

PHYSICS

1) An athlete completes one round of a circular track of radius R in 40 second. What will be his displacement at the end of 2 minute 20 second ?

- (1) Zero
- (2) $2R$
- (3) $2\pi R$
- (4) $7\pi R$

2) Shore based radar indicates that a ferry boat is moving on a river with a speed of 10 m/s at an angle of 30° North of east. The instruments on the ferry boat indicate that it moves with a speed of 10 m/s at an angle of 30° North of west relative to the river. True speed at which river flowing is (in m/s) :-

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

3) The distance travelled by a particle is directly proportional to $t^{1/2}$, where t = time elapsed. What is the nature of motion ?

- (1) Increasing acceleration
- (2) Decreasing acceleration
- (3) Increasing retardation
- (4) Decreasing retardation

4) Two balls of different masses m_a and m_b are dropped from two different heights, viz., a and b . The ratio of times taken by the balls to drop through these distances is :

- (1) $a : b$
- (2) $b : a$
- (3) $\sqrt{a} : \sqrt{b}$
- (4) $a^2 : b^2$

5) The splash is heard after 2.05 s after the stone is dropped into a well of depth 19.6 m. The velocity of sound is :

- (1) 342 ms^{-1}
- (2) 372 ms^{-1}
- (3) 392 ms^{-1}

(4) 352 ms^{-1}

6) A particle is moving eastward with a velocity of 5 m/second. In 10 seconds, the velocity changes to 5 m/second northward. The average acceleration in this time is :

(1) Zero

(2) $\frac{1}{\sqrt{2}} \text{ m/sec}^2$ towards north-west

(3) $\frac{1}{\sqrt{2}} \text{ m/sec}^2$ towards north-east

(4) $\frac{1}{2} \text{ m/sec}^2$ towards north-west

7) When the speed of a car is u , the minimum distance over which it can be stopped is s . If the speed becomes nu , what will be the minimum distance over which it can be stopped during same time ?

(1) s/n

(2) ns

(3) s/n^2

(4) n^2s

8) A ball is thrown downwards with velocity v from the top of a tower and it reaches the ground with speed $3v$. What is the height of the tower ?

(1) v^2/g

(2) $2v^2/g$

(3) $4v^2/g$

(4) $8v^2/g$

9) A particle moves for 8 seconds. It first accelerates from rest and then retards to rest. If the retardation be 3 times the acceleration, then time for which it accelerates will be :

(1) 2 s

(2) 3 s

(3) 4 s

(4) 6 s

10) A body is thrown vertically upwards from the top A of a tower. It reaches the ground in t_1 seconds. If it is thrown vertically downwards from the same tower with the same speed it reaches the ground in t_2 seconds. If it is allowed to fall freely from the same tower, then the time it takes to reach the ground is given by :-

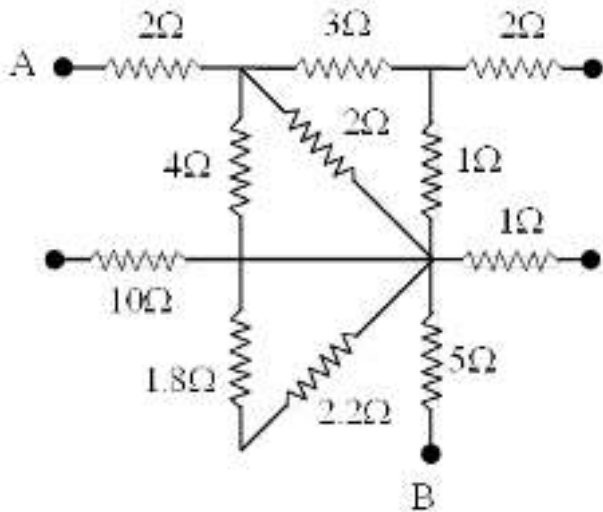
(1) $t = \frac{t_1 + t_2}{2}$

(2) $t = \frac{t_1 - t_2}{2}$

(3) $t = \sqrt{t_1 t_2}$

(4) $t = \sqrt{\frac{t_1}{t_2}}$

11) What is the equivalent resistance between the points A and B of the network :-



(1) $\frac{57}{7} \Omega$

(2) 8Ω

(3) 6Ω

(4) $\frac{57}{5} \Omega$

12) A particle moves along straight line such that its position x at any time is given by $x = 6t^2 - t^3$, where x is in metre and t is in second, then :

(1) at $t = 0$, acceleration is 12 m/s^2

(2) $x - t$ curve has maxima at $t = 4\text{s}$

(3) Both (1) and (2) are wrong

(4) Both (1) and (2) are correct

13) A body is dropped from a height 39.2 m . After it crosses half distance, the acceleration due to gravity ceases to act. The body will hit the ground with velocity :

(1) 19.6 m/s

(2) 20 m/s

(3) 1.96 m/s

(4) 196 m/s

14) An engine of a vehicle can produce a maximum acceleration of 4 ms^{-2} . Its brakes can produce a maximum retardation of 6 ms^{-2} . The minimum time in which it can cover a distance of 3 km is :

(1) 30 s

(2) 40 s

(3) 50 s

(4) 60 s

15) A body is dropped from a balloon moving up with a velocity of 4 ms^{-1} , when the balloon is at a height of 120.5 m from the ground; the height of the body from the ground after five seconds is : ($g = 9.8 \text{ m/s}^2$)

- (1) 2 m
- (2) 12 m
- (3) 18 m
- (4) 24 m

16) A train is moving at a constant speed V , when its driver observes another train in front of him on the same track and moving in the same direction with constant speed v . If the distance between the trains be x , then what should be the minimum retardation of the train so as to avoid collision ?

- (1) $((V + v)^2)/x$
- (2) $((V - v)^2)/x$
- (3) $((V + v)^2)/2x$
- (4) $((V - v)^2)/2x$

17) A 100 m long train moving at 15 m/s overtakes a man running on the platform in the same direction in 10 s. How long the train will take to cross the man if he was running in the opposite direction ?

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

18) **Assertion :-** The average speed of an object may be equal to arithmetic mean of individual speeds.

Reason :- Average speed is equal to ratio of total distance travelled and total time taken.

