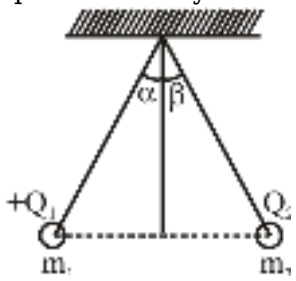
PHYSICS

1) ***Assertion :-*** The tyres of aeroplanes are slightly conducting.
Reason :- During take off and landing of aeroplanes, the friction between tyres and the runway may cause electrification of tyres.

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

2) Consider the following charged suspended ball system. If $\alpha < \beta$ then the statements which can be true at equillibrium out of followings



(a) $Q_1 > Q_2 \quad m_1 < m_2$
(b) $Q_1 > Q_2 \quad m_1 > m_2$
(c) $Q_1 < Q_2 \quad m_1 = m_2$
(d) $Q_1 < Q_2 \quad m_1 > m_2$

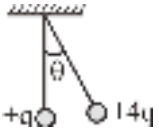
(1) Only d
(2) Only c
(3) (c,d)
(4) (b, d)

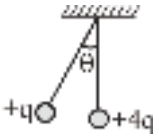
3) **Assertion (A) :-** Two similarly charged bodies may attract each other. **Reason (R) :-** When charge on one body (Q) is much greater than that on another (q) and they are close enough to each other, then force of attraction between Q and induced charges exceeds the force of repulsion between Q and q.

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

4) Two metal spheres of same mass are suspended from a common point by a light insulating string. The length of each string is same. The spheres are given electric charge +q on one end and +4q on the other. Which of the following diagrams best shows the resulting positions of spheres ?

(1) 

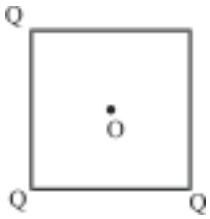
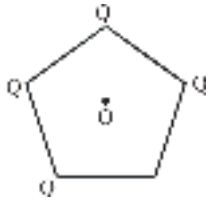
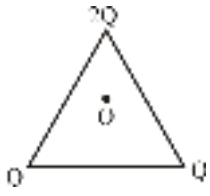
(2) 

(3) 

(4) 

5)

In the given diagrams the direction of electric field at point O is given in list-II (O is circumcenter of the given regular polygon). Charge Q is positive. Match the direction of electric field for the given arrangement:-

List-I		**List-II**	
(P)		(1)	
(Q)		(2)	
(R)		(3)	
(S)		(4)	

Code :-

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

(4)	1	4	3	2

(1) 1

(2) 2

(3) 3

(4) 4

6) ***Statement-I:*** If there exists coulombic attraction between two bodies, then both of them may not be charged.
Statement-II: In coulombic attraction two bodies are oppositely charged.

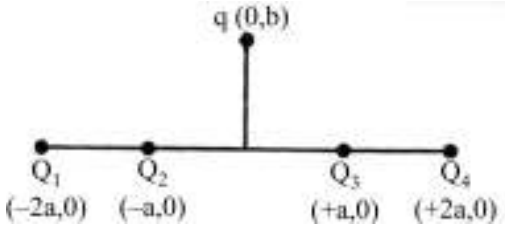
(1) Both statement I and statement II are incorrect

(2) Statement I is correct and statement II is incorrect

(3) Statement I is incorrect and statement II is correct

(4) Both statement I and statement II are correct

7) Four charges Q_1, Q_2, Q_3 and Q_4 of same magnitude are fixed along the x axis at x = – 2a, –a, +a and +2a, respectively. A positive charge q is placed on the positive y axis at a distance b > 0. Four options of the signs of these charges are given in List I. The direction of the forces on the charge q is given in List II. Match List I with List II and select the correct answer using the code given below the lists.



List I		List II	
P	Q_1, Q_2, Q_3, Q_4 all positive	1	+x
Q	Q_1, Q_2 positive; Q_3, Q_4 negative	2	–x
R	Q_1, Q_4 positive; Q_2, Q_3 negative	3	+y
S	Q_1, Q_3 positive; Q_2, Q_4 negative	4	–y

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

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

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

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

8) **Statement-1 :** Charge is conservative.
Statement-2 : Total positive charge in universe is constant.

(1) Statement-1 is true, Statement-2 is true

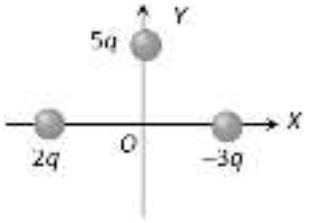
(2) Statement-1 is false, Statement-2 is true

(3) Statement-1 is true, Statement-2 is false

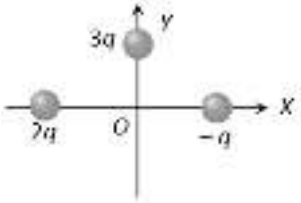
(4) Statement-1 is false, Statement-2 is false

9) In the following four situations charged particles are at equal distance from the origin. Arrange them according to the magnitude of the net electric field at origin greatest first

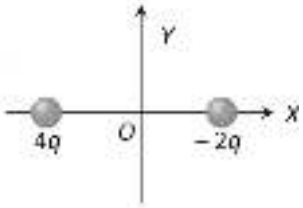
(i)



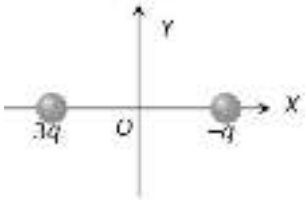
(ii)



(iii)



(iv)



(1) (i) > (ii) > (iii) > (iv)

(2) (ii) > (i) > (iii) > (iv)

(3) (i) > (iii) > (ii) > (iv)

(4) (iv) > (iii) > (ii) > (i)

10) ***Assertion :-*** Charge is invariant
Reason :- Charge does not depends on speed or frame of reference.

(1) Both Assertion & Reason are True & the Reason is a correct explanation of the Assertion.

(2) Both Assertion & Reason are True but Reason is not a correct explanation of the Assertion.

(3) Assertion is True but the Reason is False.

(4) Both Assertion & Reason are False.

11) Match the column

	Column-I		**Column-II**
(A)	A charge at rest produces	(P)	Magnetic field
(B)	A charge moving with uniform speed produces	(Q)	Electric field
(C)	A charge moving with variable speed produces	(R)	Electromagnetic waves

(1) A-P; B-Q; C-R

(2) A-R; B-Q; C-P

(3) A-Q; B-P,Q; C-P,Q,R

(4) A-Q; B-Q,R; C-P,Q,R

12) The dielectric constant K of an insulator can be :-

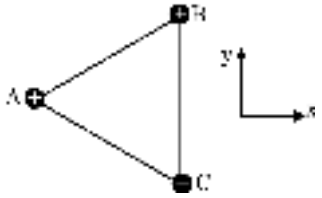
(1) –1

(2) zero

(3) 0.5

(4) 5

13) Three point charges lie at the vertices of an equilateral triangle as shown. All three charges have the same magnitude, but charge A and B are positive and charge C is negative. The net electric force that charges B and C exert on A.



(1) is in the +x–direction

(2) is in the –x–direction

(3) is in the +y–direction

(4) is in the –y–direction

14) Two objects are rubbed against each other, the nature of electric force, when they are placed at some distance is :

(1) Attractive

(2) Repulsive

(3) Both (1) and (2)

(4) Either (1) or (2)

15) Two small conducting spheres of equal radius have charges +10μC and –20μC respectively & when placed at a distance R from each other experience force $\vec{F}_1$. If they are brought in contact and separated to the same distance, they experience force $\vec{F}_2$. The ratio of $|\vec{F}_1|$ to $|\vec{F}_2|$ is :-

(1) 1 : 8

(2) 8 : 1

(3) 1 : 2

(4) 2 : 1

16) Two identical metallic spheres are given equal but opposite charges of +q coulomb and –q coulomb respectively. After charging :-

(1) Both the spheres still have identical masses.

(2) The positively charged sphere has a smaller mass than the negatively charged sphere.

(3) The negatively charged sphere has a smaller mass than the positively charged sphere.

(4) The variation in their masses do depends on the magnitude of q.

17) A body has –80 micro coulomb of charge. Number of additional electrons in it will be :-

(1) 8×10^{-5}

(2) 80×10^{-17}

(3) 5×10^{14}

(4) 1.28×10^{-17}

18) If 1000 droplets each of charge q and radius r are mixed to a form a big drop. The charge of big drop is :-

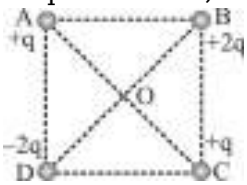
(1) q

(2) 100 q

(3) 1000 q

(4) 50 q

19) Four charges are arranged at the corners of a square ABCD, as shown in the adjoining figure.



The force on the charge kept at the centre O is:-

(1) Zero

(2) Along the diagonal BD

(3) Along the diagonal AC

(4) Perpendicular to side AB

20) Two charged spheres of radii 20 cm and 25 cm respectively and having an equal charge Q are connected by a copper wire and then they are separated :-

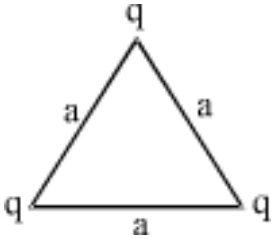
(1) Both the spheres will have the same charge

(2) Charge on the 20 cm sphere will be greater than that on the 25 cm sphere

(3) Charge on the 25 cm sphere will be greater than that on the 20 cm sphere

(4) Charge on each of the spheres will be 2Q

21) Three charges of equal magnitude q and mass m are in equilibrium under the influence of electrostatic and gravitational force as shown in figure then ratio of q/m is :-



(1) $2\sqrt{\pi\in_0 G}$

(2) $4\sqrt{\pi\in_0 G}$

(3) $\frac{2}{\sqrt{3}}\sqrt{\pi\in_0 G}$

(4) $\frac{4}{\sqrt{3}}\sqrt{\pi\in_0 G}$

22) Where should be the 3rd charge + Q placed so that it remain in equilibrium :-

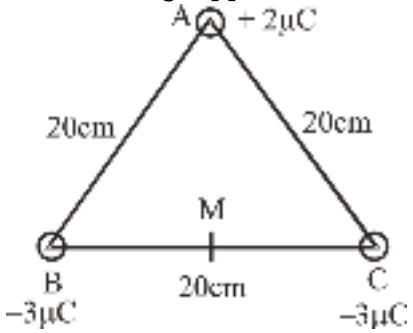
(1) x = 14 m

(2) x = 40 m

(3) x = 62 m

(4) x = 82 m

23) For the system shown in figure. What should be the value of charge q placed at mid point M of side BC, so that the charge at A remains in equilibrium :-



