

PHYSICS

1) When 10^{19} electrons are removed from a neutral metal plate, the electric charge on it is :-

- (1) -1.6 C
- (2) +1.6 C
- (3) 10^{+19} C
- (4) 10^{-19} C

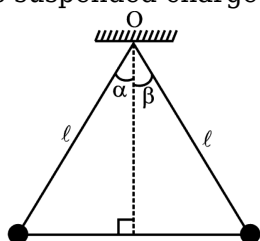
2) Two free positive charges $4q$ and q are a distance ℓ apart. What charge Q is needed to achieve equilibrium for the entire system and where should it be placed from charge q ?

- (1) $Q = \frac{4}{9}q$ (negative) at $\frac{\ell}{3}$ distance
- (2) $Q = \frac{4}{9}q$ (positive) at $\frac{\ell}{3}$ distance
- (3) $Q = q$ (positive) at $\frac{\ell}{3}$ distance
- (4) $Q = q$ (negative) at $\frac{\ell}{3}$ distance

3) Two point charges placed at a distance 10 cm in air exert a force F . The value of distance at which they exert same force when placed in medium has dielectric constant 10 :

- (1) 5 cm
- (2) 10 cm
- (3) $\sqrt{10}$ cm
- (4) $5\sqrt{2}$ cm

4) Figure shows suspended charge ball system. If $\alpha > \beta$ then at equilibrium which of the following



may be true :- (q_1, m_1) (q_2, m_2)

- (1) $q_1 > q_2$ & $m_1 = m_2$
- (2) $q_1 = q_2$ & $m_1 = m_2$
- (3) $q_1 > q_2$ & $m_1 < m_2$
- (4) $q_1 = q_2$ & $m_1 > m_2$

5) A small ball of mass m having charge $+q$ is suspended by a string in a region of uniform horizontal electric field E . The tension in the string will be :-

- (1) mg
- (2) qE
- (3) $mg + qE$
- (4) $\sqrt{(mg)^2 + (qE)^2}$

6) Force between A and B is F . If 75% charge of A is transferred to B then force between A and B is:-



- (1) $\frac{F}{4}$
- (2) $4F$
- (3) F
- (4) None

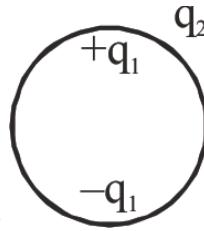
7) Two balls, each of mass M and charge Q are suspended by means of 2 strings of same length L . If separation between the balls is so small then the value of separation in equilibrium is:

- (1) $\left(\frac{2KQ^2L}{Mg}\right)^{1/3}$
- (2) $\left(\frac{2KQ^2L}{Mg}\right)^{2/3}$
- (3) $\left(\frac{2KQ^2L}{Mg}\right)$
- (4) $\left(\frac{2KQ^2L}{Mg}\right)^3$

8) A regular polygon has 20 sides, Equal charges, each of 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' then net force experienced by q is:

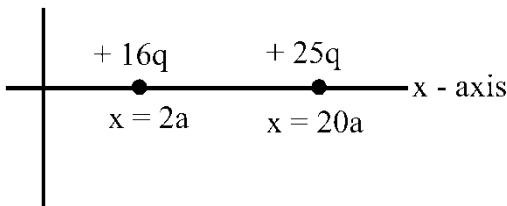
- (1) $\frac{1}{4\pi\epsilon_0} \frac{20Qq}{a^2}$
- (2) $\frac{1}{4\pi\epsilon_0} \frac{qQ}{a^2}$
- (3) $\frac{1}{4\pi\epsilon_0} \frac{19Qq}{a^2}$
- (4) zero

9) Consider the charge configuration and a spherical Gaussian surface as shown in the figure. At the



spherical surface, the electric field will be due to :-

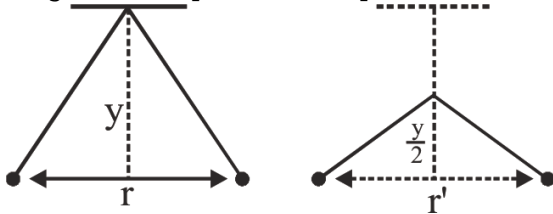
- (1) q_2
- (2) $+q_1$ and $-q_1$
- (3) All the charges
- (4) Only the positive charges



10) Two charge particles are shown in the diagram. Where should a third charge particle q_0 be placed so that q_0 will be in equilibrium :-

- (1) $x = 10 a$
- (2) $x = 8 a$
- (3) $x = 11 a$
- (4) $x = 12 a$

11) Two pith balls carrying equal charges are suspended from a common point by strings of equal length, the equilibrium separation between them is r . Now the strings are rigidly clamped at half the height. The equilibrium separation between the balls now become.



- (1) $\frac{2r}{3}$
- (2) $\left(\frac{1}{\sqrt{2}}\right)^2$
- (3) $\frac{r}{\sqrt[3]{2}}$
- (4) $\left(\frac{2r}{\sqrt{3}}\right)$

12) Two identical spherical conductors A and B have charge $2q$ and $3q$ respectively and repel each other with a force F when kept at a large distance. A third identical but uncharged sphere C is brought in contact with A then brought in contact with B and finally removed away from the system. The new force of repulsion between A and B is :-

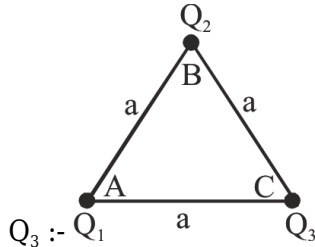
- (1) F

(2) $2F$

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

(4) $\frac{F}{2}$

13) Net electric force on charge placed at corner A is \vec{F}_1 and net force on Q_2 is \vec{F}_2 then net force on



(1) May be more than $F_1 + F_2$

(2) Always equals to $F_1 + F_2$

(3) May be equals to $F_1 + F_2$

(4) Always equals to $F_1 - F_2$

14) Two identical small spheres carry charge of Q_1 and Q_2 with $Q_1 \gg Q_2$. The charges are d distance apart. The force they exert on one another is F_1 . The spheres are made to touch one another and then separated to distance d apart. The force they exert on one another now is F_2 . Then F_1/F_2 is :-

(1) $\frac{4Q_1}{Q_2}$

(2) $\frac{Q_1}{4Q_2}$

(3) $\frac{4Q_2}{Q_1}$

(4) $\frac{Q_2}{4Q_1}$

15) Three point charges q_1, q_2, q_3 are placed at the vertex of a triangle if forces on q_1 and q_2 are $(2\hat{i} - \hat{j})$ N and $(\hat{i} + 3\hat{j})$ N respectively then what will be force on q_3 :-

(1) zero

(2) $(-3\hat{i} - 2\hat{j})$ N

(3) $(\hat{i} - \hat{j})$ N

(4) Can not find

16) Four identical charges Q are fixed at the four corners of a square of side a . The electric field at a point P located symmetrically at a distance $\frac{a}{\sqrt{2}}$ from the centre of the square is :-

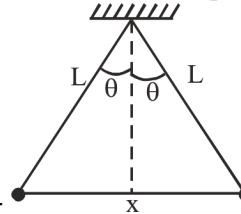
(1) $\frac{Q}{2\sqrt{2}\pi\epsilon_0 a^2}$

(2) $\frac{Q}{\sqrt{2}\pi\epsilon_0 a^2}$

(3) $\frac{2\sqrt{2}Q}{\pi\epsilon_0 a^2}$

(4) $\frac{\sqrt{2}Q}{\pi\epsilon_0 a^2}$

17) Two identical charged balls (each of charge Q and mass M) are suspended by 2 strings of same



length as in figure at equilibrium θ is very small then :-

(1) $x^2 \propto Q^3$

(2) $x^3 \propto Q^2$

(3) $x \propto Q^2$

(4) $x^3 \propto Q$

18) Two metallic spheres of radii 2 cm and 3 cm are given charges of $-10 \times 10^{-3}\text{C}$ and $50 \times 10^{-3}\text{C}$ respectively. If these are connected by a conducting wire, the final charge on the bigger sphere is :-

(1) $40 \times 10^{-3}\text{C}$

(2) $16 \times 10^{-3}\text{C}$

(3) $24 \times 10^{-3}\text{C}$

(4) $30 \times 10^{-3}\text{C}$

19) Which of the following statement is **incorrect** :-

(1) Quantisation of charge at macroscopic level can be ignored.

(2) After discovery of quark particles quanta of charge is still $1.6 \times 10^{-19}\text{C}$.

(3) 1 Coulomb is very large amount of charge.

(4) Coulomb's law is valid for two static as well as for two moving charge particles

20) A point charge $2\mu\text{C}$, of mass 1g released in uniform electric field $3 \times 10^3 \text{ N/C}$ then find distance travelled by particle in 2 sec.

(1) 12 m

(2) 24 m

(3) 6 m

(4) 8 m

21) Sure test of electrification is :-

(1) Attraction

- (2) Repulsion
- (3) Friction
- (4) Induction

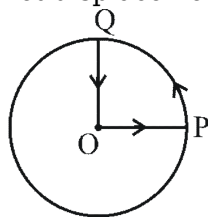
22) Point charges $+4q$, $-q$ and $+4q$ are kept on the x-axis at points $x = 0$, $x = a$ and $x = 2a$ respectively :

- (1) only $-q$ is in stable equilibrium
- (2) none of the charges are in equilibrium
- (3) all the charges are in unstable equilibrium
- (4) all the charges are in stable equilibrium

23) In a region of space the electric field is given by $\vec{E} = 8\hat{i} + 4\hat{j} + 3\hat{k}$. The electric flux through a surface of area of 100 units in the x-y plane is :-

- (1) 800 units
- (2) 300 units
- (3) 400 units
- (4) 1500 units

24) A cyclist starts from the centre O of a circular park of radius one kilometre, reaches the edge P of the park. Then cycles along the circumference and returns to the centre along QO as shown in the figure. If the trip takes ten minutes, the net displacement and average speed of the cyclist (in metre



and kilometre per hour respectively) is:-

- (1) 0,1
- (2) $\frac{\pi + 4}{2}, 0$
- (3) $21.4, \frac{\pi + 4}{2}$
- (4) 0, 21.4

25) If a car covers $\frac{2}{5}$ of the total distance with 2 m/s speed and $\frac{3}{5}$ distance with 3 m/s speed then average speed is

- (1) 5 m/s
- (2) 6 m/s
- (3) 2.5 m/s
- (4) 3.5 m/s

26) The length of a second's hand in a watch is 1cm. Magnitude of change in velocity of its tip in 15 second is :

- (1) 0 cm/sec
- (2) $\frac{\pi}{30\sqrt{2}}$ cm/sec
- (3) $\frac{\pi}{30}$ cm/sec
- (4) $\frac{\pi\sqrt{2}}{30}$ cm/sec

27) A body moves with initial velocity 10ms^{-1} . If it covers a distance of 20m in 2s with constant acceleration, then acceleration of the body is :-

- (1) Zero
- (2) 10ms^{-2}
- (3) 5ms^{-2}
- (4) 2ms^{-2}

28) A particle is moving in x-y-plane at 2 m/s along x-axis. 2 seconds later, its velocity is 4 m/s in a direction making 60° with positive x-axis in ACW direction. Its average acceleration for this period of motion is:-

- (1) $\sqrt{5} \text{ m/s}^2$, along y-axis
- (2) $\sqrt{3} \text{ m/s}^2$, along y-axis
- (3) $\sqrt{5} \text{ m/s}^2$, at 60° with positive x-axis
- (4) 3 m/s^2 , at 60° with positive x-axis.

29) A car starts from rest and moves with uniform acceleration 10 m/s^2 on a straight road from time $t = 0$ to $t = 4\text{s}$. After that, a constant deceleration of same magnitude brings it to rest. In this process the average speed of the car is :-

- (1) 10 m/s
- (2) 30 m/s
- (3) 20 m/s
- (4) 40 m/s

30) A body is projected vertically upwards from ground with a certain speed. If it travels equal distance in third & fourth second of its journey then find total distance travelled when it again strikes the ground ($g = 10 \text{ m/s}^2$) :-

- (1) 160 m
- (2) 250 m
- (3) 90 m
- (4) 100 m

31) If the position vector of a particle is

$\vec{r} = -\cos t \hat{i} + \sin t \hat{j} - 18t \hat{k}$ then what is the magnitude of its acceleration ?