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

19) A projectile is given initial velocity of $(\hat{i} + 2\hat{j}) \text{ m/s}$. The equation of the path is : ($g = 10 \text{ m/s}^2$)

- (1) $y = 2x - 5x^2$
- (2) $y = x - 5x^2$
- (3) $4y = 2x - 5x^2$
- (4) $y = 2x - 25x^2$

20) A particle moves in a plane with uniform acceleration having direction different from that of the

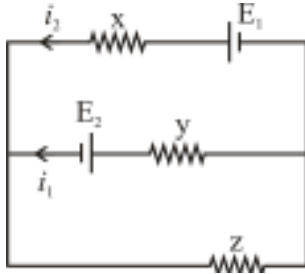
instantaneous velocity. What is the nature of trajectory ?

- (1) Straight line
- (2) Parabola
- (3) Circle
- (4) Ellipse

21) In a circuit, a battery of 12 V is connected with internal resistance of $1\ \Omega$ and external resistance of $5\ \Omega$. Power loss inside the battery is :-

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

22) For the circuit shown in figure, which one of the following equation is correct :-



- (1) $E_1 - i_2x + E_2 + i_1y = 0$
- (2) $E_1 - i_2x - i_1z = 0$
- (3) $E_2 + i_2y - i_2z = 0$
- (4) $-E_2 + (i_1 + i_2)z + i_1y = 0$

23) A wire carries a current of 5A. The drift speed of electrons is 10^{-3} ms^{-1} . If area of cross section is $0.5 \times 10^{-6}\text{ m}^2$, the number density of free electrons is :-

- (1) $6.25 \times 10^{28}\text{ m}^{-3}$
- (2) $1.25 \times 10^{29}\text{ m}^{-3}$
- (3) $2.5 \times 10^{28}\text{ m}^{-3}$
- (4) 10^{29} m^{-3}

24) The specific resistance of a wire is ρ , its volume is 3m^3 and its resistance is 3 ohms, then its length will be:-

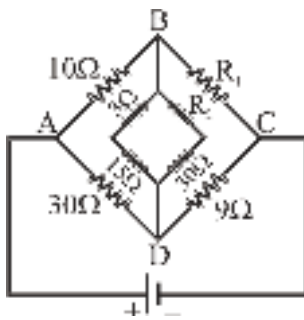
- (1) $\sqrt{\frac{1}{\rho}}$
- (2) $\frac{3}{\sqrt{\rho}}$
- (3) $\frac{1}{\rho}\sqrt{3}$

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

25) A heating element has a resistance of $100\ \Omega$ at room temperature when it is connected to a supply of 220 V , a steady current of 2 A passes in it and the temperature is 500°C more than room temperature. The temperature coefficient of heating element is :

- (1) $1 \times 10^{-4}\ ^\circ\text{C}^{-1}$
- (2) $2 \times 10^{-4}\ ^\circ\text{C}^{-1}$
- (3) $0.5 \times 10^{-4}\ ^\circ\text{C}^{-1}$
- (4) $5 \times 10^{-4}\ ^\circ\text{C}^{-1}$

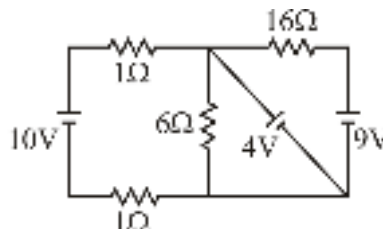
26) In the Wheatstone bridge shown below, in order to balance the bridge, we must have :-



- (1) $R_1 = 3\Omega$; $R_2 = 3\Omega$
- (2) $R_1 = 6\Omega$; $R_2 = 15\Omega$
- (3) $R_1 = 1.5\Omega$; $R_2 = \text{any finite value}$
- (4) $R_1 = 3\Omega$; $R_2 = \text{any finite value}$

27) Consider a conductor of length 40 cm whose ends are maintained at 80 V potential difference. If drift velocity of e^- is $5 \times 10^{-4}\text{ m/s}$ then mobility of e^- is :-

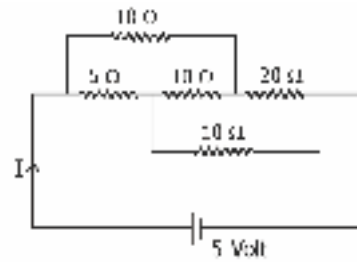
- (1) $1.5 \times 10^{-6}\text{ m}^2/\text{V-sec}$
- (2) $2.5 \times 10^{-6}\text{ m}^2/\text{V-sec}$
- (3) $5 \times 10^6\text{ m}^2/\text{V-sec}$
- (4) None of these



28) Find current in 16Ω resistance :-

- (1) Zero
- (2) $\frac{5}{16}\text{ A}$
- (3) $\frac{5}{6}\text{ A}$

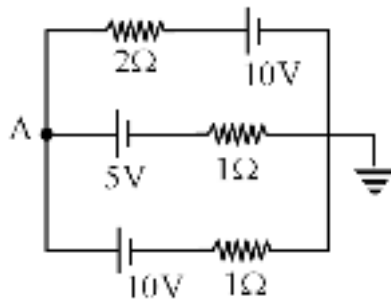
(4) $\frac{1}{4}A$



29) The current I drawn from the 5 volt source will be -

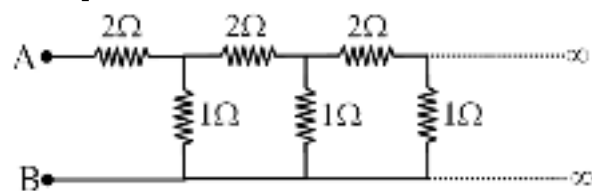
- (1) 0.17 A
- (2) 0.33 A
- (3) 0.5 A
- (4) 0.67 A

30) The potential of point A is :-



- (1) 10 V
- (2) 4 V
- (3) 8 V
- (4) 2 V

31) Equivalent resistance between A and B is :-



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

32) A galvanometer gives full scale deflection at 2mA. To convert it into a voltmeter of range 0 - 20V, the resistance that must be connected in series, if its internal resistance is 200 Ω , is :-

- (1) 9800 Ω
- (2) 10,000 Ω

(3) $200\ \Omega$

(4) $9900\ \Omega$

33) An ammeter reads upto 1A. Its resistance is $0.81\ \Omega$. To increase the range to 10 A, the value of the required shunt is :-