(1) $q = \frac{9\sqrt{3}}{4}\ \mu C$

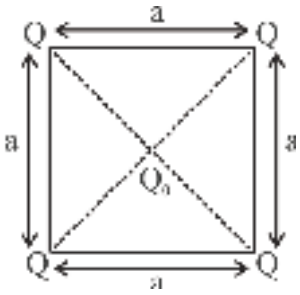
(2) $q = \frac{-9\sqrt{3}}{4}\ \mu C$

(3) $q = \frac{3\sqrt{3}}{4}\ \mu C$

(4) $\frac{\sqrt{3}}{4}\ \mu C$

0

24) For which value of Q , it is in equilibrium :

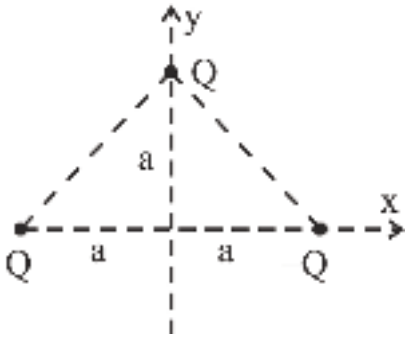


(1) $-\frac{Q}{2}$

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

(3) Q

(4) All of them



25) Net force on charge placed on y-axis is

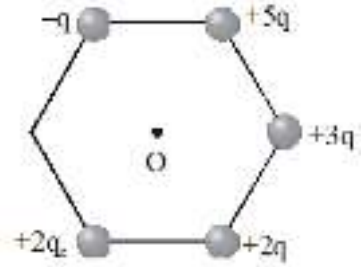
(1) $\frac{KQ^2}{a^2}\hat{i}$

(2) $\frac{\sqrt{2}KQ^2}{2a^2}\hat{i}$

(3) $\frac{\sqrt{2}KQ^2}{a^2}\hat{j}$

(4) $\frac{\sqrt{3}KQ^2}{2a^2}\hat{j}$

26) Five point charges are placed at the corners of a regular hexagon of side 'a' as shown in figure.



Net force experienced by an electron placed at centre O will be :-

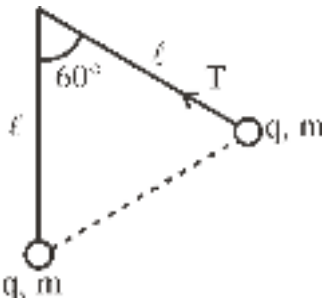
(1) $\frac{6kqe}{a^2}$ towards +5q charge.

(2) $\frac{3kqe}{a^2}$ towards +3q charge.

(3) $\frac{6kqe}{a^2}$ towards +3q charge.

(4) $\frac{3kqe}{a^2}$ towards –q charge.

27) If mass of balls is m = 5 kg then find out tension in threads. :-



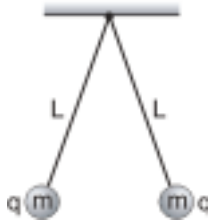
(1) 10 N

(2) 20 N

(3) 40 N

(4) 50 N

28) Two small balls, each having equal positive charge Q are suspended by two insulating strings of equal length L from a hook fixed to a stand. If the whole set-up is transferred to a artificial satellite in orbit around the earth, the tension in each string is equal to



(1) zero

(2) $\frac{kQ}{L^2}$

(3) $\frac{kQ^2}{2L^2}$

(4) $\frac{kQ^2}{4L^2}$

29) Total charge of electrons in 90 gm water is :-

(1) –5μC

(2) –50μC

(3) –5 faraday

(4) –50 faraday

30) The magnitude of pairs of displacement vectors are given. Which pairs of displacement vectors cannot be added to give a resultant vector of magnitude 13 cm?

(1) 4 cm, 16 cm

(2) 20 cm, 7 cm

(3) 1 cm, 15 cm

(4) 6 cm, 8 cm

31) Volume is :-

(1) Scalar

(2) Vector

(3) Neither scalar nor vector

(4) Both scalar and vector

32) If $\vec{A} = \hat{i} + 2\hat{j} + \hat{k}$ and $\vec{B} = 5\hat{i} + y\hat{j} + z\hat{k}$ are parallel to each other then value of z and y will be :

(1) 10, 5

(2) 5, 10

(3) 5, 5

(4) 10, 10

33) $\vec{A} = 0.3\hat{i} + b\hat{j} - 0.4\hat{k}$ is an unit vector what is the value of b

(1) 0.25

(2) 0.75

(3) $\sqrt{0.75}$

(4) 0.93

34) Unit vector along $\left(3\hat{i} + \hat{j}\right)$ will be

(1) $\frac{3\hat{i} + \hat{j}}{\sqrt{10}}$

(2) $\frac{\hat{i} + 3\hat{j}}{\sqrt{10}}$

(3) $\frac{3\hat{i} + \hat{j}}{10}$

(4) $\frac{\hat{i} + \hat{j}}{\sqrt{10}}$

35) The vector $\vec{P}$ makes 120° with the x-axis and the vector $\vec{Q}$ makes 30° with the y-axis. What is their resultant ?

(1) P + Q

(2) P – Q

(3) $\sqrt{P^2 + Q^2}$

(4) $\sqrt{P^2 - Q^2}$

36) Find value of $\left(2\vec{A} + 3\vec{B}\right) . \left(3\vec{A} - 2\vec{B}\right)$

(1) zero

(2) $6AB\cos\theta + 9A^2 - 9B^2$

(3) $6A^2 + 5AB\cos\theta - 6B^2$

(4) $5AB\cos\theta$

37) If magnitude of vector addition of two unit vectors is 2 units then magnitude of their vector difference is :

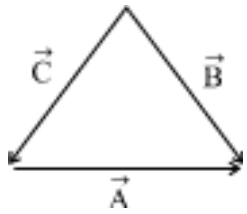
(1) $\sqrt{3}$

(2) 1

(3) 0

(4) 2

38) Correct statement, considering figure is :-



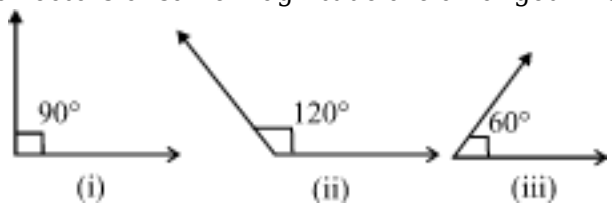
(1) $\vec{A} + \vec{B} = \vec{C}$

(2) $\vec{B} + \vec{C} = \vec{A}$

(3) $\vec{C} + \vec{A} = \vec{B}$

(4) $\vec{A} + \vec{B} + \vec{C} = 0$

39) Two force vectors of same magnitude are arranged in the following manner :-



Magnitude of resultant force is maximum for :-

(1) I

(2) II

(3) III

(4) II and III

40)

Consider system X of 3 bodies A, B and C. If charge on C is 2C and charge on system X is 10C then charges of A and B can be :-

(1) A = 2C, B = 4C

(2) A = 3C, B = 6C

(3) A = –4C, B = 12C

(4) A = –4C, B = –4C

41) An object A has a charge of + 2μC and the object B has a charge of + 6μC. Which statement

is true ?

(1) $\vec{F}_{AB} = -3\vec{F}_{BA}$

(2) $\vec{F}_{AB} = -\vec{F}_{BA}$

(3) $3\vec{F}_{AB} = -\vec{F}_{BA}$

(4) $\vec{F}_{AB} = -4\vec{F}_{BA}$

42) Electrostatic force and gravitational force between two bodies differ in which respect :

(1) Conservative force

(2) Central force

(3) Principle of superposition

(4) Dependence on the intervening medium

43) Two point charges +3μC and +8μC repel each other with a force of 40N. If a charge of –5μC is added to each of them, then the force between them will become :-

(1) –10 N

(2) +10 N

(3) +20 N

(4) –20 N

44) Coulomb's law is analogous to :-

(1) Charge conservation law

(2) Newton's second law of motion

(3) Law of conservation of energy

(4) Newton's law of gravitation

45) A rubbing glass rod is rubbing with a silk. Nature of charge acquired by glass rod is :-

(1) Positive

(2) Negative

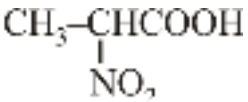
(3) Neutral

(4) None

CHEMISTRY

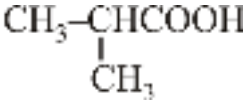
1)

Find the strongest acid among the following compounds.

(1) 

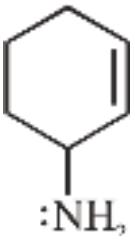
(2) $CH_3CH_2CH_2COOH$

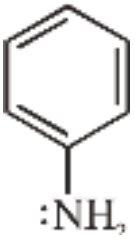
(3) CH_3CH_2COOH

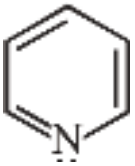
(4) 

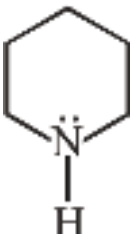
2)

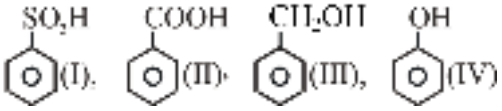
In which of following is minimum basic :-

(1) 

(2) 

(3) 

(4) 

3) Arrange the following in correct order of acidic strength. 

(1) I > II > III > IV

(2) I > II > IV > III

(3) II > I > III > IV

(4) II > III > IV > I

4) Which of the following represents the correct order of the acidity in the given compounds?

(1) $FCH_2COOH > ClCH_2COOH > BrCH_2COOH > CH_3COOH$

(2) $CH_3COOH > BrCH_2COOH > ClCH_2COOH > FCH_2COOH$

(3) $FCH_2COOH > CH_3COOH > BrCH_2COOH > ClCH_2COOH$

(4) $BrCH_2COOH > ClCH_2COOH > FCH_2COOH > CH_3COOH$

5) Hyperconjugation essentially involves delocalisation of :-

(1) π e^-

(2) Lone pair e^-

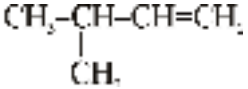
(3) σ e^-

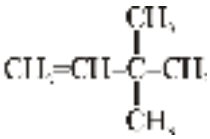
(4) Unpaired e^-

6) Hyperconjugation is shown by :-

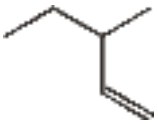
(1) $CH_3–CH_2–CH_3$

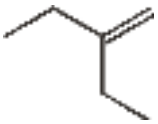
(2) $CH_2 = CH_2$

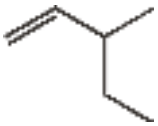
(3) 

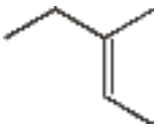
(4) 

7) Which of the following alkene is most stable:-

(1) 

(2) 

(3) 

(4) 

8) Which of the following has maximum –I effect.

(1) $–NO_2$

(2) –Cl

(3) –CN

(4) –F

9) Which effect is distance dependent :-

(1) Inductive

(2) Hyperconjugation

(3) Resonance

(4) All of these

10) Which of the following has strongest +I effect?

