized by resonance 4 π-electron, hyperconjugation (with the adjacent 3 C-H bonds) and the inductive effect (+I) of the alkyl groups.

Overall stability = 4 > 3 > 2 > 1

E. Final Answer: - 4

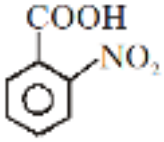
50) 

resonance inside benzene
+H, +I effect by $-CH_3$ group on benzene.

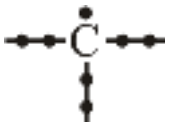
51) Aromatic→  (3)

Non-Aromatic→  (4)

52)

Due to ortho effect 

is more acidic.

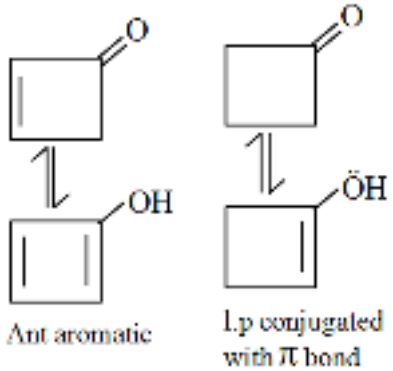
53) 

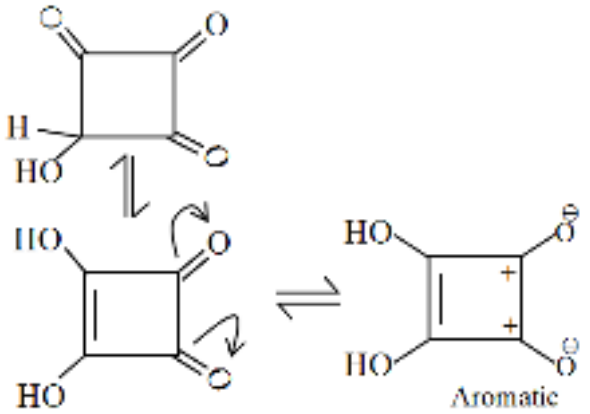
No. of valence $e^{\ominus}$ = $7e^{\ominus}$
No. of bond –pair = 3
unpaired $e^{\ominus}$ = 1
Nature = paramagnetic
sp^2 hybridised, Trigonal planar geomatry

54)

Heat of hydrogenation $\propto \frac{1}{\text{stability}}$

55)





56)

NCERT XI Pg. # 348

57)

Position of double bond is different So position isomers

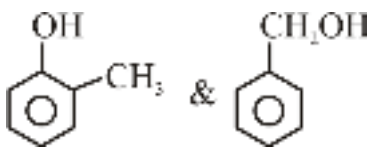
58)

⇒ If molecule is Asymmetrical and number of stereocentre to "n" then number of stereoisomers is 2^n

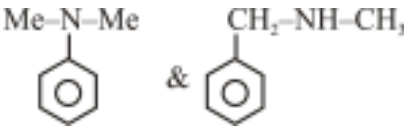
$$CH_3-CH-CH-\underset{\displaystyle CL}{\underset{|}{CH}}-CH=CH-C_2H_5$$

∴ In
→ molecule to Asymmetrical
→ n=3
→ ∴ Number of stereoisomers ⇒2^3
⇒ 8

59)

(i) 

are F.G.I.

(ii)  are F.G.I

(iii) $CH_3–C\equiv C–CH_3$ &  are not Isomers.

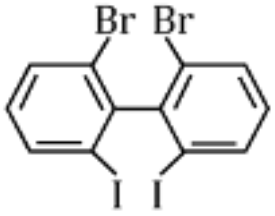
C_4H_6 C_4H_8

(iv)  are chain Isomers

(v) 
are not isomers.