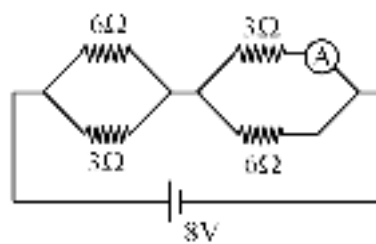
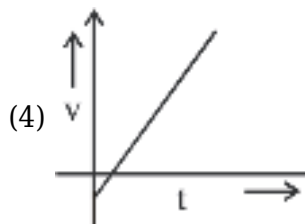
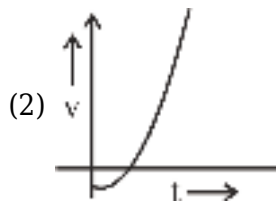
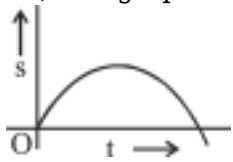
(1) $0.03\ \Omega$

(2) $0.3\ \Omega$

(3) $0.9\ \Omega$

(4) $0.09\ \Omega$

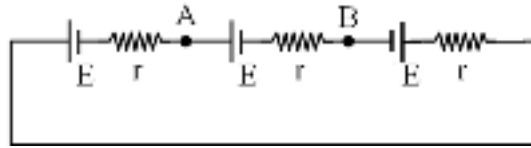
34) The graph of displacement versus time is shown. Its corresponding velocity-time graph will be :-



35) The reading of ammeter is :-

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

- (2) $\frac{4}{3} \text{ A}$
 (3) $\frac{1}{3} \text{ A}$
 (4) $\frac{5}{3} \text{ A}$

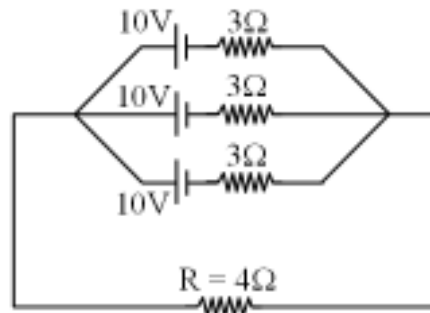


36) For the given circuit $V_A - V_B = ?$

- (1) $\frac{2E}{3}$
 (2) E
 (3) $\frac{E}{3}$
 (4) 0

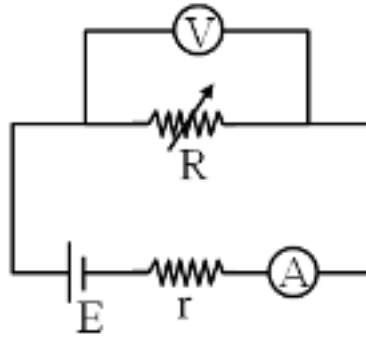
37) n identical cells, each of emf E and resistance r , are connected in series in same polarity and the outer terminals short circuited, then I v/s n graph is :

- (1) Straight line
 (2) Parabola
 (3) Hyperbola
 (4) Cannot be decided

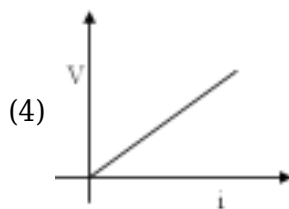
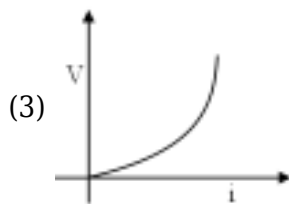
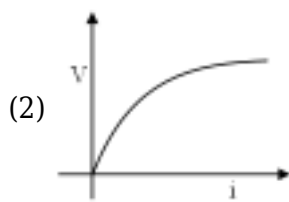
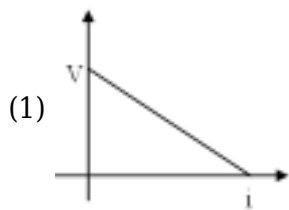


38) Current through each cell will be :-

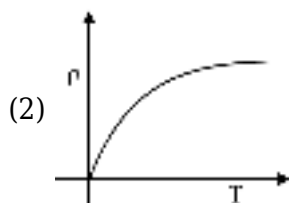
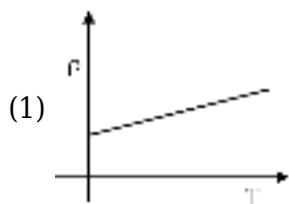
- (1) $\frac{5}{6} \text{ A}$
 (2) $\frac{1}{3} \text{ A}$
 (3) $\frac{2}{3} \text{ A}$
 (4) $\frac{1}{6} \text{ A}$

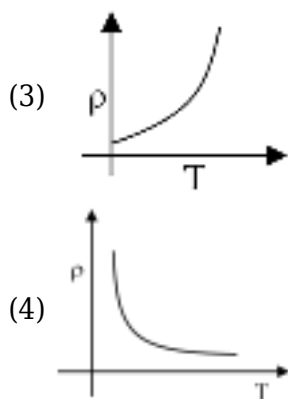


39) For the given circuit, the correct graph is :-



40) Which of the following graph is correct for copper ?





41) In a meter bridge setup, a wire of unknown resistivity has length 1.1 m and diameter 0.7 mm which is connected across left gap and a standard resistance of 8Ω across right gap. If null point is obtained at 60 cm, the resistivity of wire is :-

- (1) $1.1 \times 10^{-6} \Omega\text{-m}$
- (2) $2.1 \times 10^{-6} \Omega\text{-m}$
- (3) $4.2 \times 10^{-6} \Omega\text{-m}$
- (4) $8.75 \times 10^{-6} \Omega\text{-m}$

42)

Which of the following statement about meter bridge is/are incorrect ?