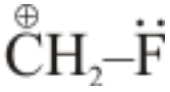
(1) $-O^{\ominus}$

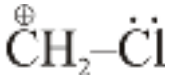
(2) –Et

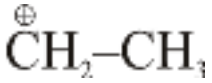
(3) $-CH_3$

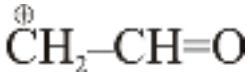
(4) $-NH-CH_3$

11) Which cation is maximum stable :-

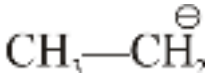
(1) 

(2) 

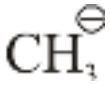
(3) 

(4) 

12) Which of the following is least stable :-

(1) 

(2) 

(3) 

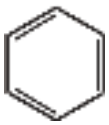
(4) None

13) Which of the following is not an aromatic :-

(1) 

(2) 

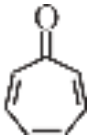
(3) 

(4) 

14) Which of the following molecules is unstable at room temperature?

(1) 

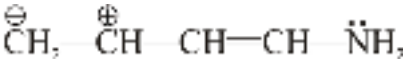
(2) 

(3) 

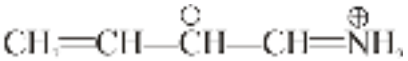
(4) 

15) Which will be the least stable resonating structure:-

(1) 

(2) 

(3) 

(4) 

16) Which of the following has + R effect :-

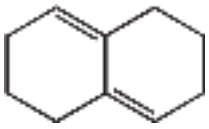
(1) – CN

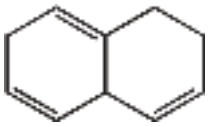
(2) – CHO

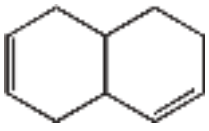
(3) – NH_2

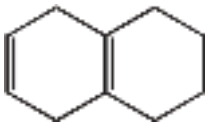
(4) – NO_2

17) Resonance present in :-

(1) 

(2) 

(3) 

(4) 

18) Free radicals & charged species are formed in _____ cleavage respectively :-

(1) Homolytic & Homolytic

(2) Heterolytic & Homolytic

(3) Homolytic & Heterolytic

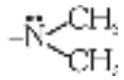
(4) Heterolytic & Heterolytic

19) Which can show –M effect –

(1) 

(2) 

(3) 

(4) 

20) Which of following cannot act as electrophile :-

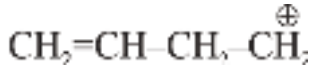
(1) CO_2

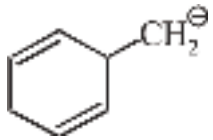
(2) : CCl_2

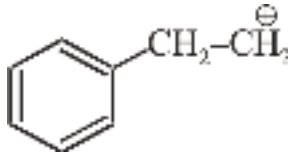
(3) 

(4) $AlCl_3$

21) Resonance shown by -

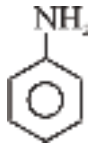
(1) 

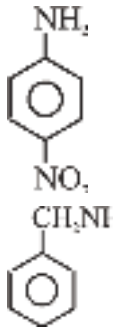
(2) 

(3) 

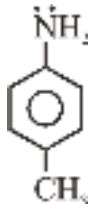
(4) None of these

22) pK_b is minimum for :-

(1) 

(2) 

(3)

(4) 

23) Which of the following does not show H-effect?

(1) $CH_3 - CH_2 - \dot{C}H_2$

(2) $CH_3 - CH_2 - \overset{\oplus}{C}H_2$

(3) CH_3 – CH = CH_2

(4) $CH_3 - CH_2 - \overset{\ominus}{C}H_2$

24)

Which of the following changes with increase in temperature ?
(I) Molality (II) Molarity
(III) % W/V (IV) Normality

(1) I, II

(2) II, III, IV

(3) I, II, III, IV

(4) None of above

25) The molarity of 2 N H_2SO_4 is :-

(1) 1 M

(2) 2 M

(3) 3 M

(4) 4 M

26) The normality of 0.3 M phosphorous acid (H_3PO_3) is :-

(1) 0.1

(2) 0.9

(3) 0.3

(4) 0.6

27) Calculate the mass of H_2SO_4 present in 100 ml of 0.1 N H_2SO_4 solution :-

(1) 49 g

(2) 0.49 g

(3) 0.049 g

(4) None of the above

28) If 25g of solute is present in 50g of solution. Then calculate % w/w. (Mass %)

(1) 50%

(2) 25%

(3) 75%

(4) None

29) The molality of a solution is 2 m at 300 K. If temperature is doubled then molality of the solution will be :-

(1) 2 m

(2) 4 m

(3) 1 m

(4) Can't be predicted

30)

What will be molality of a solution having 18 g of glucose (Mw = 180) dissolved in 500 g of water ?

(1) 1 m

(2) 0.5 m

(3) 0.2 m

(4) 2 m

31) Molar solution means 1 mole of solute present in

(1) 1000g of solvent

(2) 1 litre of solvent

(3) 1 litre of solution

(4) 1000g of solution

32) The relation between molarity (M) and molality (m) is [ρ = density of solution (g/ml), M_1 = molecular weight of solute] :-

(1) $m = \frac{1000M}{1000\rho - M_1}$

(2) $m = \frac{1000\rho M}{1000 - MM_1}$

(3) $m = \frac{1000MM_1}{1000\rho - MM_1}$

(4) $m = \frac{1000M}{1000\rho - MM_1}$

33) Which of the following statement is true :-
(a) Molarity is the no. of moles of solute dissolved per litre of solution.
(b) The molarity is the number of mole of solvent dissolved in per litre of solution.
(c) Molality (m) of a solution is defined as the number of moles of solute dissolved in 1000 gm of solution.

(d) The ratio of mole fraction of solute and solvent is in the ratio of their respective moles.

(1) a & c
(2) a & d
(3) b & c
(4) Only d

34) The molarity of HNO_3 in a sample which has density 1.4 g/mL and mass percentage of 63% is.....

(1) 14
(2) 12
(3) 8
(4) 6

35) Mole fraction of $C_3H_5(OH)_3$ in a solution of 36g of water and 46 g of glycerine is :

(1) 0.46
(2) 0.36
(3) 0.20
(4) 0.40

36) What will be the normality of 10 ml solution of '20 V' H_2O_2 ?

(1) 1.79
(2) 3.58
(3) 60.86
(4) 6.086

37) Mass of NaOH required for formation of 100 ml of its decimolar solution is :-

(1) 0.8
(2) 0.4
(3) 0.2
(4) 8 g

38) Equal weight of NaCl and KCl are dissolved separately in equal volumes of solutions then molarity of the two solutions will be

(1) Equal
(2) That of NaCl will be less than that of KCl
(3) That of NaCl will be more than that of KCl solution
(4) That of NaCl will be half of that of KCl solution

39) Molarity of 720 g of pure water

(1) 40 M

(2) 4 M

(3) 55.5 M

(4) Can’t be determined

40) 0.5 M of H_2SO_4 is diluted from 1 litre to 10 litre, normality of resulting solution is

(1) 1 N

(2) 0.1 N

(3) 10 N

(4) 11 N

41)

In a solution of 7.8 g benzene (C_6H_6) and 46.0g toluene ($C_6H_5CH_3$), the mole fraction of benzene is:-

(1) $\frac{1}{6}$

(2) $\frac{1}{5}$

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

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

42)

1000 g aqueous solution of $CaCO_3$ contains 10 g of calcium carbonate, concentration of the solution is :

(1) 10 ppm

(2) 100 ppm

(3) 1000 ppm

(4) 10,000 ppm

43)

An X molal solution of a compound in benzene has mole fraction of solute equal to 0.2. The value of X is

(1) 14

(2) 3.2

(3) 1.4

(4) 2.0

44) The molarity of H_2SO_4 is 18 M. If density d is 1.8 gcm^{-3}, then the molality of solution is :-

(1) 50

(2) 500

(3) 400

(4) 100

45) The molarity of solution obtained by mixing of 750 mL, 0.5 M HCl with 250 mL, 2M HCl is :-

(1) 0.875

(2) 1

(3) 1.75

(4) 1.5

BIOLOGY

1) **Assertion :-** In human, the temperature of scrotum is 2-2.5°C lesser than normal body temperature.
Reason :- Dartos muscles help in regulation of the temperature of scrotum.

(1) If both the Assertion and Reason are true and Reason is a correct explanation of Assertion.

(2) If both the Assertion and Reason are true and Reason is not a correct explanation of Assertion.

(3) If Assertion is true but Reason is false.

(4) If Assertion is false but Reason is true.

2) Which of the following depicts the **correct** pathway of transport of sperms ?

(1) Rete testis → Vas deferens → Vasa efferentia → Epididymis

(2) Vasa efferentia → Rete testis → Vas deferens → Epididymis

(3) Rete testis → Vasa efferentia → Epididymis → Vas deferens

(4) Rete testis → Epididymis → Vasa efferentia → Vas deferens

3) Identify the **incorrect** statement about Sertoli cells

(1) Provide nutrition to the germ cells

(2) Secrete Androgen Binding Protein and Inhibin

(3) LH stimulate sertoli cells for spermatogenesis

(4) Provide protection to spermatozoa

4) Which statement is **correct** :-

(1) Glans penis is covered by a loose fold of skin called foreskin

(2) The male accessory gland include paired seminal vesicle, paired prostate and paired bulbourethral gland

(3) Both (1) and (2)

(4) Ovary considered to be accessory gland of female reproductive system

5) Which statement is **correct** ?

(1) Sperm formation continues in aged man

(2) Ovum formation ceases in women around the age of 50 years

(3) Testes of male are extra abdominal

(4) All of the above

6) Choose **incorrect** option :-

(1)	Tunica vaginalis	Outer most layer of testis
(2)	Tunica albuginea	Dense, white fibrous coat
(3)	Tunica vasculosa	Inner most vascular coat
(4)	Rete testis	Tuse to form vas deferens

(1) 1

(2) 2

(3) 3

(4) 4

7) If A stands for seminal vesicles, B stands for bulbourethral glands and C stands for prostate gland, then which of the following is **true**?

(1) A and C occur in pairs

(2) A and B occur in pairs

(3) B and C occur in pairs

(4) None of these

8) Which statement is not **correct** for both testes and ovary :

(1) Both are primary sex organs.

(2) Both are developed from mesoderm.

(3) Both are developed in abdominal cavity in Intra uterine life.

(4) At the time of birth both descend down into extra abdominal space.

9) The Scrotum helps in maintaining the low temperature of the testes necessary for :

(1) Oogenesis

(2) Spermatogenesis

(3) Gestation

(4) Implantation

10) Leydig are found in :-

(1) Ovaries and secrete progesterone

(2) Adrenal cortex and secrete adrenaline

(3) Testis and secrete testosterone

(4) Pancreas and secrete cholecystokinin.

11) **Assertion (A) :** Testis is a primary reproductive organ.
Reason (R) : Testis is responsible for formation of gamete and secretion of sex hormone.