- (1) 0
- (2) 1
- (3) $\sin^2 t$
- (4) $\cos t$

32) Position of a particle moving along x-axis is given by $x = (8t - 4t^2)$ m. The distance travelled by the particle from $t = 0$ s to $t = 2$ s is :-

- (1) 0
- (2) 8 m
- (3) 12 m
- (4) 16 m

33) A packet is dropped from a ballon which is going upward with a velocity 12 m/sec. The velocity of the packet after 2 seconds will be- ($g = 9.8 \text{ m/s}^2$) [Take upward as positive]

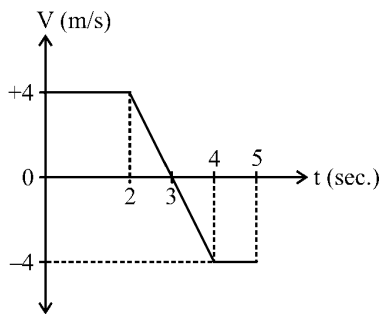
- (1) -7.6 m/sec
- (2) 7.6 m/sec
- (3) 12 m/sec
- (4) -12 m/sec

34) A body is projected vertically upwards with some velocity. It reaches the maximum vertical height h in time t . In time $t/2$, the height covered is :-

- (1) $\frac{h}{2}$
- (2) $\frac{2h}{5}$
- (3) $\frac{3h}{4}$
- (4) $\frac{5h}{8}$

35) Drops of a liquid are falling from the top of a building of height 20 m at a regular time interval such that when 1st drop reaches the ground, third is about to fall, then find the time interval between two successive liquid drops :-

- (1) $\frac{2}{3}$ second
- (2) 1 second
- (3) 2 second
- (4) $\frac{3}{2}$ second



36) The velocity-time graph of a particle moving along straight line is shown in figure. Find the displacement of the particle in 5 seconds :-

- (1) 16 m
- (2) 4 m
- (3) 12 m
- (4) 10 m

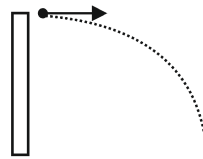
37) A projectile cover range double of its maximum height attained. The angle of projection is-

- (1) $\tan^{-1} 2$
- (2) $\tan^{-1} 4$
- (3) $\tan^{-1} 3$
- (4) $\tan^{-1} 5$

38) A ball is thrown upward from a 80 m tall building with 100 m/s speed at an angle of 30° from the horizontal. Find the maximum height attain by the ball from ground. (Take $g = 10 \text{ m/s}^2$) :

- (1) 125 m
- (2) 110 m
- (3) 180 m
- (4) 205 m

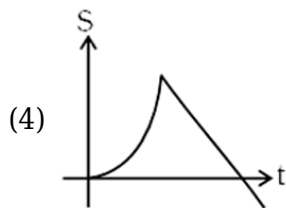
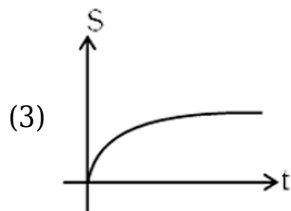
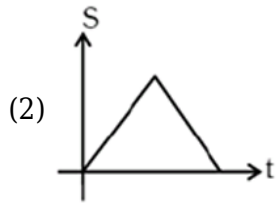
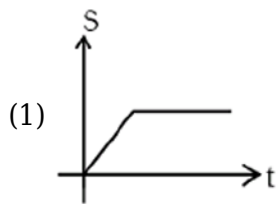
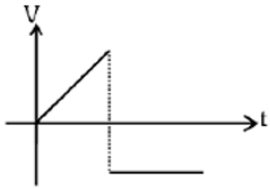
39) A particle is projected horizontally with a speed of 40m/s, from some height at $t = 0$. At what



time will its velocity make 37° angle with the initial velocity ?

- (1) 1 sec
- (2) 3 sec
- (3) 4 sec
- (4) 2 sec

40) For V-t graph shown in figure which one graph is correctly showing S-t graph.



41) A car starting from rest on a straight road first accelerates with 6 m/s^2 . then suddenly decelerates with 3 m/s^2 till it stops. If total time of journey is 10 second, then the maximum speed acquired by the car is -

- (1) 10 m/s
- (2) 20 m/s
- (3) 30 m/s
- (4) 35 m/s

42) Which of the following is(are) example(s) of zero vector?

- (A) The displacement vector of a stationary object.
- (B) The velocity vector of a stationary object.
- (C) The position vector of the origin of coordinate axes.
- (D) The acceleration vector of an object moving with uniform velocity.

- (1) Only A, B, C
- (2) Only B, C, D
- (3) Only A, B, D

(4) All

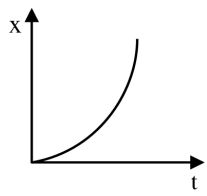
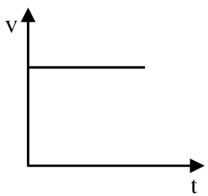
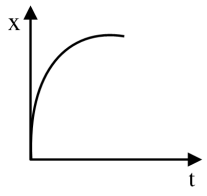
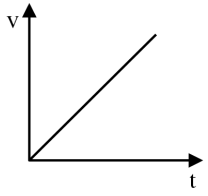
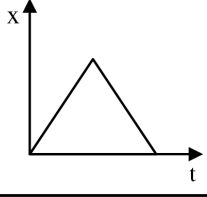
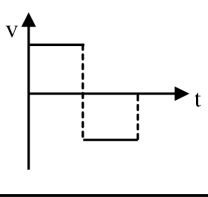
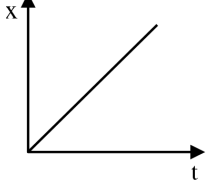
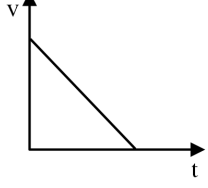
43) Find out the length of train which is moving with constant velocity.

Information I : Train crosses a pole in 5 seconds.

Information II : It cross the bridge of length 500 m in 8 seconds.

- (1) question can be solved by information I only
- (2) question can be solved by information II only
- (3) question can be solved by information I & II together only
- (4) question can not be solved by using these information alone

44) Match column-I with column-II :

	Column-I (x-t graph)		Column-II (v-t graph)
(A)		(I)	
(B)		(II)	
(C)		(III)	
(D)		(IV)	

- (1) A-II, B-IV, C-III, D-I
- (2) A-II, B-II, C-III, D-I
- (3) A-IV, B-II, C-III, D-I
- (4) A-IV, B-III, C-I, D-II

45) The trajectory of a particle near the surface of the earth is given by $y = 2x - 9x^2$. If it was projected at an angle θ with horizontal and with speed v , then $[g = 10\text{m/s}^2]$

(1) $\theta = \sin^{-1}\left(\frac{1}{\sqrt{5}}\right)$ and $v = \frac{5}{3} \text{ m/s}$

$$(2) \theta = \cos^{-1}\left(\frac{2}{\sqrt{5}}\right) \text{ and } v = \frac{3}{5} \text{ m/s}$$

$$(3) \theta = \cos^{-1}\left(\frac{1}{\sqrt{5}}\right) \text{ and } v = \frac{5}{3} \text{ m/s}$$

$$(4) \theta = \sin^{-1}\left(\frac{2}{\sqrt{5}}\right) \text{ and } v = \frac{3}{5} \text{ m/s}$$

CHEMISTRY

1) An element A is invariably bivalent and its oxide is soluble in excess NaOH and the cation of oxide does not have electron in d-subshell :-

- (1) Ca
- (2) Be
- (3) Zn
- (4) K

2) Which of the following reactions would not proceed in the forward direction spontaneously ?

- (1) $\text{Xe} + \text{He}^{\oplus} \rightarrow \text{Xe}^{\oplus} + \text{He}$
- (2) $\text{F} + \text{Cl}^{\ominus} \rightarrow \text{F}^{\ominus} + \text{Cl}$
- (3) $\text{F} + \text{I}^{\ominus} \rightarrow \text{F}^{\ominus} + \text{I}$
- (4) $\text{Be}^{-} + \text{B} \rightarrow \text{B}^{-} + \text{Be}$

3) Select the correct order of Acidic Nature.

- (1) $\text{HF} > \text{HCl} > \text{HBr} > \text{HI}$
- (2) $\text{CO}_2 < \text{CO}$
- (3) $\text{MnO} < \text{MnO}_2 < \text{Mn}_2\text{O}_7$
- (4) $\text{H}_3\text{PO}_2 < \text{H}_3\text{PO}_3 < \text{H}_3\text{PO}_4$

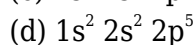
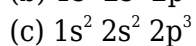
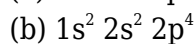
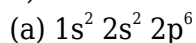
4) Which statements is/are incorrect :

- (1) In alkali metal group, from top to bottom increase in size is maximum from Na to K
- (2) addition of e^{-} in P atom will be exothermic
- (3) IP of F is greater than its EA value
- (4) Reaction $\text{O}_{(g)}^{-} + \text{S}_{(g)} \rightarrow \text{O}_{(g)} + \text{S}_{(g)}^{-}$ is endothermic

5) Which of the following process is exothermic ?

- (1) $\text{N}^{-} \rightarrow \text{N}$
- (2) $\text{Ne} \rightarrow \text{Ne}^{\ominus}$
- (3) $\text{Mg}^{+} \rightarrow \text{Mg}^{+2}$
- (4) $\text{S}^{\ominus} \rightarrow \text{S}^{-2}$

6) Electronic configuration of four elements a,b,c and d are given below :



Which of the following is the correct order increasing tendency to gain electron?

(1) $a < c < b < d$

(2) $a < b < c < d$

(3) $d < b < c < a$

(4) $d < a < b < c$

7)

Which is correct order of EN :-

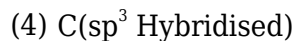
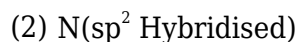
(1) $P < Si$

(2) $B > Tl$

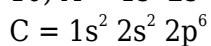
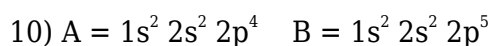
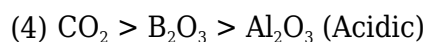
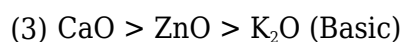
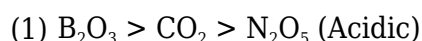
(3) $C > Br$

(4) $In > Tl$

8) Which of the following has the highest electronegativity :-

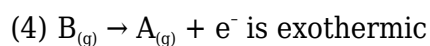
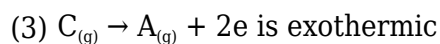
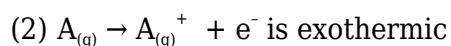
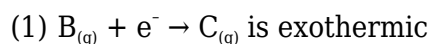


9) Which order is correct ?



A, B & C are atoms/anion of same element. Then which one is correct :-

(One of A/B/C is neutral atom)



11) Which of the following point never be same for IP and EA :-

- (1) Both are decided by Z_{eff} in a period
- (2) Both depends upon size in a group
- (3) Both are affected by penetration power
- (4) Both are maximum for noble gas configuration

12)

Total number of compounds which does not exist among the followings ?

PH_5 , SF_2 , SF_5 , ClF_4 , SH_4 , XeF_6 , XeO_3 , FCl_3 , PCl_6^- , PCl_4 , XeO_2F_2 , CF_6^{2-} , S_2 (Vapour)

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

13)

Correct order of EA is ?

- (1) $\text{Cl} > \text{Br} > \text{F} > \text{I}$
- (2) $\text{S}^+ < \text{O}$
- (3) $\text{N}^+ > \text{O}^+$
- (4) $\text{Se} < \text{Te}$

14)

Identify the correct order of Bond strength ?

- (1) $\text{C}-\text{C} < \ddot{\text{N}}-\ddot{\text{N}} < \ddot{\text{O}}-\ddot{\text{O}} < \ddot{\text{F}}-\ddot{\text{F}}$
- (2) $\text{N} \equiv \text{N} > \text{O} = \text{O} > \text{H}-\text{F}$
- (3) $\text{C} \equiv \text{C} > \text{C} = \text{O} > \text{C} = \text{S}$
- (4) $\text{H}-\text{F} < \text{H}_2$

15) Which of the following combination of orbitals does not form covalent bond (x-axis is internuclear axis):-

- (1) $s + p_y$
- (2) $p_y + p_y$
- (3) $d_{xz} + d_{xz}$
- (4) $d_{xy} + p_y$

16)

Identify correct match

	Type of overlapping	Bond formed	Internuclear axis
(1)	$p_x + p_x$	π	X
(2)	$p_x + d_{xz}$	π	X
(3)	$p_z + d_{xz}$	π	X
(4)	$s + p_z$	π	X

(1) 1

(2) 2

(3) 3

(4) 4

17)

Identify the correct statement ?

(1) Valency with respect to oxygen first increase then decreases in a period.

(2) Valency with respect to hydrogen increases continuously in a period.

(3) During protonation of H_2O molecule the Hybridisation of 'O' atom remains same.

(4) AlF_3 is incomplete octet molecule.

18) Which of the following bonds has the highest energy :-

(1) Se-Se

(2) Te-Te

(3) S-S

(4) O-O

19) Incorrect statement is :-

(1) s-s overlapping is always weakest

(2) In SiO_2 , each 'Si' atom is surrounded by four 'O' atoms tetrahedrally

(3) Coaxial overlapping always produce σ bond

(4) Hybrid orbitals mostly produce σ bonds

20)

Correct order of IP for :

(1) $O^\ominus > S^\ominus$

(2) $Cl^\ominus > Br^\ominus$

(3) $Ne^+ < N$

(4) $O^+ < N$

21)

Identify the correct order of Bond length ?

- (1) $(C - H) < (O - H)$
- (2) $(C = C) > (C = N)$
- (3) $(C - O) = (C - N)$
- (4) $(C = N) < (C \equiv C)$

22) In which of the following promotion of e^- is not required for bonding :-

- (1) C_2H_2
- (2) SiO_2
- (3) $H - N \equiv C$
- (4) SF_6

23) A compound contains element X,Y,Z with oxidation no. +3, +5 and -2 respectively. What will be possible formula of compound containing above elements.

- (1) XYZ
- (2) $Y_2(XZ_3)_2$
- (3) $X_3(YZ_4)_3$
- (4) $X_3(Y_4Z)_2$

24) In combustion reaction of CH_4 number of electrons involved is :-

- (1) 4
- (2) 8
- (3) 6
- (4) 2

25) Which of the following equations hydrogen peroxide acts as a reductant?