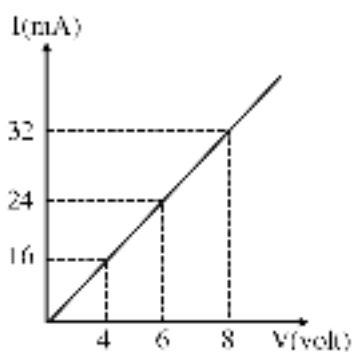
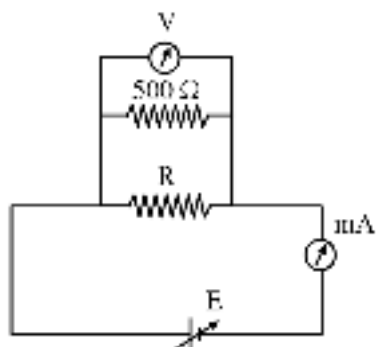
- (a) The accuracy of meter bridge is maximum, when null point is obtained near midpoint of bridge wire as it reduces errors due to end contact resistances and improves sensitivity.
- (b) Meter bridge wire should be of low resistivity and low temperature coefficient of resistance.
- (c) It works on principle of Wheat stone bridge.
- (d) Sensitivity of meter bridge remains unaffected by thickness of bridge wire.

- (1) a, b
- (2) b, d
- (3) Only b
- (4) Only d

43) When a standard resistance of 2Ω is connected in left gap and a wire of resistance $R \Omega$ in right gap of a meter bridge, the balance point obtained is at 40 cm. Now if the wire is cooled such that its resistivity is reduced by 20%, the new balance point obtained will be at:

- (1) 35.5 cm
- (2) 45.4 cm
- (3) 50.5 cm
- (4) 61 cm

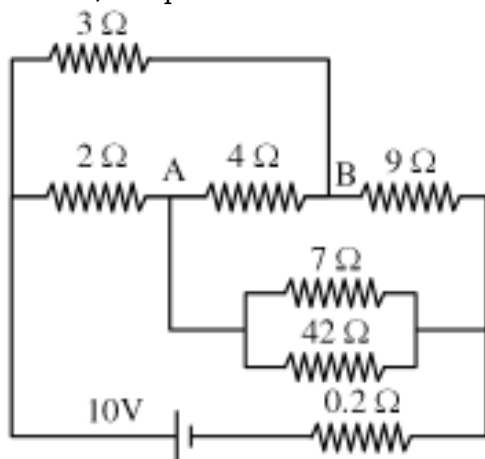
44) In an experiment to determine resistance (R) of a given wire, a circuit is arranged as shown in figure(a). The V-I characteristics for this circuit is plotted for readings of ammeter and voltmeter as shown in figure(b). From given information, the value of resistance R is:-



(a) (b)

- (1) 250 Ω
- (2) 400 Ω
- (3) 500 Ω
- (4) 600 Ω

45) For the given circuit, the potential difference between points A & B and current through battery



are respectively:

- (1) 3V, 1.5A
- (2) 3V, 2A
- (3) 2V, 3A
- (4) 0V, 2A

CHEMISTRY

1) $\text{PCl}_5(\text{g}) \rightleftharpoons \text{PCl}_3(\text{g}) + \text{Cl}_2(\text{g}) - 20 \text{ J}$
favourable conditions for the reaction are :-

- (1) High T, High P
- (2) Low T, Low P
- (3) High T, Low P
- (4) Low T, High P

2) Degree of dissociation & total equilibrium pressure for given reaction $\text{N}_2\text{O}_{3(\text{g})} \rightleftharpoons \text{NO}_{(\text{g})} + \text{NO}_{2(\text{g})}$ is

$\sqrt{0.2}$ & 10 atm respectively then calculate K_p .

- (1) 50 atm
- (2) 2 atm
- (3) 2.5 atm
- (4) 25 atm

3) Which is correct relationship for given reaction



- (1) $K_p = 3K_c$
- (2) $K_p = K_c(RT)^3$
- (3) $K_c = K_p(RT)^3$
- (4) $K_p = K_c(RT)^2$

4) Equilibrium constant (K_c) of

$2\text{HI}_{(\text{g})} \rightleftharpoons \text{H}_{2(\text{g})} + \text{I}_{2(\text{g})}$ is 5×10^3 . What is the equilibrium concentration of HI, if equilibrium concentrations of $\text{H}_{2(\text{g})}$ and $\text{I}_{2(\text{g})}$ are 2.2×10^{-2} M and 2.2×10^{-4} M respectively ?

- (1) 1.11×10^{-5} M
- (2) 2.22×10^{-5} M
- (3) 3.11×10^{-5} M
- (4) 6.66×10^{-5} M

5) In which of the following reaction K_p is less than K_c at 298 K:-

- (1) $\text{N}_2\text{O}_{4(\text{g})} \rightleftharpoons 2\text{NO}_{2(\text{g})}$
- (2) $2\text{HI}_{(\text{g})} \rightleftharpoons \text{H}_{2(\text{g})} + \text{I}_{2(\text{g})}$
- (3) $2\text{SO}_{2(\text{g})} + \text{O}_{2(\text{g})} \rightleftharpoons 2\text{SO}_{3(\text{g})}$
- (4) $2\text{NH}_{3(\text{g})} \rightleftharpoons \text{N}_{2(\text{g})} + 3\text{H}_{2(\text{g})}$

6) The equilibrium constant (K_c) for the reaction $\text{HA} + \text{B} \rightleftharpoons \text{BH}^+ + \text{A}^-$ is 100. If the rate constant for the forward reaction is 10^5 , then rate constant for the backward reaction is :-

- (1) 10^7
- (2) 10^3
- (3) 10^{-3}
- (4) 10^{-5}

7) The equilibrium constant for a reaction $\text{A} + 2\text{B} \rightleftharpoons 2\text{C}$ is 40 The equilibrium constant for reaction C

$\rightleftharpoons \text{B} + \frac{1}{2}\text{A}$ will be :-

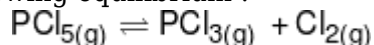
- (1) 1/40

(2) $(1/40)^{1/2}$

(3) $(1/40)^2$

(4) 40

8) 0.6 mole of PCl_5 , 0.3 mole of PCl_3 and 0.5 mole of Cl_2 are taken in a 1 L flask to obtain the following equilibrium :



If the equilibrium constant K_c for the reaction is 0.2. Predict the direction of the reaction.