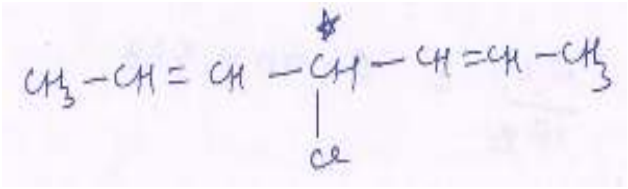
60)

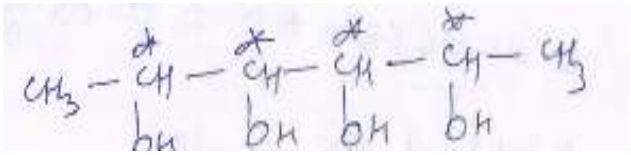
(A) Meso compounds – (S) An optically inactive compound whose molecule is achiral even though they contain chiral centres.
(B) Enantiomers – (R) Non- superimposable mirror image
(C) Diastereomers – (Q) Stereoisomers that are not mirror images
(D) Racemates (Racemic mixture) – (P) An equimolar mixture of enantiomers

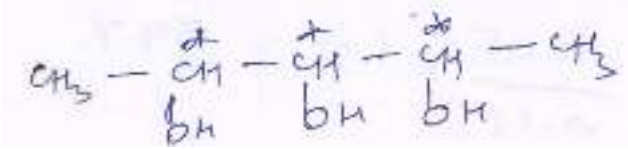

61)
All four ortho positions are occupied by bulky groups, so rings become □ to each other to minimize repulsion.
So, this compound is optically active.

62)

A chiral carbon has four different valencies.
Chiral carbon is marked with ' * '

(a) 
no. of chiral 'C' = 1

(b) 
no. of chiral 'C' = 4

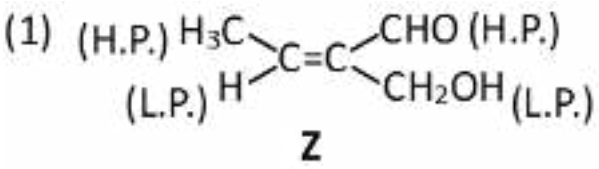
(c) 

No. of chiral 'C' = 3
Total no of chiral carbon in a, b, and C are 1 + 4 + 3 = 8.

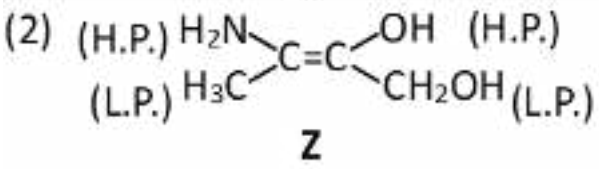
63)

Concept:
E-Z configuration

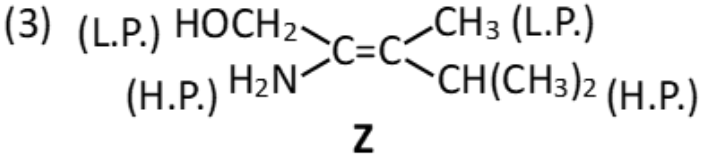
Sol^{n}/Explanation:

(1) 

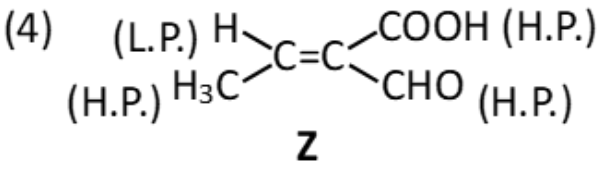
Z

(2) 

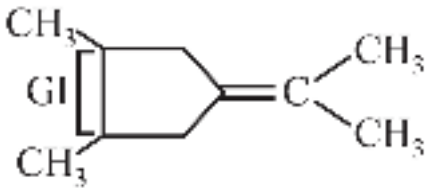
Z

(3) 

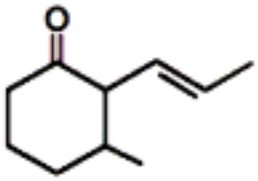
Z

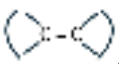
(4) 

Z

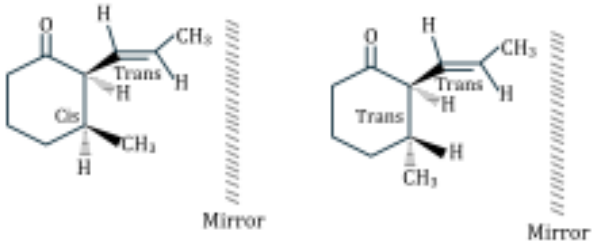
64) 