- (1) $2FeCl_2 + 2HCl + H_2O_2 \rightarrow 2FeCl_3 + 2H_2O$
- (2) $Cl_2 + H_2O_2 \rightarrow 2HCl + O_2$
- (3) $2HI + H_2O_2 \rightarrow 2H_2O + I_2$
- (4) $H_2SO_3 + H_2O_2 \rightarrow H_2SO_4 + H_2O$

26) Match List-I with List-II

	List-I (Compounds/ions)		List-II (Oxidation state of underlined atom)
(A)	$[Cr(NH_3)_4Cl_2]^+$	(I)	-3
(B)	$\underline{N}H_4Cl$	(II)	+6
(C)	$H_2\underline{S}O_8$	(III)	+3

(D)	OsO_4	(IV)	+8
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Choose the correct answer from the options given below :

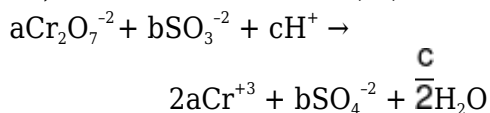
- (1) A-III, B-I, C-IV, D-II
- (2) A-III, B-I, C-II, D-IV
- (3) A-I, B-II, C-III, D-IV
- (4) A-II, B-I, C-IV, D-III

27) **Assertion :-** Oxidation state of Hydrogen is +1 in H_2O while -1 in CaH_2 .

Reason :- CaH_2 is a metal hydride and for metal hydrides, hydrogen is assigned the oxidation number of -1.

- (1) Both Assertion and Reason are correct and Reason is the correct explanation of Assertion.
- (2) Both Assertion and Reason are correct but Reason is not the correct explanation of Assertion.
- (3) Assertion is correct and Reason is incorrect.
- (4) Assertion is incorrect and Reason is correct.

28) What are coefficient a, b, c in the following reaction respectively :-



- (1) 3, 8, 1
- (2) 1, 8, 3
- (3) 8, 1, 3
- (4) 1, 3, 8

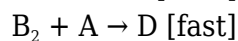
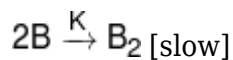
29) A metal M of equivalent mass E form an oxide of molecular formula M_xO_y . The atomic mass of Metal is :

- (1) $\frac{2y.E}{x}$
- (2) $x.y.E$
- (3) $\frac{E}{y}$
- (4) $\frac{y}{E}$

30) 25 mL of a solution of Fe^{2+} ions was reacted with a solution of the oxidizing agent $\text{Cr}_2\text{O}_7^{2-}$. 50 mL of 0.01 M $\text{K}_2\text{Cr}_2\text{O}_7$ solution was required. What is the molarity of the Fe^{2+} solution ?

- (1) 0.6 M
- (2) 0.12 M
- (3) 1.2 M
- (4) 2.4 M

31) The mechanism of the reaction $\text{A} + 2\text{B} \rightarrow \text{D}$ is as under :



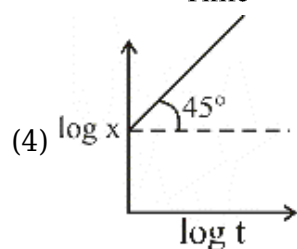
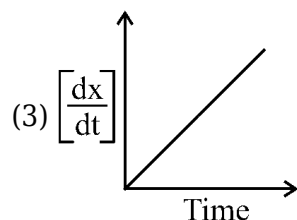
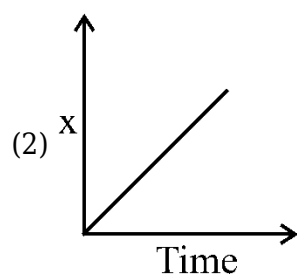
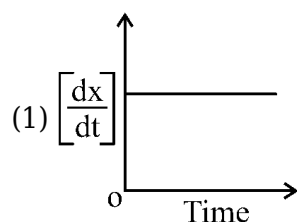
What is the rate, order with respect to A, B and the total order respectively?

- (1) $k[B]^2$, 0, 2, 2
- (2) $k[A][B]^2$, 1, 2, 3
- (3) $k[A]^2$, 0, 2, 2
- (4) $k[A]^2[B]$, 1, 2, 3

32) What amount of reactant remains after 80 minute in zero order reaction if half life ($t_{1/2}$) is 20 minute :-

- (1) $\left(\frac{1}{2}\right)^3$
- (2) 0
- (3) $\left(\frac{1}{2}\right)^2$
- (4) 2^4

33) Which of the following is not the graphical representation for the zero order reaction ?



34) If the slope of a line of the graph between concentration of formed product and time (min) for

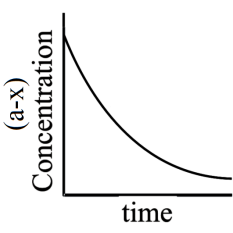
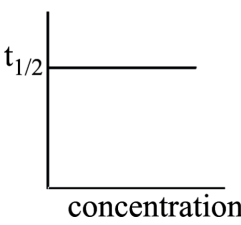
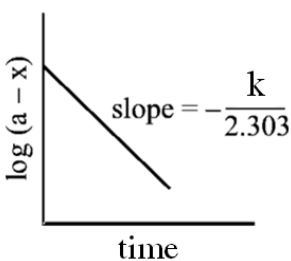
zero order reaction ($A \rightarrow B$) is 0.02 then find the initial concentration of reactant, if after 30 minute its concentration is 0.05 mol L^{-1} , is :

- (1) 0.45 M
- (2) 0.65 M
- (3) 0.25 M
- (4) 0.50 M

35) At 300 K, a gaseous reaction : $A \rightarrow B + C$ was found to follow first order kinetics. Starting with pure A, the total pressure at the end of 20 minutes was 100 mm of Hg. The total pressure after the completion of the reaction is 180 mm of Hg. The partial pressure of A (in mm of Hg) after 20 minutes is :-

- (1) 100
- (2) 90
- (3) 180
- (4) 80

36) The correct graph regarding first order reaction is-

- (1) 
- (2) 
- (3) 

- (4) All of these

37) The rate constant of the reaction,

$2\text{H}_2\text{O}_2 \rightarrow 2\text{H}_2\text{O} + \text{O}_2$ is $3 \times 10^{-3} \text{ min}^{-1}$. At what concentration of H_2O_2 , the rate of reaction will be $2 \times 10^{-4} \text{ Ms}^{-1}$?

- (1) $6.67 \times 10^{-3} \text{ M}$
- (2) 4 M
- (3) 0.08 M
- (4) 2 M

38) The half life period of a first order reaction is 6.93 minutes. The time required for the reaction for the completion of 99% of the chemical reaction will be ($\log 2 = 0.3010$)

- (1) 230.3 min
- (2) 23.03 min
- (3) 46.06 min
- (4) 460.6 min

39) For a reaction $A \rightarrow P$: following data are given

$t_{1/2}$ (sec)	10	20
[A] mol/L	0.2	0.1

what will be order of reaction :-

- (1) Zero order
- (2) 1st order
- (3) 2nd order
- (4) 3rd order

40) The activation energy for the forward reaction $X \rightarrow Y$ is 60 kJ mol^{-1} and ΔH is -20 kJ mol^{-1} . The activation energy for the backward reaction $Y \rightarrow X$ is:

- (1) 80 kJ mol^{-1}
- (2) 40 kJ mol^{-1}
- (3) 60 kJ mol^{-1}
- (4) 20 kJ mol^{-1}

41) When temperature of $A \rightarrow P$ reaction increases from 300 to 310 K then its rate of reaction becomes two times, the activation energy of this reaction will be-

- (1) 53.6 kJ mol^{-1}
- (2) $42.88 \text{ kJ mol}^{-1}$
- (3) $35.88 \text{ kJ mol}^{-1}$
- (4) 60 kJ mol^{-1}

42) For a complex reaction $A \xrightarrow{K} \text{products}$

$E_{a1} = 180 \text{ kJ/mol}$; $E_{a2} = 80 \text{ kJ/mol}$; $E_{a3} = 50 \text{ kJ/mol}$

Overall rate constant k is related to individual rate constant by the equation $k = \left(\frac{k_1 \cdot k_2}{k_3} \right)^{2/3}$.
Activation energy (kJ/mol) for the overall reaction is :-

- (1) 100
- (2) 43.44
- (3) 150
- (4) 140

43) **Statement-I** : In the reaction $N_2 + 3H_2 \rightarrow 2NH_3$, the value of rate of reaction is different in terms of N_2 , H_2 and NH_3 .

Statement-II : Rate of reaction may be equal to the rate of disappearance of a reactant or rate of formation of a product.

- (1) Both **Statement I** and **Statement II** are true
- (2) **Statement I** is true but **Statement II** is false
- (3) **Statement I** is false but **Statement II** is true
- (4) Both **Statement I** and **Statement II** are false

44) Select the correct statement(s) regarding effect of catalyst on reaction :

- (A) It is believed that catalyst provides an alternate pathway with lower activation energy.
- (B) A catalyst does not alter Gibbs energy (ΔG) of reaction.
- (C) It catalyses both spontaneous as well as non spontaneous reactions.
- (D) Catalyst does not changes the equilibrium constant of reaction.

Choose the correct answer from the options given below :

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

45) For gaseous reaction having rate law

$$r = k[A]^2 [B]^{1/2}$$

Match the following :-

	Column-I (Change)		Column-II (Effect on rate)
(A)	Concentration of both A and B is tripled	(P)	4 times
(B)	Pressure of only B reduced to one-fourth	(Q)	5.64 times
(C)	Volume of vessel is decreased to one-half	(R)	0.5 times
(D)	Concentration of only A is doubled	(S)	15.57 times

- (1) A→Q, B→R C→P, D→S
- (2) A→P, B→R, C→S, D→Q
- (3) A→S, B→R, C→Q, D→P
- (4) A→P, B→S, C→R, D→Q

BIOLOGY

1)

Given below are the stages in the life cycle of pteridophytes Arrange the following stages in the

correct sequence.

A. Meiosis in spore mother cells.

B. Fertilization

C. Formation of archegonia and antheridia in gametophyte

D. Prothallus stage

E. Transfer of antherozoids to the archegonia in presence of water.

Choose the correct answer from the options given below :

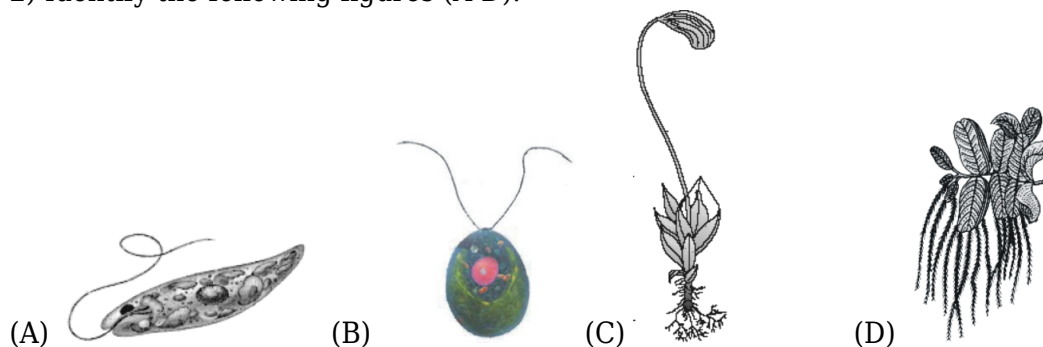
(1) B A D E C

(2) A D C B E

(3) A D E C B

(4) A D C E B

2) Identify the following figures (A-D).



	A	B	C	D
(1)	<i>Euglena</i>	<i>Chlamydomonas</i>	<i>Funaria</i>	<i>Salvinia</i>
(2)	<i>Paramoecium</i>	<i>Chara</i>	<i>Sphagnum</i>	<i>Salvinia</i>
(3)	<i>Euglena</i>	<i>Chara</i>	<i>Marchantia</i>	<i>Pteridium</i>
(4)	<i>Paramoecium</i>	<i>Chlamydomonas</i>	<i>Funaria</i>	<i>Selaginella</i>

(1) 1

(2) 2

(3) 3

(4) 4

3) Which of the following is true for alternation of generation ?

(1) The sporophyte undergoes syngamy to produce spores

(2) The gametophyte undergoes syngamy to produce spores

(3) The sporophyte undergoes meiosis to produce spores

(4) The gametophyte undergoes meiosis to produce gametes

4) (a) Gymnosperms are heterosporous

(b) *Dryopteris* is Pteridophyta

(c) Floridian starch present in *Polysiphonia*

(d) Gemma present on thallus of *Marchantia*

(e) Fucus is Gymnosperm

Wrong statement is/are

(1) b and e

(2) c and d

(3) only e

(4) only a

5) Choose the incorrect statement from followings

(1) The sporophyte of liverwort is more elaborate than that in moss

(2) In *Selaginella* female gametophyte is retained on the parent sporophytes for variable period.

(3) In pteridophytes sporophyte is independent

(4) In gymnosperm, gametophyte do not have an independent free-living existence

6) In which of the following sexual reproduction is oogamous type and accompanied by complex post fertilization development ?

(1) *Chara*

(2) *Ulothrix*

(3) *Ectocarpus*

(4) *Polysiphonia*

7)

Which is not true about agar ?

(1) It is obtained from red algae

(2) It is used to grow microbes

(3) It is used to make ice-cream and Jellies

(4) It is used as food supplement even by space travellers.