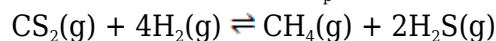
(1) Forward direction

(2) Backward direction

(3) Direction of the reaction cannot be predicted

(4) Reaction does not move in any direction

9) What is the unit of K_p for the reaction :



(1) atm

(2) atm^{+2}

(3) atm^{-2}

(4) atm^{-1}

10) 64 g of HI gas is present in a two litre vessel. The active mass of HI is (Molecular weight of HI = 128) :-

(1) 0.5

(2) 0.25

(3) 1.0

(4) 0.45

11) For an equilibrium, $\text{H}_2\text{O}(s) \rightleftharpoons \text{H}_2\text{O}(l)$ which of the following statement is true :-

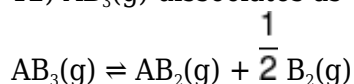
(1) The pressure changes do not affect the equilibrium

(2) More ice melts if pressure on the system is increased

(3) More of liquid freezes if pressure on the system is increased

(4) Temperature changes do not affect equilibrium

12) $\text{AB}_3(g)$ dissociates as



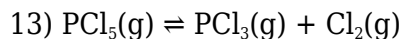
When the initial pressure of AB_3 is 800 torr and the total pressure developed at equilibrium is 900 torr. What percentage of $\text{AB}_3(g)$ is dissociated?

(1) 10 %

(2) 20 %

(3) 25 %

(4) 30 %



Calculate the total moles at equilibrium if 10 moles of PCl_5 are heated.

Given α of PCl_5 is 50% :-

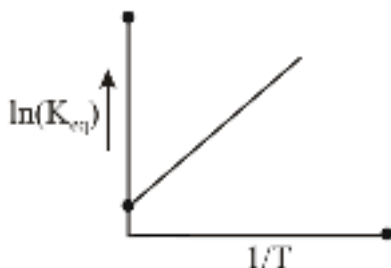
(1) 10

(2) 20

(3) 5

(4) 15

14) A schematic plot of $\ln K_{\text{eq}}$ verses inverse of temperature for a reaction is shown below. The



reaction must be

(1) endothermic

(2) exothermic

(3) highly spontaneous at normal temperature

(4) one with negligible enthalpy change

15) 8 mol of $\text{AB}_3(\text{g})$ are introduced into a 1.0 dm^3 vessel. If it dissociates as $2\text{AB}_3(\text{g}) \rightleftharpoons \text{A}_2(\text{g}) + 3\text{B}_2(\text{g})$ At equilibrium, 2 mol of A_2 are found to be present. The equilibrium constant of this reaction is :-

(1) 36

(2) 3

(3) 27

(4) 2

16) In a system $\text{P}_{(\text{s})} \rightleftharpoons 2\text{Q}_{(\text{g})} + \text{R}_{(\text{g})}$, at equilibrium the concentration of 'Q' is doubled then how many times the concentration of R at new equilibrium will be :-

(1) Double of its original equilibrium concentration

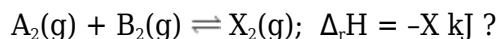
(2) $\frac{1}{4}$ of its original equilibrium concentration

(3) $\frac{1}{2}$ of its original equilibrium concentration

(4) 4 times of its original equilibrium concentration

17)

Which one of the following conditions will favour maximum formation of the product in the reaction,



- (1) Low temperature and high pressure
- (2) Low temperature and low pressure
- (3) High temperature and high pressure
- (4) High temperature and low pressure

18) Match the columns :

	Column-I		Column-II
(A)	For the equilibrium $NH_4I(s) \rightleftharpoons NH_3(g) + HI(g)$, if pressure is increased at equilibrium	(p)	Forward shift
(B)	For the equilibrium $N_2(g) + 3H_2(g) \rightleftharpoons 2NH_3(g)$ If volume is increased at equilibrium	(q)	No change
(C)	For the equilibrium $H_2O(g) + CO(g) \rightleftharpoons H_2(g) + CO_2(g)$, if inert gas is added at constant pressure at equilibrium	(r)	Backward shift
(D)	For the equilibrium $PCl_5 \rightleftharpoons PCl_3 + Cl_2$ what happens if more PCl_5 is added	(s)	More N_2 and H_2 are formed.

- (1) A - (p), B - (q), C - (r), D - (s)
- (2) A - (r), B - (r), (s), C - (q), D - (p)
- (3) A - (s), B - (p), C - (q), D - (r)
- (4) A - (q), B - (s), C - (r), D - (p)

19) For a first order reaction rate constant is 0.346 min^{-1} . Calculate concentration of reactant after 10 min. If initial concentration of reactant is 32 M.

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

20)

In the following reaction : $xA \rightarrow yB$

$$\log \left[-\frac{d[A]}{dt} \right] = \log \left[\frac{d[B]}{dt} \right] + \log 2$$

where -ve sign indicates rate of disappearance of the reactant. Thus, x : y is :

- (1) 1 : 2
- (2) 2 : 1
- (3) 3 : 1
- (4) 3 : 10

21) A first order reaction has half life 12 hours. What percentage of the reactant will remain after 24 hours :-

- (1) 75%
- (2) 25%
- (3) 87.5%
- (4) 93.75%

22) Match the column - I with column - II.

Column - I		Column - II	
(A)	Rate of Reaction	(P)	May be fractional
(B)	Activation energy	(Q)	Positive integer
(C)	Order of reaction	(R)	Independent of temperature
(D)	Molecularity of reaction	(S)	Increases with temperature

The correct matching is -

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

23) **Statement I :** Rate constant (K) for zero order reaction is equal to $\frac{[A]_0 - [A]_t}{t}$
Statement II : Unit of rate and rate constant is same for zero order reaction.