(1) Both A/R are correct, R correctly explains A

(2) Both A/R are correct, R is not correctly explaining A

(3) A correct, R incorrect

(4) A/R both incorrect

12) **Statement-I :** In human the urethra arises from the urinary bladder.
Statement-II : In male, urethra is common passage for urine and semen.
Read the above statements and select the correct answer from the options given below.

(1) Both Statement I and Statement II are incorrect.

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

(3) Statement I is incorrect but Statement II is correct

(4) Both Statement I and Statement II are correct.

13) Testes are extraabdominal in position'. Which of the following is the most appropriate reason ?

(1) Narrow pelvis in male

(2) Maintance of 2.0 – 2.5ºC temperature of testes

(3) Prostate gland and seminal vesicles occupy maximum space

(4) Maintance of 2.0 – 2.5ºC temperature lower than the normal body temperature

14) The testes are situated ____ the abdominal cavity within a pouch called ____.

(1) Inside, testicular lobules

(2) Outside, scrotum

(3) Outside, vas deferens

(4) Inside, scrotum

15) Which structure does not carry sperms ?

(1) Vas-deferens

(2) Rete testis

(3) Epididymis

(4) Seminal vesicle

16) Secretion of which gland helps in lubrication during coitus ?

(1) Seminal vesicle

(2) Prostate

(3) Cowper's gland
(4) Mammary gland

17) **Statement I** : The regions inside the seminiferous tubules called interstitial space contain Leydig cells.
Statement II : Leydig cells of testis synthesise and secrete testicular hormones called androgens.

(1) Both Statement I and Statement II are incorrect
(2) Statement I is correct but Statement II is incorrect
(3) Statement I is incorrect but Statement II is correct
(4) Both Statement I and Statement II are correct

18) Scrotal sacs are connected with abdominal cavity by-

(1) Vagina
(2) Inguinal canal
(3) Spermatic canal
(4) Haversian canal

19) Which gland is unpaired ?

(1) Seminal vesicle
(2) Prostate gland
(3) Bulbourethral gland
(4) (1) and (2) both

20) Testis is covered by three coats. Which one of them are not completely cover the testis :

(1) Tunica vaginalis
(2) Tunica albugenia
(3) Tunica propria
(4) Tunica vasculosa

21) Primary sex organ of male is :

(1) Penis
(2) Testis
(3) Seminal vesicle
(4) Vas-deferens

22)

Match the column-A with column-B :-

Column-A	**Column-B**

(A)	Transfer of sperms in the female genital tract	(i)	Ejaculation
(B)	Sperms released from seminiferous tubules	(ii)	Spermiation
(C)	Expulsion of semen from body of male	(iii)	Insemination

(1) A-ii, B-iii, C-i

(2) A-i, B-ii, C-iii

(3) A-iii, B-ii, C-i

(4) A-i, B-iii, C-ii

23) If testis fail to descend in scrotum then this disorder is called :-

(1) Orchiopexy

(2) Orchiodectony

(3) Castration

(4) Cryptoorchidism

24) Common duct formed by union of vas deferens and duct from seminal vesicle is

(1) urethra

(2) tunica-vasculosa

(3) ejaculatory duct

(4) spermatic duct

25) **Assertion:** The enlarged part of penis is called glans penis.
Reason: The glans penis is covered by a loose fold of skin called foreskin.

(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.

26)

In human Male reproductive system located in the

(1) Pectoral region

(2) Abdomen region

(3) Pelvic region

(4) Just below the Diaphragm

27) Identify the structure shown below and its location in the human, and select the right option.

	Structure	Site of occurrence
(1)	Testis	Abdominal cavity
(2)	Penis	Abdominal cavity
(3)	Seminiferous tubules	Testis
(4)	Prostate	Below the urinary bladder

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

28) Which of the following muscles will help in changing the position of the testis to keep them at proper temperature for the process of spermatogenesis?

(1) Detrusor
(2) Dartos
(3) Cremaster
(4) Both (2) & (3)

29) All of the following cells are present in human testes, except

(1) Leydig cells
(2) Germ cells
(3) Granulosa cells
(4) Sertoli cells

30) How many seminiferous tubules are present in each testicular lobule?

(1) 2-5
(2) 1-6
(3) 1-3
(4) 5-7

31) The male reproductive system does not includes

(1) A pair of testes
(2) Epididymis and vas deferens
(3) Bartholins glands

(4) Ejaculatory duct

32) Testis secrete :-

(1) Estrogen only
(2) FSH only
(3) ICSH
(4) Testosterone

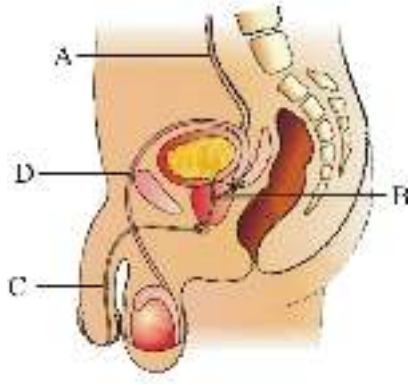
33) The functional unit of testis is :-

(1) uriniferous tubules
(2) malpighian tubules
(3) seminiferous tubules
(4) acini or lobules

34) Given below are two statements :-
Statement-I : In human male, ejaculatory duct opens outside of the penis.
Statement-II : Tunica vaginalis is a coat present over female reproductive structure.
In the light of above statement, choose the most appropriate answer from the options given below.

(1) Both statement-I and statement-II are correct.
(2) Both statement-I and statement-II are incorrect.
(3) Statement-I is incorrect and statement-II is correct.
(4) Statement-I is correct and statement-II is incorrect.

35) It is a diagrammatic sectional view of male reproductive system, In which identify ejaculatory duct :-



(1) A
(2) B
(3) C
(4) D

36) The _____ lead to vas deferens that ascends to the _____ and loops over the _____.

(1) Prostate, Stomach, Urinary bladder
(2) Epididymis, Abdomen, Urinary bladder

(3) Epididymis, Abdomen, Ureter

(4) Urinary bladder, Ejaculatory duct, Abdomen

37) Seminal plasma, the fluid part of semen, is contributed by:
(i) Seminal vesicle
(ii) Prostate
(iii) Urethra
(iv) Bulbourethral gland

(1) (i) and (ii)

(2) (i), (ii) and (iv)

(3) (ii), (iii) and (iv)

(4) (i) and (iv)

38) The male reproductive system includes
a. Primary sex organ
b. Accessory duct
c. Accessory glands
d. External genitalia

(1) a, b and d

(2) a, c and d

(3) a and d only

(4) a, b, c and d

39) Select the correct match from following table.

(A)	ICSH	(i)	Released by hypothalamus
(B)	FSH	(ii)	Stimulate leydig cells
(C)	ABP	(iii)	Stimulate Sertoli cells
(D)	GnRH	(iv)	Released by sertoli cells

(1) A – ii ; B – iii ; C – iv ; D – i

(2) A – iii ; B – ii ; C – i ; D – iv

(3) A – i ; B – ii ; C – iii ; D – iv

(4) A – iv ; B – iii ; C – ii ; D – i

40) Which of the following is a content of spermatic cord?

(1) Dartos muscle

(2) Cremaster muscle

(3) Vas deferens

(4) Vasa efferentia

41) Each testis is connected with the wall of scrotum through a flexible and fibrous structure which is called :

(1) Spermatic fascia
(2) Gubernaculum
(3) Dartos muscles
(4) Cremaster muscles

42) Which of the following is not function of sertoli cells ?

(1) Protection of developing sperms
(2) Nourishment of spermatocytes and spermatids
(3) Phagocytosis of injured sperm
(4) Control the movement of oogonia cells

43) The nutritive cells found in seminiferous tubules are :-

(1) sertoli cells
(2) leydig cells
(3) Receptor cells
(4) none of these

44) Which is not present in scrotal wall structure ?

(1) Cremasteric fascia
(2) Spermatic fascia
(3) Dartos muscle
(4) Tunica albuginea

45) Find out the **correct** match

1	Inhibin - Supress FSH synthesis
2	FSH - Acts on leydig cells
3	LH - Acts on Sertoli cells
4	Testosterone - Secreted by pituitory gland

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

46) Which are **incorrect** and correct statement?
I. Each cell of sporogenous tissue in anther is capable of giving rise to microspore tetrad.
II. The pollen grain represent male gametophyte.
III. Pollen grains are usually triangular and 10-15 mm in diameter.
IV. Sporopollenin is one of the most resistance organic material which can be destroyed only by strong acids and alkali.

(1) I, II are incorrect but III, IV are correct

(2) III, IV are incorrect but I, II are correct

(3) I, III are incorrect but II, IV are correct

(4) II, IV are correct but I, III are incorrect

47) Find the **correct** statement w.r.t. microsporogenesis

(1) Only one cell of sporogenous tissue is capable of meiosis to form four microspore tetrad

(2) Microspores dissociate before PMC divides

(3) Three microspore dissociates and only one remains functional

(4) Microspores are arranged in cluster, as they are formed in microsporogenesis by meiosis

48) Select the **correct** match w.r.t. pollen viability period.

(1) Rice - 30 days

(2) Potato - Several years

(3) Pea - 10 minutes

(4) Wheat - 30 minutes

49) Read the following statements and select the **correct** option.
(A) The synergids have special cellular thickenings called filiform apparatus, which play an important role in guiding the entry of pollen tube.
(B) Three antipodal cells are found towards the micropylar end in most of angiosperms.

(1) Both A and B are correct.

(2) Only A is correct.

(3) Only B is correct.

(4) Both A and B are incorrect.

50) **Assertion :-** Tapetum is a nutritive layer of microsporangium
Reason :- Tapetum is responsible for storage of food.

(1) Both **Assertion** and **Reason** are true but **Reason** is NOT the correct explanation of **Assertion**.

(2) **Assertion** is true but **Reason** is false.

(3) **Assertion** is false but **Reason** is true.

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

51) **Assertion :** Pollen consumption has been claimed to increase the performance of athletes and race horses.
Reason : Pollen grains are rich in nutrients.

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

(2) Assertion is correct but Reason is incorrect.

(3) Assertion is incorrect but Reason is correct.

(4) Both Assertion and Reason are correct and Reason is not the correct explanation of Assertion.

52) **Statement-I :-** Pollen grains can withstand high temperature and strong acid and alkali.

Statement-II :- Intine of pollen grain is made up of sporopollenin.

(1) Both **Statement I** and **Statement II** are incorrect.
(2) **Statement I** is correct and **Statement II** is incorrect.
(3) **Statement I** is incorrect but **Statement II** is correct.
(4) Both **Statement I** and **Statement II** are correct.

53) If the number of chromosomes in gamete (n) of corn is 12. What will be the number of chromosome in polar nuclei, embryo, synergids respectively?