8) Read the following five statements (A to E) and select the option with all correct statements :-

(A) Mosses and Lichens are the first organisms to colonise a bare rock.

(B) *Selaginella* is a homosporous pteridophyte

(C) Coralloid roots in *Cycas* have VAM

(D) Main plant body in bryophytes is gametophytic, whereas in pteridophytes it is sporophytic

(E) In gymnosperms, male and female gametophytes are present within sporangia located on sporophyte

(1) (B), (C) and (D)

(2) (A), (D) and (E)

(3) (B), (C) and (E)

(4) (A), (C) and (D)

9) **Statement-I :-** Sporophytes of moss is more elaborate than liver worts.

Statement-II :- Dikaryon stage present in both ascomycetes and phycomycetes.

- (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

10) Match the column I with column II and choose correct option :-

	Column I		Column II
(i)	Red algae	(a)	Pyrenoids
(ii)	Brown algae	(b)	Agar - Agar
(iii)	Blue green algae	(c)	Alginate
(iv)	Green algae	(d)	Water blooms

- (1) (i) - (d), (ii) - (c), (iii) - (b), (iv) - (a)
- (2) (i) - (b), (ii) - (c), (iii) - (d), (iv) - (a)
- (3) (i) - (a), (ii) - (b), (iii) - (d), (iv) - (c)
- (4) (i) - (b), (ii) - (a), (iii) - (d), (iv) - (c)

11) (i) *Selaginella* and *Salvinia* are heterosporous plant.
(ii) Gametophyte of most pteridophyte is called prothallus.
(iii) In *Cycas*, stems are unbranched.
(iv) Gymnosperms are heterosporous.
How many statement/s is/are correct ?

- (1) Two
- (2) Three
- (3) One
- (4) Four

12) **Assertion :** The haploid plant body (gametophyte) produces gamete by mitosis.

Reason : Diploid plant body (sporophyte) produces spores by meiosis.

- (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.

13) Which among the following statements is **wrong** ?

- (1) The strobili bearing microsporophylls & microsporangia are called microsporangiate or male strobili.
- (2) In *Cycas* small specialized roots called coralloid roots are associated with N_2 -fixing cyanobacteria.
- (3) *Sequoia* is one of the tallest tree species.

(4) In *Cycas* the pinnate leaves persist for many years

14) Read the statement A to D & select **wrong** statement :

(A) The pteridophytes include horsetails & fern

(B) Pteridophytes are the first terrestrial plants to possess vascular tissues : xylem & phloem.

(C) In Bryophytes, the dominant phase in the life cycle is the sporophytic plant body.

(D) In Pteridophytes, the main plant body is a gametophyte

(1) only B

(2) only A & C

(3) only C & D

(4) only B & D

15) Which of the following event is a precursor to the seed habit considered an important step in evolution ?

(1) Development of the zygotes into young embryos within the monoecious gametophytes

(2) Development of zygotes into young sporophytes within the male gametophytes

(3) Development of zygotes into zygospores within the female gametophytes

(4) Female gametophyte is retained on parental sporophyte for variable period.

16) Which one of the following is a correct statement ?

(1) The sporophyte in mosses is less elaborate than in liver worts

(2) The sporophyte in mosses is more elaborate than in liver worts

(3) The sporophyte is main plant body in mosses

(4) The sporophyte has only foot and seta in liver worts

17) Stored food of red algae is similar to :

(1) Chitin

(2) Pyrenoid

(3) Amylopectin and glycogen

(4) Glycogen and chitin

18) (a)- Stem of *Pinus* and *Cedrus* are branched

(b)- *Selaginella* is heterosporous pteridophyte

(c)- *Chara* is an algae

(d)- *Marchantia* is dioecious bryophyta

(e)- Protonema is the character of Moss.

From given correct statement is/are

(1) Only a, c, d

(2) Only a, b, c

(3) Only b, c, d

(4) All are correct

19) Select the correct statement.

- (1) The sporophyte in liver worts is more elaborated than that in mosses.
- (2) Protonema stage of mosses bear sex organs.
- (3) In mosses, spores directly germinate to form leafy stage.
- (4) The gametophyte in mosses is more elaborated than that of liverworts.

20) Consider the following **statements** :

- (a) Oogamous type of sexual reproduction
- (b) Belongs to pheophyceae
- (c) Major pigments - Chlorophyll a, c and fucoxanthin
- (d) Food is stored in the form of floridean starch
- (e) Flagella-Absent

How many statements are true about *Fucus* :-

- (1) Four
- (2) Three
- (3) Five
- (4) Two

21) Branched rhizoids and leafy gametophytes are the characteristic of :

- (1) Liverworts
- (2) Mosses
- (3) Ferns
- (4) Conifers

22) In *Cycas*

- (1) Male cones and female cones are present on same plant
- (2) Male cones and female cones are present on different plant.
- (3) Male cones and megasporophylls are present on same plant.
- (4) Male cones and megasporophylls are found on different plants.



23) Which of the following option is **correct** in respect of given diagram ?

- (1) It is an independent sporophyte.
- (2) Gametophyte well differentiated into root, stem and leaf.
- (3) Sporophytic body forms spores by meiosis.
- (4) Gametophyte is partially dependent on sporophyte for food and water

24) Agar-Agar are obtained from :-

- (1) *Porphyra*
- (2) *Gelidium*
- (3) *Spirogyra*
- (4) *Ectocarpus*

25)

List some of the genera are given below :-

Fucus, Chlamydomonas, Polysiphonia, Ulothrix, Gelidium, Ectocarpus

How many above genera reproduce asexually by zoospores formation in favourable condition?

- (1) Four
- (2) Three
- (3) Six
- (4) Two

26) Read the following **statements** (a - e) and answer the question which follows them.

- (a) In liverworts, mosses and most ferns gametophytes are free living
- (b) Gymnosperms and some ferns are heterosporous
- (c) Sexual reproduction in *Fucus*, *Volvox* and *chara* is oogamous
- (d) The sporophyte in liverworts is more elaborate than that in mosses
- (e) Both, *Pinus* and *Marchantia* are dioecious

How many of the above statements are **correct** ?

- (1) Four
- (2) One
- (3) Two
- (4) Three

27) Which one of the following statement is not true for Bryophytes ?

- (1) They are called amphibians of the plant kingdom.
- (2) They are non vascular embryophytic cryptogamous plants.
- (3) Their zygote undergoes meiosis and then produces sporophyte.
- (4) Their spore germinates and produces gametophyte.

28) **Selaginella** and **Salvinia** _____ pteridophyte :-

- (1) Homosporous
- (2) Heterosporous

(3) Polyploid

(4) Aquatic

29) A protonema is :-

(1) A structure in pteridophytes formed before the thallus develops

(2) A sporophytic free living structure formed in pteridophytes

(3) A creeping, green, filamentous and gametophytic structure produced in bryophytes.

(4) A primitive structure formed after fertilization in pteridophytes

30) **Assertion** : A virus is a nucleoprotein and the genetic material is infectious.

Reason : No virus contains both RNA and DNA.

(1) **Assertion** and **Reason** both are correct but **Reason** is NOT correct explanation of **Assertion**.

(2) **Assertion** and **Reason** both are correct and **Reason** is correct explanation of **Assertion**.

(3) **Assertion** is correct but **Reason** is incorrect.

(4) **Assertion** is incorrect but **Reason** is correct.

31) **Statement-I** : The viruses are non-cellular organisms that are characterised by having an inert crystalline structure outside the living cell.

Statement-II : The RNA of the viroid was of high molecular weight.

(1) **Statement I** is incorrect but **Statement II** is correct.

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

(3) Both the **Statements** are correct.

(4) Both the **Statements** are incorrect.

32) In modern medicine certain infectious neurological diseases were found to be transmitted by an agent consisting of abnormally folded proteins. These agents are called as ?

(1) Viruses

(2) Viroid's

(3) Prions

(4) Lichens

33) An infectious agent that was smaller than viruses and caused potato spindle tuber disease, is :

(1) Virus

(2) Prion

(3) Viroid

(4) Bacteria

34)

Read the following statements carefully and select incorrect one ?

(1) Viruses did not find a place in classification since they are not considered truly living.

- (2) W. M. Stanley (1935) showed that viruses could be crystallised and crystals consist largely of proteins.
- (3) Prions are smaller than viruses and cause potato spindle tuber disease.
- (4) Viroids was found to be a free RNA, lacking protein coat.

35) **Assertion** : Mycorrhiza is a symbiotic association between fungi and roots of higher plants.

Reason : Fungi provide shelter, water and minerals to root and root provides water and food to fungi.

- (1) **Assertion** is correct but **Reason** is incorrect.
- (2) **Assertion** is incorrect but **Reason** is correct.
- (3) Both **Assertion** and **Reason** are correct.
- (4) Both **Assertion** and **Reason** are incorrect.

36) **Assertion** : The liverworts grow usually in moist, shady habits such as bark of tree & deep in the woods.

Reason : They are dependent on water for sexual reproduction.

- (1) **Assertion** and **Reason** both are correct but **Reason** is NOT a correct explanation of **Assertion**.
- (2) **Assertion** and **Reason** both are correct and **Reason** are a correct explanation of **Assertion**.
- (3) **Assertion** and **Reason** both are incorrect.
- (4) **Assertion** is correct but **Reason** is incorrect.

37) Which one of the following statement is incorrect ?

- (1) Asexual reproduction in liver worts takes place by gemma.
- (2) The plant body of a liver wort is thalloid.
- (3) In liver worts, the sporophyte is differentiated into a foot, seta and capsule.
- (4) In liver wort's gametophyte consists of two stages. The first stage is the protonema stage. and second is leafy gametophyte.

38) **Assertion** : *Pinus* roots have fungal association in the form of mycorrhiza.

Reason : *Pinus* leaves are well adapted to withstand extremes of temperature, humidity and wind.

- (1) **Assertion** and **Reason** both are incorrect.
- (2) **Assertion** is correct but **Reason** is incorrect.
- (3) **Assertion** is incorrect but **Reason** is correct.
- (4) **Assertion** and **Reason** both are correct.

39) **Statement-I** : In conifers, the needle-like leaves reduce the surface area. Their thick cuticle and sunken stomata also help to reduce water loss.

Statement-II : The male or female cones may be borne on the same tree in *Pinus*.

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

40) **Assertion** : The pteridophytes include horsetails and ferns.

Reason : The pteridophytes are classified into four classes : Psilopsida, lycopsida, sphenopsida, pteropsida.

- (1) **Assertion** and **Reason** both are incorrect.
- (2) **Assertion** and **Reason** both are correct.
- (3) **Assertion** is correct but **Reason** is incorrect.
- (4) **Assertion** is incorrect but **Reason** is correct.

41) **Statement-I** : In majority of the pteridophytes all the spores are of similar kinds.

Statement-II : The female gametophytes in these plants are retained on the parent sporophytes for variable periods.

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

42) Match the column-I with column-II and select correct one ?

	Column-I		Column-II
A.	Psilopsida	(i)	<i>Psilotum</i>
B.	Lycopsida	(ii)	<i>Adiantum</i>
C.	Sphenopsida	(iii)	<i>Selaginella</i>
D.	Pteropsida	(iv)	<i>Equisetum</i>

- (1) A-(i), B-(iii), C-(iv), D-(ii)
- (2) A-(i), B-(ii), C-(iii), D-(iv)
- (3) A-(i), B-(iii), C-(ii), D-(iv)
- (4) A-(i), B-(ii), C-(iv), D-(iii)

43) **Assertion** : Bryophytes produce a multicellular diploid body called a sporophyte.

Reason : Zygote do not undergo reduction division immediately.

- (1) Both **Assertion** and **Reason** are correct and **Reason** is correct explanation of **Assertion**.
- (2) Both **Assertion** and **Reason** are correct but **Reason** is not correct explanation of **Assertion**.
- (3) **Assertion** is correct but **Reason** is incorrect.
- (4) Both **Assertion** and **Reason** are incorrect.

44) **Statement-I** : The main plant body of bryophyte is haploid and produces spore so called it sporophyte.

Statement-II : The sex organs in bryophytes are multicellular and jacketless.

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

(4) Both **Statements** are incorrect.

45) **Assertion** : *Dryopteris*, *Pteris* and *Adiantum* are the member of pteropsida.

Reason : They are homosporous.

(1) **Assertion** and **Reason** both are correct but **Reason** is NOT correct explanation of **Assertion**.

(2) **Assertion** and **Reason** both are correct and **Reason** is correct explanation of **Assertion**.

(3) **Assertion** is correct but **Reason** is incorrect.

(4) **Assertion** and **Reason** both are incorrect.