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

24) The slope of Arrhenius Plot $\left(\ln k \text{ v/s } \frac{1}{T} \right)$ of first order reaction is $-5 \times 10^3 \text{ K}$. The value of E_a of the reaction is. [Given $R = 8.314 \text{ JK}^{-1} \text{ mol}^{-1}$]

- (1) 41.5 kJ mol^{-1}
- (2) 83.0 kJ mol^{-1}
- (3) 166 kJ mol^{-1}
- (4) -83 kJ mol^{-1}

25) The half-life for a zero order reaction having 0.02 M initial concentration of reactant is 100 s. The rate constant (in $\text{mol L}^{-1} \text{s}^{-1}$) for the reaction is

- (1) 1.0×10^{-4}
- (2) 2.0×10^{-4}
- (3) 2.0×10^{-3}
- (4) 1.0×10^{-2}

26) In collision theory of chemical reaction, Z_{AB} represents

- (1) The fraction of molecules with energies greater than E_a
- (2) The collision frequency of reactants, A and B
- (3) Steric factor
- (4) The fraction of molecules with energies equal to E_a

27) If rate constant for a first order reaction is k , the time (t) required for the completion of 99% of the reaction is given by :-

- (1) $t = 0.693/k$
- (2) $t = 6.909/k$
- (3) $t = 4.606/k$
- (4) $t = 2.303/k$

28) For reaction $X \rightarrow Y$, unit of rate constant is $\text{mol}^{-1} \text{L s}^{-1}$. If concentration of X is increased to three times, then rate of formation of Y will :-

- (1) become 3 times
- (2) become 9 times
- (3) not be affected
- (4) become 6 times

29) For a 1st order reaction, ratio of time required for 99.9% completion to time required for 90% completion is :-

- (1) 10
- (2) 2
- (3) 3
- (4) 9

30) At 30°C, half life for decomposition of AB_2 substance is 200 sec and it is independent of initial concentration of AB_2 , then time required for its 75% decomposition is :
(Given $\log 3 = 0.48$, $\log 4 = 0.6$)

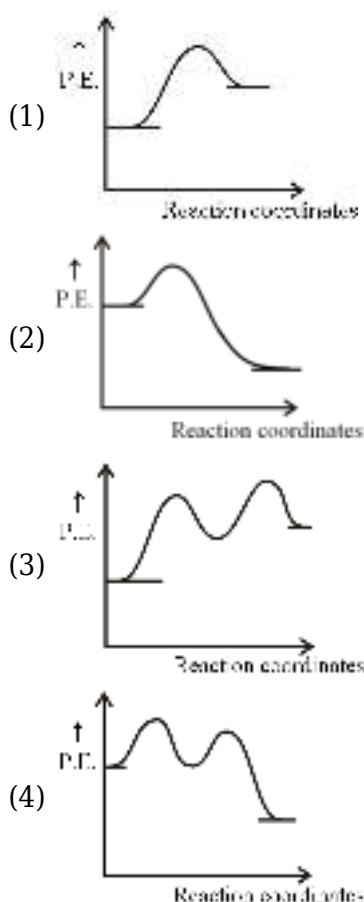
- (1) 300 sec
- (2) 400 sec
- (3) 350 sec

(4) 250 sec

31) For a zero order reaction $R \rightarrow P$, initial concentration of R is 1 M and after 60 seconds, concentration of R becomes 0.6 M then rate constant of reaction is :-

- (1) 0.6 M min^{-1}
- (2) 0.4 M min^{-1}
- (3) $6.6 \times 10^{-3} \text{ M min}^{-1}$
- (4) 0.01 M min^{-1}

32) For a single step reaction $A \rightarrow B + x \text{ kcal}$ correct diagram showing plot of potential energy v/s reaction coordinate is :



33) For an exothermic reaction $x \rightarrow y$, the activation energy of forward reaction is 30 kJ/mol. If enthalpy change (ΔH) for the reaction is -20 kJ/mol then activation energy of backward reaction is (in kJ/mol)

- (1) 10
- (2) 20
- (3) 50
- (4) -30

34) For the reaction $3A + 2B \rightarrow C$, which statement is correct :-

- (1) Rate of formation of C is three times of rate of disappearance of A

- (2) Rate of disappearance of B is $\frac{3}{2}$ times of rate of disappearance of A
- (3) Rate of disappearance of A is $\frac{3}{2}$ times of rate of disappearance of B
- (4) Rate of disappearance of B is half of the rate of formation of C

35) The rate constant of a reaction depends on :

- (1) temperature only
- (2) temperature, catalyst and concentration
- (3) temperature and catalyst
- (4) catalyst only

36) For a reaction $2X + Y \rightarrow Z + W$, $r = k[X][Y]$ molecularity of reaction is

- (1) 2
- (2) 1
- (3) 3
- (4) Molecularity has No meaning

37) Reaction $X + 2Y + 2Z \rightarrow B$ takes place by following mechanism -

- (i) $X + Y \rightleftharpoons 2A$
- (ii) $A + Z \rightarrow C$ (Slow)
- (iii) $2C + Y \rightarrow B$

The rate law for above reaction is :-

- (1) rate = $k[Z]$
- (2) rate = $k[X][Y][Z]$
- (3) rate = $k[X]^{\frac{1}{2}}[Y]^{\frac{1}{2}}[Z]$
- (4) rate = $k[X]^{\frac{1}{2}}[Y][Z]$

38) Which of the following options regarding True (T) or False(F) nature of statements is correct ?

Statement-1 : For a zero order reaction, average rate and instantaneous rate will be same.

Statement-2 : Zero order reaction must be an elementary reaction.

Statement-3 : Order of an elementary reaction can be negative.

Statement-4 : Rate of first order reaction decreases linearly with time.

- (1) TFFF
- (2) TTTF
- (3) FTTT
- (4) TFTF

39) Ratio of time taken to complete 60% and 20% of first order reaction $[A \rightarrow \text{product}]$ is :

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

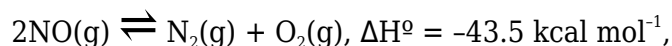
40) In the following reaction, $2\text{H}_2\text{O}_2 \rightarrow 2\text{H}_2\text{O} + \text{O}_2$

rate of formation of O_2 is $36 \text{ g L}^{-1} \text{ min}^{-1}$, what is rate of disappearance of H_2O_2 in $\text{mol L}^{-1} \text{ min}^{-1}$

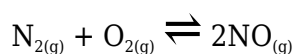
- (1) 2.25
- (2) 3.50
- (3) 1.50
- (4) 2.75

41)

For the gaseous phase reaction,



which statement is correct for,

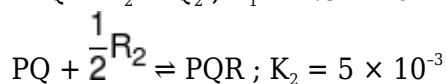
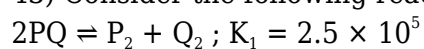


- (1) K_{eq} is independent of temperature
- (2) K_{eq} increases as temperature decreases
- (3) K_{eq} decreases as temperature decreases
- (4) K_{eq} varies with addition of NO