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

54)

Consider the following five statements (a-e) and select the option which includes all the **correct** ones only :-
(a) Vegetative cell is bigger, has abundant food reserve and a large irregularly shaped nucleus.
(b) Over 60 percent of angiosperms, pollengrains are shed at 3-celled stage.
(c) Pollen grains can be stored for years in liquid nitrogen (–196°C).
(d) Members of Rosaceae, Leguminosae and Solanaceae the pollen grains are viable for few months.

(e) Pollen grains are poor in nutuients.
(1) a, b, c, d
(2) a, c, d
(3) b, c, d
(4) a, c, d, e

55) **Assertion** : Megaspore mother cell undergoes meiosis.
Reason : A functional megaspore is the first cell of female gametophyte.

(1) Assertion and reason both are true and the reason is correct explanation of assertion
(2) Assertion and reason both are true but reason is not correct explanation of assertion
(3) Assertion is true but reason is wrong
(4) Assertion and reason both are wrong

56) Which one of the following statement is **correct** ?

(1) Ovules mature into fruits
(2) Ovary develops into seeds
(3) The fruit may be fleshy in groundnut and mustard
(4) The wall of the ovary develops in to wall of fruit

57) Given below are two statements : one is labelled as Assertion (A) and the other is labelled as Reason (R)

Assertion : In majority of flowering plants development of female gametophyte is monosporic
Reason : In majority of flowering plants one of the megaspore is functional while other three degenerate and only functional megaspore develop into female gametophyte.
In the light of the above statements, choose the correct answer from the options given below :

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

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

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

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

58) Which one of the following statements regarding pre fertilization event in flowering plants is **correct**?

(1) Ovary develops into fruit

(2) Zygote develops into embryo

(3) Megaspore develops into embryo sac

(4) Central cell develops into endosperm

59) If a typical angiosperm anther has 50 microspore mother cells in its each sporangium. Calculate the total number of microspore tetrads, pollen grains and male gametes respectively produced by the anther?

(1) 200, 400, 800

(2) 200, 800, 1600

(3) 800, 1600, 3200

(4) 400, 800, 1600

60) Which statement is **incorrect** regarding *Parthenium* ?

(1) It came into India with imported wheat

(2) It causes pollen allergy

(3) Now it becomes ubiquitous in occurrence

(4) It is also known as sea grass

61) Select how many statement are true for tapetum?
(A) Polyploid
(B) Have dense cytoplasm
(C) Became uninucleated by endomitosis
(D) Mainly help in protection & Dehiscence of anther

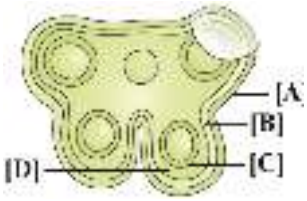
(1) 1

(2) 2

(3) 3

(4) 4

62) Given below is the diagrammatic view of anther T.S. Identify the parts labelled A,B,C and D and

select the right option about them. 

	Part-A	Part-B	Part-C	Part-D
(1)	Endothecium	Epidermis	Tapetum	Middle layers
(2)	Epidermis	Endothecium	Tapetum	Middle layers
(3)	Epidermis	Endothecium	Sporogenous tissue	Middle layers
(4)	Endothecium	Epidermis	Middle layers	Sporogenous tissue

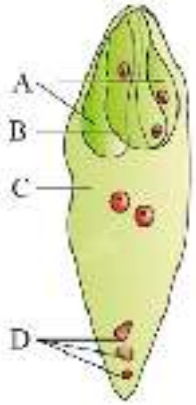
(1) 1

(2) 2

(3) 3

(4) 4

63) Given below a diagram of mature embryosac. Identify the parts labelled A, B, C and D and select



correct option about them.

	Part-A	Part-B	Part-C	Part-D
(1)	Synergids	Egg	Central cell	Antipodals
(2)	Egg	Synergids	Central cell	Antipodals
(3)	Antipodals	Central cell	Synergids	Egg
(4)	Central cell	Egg	Synergids	Antipodals

(1) 1

(2) 2

(3) 3

(4) 4

64)

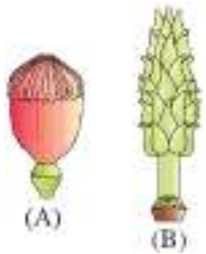
Read the following statements (A-D)
(A) Megaspore is the first cell of male gametophyte
(B) In a mature anther only two layers are present in flowering plants
(C) Anatropous ovule is considered as typical ovule of angiosperms
(D) In angiosperms both male gametes are non motile
How many of the above statements are **correct**.

(1) 1

(2) 2

(3) 3

(4) 4

65) 

Choose **correct** option with regarding above diagram :-

(1) A-Multicarpellary syncarpous gynoecium-*Michelia*
B-Multicarpellary syncarpous gynoecium-*Papaver*

(2) A-Multicarpellary syncarpous gynoecium-*Papaver*
B-Multicarpellary apocarpous gynoecium-*Michelia*

(3) A-Multicarpellary apocarpous gynoecium-*Papaver*
B-Multicarpellary syncarpous gynoecium-*Michelia*

(4) A-Multicarpellary apocarpous gynoecium-*Papaver*
B-Multicarpellary apocarpous gynoecium-*Michelia*

66) Select the **incorrect** statement from the following.

(1) In some cereals such as rice and wheat pollen grains lose viability within 30 minutes.

(2) Multicarpellary syncarpous pistil is found in Papaver.

(3) The body of ovule fuses with funicle in the region called hilum.

(4) Each ovule has many protective envelopes called integuments.

67) What will be the number of chromosomes in antipodal cells of a plant with 40 chromosome in vegetative cell of pollen grain.

(1) 60

(2) 30

(3) 40

(4) 20

68) Which of the following parts are related to ovule structure.

(1) Integuments, Tapetum and Funiculus

(2) Integuments, Nucellus and Tapetum

(3) Nucellus, Funiculus and Tapetum

(4) Integument, Nucellus and Micropyle

69) In most of the angiosperm functional megaspore lies towards ..... and produces, 7 – celled and 8 – nucleate embryo sac.

(1) Micropylar end

(2) Chalazal end

(3) Central megaspore

(4) Any of the four

70) Which of the following statement is **wrong.**

(1) Pollen grain in some plants remains viable for months.

(2) Tapetum nourishes the developing pollen

(3) Vegetative cell is larger than generative cell.

(4) At germ pore intine is absent, only thin exine is present.

71) Filliform apparatus are present at the ……..part of the synergids and guides the entry of pollen tube.

(1) Chalazal

(2) Micropylar

(3) Central cell

(4) Basal

72) Select the **mismatched** pair:

(1) Microsporangium – pollen sac

(2) Megasporangium - ovule

(3) Pollen grain – male gamete

(4) Embryo sac - female gametophyte

73) Mass of cell enclosed within the integuments in ovule is called

(1) Chalaza

(2) Endosperm

(3) Nucellus

(4) Sporogenous tissue

74) Pollen grains are well preserved as fossils because of the presence of …… on their wall.

(1) Vegetative cell

(2) Generative cell

(3) Sporopollenin

(4) Pectin

75) The formation of two male gametes in flowering plants occurs by

(1) Meiosis of microspore mother cell
(2) Mitosis of microspore
(3) Mitosis of vegetative cell
(4) Mitosis of generative cell

76) Most common type of ovule found in angiospermic plants is :-

(1) Anatropous
(2) Hemitropous
(3) Campylotropous
(4) Circinotropous

77) In angiosperm anther is generally

(1) Unilobed and dithecous
(2) Bilobed and dithecous
(3) May be both (1) and (2)
(4) Bilobed and tetrathecous

78) Typical microsporangium appear _____ in transverse section.

(1) Wavy
(2) Circular
(3) Oval
(4) Irregular

79) Which of the following is **correct**

(1) The number of stamens is variable in flowers of different species
(2) The length of stamen is constant in flowers of different species
(3) The distal end of filament of stamen is attached to thalamus or petal of flower
(4) Anther and funicle are the two parts of a stamen

80) Formation of pollen grain from pollen mother cell is referred to as

(1) Pollenogenesis
(2) Megasporogenesis
(3) Microsporogenesis
(4) Ovulation

81) Thin and continuous layer of pollen made up of cellulose and pectin

(1) Intine
(2) Exine

(3) Germ pore

(4) Tapetum

82) Select the **incorrect** statement from the following.
(A) Parthenium or carrot gases causes pollen allergy.
(B) Vegetative cell of pollen has abundant food reserve.
(C) All pollen's cause severe allergies and bronchial afflictions.
(D) Sporopollenin is the most resistant organic matter known.

(1) All are correct

(2) A only

(3) B only

(4) C only

83) How many embryo sacs are present in an ovule?

(1) One embryo sac

(2) More than one embryo sac

(3) Many embryo sac

(4) Two embryo sacs

84) Typical female gametophyte is

(1) 7-celled 8 nucleate

(2) 6-celled 8 nucleate

(3) 8-celled 7 nucleate

(4) 7-celled 6 nucleate

85) Which one of the following statements is **correct.**

(1) Hard outer layer of pollen is called intine.

(2) Cells of Sporogenous tissue are haploid.

(3) Endothecium produces the microcspores.

(4) Tapetum provides nutrition to developing pollen grains.

86) The outermost and innermost wall layers of microsporangium in an anther are respectively

(1) Endothecium and tapetum

(2) Epidermis and endodermis

(3) Epidermis and middle layer

(4) Epidermis and tapetum

87) **Assertion (A)–** Microspore are haploid and forms haploid pollen grains.
Reason (R)– Micropspore are formed from microspore mother cell by meiosis.

(1) Both assertion and reason are correct and reason is correct explanation of assertion

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

(3) Both assertion and reason are incorrect

(4) Assertion is true but reason is incorrect

88) **Statement I:** The microsporangia develop into pollen sacs, which extend longitudinally all through the length of an anther and are packed with pollen grains.
Statement II: The microsporangium is surrounded by three wall layers – the epidermis, endothecium, and the tapetum, which perform the function of protection and help in the dehiscence of anther to release the pollen.

(1) Statement I and Statement II both are correct.

(2) Statement I is correct, but Statement II is incorrect.

(3) Statement I is incorrect, but Statement II is correct.

(4) Statement I and Statement II both are incorrect.

89) There is characteristics distribution of the cells within the embryosac. Three cells grouped together the chalazal end constitutes

(1) Egg apparatus

(2) Polar nuclei

(3) Central cell

(4) Antipodals

90) Production of embryo sac from the functional megaspore involves.