46) Uterine contractions called foetal ejection reflex for parturition is induced by :

(1) Oxytocin

(2) Fully developed foetus

(3) Placenta

(4) Both 2 and 3

47) In the given below hormones how many are not secreted by placenta in human
HCG, HPL, Cortisol, Estrogens, Progesterone, Thyroxine, Relaxin, Prolactin

(1) 7

(2) 6

(3) 5

(4) 3

48) Normally placenta is formed by the interdigitation of :

(1) Chorionic villi with trophoblast

(2) Chorionic villi with fallopian tube wall

(3) Chorionic villi with uterine wall

(4) Chorionic villi with inner cell mass

49) Colostrum :

(1) Is a hormone essential for milk secretion

(2) can be synthesized by the newborn infant but not by a foetus

(3) Stimulates further secretion of oxytocin for uterine contraction

(4) Is a source of antibodies essential to develop resistance against diseases in new born babies

50) Gestation period is the time interval

(1) From fertilization to lactation

(2) From implantation to parturition

(3) From zygote to death

(4) All

51) Which one of the following is incorrect match :

- (1) Foetal - ejection reflex - Parturition
- (2) First polar body - Oogenesis
- (3) Second polar body - Spermatogenesis
- (4) Implantation - Blastocyst

52) Ectopic pregnancies are referred to as:

- (1) Implantation of defective embryo in the uterus
- (2) Pregnancies terminated due to hormonal imbalance
- (3) Pregnancies with genetic abnormality
- (4) Implantation of embryo at site other than uterus

53) In human female the blastocyst

- (1) Forms placenta even before implantation
- (2) Gets implanted into uterus three days after ovulation
- (3) The trophoblast layer get differentiated as embryo
- (4) Gets implanted in endometrium by help of trophoblast

54) Which one of the following is the function of placenta:

- (1) Facilitates removal of carbon dioxide and waste material from embryo
- (2) Facilitates supply of oxygen and nutrients to embryo
- (3) Secrete estrogen
- (4) All of these

55) **Assertion (A)** : Lactational amenorrhea is based on Barrier method.

Reasons (R) : Lactational amenorrhea method based on the fact that ovulation stopped and there for the cycle do not occur during the period of intense lactation following parturition.

- (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)

56) Match the development of the foetus in accordance with its correct time during pregnancy.

- (1) 8 weeks - heart formation
- (2) 4 weeks - limbs and digits are formed
- (3) 24 weeks - eyelids separate and eyelashes are formed
- (4) 24 weeks - external genital organs developed

57)

Which of the followings when used within 72 hours of coitus, can be very effective as emergency

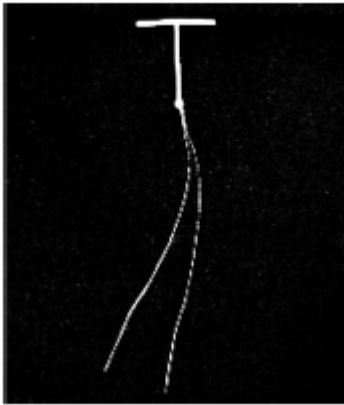
contraceptive?

- a. Administration of progestogens alone
- b. Administration of progestogen and estrogen combinations
- c. Insertion of IUDs within uterus

Choose the correct option

- (1) a only
- (2) a, c only
- (3) b, c only
- (4) a, b, c

58) Which of the following statements are correct with reference to given diagram:



- (1) It is a kind of barrier method for contraception
- (2) They suppress the ovum motility
- (3) They enhances the phagocytosis of ovum
- (4) None of these

59) Which of the following statement is correct :

- (1) Reproductive health means physical, emotional, behavioural, social
- (2) The family planing programme was initiated in 1951
- (3) A rapid decline death rate, MMR and IMR are lead to population growth
- (4) All of these

60) **Statement I :** Surgical methods, also called sterilisation are generally advised for the male/female partner as a terminal method to prevent any more pregnancies.

Statement II : Male contraceptive surgical intervention blocks gamete transport and there by prevent conception.

- (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

61) Late detection and improper treatment of STIs leads to

- (1) Pelvic inflammatory diseases
- (2) Abortions, still birth, ectopic pregnancies
- (3) Infertility or cancer of reproductive tract
- (4) All of these

62) Match the following:

List I		List II	
(a)	IUT	(i)	transfer in fallopian tube at 1-8 celled stage
(b)	ZIFT	(ii)	Embryo transfer in uterus at more than 8 celled stage
(c)	GIFT	(iii)	Induced abortion
(d)	MTP	(iv)	Ova transferred in fallopian tube

- (1) a-ii, b-i, c-iv, d-iii
- (2) a-i, b-ii, c-iii, d-iv
- (3) a-iv, b-i, c-iii, d-iv
- (4) a-i, b-iv, c-iii, d-ii

63) **Statement I :** The world population was around 6 billion in 1900.

Statement II : The world population were 7.2 billion in 2011.

- (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

64) How many matching are not incorrect according to contraceptive method and their modes of action in achieving contraception :

Contraceptive Method		Mode of Action	
a.	Hormonal IUD	i.	Alter the quality of cervical mucus & prevent entry of sperm
b.	Condom	ii.	Barrier
c.	Injections	iii.	Used for female
d.	Implants	iv.	Used for male

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

65) Which of the following is not a component of innate immunity ?

- (1) Interferons
- (2) Phagocytes
- (3) Skin
- (4) Antibodies

66) Who disproved the "good humor hypothesis" of health using thermometer to demonstrate normal body temperature in person with blackbile ?

- (1) Hippocrates
- (2) Indian Ayurveda system of medicine
- (3) William Harvey
- (4) Both (1) and (2)

67) Health is affected by :

- (1) Life style
- (2) Infections
- (3) Genetic disorders
- (4) All of the above

68) Which of the following is important to maintain good health?

- (1) Nutritious diet
- (2) Regular hygiene
- (3) Regular exercise
- (4) All of the above

69) When people are healthy they are?

- (a) More efficient at work
- (b) Decreases productivity
- (c) Brings economic prosperity
- (d) Increases longevity of people
- (e) Increases infant and maternal mortality

How many statements are correct about healthy people :-

- (1) Two
- (2) Three
- (3) Four
- (4) All are correct

70)

What are the advantages of using IVF methods?

- A. Affordable to only a limited number of people
- B. Offer control over the timing of pregnancy.
- C. Can't be a good option for couples facing challenges like infertility, defect in gamete production.
- D. Can't used when fallopian tube is damaged or blocked.

E. Emotional religions and social factors are also deterrent in this method.
Choose the correct answer from the options given below :

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

71)

Which of the following statement is correct ?

- (a) Health is affected by genetic disorders, life style and infections.
- (b) Balanced diet, personal hygiene and infection are very important to maintain good health.
- (c) Health is "absence of disease" or physical fitness" only.

- (1) a, c
- (2) b, c
- (3) a, b, c
- (4) a,b

72) Which of the following options gives the correct categorisation of barriers of Innate immunity ?

	Physical	Physiological	Cellular
(1)	N.K. cell	Saliva	PMNL
(2)	Skin	Tear	W.B.C.
(3)	Mucous	Interferon	T-killer cells
(4)	Fever	Phagocyte cells	Leukocyte

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

73) What is correct about test tube baby :-

- (1) Fertilization inside female genital tract and growth in test tube
- (2) Rearing of prematurely born baby in incubator
- (3) Fertilization outside the body and gestation inside womb of mother
- (4) Both fertilization and full development are occur outside the female genital tract

74) Given below are four methods (A-D) and their modes of action (a-d) in achieving contraception.
Select their correct matching from the four options that follow.

	Method		Mode of Action
A.	Oral pill	(a)	Prevents sperms reaching to cervix

B.	Condom	(b)	Suppresses sperm motility
C.	Vasectomy	(c)	Prevents ovulation
D.	Copper T	(d)	Semen contains no sperms

- (1) A - (c), B - (d), C - (a), D - (b)
 (2) A - (b), B - (c), C - (a), D - (d)
 (3) A - (c), B - (a), C - (d), D - (b)
 (4) A - (d), B - (a), C - (b), D - (c)

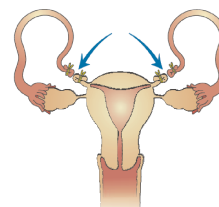
75) **Assertion (A):** Intense Lactation provide natural contraception for maximum upto 6 months.

Reason (R): High level of prolactin cause amenorrhoea.

- (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

76) Case: A lady is 15 weeks pregnant. Various tests confirm that if her child born, it would suffer from a serious illness causing threat to life of new born. What is the best-suggested option to this case as per the medical termination of pregnancy (Amendment) Act. 2017?

- (1) MTP can't be performed
 (2) MTP can be easily performed without any restrictions.
 (3) MTP can be performed only if two registered medical practitioners agree to it.
 (4) MTP can be performed only after determination of sex of the baby.



77) Regarding the given diagram choose the incorrect statement :-

- (1) A sterilisation method
 (2) Prevents conceiving
 (3) Highly effective
 (4) High reversibility

78) If male is impotent and female is fertile then what possible assisted reproductive technique is used for treating infertility in particular couple :-

- (1) G.I.F.T
 (2) Z.I.F.T
 (3) A.I
 (4) I.U.T

79) Arrange the correct sequence of fertilisation process:-

- (A) Intermingling of chromosomes
- (B) Fusion of nucleus of sperm & ovum
- (C) Intermixing of cytoplasm
- (D) Union of male & female gametes

- (1) $D \rightarrow B \rightarrow C \rightarrow A$
- (2) $C \rightarrow D \rightarrow B \rightarrow A$
- (3) $C \rightarrow B \rightarrow A \rightarrow D$
- (4) $D \rightarrow C \rightarrow B \rightarrow A$

80) **Assertion :** The sex of the baby is determined by father and not by the mother.

Reason : 50 percent of sperm carry X chromosome and 50 percent carry the Y.

- (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.

81) Which of the following statement incorrect` about parturition in human?

- (1) Signals for parturition originate from fully develop foetus and placenta.
- (2) It is a complex neuroendocrine mechanism.
- (3) Oxytocin induces endometrium contraction.
- (4) Increase in estrogen and progesterone ratio.

82) Consider the following statements and select the wrong one :-

- (1) Parturition is a complex neuro endocrine mechanism
- (2) The first movement of the foetus & appearance of hairs on the head are usually observed during fifth month of pregnancy
- (3) During parturition, secretion of progesterone decreases but secretion of estrogen increases from placenta
- (4) Progesterone and estrogen are produced in women only during pregnancy

83) Which of the following hormone is/are responsible for parturation

- (i) Progesterone
- (ii) Estrogen
- (iii) Cortisol
- (iv) Oxytocin
- (v) hPL

- (1) i, ii, iii, iv
- (2) ii, iii, iv, v
- (3) ii, iii, iv
- (4) ii, iv only

84)

In the given following four statements (A-D) select the option which includes all the incorrect ones only.

(A) In cleavage G_1 and G_2 are present (B) Single cell zygote changes to multicellular structure through cleavage.

(C) Cleavage starts in uterus

(D) In the interphase of cleavage 'S' phase is absent.

- (1) Statement (A), (B)
- (2) Statement (B), (C), (D)
- (3) Statement (C), (D)
- (4) Statement (A), (B), (C)

85) After three cleavage in embryo egg amount of cytoplasm and DNA will be :

	Amount of cytoplasm	Amannt of DNA
1	Same as fertilised egg	Same as fertilised egg
2	Two time more as compared two fertilised egg	Three time more as compared to fertilised egg
3	Same as zygote	more as compared to unfertilised egg
4	Same as fertilised egg	Less as compared to unfertilised egg

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

86)

How many of the following comes under hormonal method of contraception?

Mala-D, Mala-N, Condoms, Diaphragm, multiload-375 injections, Lippes loop, Cut, implants.

- (1) Seven
- (2) Four
- (3) Six
- (4) Five

87) How many of the following structure are paired in Human ?

- | | |
|----------------------|----------------------------|
| (i) Ovary | (vi) Vagina |
| (ii) Oviduct | (vii) Hymen |
| (iii) Prostate gland | (viii) Bulbourethral gland |
| (iv) Uterus | (ix) Seminal vesicle |
| (v) Cervix | (x) Penis |

- (1) Four
- (2) Five

- (3) Six
- (4) Seven

88) An emergency contraceptive pill is given to a female who is 2 weeks pregnant. This will lead to:

- (1) Termination of pregnancy.
- (2) Prevention of implantation
- (3) Pregnancy is unaffected.
- (4) Degeneration of corpus luteum due to negative feedback of LH.

89)

Read the given statements and select the correct option:

(A) According to the WHO reproductive health means a total well-being in all aspects of reproduction.

(B) India was amongst the first country in the world to initiate action plans and programmes at a national level to attain total reproduction health as a social goal called "family planning" were initiated in 1971. (C) Amniocentesis is used to test for the presence of certain genetic disorder such as Down syndrome, AIDS and sex-detection of foetus. (D) An ideal contraceptive should be user-friendly, easily available, effective and with no or least side-effect

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

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

90) Which of the following sexually transmitted infections are completely curable ?

- (1) HIV infection and Trichomoniasis
- (2) Syphilis and trichomoniasis
- (3) Hepatitis - B and Genital herpes
- (4) Genital herpes and Genital warts

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.	2	1	3	3	4	3	1	2	3	1	3	3	3	3	2	2	2	3	4	1
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	4	1	2	3	3	2	2	1	3	2	2	1	4	2	4
Q.	41	42	43	44	45															
A.	2	4	3	1	3															

CHEMISTRY

Q.	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65
A.	2	2	3	4	1	1	2	3	4	3	4	4	3	3	1	3	3	3	1	2
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	2	2	2	1	4	1	2	1	2	3	2	4	4	2	3	3	1
Q.	86	87	88	89	90															
A.	1	4	3	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.	4	1	3	3	1	4	4	2	4	2	4	2	4	3	4	2	3	4	4	2
Q.	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130
A.	2	4	3	2	1	4	3	2	3	1	2	3	3	3	1	2	4	4	1	2
Q.	131	132	133	134	135	136	137	138	139	140	141	142	143	144	145	146	147	148	149	150
A.	1	1	1	4	1	4	4	3	4	2	3	4	4	4	3	3	4	4	4	4
Q.	151	152	153	154	155	156	157	158	159	160	161	162	163	164	165	166	167	168	169	170
A.	4	1	3	1	4	3	4	4	2	3	1	2	3	3	1	3	4	3	4	1
Q.	171	172	173	174	175	176	177	178	179	180										
A.	3	4	3	3	3	2	1	3	3	2										

SOLUTIONS

PHYSICS

1) **Explanation :**

Given : No. of electron(N) removed out from a neutral metal plate = 10^{19}

To find : The charge (Q) on the plate ?