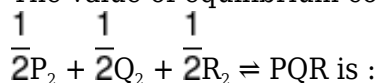
42) For exothermic reaction of H_2 with I_2 to give HI, $K_c = 57$ at 700 K. The possible K_c at 900 K is

- (1) 57
- (2) 80
- (3) 40
- (4) 100

43) Consider the following reactions in which all the reactants and products are in gaseous state :



The value of equilibrium constant for reaction :



- (1) 2.5×10^{-3}
- (2) 2.5×10^3
- (3) 1×10^{-5}
- (4) 10

44) The least stable oxide of nitrogen will be :-

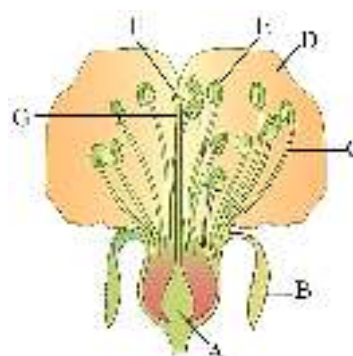
- (1) $2\text{NO}_2(\text{g}) \rightleftharpoons \text{N}_2(\text{g}) + 2\text{O}_2(\text{g}),$
 $K_{\text{eq}} = 6.7 \times 10^{16} \text{ molL}^{-1}$

- (2) $2\text{N}_2\text{O}_5(\text{g}) \rightleftharpoons 2\text{N}_2(\text{g}) + 5\text{O}_2(\text{g});$
 $K_{\text{eq}} = 1.2 \times 10^{24} \text{ mol}^5 \text{ L}^{-5}$
- (3) $2\text{NO}_2(\text{g}) \rightleftharpoons \text{N}_2(\text{g}) + \text{O}_2(\text{g});$
 $K_{\text{eq}} = 2.2 \times 10^{30}$
- (4) $2\text{N}_2\text{O}(\text{g}) \rightleftharpoons 2\text{N}_2(\text{g}) + \text{O}_2(\text{g});$
 $K_{\text{eq}} = 3.5 \times 10^{33} \text{ mol L}^{-1}$

45) 2 moles of N_2 are mixed with 6 moles of H_2 in a closed vessel of one litre capacity. If 50% N_2 is converted into NH_3 till equilibrium, find the value of K_c for the reaction,
 $\text{N}_2(\text{g}) + 3\text{H}_2(\text{g}) \rightleftharpoons 2\text{NH}_3(\text{g})$

- (1) 4/27
 (2) 27/4
 (3) 1/27
 (4) 27

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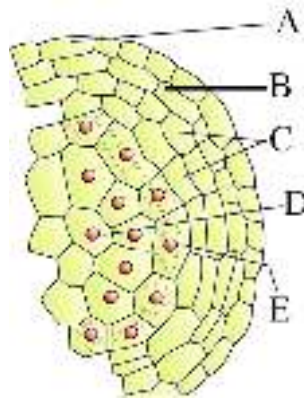


1) Identify A to G in following figure and answer accordingly.

- (1) A-Ovary, B-Sepal, C-Filament, D-Petal,
 E-Stigma, F-Style, G-Anther
- (2) A-Sepal, B-Ovary, C-Petal, D-Filament,
 E-Anther, F-Stigma, G-Style
- (3) A-Ovary, B-Sepal, C-Filament, D-Petal,
 E-Anther, F-Stigma, G-Style
- (4) A-Petal, B-Anther, C-Stigma, D-Style,
 E-Filament, F-Sepal, G-Ovary

2) A Typical angiospermic anther is

- (1) Bilobed and dithealous
 (2) Bilobed and monothecous
 (3) Single lobe and dithealous.
 (4) Single lobe and monothecous



3) Identify A to E in the following diagram

- (1) A-Tapetum, B-Microspore mother cell,
C-Middle layer, D-Endothecium, E-Epidermis
- (2) A-Epidermis, B-Endothecium, C-Middle layer, D-Tapetum, E-Microspore mother cell
- (3) A-Middle layer, B-Epidermis, C-Tapetum, D-Microspore mother cell, E-Endothecium
- (4) A-Epidermis, B-Endothecium, C-Middle layer, D-Microspore mother cell, E-Tapetum

4) Formation of microspore tetrad from microspore mother cell is a result of :-

- (1) Mitotic cell division
- (2) Meiotic cell division
- (3) Both (1) and (2)
- (4) Equational division

5) The pollen grains are well preserved as fossils because of the presence of :-

- (1) Lignified cell wall
- (2) Intine
- (3) Sporopollenin
- (4) Cellulosic cell wall

6) Which cell of pollen grain is bigger and have abundant food reserve?

- (1) Generative cell
- (2) Vegetative cell
- (3) Central cell
- (4) Spore mother cell

7) Over 60% of angiosperms shed their pollen at the:

- (1) 2-celled stage
- (2) 3-celled stage
- (3) 4-celled stage
- (4) 1-celled stage

8) The stalk which joins ovule and placenta is called :-

- (1) Funicle
- (2) Hilum
- (3) Chalaza
- (4) Micropyle

9) How many nuclei are found in a typical female gametophyte of angiosperm.

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

10) Egg apparatus in typical angiosperm consist of :-

- (1) Two synergids + 2 egg cells
- (2) One synergid + 2 egg cells
- (3) Two synergids + one egg cell
- (4) Two synergids +1 egg cell + 3 antipodal cells

11) Pollen tablet are used as :-

- (1) Antibiotic
- (2) Antibodies in animals
- (3) Food supplement
- (4) Anti allergic

12) Plant in which both autogamy and geitonogamy are prevented

- (1) Castor
- (2) Maize
- (3) Date palm
- (4) Cucumber

13) Which one of the following is correct option regarding apocarpous gynoecium ?

- (1) Rose, *Michelia*, *Papaver*
- (2) *Papaver*, *Hibiscus*, lotus
- (3) Rose, lotus, *Michelia*
- (4) *Papaver*, *Michelia*, lotus

14) Which of these is a condition that makes flower invariably autogamous ?

- (1) Dioecy
- (2) Self incompatibility
- (3) Cleistogamy
- (4) Xenogamy

15) Ovules generally differentiate a single megaspore mother cell at which region ?