(1) Single meiotic division

(2) First meiotic and then two successive mitotic division

(3) First meiotic and then three successive mitotic division

(4) Three successive mitotic division

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.	4	4	4	1	2	3	1	3	3	1	3	4	4	1	2	2	3	3	2	3
Q.	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
A.	1	4	1	4	2	3	4	4	4	3	1	2	3	1	1	3	3	3	3	3
Q.	41	42	43	44	45															
A.	2	4	1	4	1															

CHEMISTRY

Q.	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65
A.	1	2	2	1	3	3	4	1	1	1	3	2	1	2	2	3	1	3	3	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	4	2	1	4	2	1	1	3	3	4	2	1	3	1	2	3	3	2
Q.	86	87	88	89	90															
A.	1	4	2	2	1															

BIOLOGY

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

SOLUTIONS

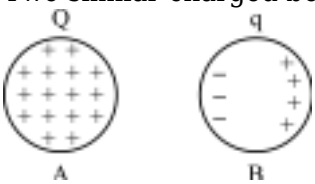
PHYSICS

1) During landing and take off, charge may develop on tyres of aeroplane due to friction which can cause undesired accumulation of charges, leading to spark. To avoid this, tyres are made of slightly conducting material, so that charges develop, will not stay and find its way to earth.

2) $\alpha < \beta$
$\Rightarrow m_1 > m_2$
Nothing can be said about charge

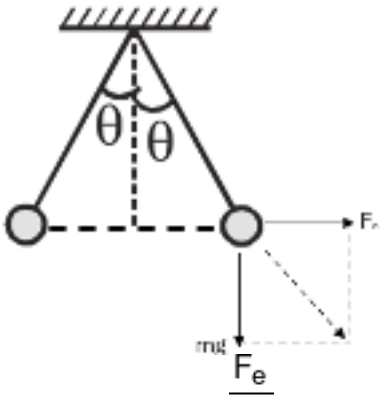
3)

Two similar charged bodies may attract each other only in special case.



If Q and q are similar charge and induced charge of body B is at smaller distance to A as compare to positive charge of B. If q < Q there there is a possibility that attraction is more than repulsion.

4) **Concept :** Equilibrium of suspended charged balls.



Formula : $\tan\theta = \frac{F_e}{mg}$
Calculation :
$\tan\theta = \frac{F_e}{mg}$
as F_e is of same magnitude for both.
$F_e = \frac{k\,(q)\,(4q)}{r^2}$
moreover, mass m is also same.
$\Rightarrow \tan\theta$ is same for both.
Hence the first choice, which shows same angle q for both is correct.

5) Apply superposition of electric field using the fact that electric field is radially outwards.

6) Coulombic attraction exists even when one body is charged and other uncharged.

7) **Concept :** The force on q due to a charge depends on Coulomb's law:

$F = k\frac{|Qq|}{r^2}$

• Like charges repel, and opposite charges attract.

• The horizontal or vertical components of force cancel due to symmetrically if charges are identical in magnitude placed at symmetric locations.

• The net force direction is determined by the dominant vertical or horizontal component.

Formula :

• **Coulomb's Law :** $F = k\frac{|Qq|}{r^2}$

• **Superposition Principle:** Net force is the vector sum of forces due to individual charges.

Matching Process:

• **Case P (All positive):** All forces push charge q away. Net force is upward (+Y) Match with 3.

• **Case Q (Q_1, Q_2 positive, Q_3, Q_4 negative):** Forces from Q_1, Q_2 are repulsive, and those from Q_3, Q_4 are attractive. Net force is toward + x Match with 1.

• **Case R (Q_1 , Q_4 positive, Q_2, Q_3 negative):** The forces cancel in x-direction, leaving net force in – y Match with 4.

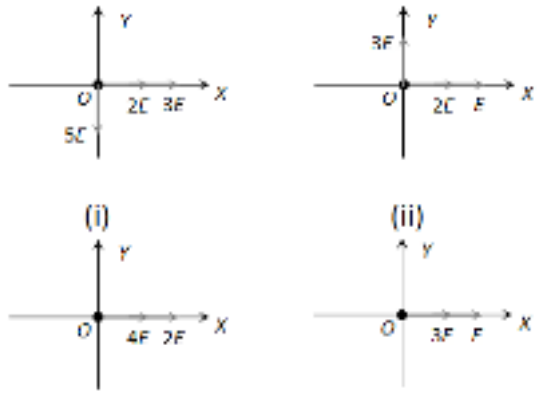
• **Case S (Q_1, Q_3 positive, Q_2, Q_4 negative):** Net force is directed – y Match → with 2.

Final Answer : (3) P-3, Q-1, R-2, S-4.

8)

Total charge remains constant this includes sum of positive and negative charge also charge is independent of speed and frame of reframe.

9) If electric field due to charge |q| at origin is E then electric field due to charges |2q|, |3q|, |4q| and |5q| are respectively 2E, 3E, 4E and 5E



$E_{(i)} = \sqrt{(5E)^2 + (5E)^2} = 5\sqrt{2}E$,

$E_{(ii)} = \sqrt{(3E)^2 + (3E)^2} = 3\sqrt{2}E$,

$E_{(iii)} = 4E + 2E = 6E$ and $E_{(iv)} = 3E + E = 4E$

$\Rightarrow E_{(i)} > E_{(ii)} > E_{(iii)} > E_{(iv)}$

12) $K = \frac{E}{E'}$. For an insulator, E' < E, hence K > 1,
 K = 5

13)

The component of forces will be in -y direction only So, answer is (4).

14)

When two objects are rubbed against each other, they undergo triboelectric charging, where :
One object **gains electrons – becomes negatively charged (– q)**
The other object **loses electrons – becomes positively charged (+ q)**
Since they acquire **opposite charges**, they will experience an **attractive force** due to electrostatic interaction.

According **Coulomb's Law**, the electrostatic force between two point charges is

$$F = \frac{k|q_1 q_2|}{r^2}$$

where :
k is Coulomb's constant,
q_1 and q_2 are the charges on the objects,
r is the separation distance.
since q_1 and q_2 are of opposite signs, the force is **attractive**.
As per given condition, one object is positively charged and the other is negatively charged.
Opposite charges **always attract**, meaning the nature of the force is **attractive**.

Correct Answer is 1

15) $\vec{F}_1 = \frac{k(+10\mu C)(-20\mu C)}{R^2}\{\text{attractive}\}$

$\vec{F}_2 = \frac{k}{R^2}\left(\frac{-10\mu C}{2}\right)^2$

$= \frac{k(+25)(\mu C)^2}{R^2}(\text{Re pulsive})$

$\frac{\vec{F}_1}{\vec{F}_2} = -\frac{200}{25} = -8:1$

16)

For charging any object negatively we need to add electron which intorn increases the mass.

17) **Concept :** Quantization of charge

Formula : q = ne

e → charge of electron (1.6×10^{-19}C)

n → no. of electron

q → total charge

Calculation : $|q| = 80 \times 10^{-6}$ coulomb.

So , n = $\frac{|q|}{e} = \frac{80 \times 10^{-16}}{1.6 \times 10^{-19}} = 5 \times 10^{14}$

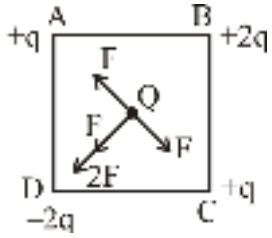
Final Answer : (3) 5×10^{14}

18)

charge is conserved so

Q = 1000q

19)



F_{net} on central

charge is along BD

20)

After Redistribution, $V_1 = V_2 \Rightarrow \frac{Q_1}{Q_2} = \frac{R_1}{R_2}$

$\Rightarrow Q_{25cm} > Q_{20cm}$ (Q ∝ R)

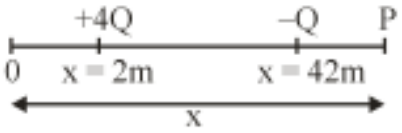
21)

$Fe = F_G$

$$\sqrt{3}\frac{Kq^2}{a^2} = \frac{\sqrt{3}Gm^2}{a^2}$$

$$\frac{q}{m} = \sqrt{\frac{G}{K}} = \sqrt{4\pi\in_0 G}$$

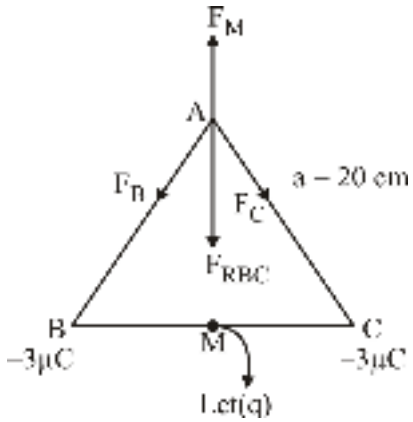
22)



For F = 0, E = 0 for point P-

$$\frac{K(4Q)}{(x-2)^2} = \frac{Q}{(x-42)^2} \Rightarrow x = 82 \text{ m}$$

23)



$(F_{net})_A = 0$

$(F_R)_{BC} = F_M$

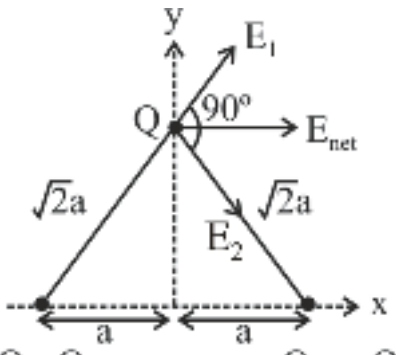
$$\frac{\sqrt{3} \times k \times 3 \times 2 \times 10^{-12}}{a^2} = \frac{k \times 2 \times 10^{-6} \times q}{\left(\frac{\sqrt{3}a}{2}\right)^2}$$

$9\sqrt{3} = 4 \times 10^{-6} \times q$

$$\boxed{q = \frac{9\sqrt{3}}{4}\mu C}$$

24)

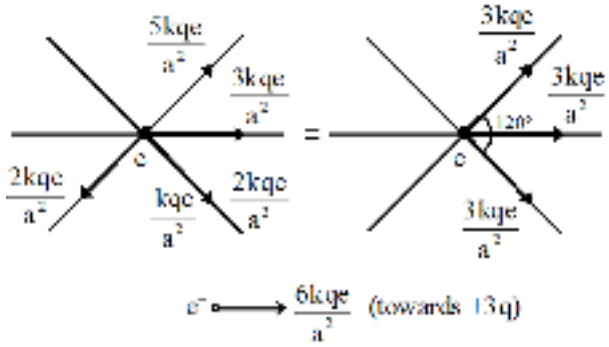
Electric field of given charge Q (at four vertices of square) at centre of square is zero, so any charge placed at centre is in equilibrium.