Concept :

Quantization of electric charge.

Solution :

Magnitude of charge obtained by the plate

$$|Q| = Ne$$

$$= 10^{19} \times (1.6 \times 10^{-19} \text{C})$$

$$= 1.6 \text{ C}$$

Since, electrons were removed from metal



Deficiency of electrons in metal



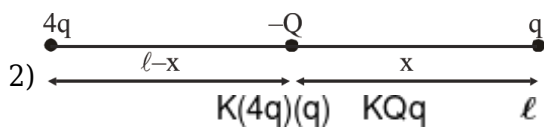
Metal will get positively charged

Hence, Charge

$$Q = +1.6 \text{ C}$$

Final Answer :

Option (2)



$$\text{For charge } q :- \frac{K(4q)(q)}{\ell^2} - \frac{KQq}{x^2} = 0 \Rightarrow x = \frac{\ell}{3}$$

$$\text{For charge } (4q) :- \frac{K(4q)(q)}{\ell^2} = \frac{K(4q)Q}{(\ell-x)^2}$$

$$\Rightarrow Q = \frac{4}{9}q \text{ (negative)}$$

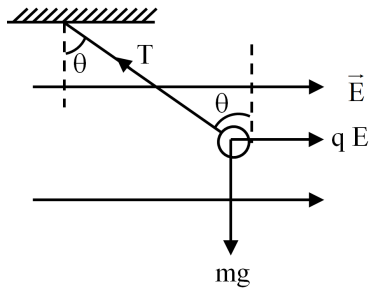
3) **Explanation :**

Case - I

$$4) \because \alpha > \beta$$

$$\Rightarrow m_1 < m_2$$

Nothing can't be said about charge



5)

$$T \cos \theta = mg \quad \dots(1)$$

$$T \sin \theta = q E \quad \dots(2)$$

$$T = \sqrt{(mg)^2 + (qE)^2}$$

6) 1. Question Explanation:

Sphere A has charge $4Q$ and B has Q . 75% of A's charge is transferred to B. Find the new electrostatic force between them in terms of initial force F .

2. Concept:

Electrostatic force changes when charges on objects change. Use Coulomb's law to compare initial and final forces after redistribution.

3. Formula Used:

Initial force: $F = k \frac{q_1 q_2}{r^2}$ New force: $F' = k \frac{q'_1 q'_2}{r^2}$ 4. Calculation:

Initial force:

A. $q_1 = 4Q$ (on A)

B. $q_2 = Q$ (on B)

$$F = k \frac{4Q \cdot Q}{r^2} = \frac{4kQ^2}{r^2}$$

Initial force:

Now, 75% of A's charge is transferred to B:

A. New charge on A:

$$q'_1 = 4Q - \frac{3}{4}(4Q) = 4Q - 3Q = Q$$

A. New charge on B:

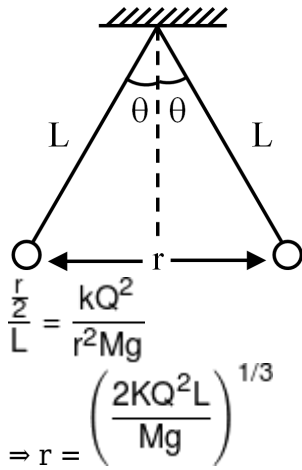
$$q'_2 = Q + 3Q = 4Q \quad \text{New force: } F' = k \frac{Q \cdot 4Q}{r^2} = \frac{4kQ^2}{r^2} \quad \text{Compare with initial force: } F' = F$$

7)

$$\tan \theta = \frac{F_e}{Mg}$$

Separation small

$$\tan \theta = \sin \theta = \frac{F_e}{Mg}$$



8)

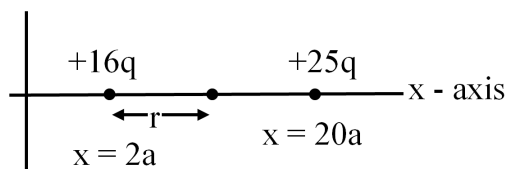
From symmetry

$$F = \frac{kqQ}{a^2}$$

$$= \frac{1}{4\pi\epsilon_0} \frac{qQ}{a^2}$$

9)

As per theory.



10)

Let distance from 16q is r

$$r = \frac{\sqrt{16q} \times 18a}{\sqrt{16q} + \sqrt{25q}}$$

$$= 8a$$

$$\text{So, } x = 2a + r = 10a$$

11)

At equilibrium

$$\tan \theta = \frac{KQ^2}{r^2 mg}$$

$$\frac{r/2}{y} = \frac{KQ}{r^2 mg}$$

$$r^3 \propto y$$

$$\frac{r'^3}{r^3} = \frac{y/2}{y} = \frac{1}{2}$$

$$r' = \frac{r}{3\sqrt{2}}$$

12)

Before process

$$F = \frac{k2q3q}{r^2} \dots(i)$$

After process

$$F' = \frac{kq-2q}{r^2} \dots (ii)$$

$$\boxed{F' = \frac{F}{3}}$$

13)

Use

$$\vec{F}_1 + \vec{F}_2 + \vec{F}_3 = \vec{0}$$

$$\text{So, } \vec{F}_3 = -(\vec{F}_1 + \vec{F}_2)$$

$$|\vec{F}_1 - \vec{F}_2| \leq |\vec{F}_3| \leq \vec{F}_1 + \vec{F}_2$$

$$14) F_1 = \frac{kQ_1Q_2}{d^2} \dots(1)$$

$$F_2 = \frac{k\left(\frac{Q_1+Q_2}{2}\right)^2}{d^2} \dots(2)$$

$$\text{So, } \frac{F_1}{F_2} = \frac{4Q_1Q_2}{Q_1^2 + Q_2^2 + 2Q_1Q_2}$$

$$= \frac{4\frac{Q_1Q_2}{Q_1^2}}{\frac{Q_1^2}{Q_1^2} + \frac{Q_2^2}{Q_1^2} + 2\frac{Q_1Q_2}{Q_1^2}}$$

$$\approx 4\frac{Q_2}{Q_1}$$

15)

$$\text{Use } \vec{F}_1 + \vec{F}_2 + \vec{F}_3 = \vec{0}$$

$$\vec{F}_3 = -(\vec{F}_1 + \vec{F}_2)$$

$$= -\{2\hat{i} - \hat{j} + \hat{i} + 3\hat{j}\}$$

$$= -\{3\hat{i} + 2\hat{j}\}$$

$$= (-3\hat{i} - 2\hat{j}) \text{ N}$$

16)

$$\begin{aligned}
 E &= 4 \frac{kQ}{\left(x^2 + \left(\frac{a}{\sqrt{2}}\right)^2\right)^{\frac{3}{2}}} \\
 &= \frac{4kQ \frac{a}{\sqrt{2}}}{a^3} \\
 &= \frac{4kQ}{\sqrt{2}a^2} \\
 E &= \frac{Q}{\sqrt{2}\pi\epsilon_0 a^2}
 \end{aligned}$$

17)

As per theory.

18) Divide the net charge in proportion of their radii.

19)

As per theory.

20)

$$\begin{aligned}
 S &= ut + \frac{1}{2}at^2 \\
 u &= 0, a = \frac{F}{m} = \frac{qE}{m} \\
 t &= 2 \text{ sec.} \\
 \text{So,} \\
 S &= 0 + \frac{1}{2} \left(\frac{2 \times 10^{-6} \times 3 \times 10^3}{10^{-3}} \right) (2)^2 \\
 &= 12 \text{ m}
 \end{aligned}$$

21)

As per theory.

22)

As per theory.

$$23) \vec{E} = 8\hat{i} + 4\hat{j} + 3\hat{k}$$

$$\vec{A} = 100 \hat{k}$$

$$\phi = \vec{E} \cdot \vec{A} = (8\hat{i} + 4\hat{j} + 3\hat{k}) \cdot (100\hat{k})$$

$$\phi = 300 \text{ unit}$$

i & j component of E.F. do not give flux in the given area.

24) Net displacement of the cyclist is zero, since the initial position coincides with the final position.

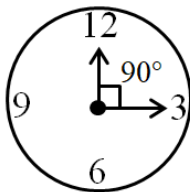
Average speed of the cyclist

$$= \frac{\text{total distance travelled}}{\text{total time taken}}$$

$$\begin{aligned} &= \frac{OP + PQ + QO}{1 + \frac{\pi}{2} \times 1 + 1} \text{ km/min} \\ &= \frac{10}{10} = \frac{\pi + 4}{20} \text{ km/min} \\ &= \frac{\pi + 4}{20} \times 60 \text{ km/hr} = 21.4 \text{ km/hr.} \end{aligned}$$

25)

$$v_{\text{avg}} = \frac{\frac{2s}{5} + \frac{3s}{5}}{\frac{2}{5} + \frac{3}{5}} = \frac{1}{\frac{1}{5} + \frac{1}{5}} = 2.5 \text{ m/s}$$



26)

speed of second hand

$$\begin{aligned} &= \frac{2\pi \times 1 \text{ cm}}{60} \\ &= \frac{\pi}{30} \text{ cm/s} \end{aligned}$$

$$\text{change in velocity} :- \sqrt{2} V = \sqrt{2} \times \frac{\pi}{30}$$

27)

$$\begin{aligned} \square S &= Ut + \frac{1}{2}at^2 \quad \square 20 = 10 \times 2 + \frac{1}{2}a \times (2)^2 \\ \square a &= 0 \end{aligned}$$

$$\begin{aligned} 28) \vec{a}_{\text{avg}} &= \frac{\vec{v}_f - \vec{v}_i}{t} = \frac{2\hat{i} + 2\sqrt{3}\hat{j} - 2\hat{i}}{2} = \sqrt{3}\hat{j} \\ &\sqrt{3} \text{ m/s}^2, \text{ along } y\text{-axis} \end{aligned}$$

29)

$$S_1 = ut + \frac{1}{2}at^2$$

$$= \frac{1}{2}(10)(16)$$

$$= 80$$

$$S_2 = 80$$

$$v_{av} = \frac{80 + 80}{8} = 20 \text{ m/s}$$

$$30) \quad T = \frac{2u}{g} = 6 \text{ sec}$$

$$\Rightarrow u = 30 \text{ m/s}$$

$$\text{Total distance} = \frac{u^2}{g} = 90 \text{ m}$$

$$31) \quad \vec{V} = \frac{d\vec{r}}{dt} = \sin t \hat{i} + \cos t \hat{j} - 18\hat{k} \quad \vec{a} = \frac{d\vec{V}}{dt} = \cos t \hat{i} - \sin t \hat{j}$$

$$|\vec{a}| = \sqrt{\cos^2 t + (-\sin t)^2} = 1$$

32)

$$\square x = 8t - 4t^2$$

$$\text{at } t = 0, x = 0$$

$$\square v = \frac{dx}{dt} = 8 - 8t \quad \text{if } v = 0, t = 1$$

$$\text{at } t = 1, x = 8 - 4 = 4 \text{ m}$$

$$\text{at } t = 2, x = 8(2) - 4(2)^2 = 0$$

$$\text{so, travelled distance} = |(4-0)| + |(0-4)|$$

$$= 4 + 4 = 8 \text{ m}$$

33)

$$v = u + at$$

$$v = 12 + (-9.8)2$$

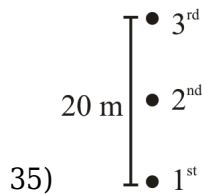
$$= -7.6 \text{ m/s}$$

$$34) \quad h = \frac{1}{2}gt^2 \quad \dots\dots\dots(i)$$

After time $t/2$ height

$$h_1 = h - \frac{1}{2}g\left(\frac{t}{2}\right)^2$$

$$h_1 = h - \frac{h}{4} = \frac{3h}{4}$$



$$t = \sqrt{\frac{2 \times 20}{10}} = 2 \text{ sec}$$

3rd drop will start falling at $t = 2 \text{ sec}$

hence 2 drops in air in 2 seconds so time interval between two drops will be 1 sec.