65) **Question Explanation:** The question asks Calculate the total number of stereoisomers when alkene having trans configuration:

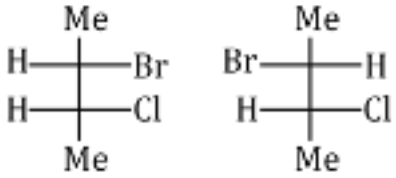


Concept: Optical isomerism, Geometrical Isomerism. Cis-Trans.
Cis-Trans system → When two similar atoms or groups are present at same side of restricted rotatory system  , then we name it as cis form otherwise trans form.

Explanation:

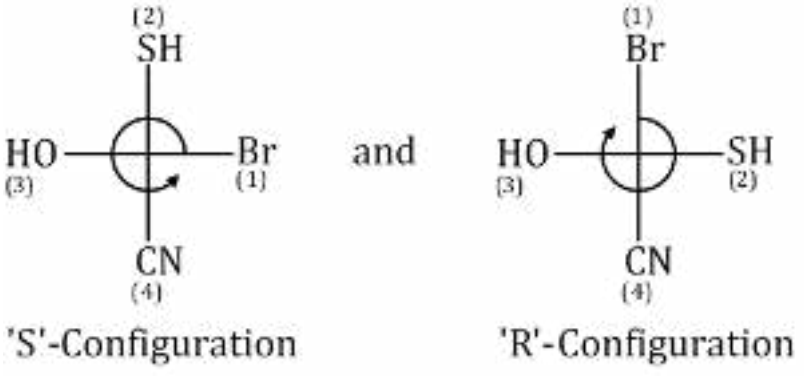


Final Answer: (3)



66)

(A) and (B) are not mirror images, So (A) and (B) are diastereomers.



67)

So they are Enantiomers.

68) $\frac{\Delta P}{P_s} = \frac{m}{1000} \times M_A$

$P_s = \frac{\Delta P \times 1000}{M_A \times m} = \frac{0.6 \times 1000}{18 \times \frac{1}{18}}$

$= 600$ mm Hg

BIOLOGY

91) NCERT XII Pg # 39

92) **Solution:**

The Correct answer is :3, 1:0:1:1

AaBb x Aabb.

Parent 1: AaBb (heterozygous for both A and B genes)

Parent 2: Aabb (heterozygous for gene A and homozygous recessive for gene B)

Step 1: Determine the possible gametes from each parent.

AaBb can produce the following gametes: AB, Ab, aB, ab
Aabb can produce the following gametes: Ab, ab
Step 2: Perform the Punnett square for the cross.

	Ab	ab
AB	AABb	AAbb
Ab	Aabb	Aabb
aB	AaBb	aabb
ab	AabB	aabb

Step 3: Determine the genotypic ratio.

A. AABb: 1
B. AaBB: 0
C. AaBb: 1
D. aabb: 1

95) NCERT Pg. # 62

97)

Law of Segregation states that allele pairs separate (segregate) during gamete formation, ensuring each gamete carries only one allele for each gene.
This is also called the Law of Purity of gametes because gametes receive only one allele from each parent without blending.
Correct Answer :-
Option 3 : Law of purity of gametes

98) NCERT (XII) Pg. # 60, 61

99)

Morgan's experiment on Drosophila (fruit flies) showed that the F_2 ratio deviated significantly from the expected 9 : 3 : 3 : 1 ratio in a dihybrid cross:
This happened because genes located close together on the same chromosome tend to be inherited together, a phenomenon known as linkage.
Independent assortment does not occur for linked genes, leading to altered phenotypic ratios
Correct Answer :-
Option 3 : Linkage

111) NCERT XII Pg # 23

112)

NCERT XII Pg no.30

122)

NCERT XII Page No. # 21 (E) 22 (H)

123) NCERT XII Page No. # 31

124) NCERT XII Page No. # 32

125) NCERT-XII Pg. # 27

126) NCERT XII Page No. # E-28, H-30

127)

NCERT-XII, Pg. # 18, 20

128) NCERT-XII, Pg. # 12,13

129) NCERT, Pg # 35(E), 37(H)