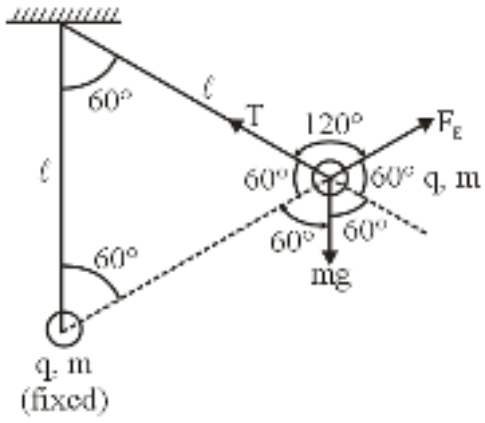
25) $Q_1=Q$ $Q_2=-Q$

$|E_1| = |E_2| = E$

$E_{net} = \sqrt{2}E = \sqrt{2} \times \frac{KQ}{(\sqrt{2}Q)^2} = \frac{\sqrt{2}KQ}{2a^2}\hat{i}$



26)



27)

For suspended charge, At equilibrium -

By Lami's Theorem -

$$\frac{T}{\sin 120^\circ} = \frac{F}{\sin 120^\circ} = \frac{mg}{\sin 120^\circ}$$

$\Rightarrow T = mg = 50$ N

28) A satellite is in a state of free fall & hence weightlessnes. Thus only electric force is responsible for the tension

$T = F_e = \frac{KQ^2}{(2L)^2}$

29) no. of moles = $\frac{90\ gm}{18\ gm} = 5$
no. of moles of e^- = 5 × 10 = 50
Total charge of e^- = 50 faraday

30) Resultant of two vectors $\vec{A}$ and $\vec{B}$ must satisfy A~ B ≤ R ≤ A + B

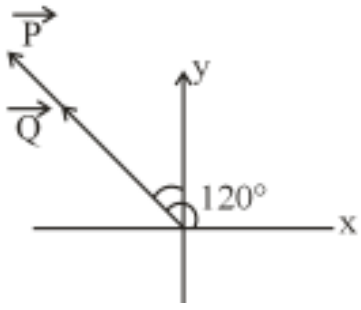
31)

Volume is scalar

32) $\frac{1}{5} = \frac{2}{y} = \frac{1}{z}$
z = 5 y = 10

33) $\sqrt{(0.3)^2 + b^2 + (0.4)^2} = 1$
$0.09 + b^2 + 0.16 = 1$
$b = \sqrt{0.75}$

34) $\frac{3\hat{i} + \hat{j}}{\sqrt{(3)^2 + (1)^2}}$
$\frac{3\hat{i} + \hat{j}}{\sqrt{10}}$



35)
Angle between $\vec{P}$ & $\vec{Q}$ is 0°
 $|\vec{R}| = P + Q$

36) **Question Explain :**
We need to compute the dot product of two given vector expressions:
$\vec{A} + 3\vec{B}).(3\vec{A} - 2\vec{B})$. The dot product follows distributive and commutative properties.

Concept Based :

The dot product of two vectors $\vec{X}$ and $\vec{Y}$ is given by $\vec{X}.\vec{Y} = |X|\,|Y|\cos\theta$. It follows the is distributive law

$(\vec{P} + \vec{Q}).(\vec{R} + \vec{S}) = \vec{P}.\vec{R} + \vec{P}.\vec{S} + \vec{Q}.\vec{R} + \vec{Q}.\vec{S}$

Formula Used :

$(m\vec{A} + n\vec{B}).(p\vec{A} + q\vec{B}) = mp(\vec{A}.\vec{A}) + mq(\vec{A}.\vec{B}) + np(\vec{B}.\vec{A}) + nq(\vec{B}.\vec{B})$

$\vec{A}.\vec{A} = A^2 \vec{B}.\vec{B} = B^2, \vec{A}.\vec{B} = \vec{B}.\vec{A} = AB\cos\theta$

Calculation :

Expanding the given expression:

$(2\vec{A} + 3\vec{B}).(3\vec{A} - 2\vec{B}) = (2\vec{A}).(3\vec{A}) + (2\vec{A}).(-2\vec{B}) + (3\vec{B}).(3\vec{A}) + (3\vec{B})(-2\vec{B})$

$= 6A^2 - 4AB\cos\theta + 9AB\cos\theta - 6B^2$

$= 6A^2 + 5AB\cos\theta - 6B^2$

Answer : The correct answer is option 3.

37) $\left|\hat{A} - \hat{B}\right| = 2 \Rightarrow \sqrt{1^2 + 1^2 + 2 \times 1 \times 1 \times \cos\theta}$

$\Rightarrow \cos\theta = 0 \Rightarrow \theta = 0°$

so $\left|\hat{A} - \hat{B}\right| = \sqrt{1^2 + 1^2 - 2 \times 1 \times 1 \times \cos 0^o}$

$= 0$

38) **(1) Asking About:**

Using the triangle law of vector addition, find the correct relationship between the given vectors.

(2) Concept:

The **triangle law of vector addition** states that if two vectors are represented by two sides of a triangle taken in the same order, their resultant is given by the third side in the reverse order.

For the given triangle:

A. $\vec{C}$ and $\vec{A}$ are in the same order
B. $\vec{B}$ is in the reverse order.

(3) Formula:

The triangle law of vector addition can be expressed as:

$$\vec{C} + \vec{A} = \vec{B}$$

(4) Solution/Explanation:

A. In the given triangle, vectors $\vec{C}$ and $\vec{A}$ are aligned in the same cyclic order.
B. According to the triangle law, the sum of $\vec{C}$ and $\vec{A}$ equals $\vec{B}$ in the reverse direction.
C. Mathematically:

$$\vec{C} + \vec{A} = \vec{B}$$

A. Comparing this with the options, **Option 3** is correct.

(5) Final Answer:

Option 3: $\vec{C} + \vec{A} = \vec{B}$

39) **1. Question Explanation:**
We are given two force vectors of the same magnitude, and we need to determine when the magnitude of their resultant force is maximum, based on their arrangement.

2. Concept-Based:
The subtopic is **Resultant of Two Vectors.** The magnitude of the resultant force depends on the angle between the two vectors.

3. Formula Used:
The formula for the resultant R of two equal magnitude vectors F with an angle θ between them is:
$R = 2F\cos\theta/_2$

4. Calculation:

(i) θ = 90° $R = 2F\cos(\frac{90}{2}) \Rightarrow \sqrt{2}f$

(ii) θ = 120° $R = 2F\cos(\frac{120}{2}) \Rightarrow F$

(iii) θ = 60° $R = 2F\cos\left(\frac{60}{2}\right) \Rightarrow \sqrt{3}F$

5. <u>Answer:</u>→
Magnitude of resultant force is maximum when θ=60° so Answer will be option (3)

40) $x = q_A + q_B + q_C \quad q_A = -4C$
$10 = q_A + q_B + 2 \quad q_B = 12C$
$q_A + qB = 8$

42) Gravitational force doesnt depend on intervening medium.

43) New charges will be –2μC and +3μC.

In first case; $40 = \frac{1}{4\pi\varepsilon_0} \times \frac{3 \times 8}{r^2}$

In second case; $F = \frac{1}{4\pi\varepsilon_0} \times \frac{(-2 \times 3)}{r^2}$

$\frac{F}{40} = \frac{-2 \times 3}{3 \times 8}$

or F = –10N

44) $F_{elec} = \frac{kq_1q_2}{r^2}$

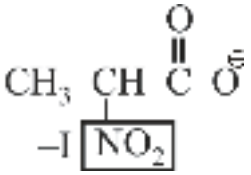
$F_{grav} = \frac{Gm_1m_2}{r^2}$

45) By rebelling glass rod acquires positive charge as silk acquires negative charge.

CHEMISTRY

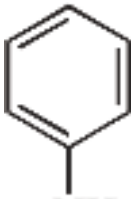
46)

–I effect ∝ Acidic strength
+I effect ∝ Basic strength



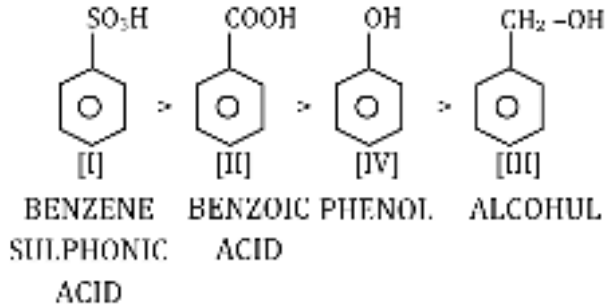
* Most stable anion due to maximum –I effect.
* Most acidic

47)



In $:NH_2$ lone pair is delocalised because involved in resonance.

48) - ORDER of R
INORGANIC ACID > ORGANIC ACID > PENOL > ALLOHOL
- ACIDIC STRENGTH [Ka] × - M effect
× - I effect
- More is the stability of ANION [Formed after donation of H^+] more is Ka



49) **A. Question Explanation**
The question asks the correct order of the acidity in the given compounds:
B Given Data:

A. A list of carboxylic acids:

The compounds provided are:

A. FCH_2COOH (Fluoroacetic acid)
B. $CICH_2$ COOH (Chloroacetic acid)

C. $BrCH_2COOH$ (Bromoacetic acid)
D. CH_2COOH (Acetic acid)

C Concept:

A. Acidity of carboxylic acids: Acidity of carboxylic acids is primarily determined by the stability of their conjugate bases (carboxylate ions).
B. Inductive Effect: Halogen atoms (F, Cl, Br) exhibit an electron-withdrawing inductive effect (-1 effect). This effect pulls electron density away from the carbonyl carbon and the O-H bond in the carboxylic acid.
C. Conjugate Base Stability: A stronger -I effect stabilizes the negative charge on the carboxylate ion by dispersing it. More stable conjugate bases correspond to stronger acids.

D Explanation:

A. **Electron-withdrawing ability of halogens:** Fluorine (F) is the most electronegative halogen, followed by chlorine (CI) and bromine (Br).
B. **Inductive effect strength:** The -I effect decreases in the order: F > CI > Br.
C. **Conjugate base stability:**

A. FCH_2COOH: Strongest -I effect, most stable conjugate base.
B. $CICH_2$ COOH: Moderate -I effect, moderately stable conjugate base.
C. $BrCH_2COOH$: Weakest -I effect among the halogens, least stable conjugate base among the halogenated acids.
D. CH_2COOH: + I effect, least stable conjugate base.

D. **The order of acidity is:** $FCH_2COOH > CICH_2COOH > BrCH_2COOH > CH_2COOH$

E Final Answer: 1

50)

Fact

51) It have C_{sp^2} as well as alpha hydrogen.

52)

Stability of Alkene ∝ (No. of α – H)
(1) ⇒ 1 α – H
(2) ⇒ 4 α – H
(3) ⇒ 1 α – H
(4) ⇒ 8 α – H

53) Order of –I effect : $-\overset{\oplus}{N}R_3 > -CN > -F > -Cl$

54)

I-effect is distance dependent.

55)

$-\overset{\ominus}{\underset{\ominus}{O}}$ shows +I & +M effect both.

56)

ability of carbocation [C^+] × + M effect
× Resonance
× Number of $\alpha - H$
× + I effect

$\overset{\oplus}{C}H_3-CH_3$ $3\alpha - H$

∴ is most stable

57)

Stability of C^- ∝ –M / Resonance / –I

58) It is antiaromatic (1st)

59)

Antiaromatic compounds are unstable at room temperature.