36)

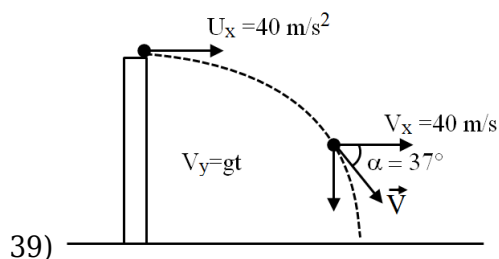
$$\begin{aligned} \text{displacement} &= \frac{1}{2} (3 + 2) \times 4 - \frac{1}{2} (2 + 1) \times 4 \\ &= 10 - 6 = 4 \text{ m} \end{aligned}$$

37)

$$\begin{aligned} \square \tan \theta &= \frac{4H}{R} \quad \square R = 2H \\ \square \tan \theta &= \frac{4H}{2H} = 2 \quad \therefore \theta = \tan^{-1}(2) \end{aligned}$$

38)

$$\begin{aligned} H &= 80 + \frac{u^2 \sin^2 \theta}{2g} = 80 + \frac{(100)^2 \sin^2 30^\circ}{2 \times 10} \\ \square H &= 80 + \frac{100 \times 100 \times 1}{2 \times 10 \times 4} = 80 + 125 = 205 \text{ m} \end{aligned}$$



$$\begin{aligned} \tan \alpha &= \frac{V_y}{V_x} \\ \tan 37^\circ &= \frac{gt}{40} \\ \frac{3}{4} &= \frac{10t}{40} \\ \boxed{t = 3 \text{ sec}} \end{aligned}$$

40) In first part of V-t graph velocity is (+)ve and is increasing so in S-t graph it is represented by parabola. In second part of V-t graph velocity becomes (-)ve and constant so, S-t graph is

straight line with negative slope.

41)

$$\square V = U + at \quad \square V_{\max} = 0 + 6t_1$$

$$\text{and } 0 = V_{\max} - 3t_2$$

$$\text{So, } 3t_2 = 6t_1 \quad \square t_2 = 2t_1$$

$$\text{and } t_1 + t_2 = 10 \quad \square t_1 = \frac{10}{3} \text{ sec.}$$

$$\square V_{\max} = 6 \times \frac{10}{3} = 20 \text{ m/s}$$

42)

Zero vector is whose magnitude is zero. If body is at rest then magnitude of displacement and velocity will be zero. If velocity = const. $\Rightarrow \vec{a} = 0$

43) Let length of train is L and velocity is v .

\square Train crosses the pole in 5 sec

$$\Rightarrow L = v(5) \quad \dots(i)$$

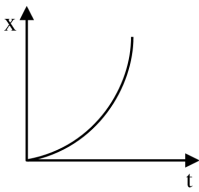
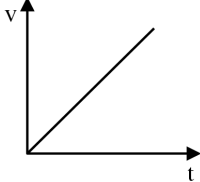
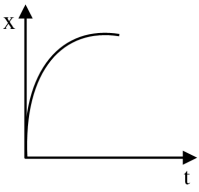
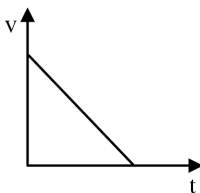
\square Train crosses the bridge in 8 sec

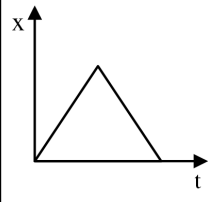
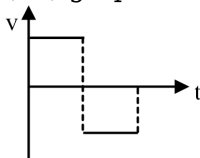
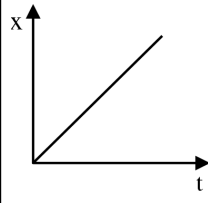
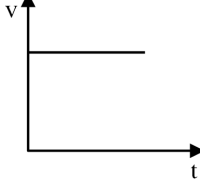
$$\Rightarrow L + 500 = v(8) \quad \dots(ii)$$

$$\text{on } \frac{2}{1} \Rightarrow \frac{L + 500}{L} = \frac{8}{5}$$

$$\Rightarrow L = \frac{2500}{3} \text{ m}$$

44)

(A)		<p>Its slope is increasing so v-t graph will be</p> 
(B)		<p>\square slop \downarrow so v-t graph will be</p> 

(C)		<p>□ First slope is +ve then slope is -ve so (v-t) graph will be</p> 
(D)		<p>□ slope is const and +ve, so (v-t) graph will be</p> 

45) Equation of trajectory is $y = x \tan \theta \left(1 - \frac{x}{R}\right)$ (i)

Given $y = 2x - 9x^2$

$$y = 2x \left(1 - \frac{x}{\frac{2}{9}}\right) \quad \dots(ii)$$

$$\tan \theta = 2 \text{ and } R = \frac{2}{9}$$

$$\Rightarrow \sin \theta = \frac{2}{\sqrt{5}}$$

$$\text{and } \cos \theta = \frac{1}{\sqrt{5}}$$

$$R = \frac{2u^2 \sin \theta \cos \theta}{g}$$

$$\Rightarrow \frac{2}{9} = \frac{2u^2 \cdot \frac{2}{\sqrt{5}} \cdot \frac{1}{\sqrt{5}}}{10}$$

$$\Rightarrow u = \frac{5}{3} \text{ m/s}$$

CHEMISTRY

46)

Element A = Be (Be^{+2} - do not contain e^- in d-subshell)

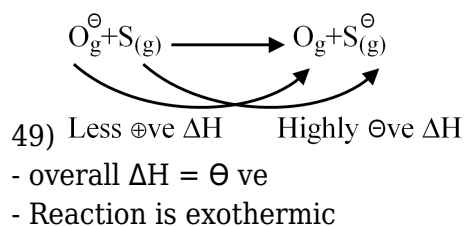
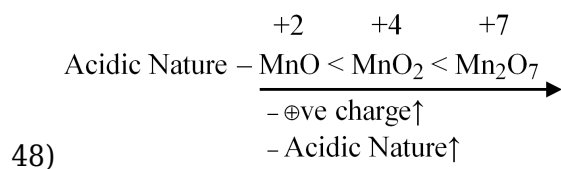
As BeO is amphoteric & thus it is soluble in excess NaOH



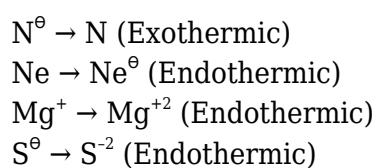
47) Less \ominus ve ΔH Highly \oplus ve ΔH

- Overall $\Delta H = \oplus$ ve

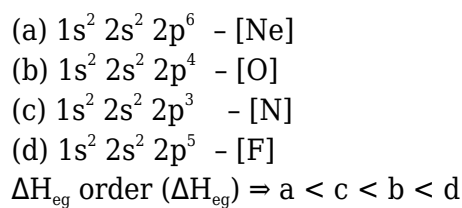
- So, Non-spontaneous reaction



50)

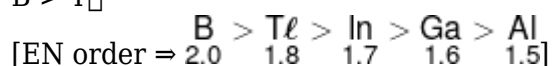
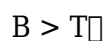


51)



52)

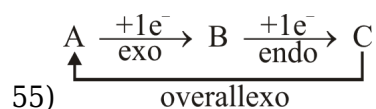
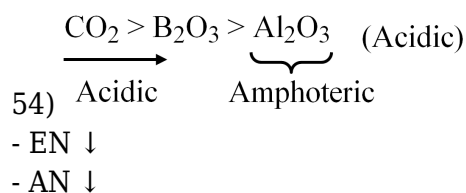
EN order :-



53)

[EN \propto % s-character in H.O]

$\square \text{ EN} = N_{\text{sp}}$ (maximum)

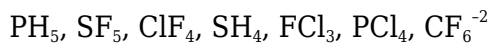


56)

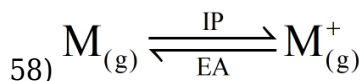
$$EA_{\text{I.gases}} = 0$$

$$IP_{\text{I.gases}} = \text{Maximum}$$

57)



- Does not exist

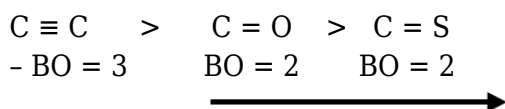


$$[\text{IP of } M_{(g)} = \text{EA of } M_{(g)}^+]$$

$$\square \text{ IP} = N > O$$

$$\square \text{ EA} = \boxed{N^+ > O^+}$$

59)



- size ↑

- B.S. ↓

60)

Explanation

- A. Covalent bonds form by the overlap of atomic orbitals. For a sigma (σ) bond, the overlap is along the internuclear axis. For a pi (π) bond, the overlap is perpendicular to the internuclear axis.

Concept

- A. $s + p_y$: The s orbital is spherical. The p_y orbital has lobes along the y -axis. With the x -axis as the internuclear axis, there will be no net overlap leading to bond formation. The positive and negative overlaps will cancel out.
- B. $p_y + p_y$: With the x -axis as the internuclear axis, the p_y orbitals will overlap sideways, forming a pi (π) bond.
- C. $dxz + dxz$: With the x -axis as the internuclear axis, the dxz orbitals can overlap sideways, forming a pi (π) bond.

- D. $p_x + p_x$: With the x-axis as the internuclear axis, the p_x orbitals will overlap head-on, forming a sigma (σ) bond.

Answer option 1, ($s + p_y$).

61)

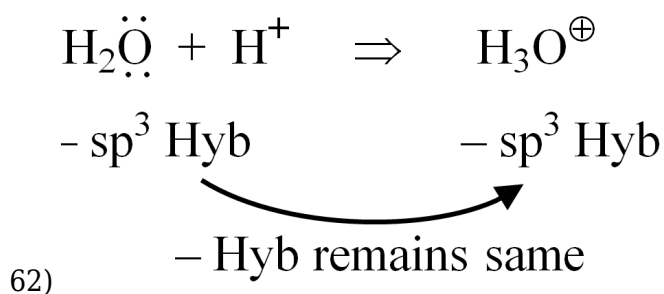
Explanation

- A. Sigma (σ) bonds are formed by head-on overlap along the internuclear axis. Pi (π) bonds are formed by sideways overlap of atomic orbitals perpendicular to the internuclear axis.

Concept

- A. Internuclear axis is X. This means the bond is forming along the X-axis.
- B. (1) $p_x + p_x$ along X-axis: This results in head-on overlap, forming a σ bond, not a π bond.
- C. (2) $p_x + dxz$ along X-axis: The p_x orbital is along the X-axis. The dxz orbital has lobes in the XZ plane. Sideways overlap is not possible, forming a σ bond.
- D. (3) $p_y + dxy$ along X-axis: The p_y orbital is along the Y-axis. The dxy orbital has lobes between the X and Y axes. Sideways overlap is possible, forming a π bond.
- E. (4) $s + p_z$ along X-axis: The s orbital is spherical. The p_z orbital is along the Z-axis. There will be no effective sideways overlap to form a π bond along the X-axis. forming a σ bond, not a π bond.

Answer option 3



62)

- 63) Due to presence of vacant 3d orbital less
 π - π repulsion. **OR** Highest Bond energy \Rightarrow S - S

64)

Explanation - The question asks to identify the statement that is incorrect regarding the

nature and formation of chemical bonds.

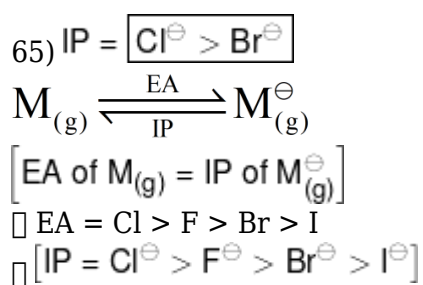
Concept - (s-s overlapping is always weakest)

- A. This statement is incorrect. While s-s overlap is generally weaker than p-p or d-d overlap, it's not "always" the weakest. The strength of overlap depends on factors like the size of the orbitals and internuclear distance.

Final Answer - Option (1)

OR

In H_2 molecule 1s - 1s overlapping forms strong bond.



66)

According to NCERT Table

Bond length :

- (a) $C - H > O - H$
- (b) $C = C < C = N$
- (c) $C - O = C - N$
- (d) $C = N > C \equiv C$

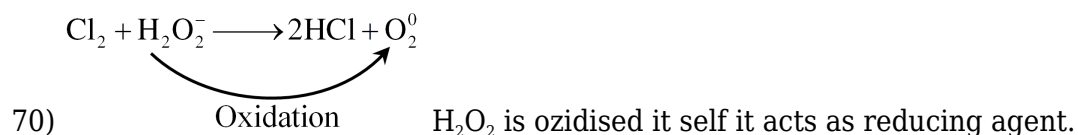
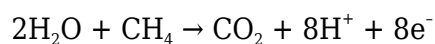
67)

HNC (Hydrogen isocyanide) is ground state compound of carbon.

68)

Sum of oxidation number of all atoms should equal to zero in the compound

69)



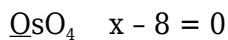
71)



$$x - 2 = +1 \Rightarrow x = +3$$



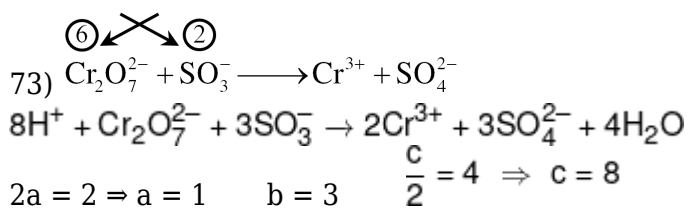
$$x + 4 - 1 = 0 \Rightarrow \text{ON of S} = +6$$



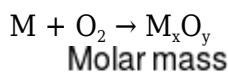
$$x = +8$$

72)

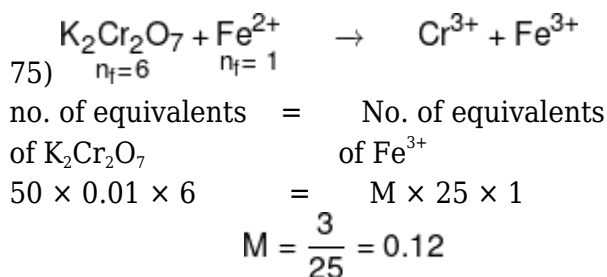
electronegativity of metal is less than hydrogen, so in metal hydride is show -1 oxidation state.