60)

2nd have incomplete octet

61)

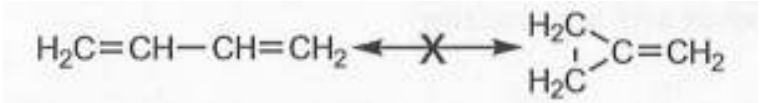
⇒ Atoms/group of atoms attached directly to conjugated system if contains lone pair then it acts as +M/+R group and effect is called go +M/+R effect

→ ∵ $-\ddot{N}H_2$ acts go +M/+R group

62) **A. Question:** The question which of the following Resonance present in.
B. Given Data:

C. Concept: Rules for writing resonating structure: -

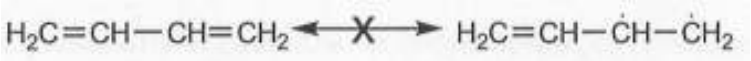
1. The -bond skeleton will remain same in two resonating structures.



2. The atoms are not moved.

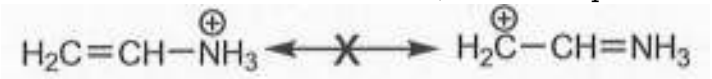
3. The no. of paired electron are same and no. of unpaired electron are same in two resonating

structure.



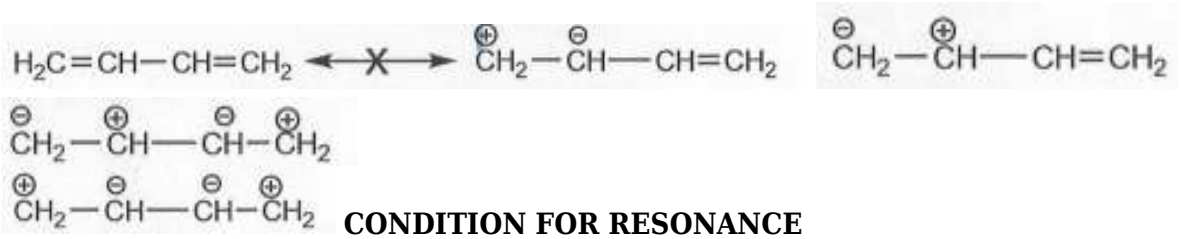
no. of paired $e^{\ominus}$ = 4 no. of paired $e^{\ominus}$ = 2
no. of unpaired $e^{\ominus}$ = O no. of unpaired $e^{\ominus}$ = 2

4. The octet rule is not violated (for second period element).



5. High Energy Structure (H.E.S.) are rejected as resonating structure or their contribution to the resonance hybrid is least.

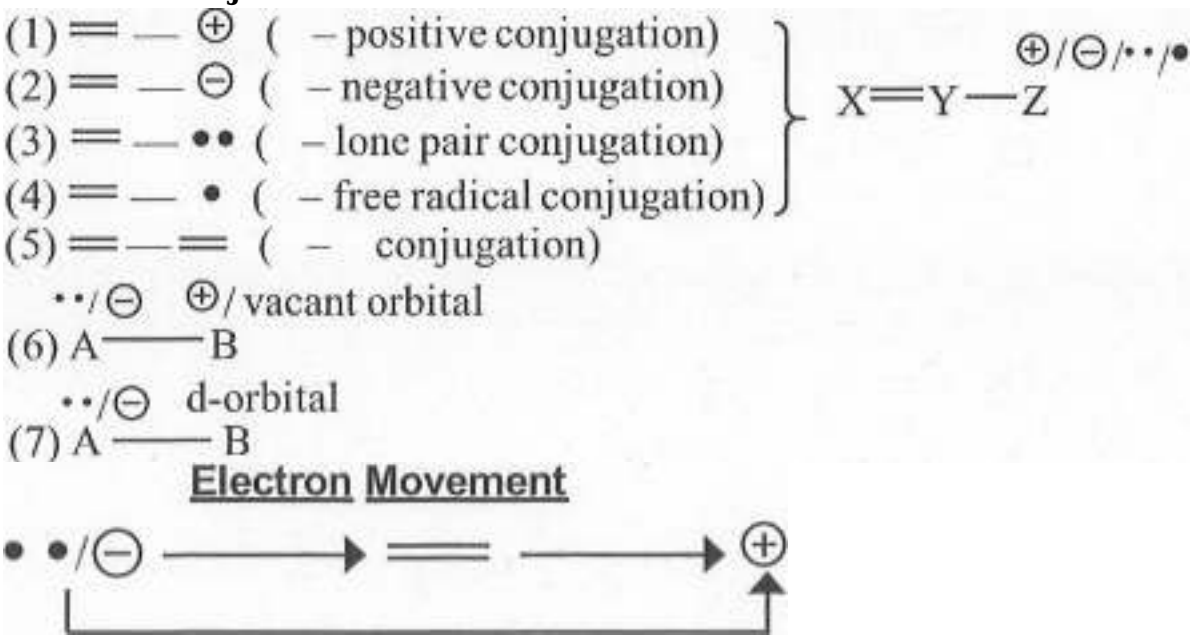
6. Opposite charge on adjacent atoms and similar charge on adjacent atoms are cases of high energy. They are not accepted as resonating structures.



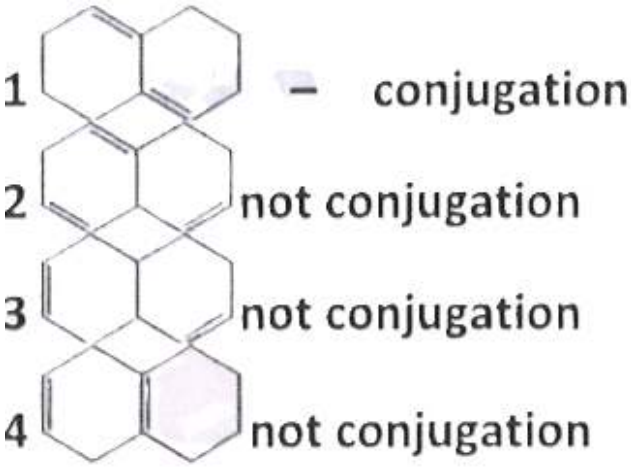
CONDITION FOR RESONANCE

System must have conjugation. (parallel 'p' orbitals with at least one electron pair)

TYPES OF CONJUGATED SYSTEM:



D. Explanation:

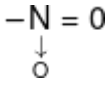


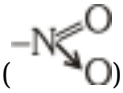
E. Final Answer: 1

63)

Fact

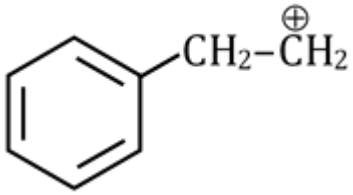
64) **Solution :-** Any specie attached directly to conjugated system if in the form of – X = Y or – X ≡ Y & E.N of Y > X then it acts as – M group

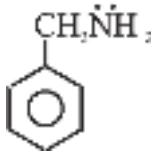
→ Here  is therefore is –M group

Answer -3 ()

65) $\overset{\oplus}{N}H_3$ does not act as electrophile due to complete octet and unavailability of vacant orbital.

66)

Resonance shown by 

67) 

In lone pair on nitrogen is not involved in resonance
 most basic and pK_b is minimum.

68) Carbanion carbon does not show H-effect due to complete octet.

69)

Concept:

Those property which function of volume will depend on temperature. (i) m = $\frac{n}{W_{(kg)}}$; (ii) m = $\frac{m}{V_{(\ell)}}$; %(w/n) = $\frac{\text{Mass of solute}}{\text{Volume of solution}} \times 100$; N = $\frac{\omega}{E \cdot V_{(\ell)}} \times 100$

Final Answer : (2) II, III, IV

78) Molarity is the no. of moles of solute dissolved per litre of solution.
Molality is defined as number of moles of solute present in 1kg of solvent.
The ratio of mole fraction of solute and solvent is in the ratio of their respective moles.

80) $X = \frac{\frac{46}{92}}{\frac{46}{92} + \frac{36}{18}}$

82) $\frac{1}{10} = \frac{W \times 1000}{100 \times 40}$
W = 0.4 g

90)

$M_1V_1 + M_2V_2 = M_fV_f$
$750 \times 0.5 + 250 \times 2 = M_f \times 1000$
$M_f = 0.875$

BIOLOGY

91)

Allen module.
Dartos muscle help in regulation of temperature but cremaster muscle help in elevation and depression of Testis.

93)

NCERT Pg.No. 43

98)

Only testis descend down at time of birth for spermatogenesis required lower temperature than Body temp. (2-2.5°C)

99) NCERT - Pg. # 43

101)

XIIth NCERT PAGE NO. 27

102) NCERT Pg. no. # 43

107)

Both statement I and statement II are correct.

111) NCERT Pg # 43

116)

Ncert Pg. No. 43

120) NCERT page: 27

125)

NCERT-XII, Pg. # 27

126)

NCERT -XII, Pg. # 27

129)

Androgen Binding Protein (ABP) secreted by sustentacular cells (Sertoli cells); which concentrate testosterone.

136)

NCERT pg. # 7

137)

NCERT pg. # 6

138)

NCERT pg. # 8

139) NCERT _12_PG_11_2023-24

140)

NCERT pg. # 5

141) NCERT-XII, Pg. # 24

142)

NCERT pg. # 8

143)

NCERT-XI, Pg. # 87

144)

NCERT, Pg. # 7, 8

145)

NCERT pg. # 8

146) NCERT Pg. # 36

147)

NCERT pg. #NCERT pg. # 10

148)

NCERT pg. # 11

149) Allen module
A typical angiospermic anther is tetrasporangiate, thus 4 x 50MMC's = 200 MMc's ; 200MMc's = 200 tetrads
200 tetrads = 200 X 4 microspores = 800 pollen grains (each pollen grain produces 2 male gametes) ; 800 X 2 = 1600 male gametes

150)

NCERT-XII, Pg. # 7

151) NCERT–XII, Pg. # 21

152)

NCERT pg. # 6

153)

NCERT (XII) Pg. # 26(E) 28(H)

154)

NCERT pg. # 9

155)

NCERT Pg. # 25(E) & 26(H)

156)

NCERT pg. # 8

157)

NCERT pg. # 11

158)

NCERT pg. # 5

159)

NCERT pg. # 11

160)

NCERT pg. # 7

161)

NCERT pg. # 11

162)

NCERT pg. # 7

163)

NCERT pg. # 9

164)

NCERT pg. # 7

165)

NCERT pg. # 7

166)

NCERT pg. # 9

167)

NCERT pg. # 5

168)

NCERT pg. # 5

169)

NCERT pg. # 5

170)

NCERT pg. # 5

171)

NCERT pg. # 7

172)

NCERT pg. # 7

173)

NCERT pg. # 10

174)

NCERT pg. # 11

175)

NCERT pg. # 7

176)

NCERT pg. # 7

177)

NCERT pg. # 6

178)

NCERT pg. # 5

179)

NCERT pg. # 11

180)

NCERT pg. # 11