74)



$$E = \frac{M}{2y/x} \Rightarrow M = E \times \frac{2y}{x}$$



76)

Concept :- rate law with the help of reaction mechanism.

Solution :- From slow step (R.d.s) $r = k[\text{B}]^2$

order w.r.t A = 0

order w.r.t B = 2

Total order = 0 + 2 = 2

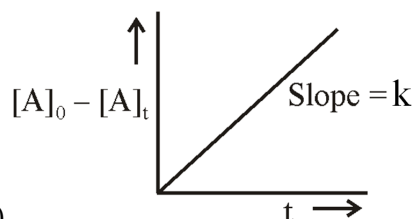
Answer :- 1

$k[\text{B}]^2$, 0, 2, 2

77)

For zero order reaction $t_{100\%} = 2 t_{1/2} = 2(20) = 40$ min.
 so after 80 min, remaining amount of reactant = 0

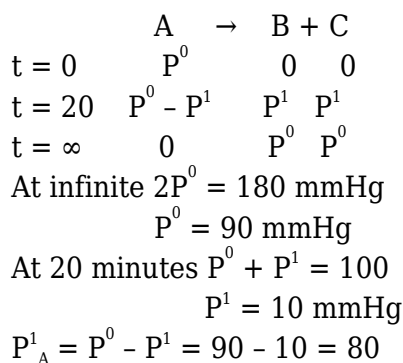
78) In zero order reaction ROR remains constant with time.



79)

$$\begin{aligned} [A]_0 &= [A]_t + kt \\ &= 0.05 + 0.02 \times 30 \\ &= 0.65 \text{ mol L}^{-1} \end{aligned}$$

80)



81) ● **First-Order Reaction:** The rate of the reaction is directly proportional to the concentration of one reactant.

● **Half-Life ($t_{1/2}$):** $t_{1/2} = 0.693/k$.

Analysis:

1 Graph 1: Concentration (a-x) vs. time

- This graph shows an exponential decay curve.
- From the integrated rate law, we know that concentration decreases exponentially with time: $A = A_0 e^{-kt}$.

● Therefore, this graph is correct.

2 Graph 2: Half-life ($t_{1/2}$) vs. concentration

- This graph shows a horizontal line, indicating that the half-life is constant.
- For a first-order reaction, $t_{1/2} = 0.693/k$, which is independent of concentration.
- Therefore, this graph is correct.

3 Graph 3: $\log(a-x)$ vs. time

- This graph shows a straight line with a negative slope.
- From the integrated rate law, $\log(A) = (-k/2.303)t + \log(A_0)$, which is a linear equation ($y = mx + c$).

● The slope of the line is $-k/2.303$.

● Therefore, this graph is correct.

4 Option 4: All of these.

- Since all the individual graphs are correct, "All of these" is also correct.

E: Final Answer

The correct option is 4 (All of these)

82) Question Explanation:

We are given the rate constant and the rate of reaction for a reaction involving H_2O_2 . We need to find the concentration of H_2O_2 .

Given Data:

- Rate constant (k) = $3 \times 10^{-3} \text{ min}^{-1}$
- Rate of reaction = $2 \times 10^{-4} \text{ M s}^{-1}$

Concept: First Order Reaction.

Mathematical Calculation:

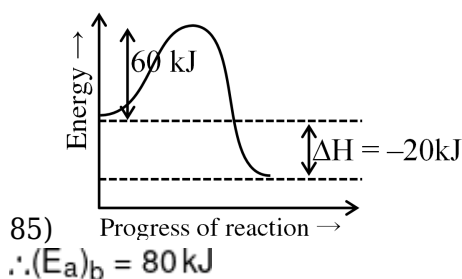
- Convert rate constant to s^{-1} : $k = (3 \times 10^{-3} \text{ min}^{-1}) / (60 \text{ s / min}) = 5 \times 10^{-5} \text{ s}^{-1}$
- Rearrange the rate law to solve for $[\text{H}_2\text{O}_2]$: $[\text{H}_2\text{O}_2] = \text{Rate} / k$
- $[\text{H}_2\text{O}_2] = (2 \times 10^{-4} \text{ M s}^{-1}) / (5 \times 10^{-5} \text{ s}^{-1}) = 4 \text{ M}$

Final Answer: 4 M

Hence, option (2) is correct

$$83) \frac{t_{99\%}}{t_{50\%}} = \frac{2.303 \log \frac{100}{1}}{2.303 \log \frac{100}{50}}$$

$$84) t_{\frac{1}{2}} \propto a^{1-n}$$



$$86) \log \frac{k_2}{k_1} = \frac{E_a}{2.303R} \left(\frac{1}{T_1} - \frac{1}{T_2} \right)$$

$$\log 2 = \frac{E_a}{2.303 \times 8.31} \left(\frac{1}{300} - \frac{1}{310} \right)$$

$$87) Ae^{-E_a/RT} = \left(\frac{Ae^{-\frac{E_{a1}}{RT}} \times Ae^{-\frac{E_{a2}}{RT}}}{Ae^{-\frac{E_{a3}}{RT}}} \right)^{\frac{2}{3}}$$

$$e^{-E_a/RT} = \left(e^{\frac{E_{a3} - (E_{a1} + E_{a2})}{RT}} \right)^{\frac{2}{3}}$$

88) Rate of reaction is equal in terms of N_2 , H_2 and NH_3 for given reaction.

89) Catalyst catalyses the spontaneous reactions but does not catalyse non-spontaneous reaction.

90)

(A) $r = k[A]^2 [B]^{1/2}$

(A) Both A, B = tripled

$$r' = k[3A]^2 [3B]^{1/2}$$
$$= r \times (3)^2 \times (3)^{1/2} = 15.57 r$$

(B) p_B = one-fourth

$$r' = k[A]^2 \left[\frac{B}{4} \right]^{1/2} = \frac{r}{2}$$

(C) V = one-half

conc. = 2 times

$$r' = k [2A]^2 [2B]^{1/2}$$
$$= r \times (2)^2 \times (2)^{1/2} = 5.64 r$$

(D) [A] = doubled

$$r' = k [2A]^2 [B]^{1/2}$$
$$= r \times 4$$

BIOLOGY

91)

NCERT XI, Pg. # 32

92)

NCERT-XI, Pg. # 21,34,37

93) NCERT-XI, Pg # 42

94)

NCERT Pg. No. 39, 3.4

95) NCERT XI. # 38,39

96) NCERT XI Pg.# 34

97) NCERT XI Pg # 32

98) **Answer:** Option 2: (A), (D), and (E) **Explanation:**

- A. **(A)** Correct: Mosses and lichens are pioneer organisms that colonize bare rocks, initiating the process of soil formation.
- B. **(B)** Incorrect: Selaginella is a heterosporous pteridophyte, meaning it produces two types of spores (microspores and megaspores), not a single type like in homosporous pteridophytes.
- C. **(C)** Correct: Coralloid roots of Cycas do contain VAM (Vesicular-Arbuscular Mycorrhiza), which helps in nutrient absorption.
- D. **(D)** Correct: In bryophytes, the gametophyte is the dominant and independent phase, while in pteridophytes, the sporophyte is the dominant, independent phase.
- E. **(E)** Correct: In gymnosperms, the male and female gametophytes develop within the sporangia located on the sporophyte.

99) NCERT-XI, Pg # 23,35

100) NCERT Pg # 19, 32, 33

101) NCERT XI Page No.# 38

102) NCERT Pg. # 402

103)

NCERT XI, Pg # 38 to 39

104)

NCERT XI, Pg # 36

105)

NCERT XI, Pg # 38

106)

NCERT XI, Pg # 36

107)

Explanation:

Red algae (Rhodophyta) store food in the form of Floridean starch, which is structurally similar to amylopectin and glycogen.

108)

NCERT-XI, Pg. # 33,32,30,31

109) **Solution/Explanation/Calculation:**

Solution:

1. The sporophyte in liver worts is more elaborated than that in mosses - Incorrect
2. Protonema stage of mosses bear sex organs - Incorrect
3. In mosses, spores directly germinate to form leafy stage - Incorrect
4. The sporophyte in mosses is more elaborated than of liverworts - Correct

The Correct Answer is - 4

110) NCERT XI, Pg # 26, 27

111) NCERT XI, Pg # 30

112)

NCERT XI pg.# 39

113)

NCERT-XI, Pg. # 16,17,18

114)

NCERT XI pg.# 32

115) *Fucus, Chlamydomonas, Ulothrix*

116)

olution:

- A. (a) In liverworts, mosses, and ferns gametophytes are free living
Correct. The gametophytes in liverworts, mosses, and ferns are indeed free-living, meaning they exist independently from the sporophyte.
- B. (b) Gymnosperms and some ferns are heterosporous
Correct. Gymnosperms like *Pinus* and some ferns are heterosporous, meaning they produce two different kinds of spores: microspores (male) and megaspores (female).
- C. (c) Sexual reproduction in *Fucus*, *Volvox*, and *Albugo* is oogamous
Correct. In these organisms, sexual reproduction is oogamous, meaning the male gamete (sperm) is smaller and motile, while the female gamete (egg) is larger and non-motile.
- D. (d) The sporophyte in liverworts is more elaborate than that in mosses
Incorrect. The sporophyte in liverworts is less elaborate than in mosses. Mosses have a

more complex and distinct sporophyte structure, including a stalk and capsule.

E. (e) Both, Pinus and Marchantia are dioecious

Correct. Both Pinus (a gymnosperm) and Marchantia (a liverwort) are dioecious, meaning they have separate male and female individuals.

Based on this analysis, three statements are correct: (a), (b), and (c). Therefore, the correct answer is:

4. Three.

117)

NCERT-XI, Pg. # 29

118) NCERT-XI, Pg. # 38

119) NCERT XI, Pg # 30

120) NCERT Pg. # 20

121)

NCERT Pg. # 20, 21

122)

NCERT Pg.# 20

123) NCERT Pg. # 21

124) NCERT Pg. # 19, 20, 21

125) NCERT Pg. # 16

126) NCERT Pg. # 29

127) NCERT Pg. # 29

128) NCERT Pg. # 3

129) NCERT Pg. # 32, 33

130) NCERT Pg. # 30, 32

131) NCERT Pg. # 32

132)

NCERT XI, Pg. # 29

133) NCERT Pg. # 29

134)

NCERT XI, Pg. # 32

135) NCERT Pg. # 32

136)

NCERT Pg. No. # 38

137)

NCERT Pg. No. # 37

138)

NCERT Pg. No. # 37

139)

NCERT Pg. No. # 38

140)

NCERT Pg. No. # 37

141)

NCERT Pg. No. # 33

142)

NCERT Pg. No. # 47

143)

NCERT Pg. No. # 37

144)

NCERT Pg. No. # 37

145)

NCERT Pg. No. # 44

146)

NCERT Pg. No. # 38

147)

NCERT Pg. No. # 45

148)

NCERT Pg. No. # 44

149)

NCERT Pg. No. # 41, 42

150)

NCERT Pg. No. # 46

151)

NCERT Pg. No. # 47

152)

NCERT Pg. No. # 48

153)

NCERT Pg. No. # 43

154)

NCERT Pg. No. # 44

155)

NCERT Pg. No. 150

156)

NCERT Pg. No. 145

157) NCERT XII Pg. # 145

158) NCERT XII Pg. # 146

159) **Explanation :** (a) More efficient at work: Healthy people are generally more efficient at work because they experience fewer sick days and are more focused and productive.

number of correct statements:

(a) More efficient at work.

(c) Brings economic property

(d) Increases longevity of people

There are three correct statements.

Answer : (3)

160)

NCERT Pg. No. # 48

161) NCERT (XII) Pg. # 145.146

162) NCERT (XII) Pg. # 150, Para-4

163)

NCERT - XII, Pg. # 48

164)

NCERT Pg. No. # 44, 45

165)

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

166)

NCERT Pg. No. # 46

167) NCERT (XII) Page # 62, Para 1

168) The correct answer is **Option 3: A.I.**

Explanation:

In this scenario, the male partner is impotent, meaning he is unable to achieve or maintain an erection sufficient for penetration. However, the female partner is fertile. In such cases, **Artificial Insemination (A.I.)** would be a suitable assisted reproductive technique.

169)

Module - 7 Pg. No. # 54

170) NCERT Pg. # 52

171)

NCERT Pg. No. # 38

172)

NCERT Pg. No. # 37

173) NCERT Pg.# 55

174) NCERT Pg.# 214 (E), 233 (H)

175)

NCERT Pg. No. # 36

176)

NCERT Pg. No. # 44, 45

177)

NCERT Pg. No. # 28

178)

179)

Question Asking About:

Analyze each statement and determine which ones are correct.

Solution Explanation:

Let's break down each statement:

- A. **Statement A:** This is **correct**. The WHO defines reproductive health as "a state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity, in all matters relating to the reproductive system and to its functions and processes."
- B. **Statement B:** This is **incorrect**. India was indeed among the first countries to initiate national family planning programs. However, these programs were initiated earlier than 1971. India's first family planning program was launched in 1952.
- C. **Statement C:** This is **incorrect**. Amniocentesis is used to detect genetic disorders like Down syndrome. However, scurvy is not a genetic disorder; it's caused by vitamin C deficiency.
- D. **Statement D:** This is **correct**. An ideal contraceptive should be user-friendly, easily available, effective, and have minimal or no side effects.

Correct Answer: 3

180)