- (1) Chalazal region
- (2) Micropylar region
- (3) Hilum region
- (4) Embryosac

16) Perisperm is :-

- (1) Persistent nucellus in seed
- (2) Ovule wall
- (3) Ovule coat
- (4) Remnants of haustoria

17) Male and female flowers are present on different plants in :-

- (1) Maize
- (2) Castor
- (3) Papaya
- (4) Cucurbita

18) In most of the water pollinated species, pollen grains are protected from wetting by :-

- (1) Sporopollenin
- (2) Mucilaginous covering
- (3) Covering by thalamus
- (4) α -cellulose fiber

19) Seed setting is assured even in the absence of pollinating agents in :-

- (1) *Commelina* & *Oxalis*
- (2) *Oxalis* & *Zostera*
- (3) *Vallisneria* & *Oxalis*
- (4) *Oxalis* & *Jasminum*

20) Nucellar polyembryony is reported in species of :-

- (1) Citrus
- (2) Mango
- (3) Both (1) and (2)
- (4) *Capsella*

21) How many nucleus and gametes are involved in syngamy and double fertilization ?

- (1) Syngamy 2, 2 and double fertilization 5, 3 respectively
- (2) Syngamy 1, 1 and double fertilization 3, 3 respectively

(3) Syngamy 2, 1 and double fertilization 3, 3 respectively

(4) Syngamy 5, 2 and double fertilization 2, 3 respectively

22) The number of embryo sac nuclei involved in double fertilization is /are :-

(1) Five

(2) Three

(3) Four

(4) One

23) In angiosperm, pollen tube liberate male gametes into the :-

(1) Central cell

(2) Antipodal cell

(3) Egg cell

(4) Synergids

24) Endosperm is completely consumed by developing embryo in:-

(1) Pea

(2) Maize

(3) Coconut

(4) Castor

25) In grasses an embryo has one large shield shape cotyledon which is known as :

(1) Epiblast

(2) Coleorhiza

(3) Scutellum

(4) Coleoptile

26) Among the terms listed below, those that are not technically correct names for a floral whorl are :-

(I) Androecium (II) Carpel

(III) Corolla (IV) Sepal

(1) I and IV

(2) III and IV

(3) II and IV

(4) I and II

27) Proximal end of filament attached to :-

(1) Anther

(2) Thalamus

(3) Petal

(4) Both (2) and (3)

28) The most common pollinating agent in flowering plant is :-

- (1) Water
- (2) Wind
- (3) Insect
- (4) Bird

29) Transfer of pollen grains from anther to stigma of another flower of different plant is called as :

- (1) Geitonogamy
- (2) Xenogamy
- (3) Chasmogamy
- (4) Cleistogamy

30) Development of embryo sac from single megaspore is known as :-

- (1) Pro-sporic development
- (2) Monosporic development
- (3) Bisporic development
- (4) Monothecous development

31) Characteristics of wind pollinated pollens are :-

- (1) Non-sticky
- (2) Light weight
- (3) Large number in production
- (4) All of the above

32) Primary endosperm cell (PEC) in angiosperm is formed:-

- (1) After triple fusion
- (2) Before triple fusion
- (3) At the time of syngamy
- (4) Always persisted

33) Long ribbon-like pollen grains are seen in

- (1) Sunflower
- (2) *Zostera*
- (3) Lotus
- (4) Water hyacinth

34) Read the following statements carefully :-

(A) Flowers are morphological and embryological marvels and the site of sexual reproduction.

- (B) Anther are attached to the proximal end of the filament of stamen.
(C) Androecium and gynoecium are non-essential part of the flower.
(D) The numbers and length of stamens are variable in flowers of different species.
How many above statement/s are correct.

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

35) To form four completely mature embryosac in angiosperm, total number of meiosis and mitotic division are required.

- (1) 4, 12 respectively
- (2) 1, 3 respectively
- (3) 4, 4 respectively
- (4) 1, 12 respectively

36) **Statement-I :-** *Vallisneria* and *Hydrilla* grow in marine water.

Statement-II :- Aquatic plants such as water hyacinth and waterlily are pollinated by insect or wind.

- (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.

37) **Statement-I :-** Often flowers of animal pollinated plants are specifically adapted for a particular species of animals.

Statement-II :- The flowers pollinated by flies or beetles secrete fragrant odours to attract these animals.

- (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.

38) Read the following statements carefully.

- (A) Majority of flowering plants use biotic agents for pollination.
- (B) Only a small proportion of flowering plants used abiotic agents, as pollinating agents.
- (C) Pollination by water is more common amongst abiotic pollination.
- (D) Wind pollination is quite common in grasses.

How many above statements are correct ?

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

(4) Four

39) Match the following column.

	Column-I		Column-II
A	Cotyledon	i	Portion below the cotyledon
B	Epicotyl	ii	Portion above the cotyledon
C	Plumule	iii	Stem tip
D	Hypocotyl	iv	Leaf of embryo

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

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

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

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

40) Read the following and find correct option.

A. Tapetum nourishes the developing pollen grain.

B. Hilum represents the junction between ovule and funicle.

C. In Aquatic plants such as water lily and water hyacinth pollination take place by water.

D. The primary endosperm nucleus is triploid.

Options :-

(1) Only A and B are correct

(2) Only A, B and D are correct

(3) Only B, C and D are correct

(4) Only B and D are correct

41) Self-incompatibility is a device for

(I) Ensuring cross-pollination

(II) Preventing self-fertilisation

(III) Ensuring self-fertilisation

(IV) Genetic control to prevent self-fertilisation.

Choose the correct statements from those given above.

(1) I, II and III

(2) I, II, III and IV

(3) I, III and IV

(4) I, II and IV

42)

Read the following statements carefully.

A. Majority of insect pollinated flowers are, small, colourful, dry, fragrant and rich in nectar.

B. Animals are attracted to flowers by colour and fragrance.

C. Nectar and pollen grains are the usual floral rewards for animals.

D. Continued cross- pollination result in inbreeding depression.

Choose the correct statements from those given above.

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

43) **Assertion :-** All the events from pollen deposition on the stigma until pollen tube enter the ovule are together referred to as pollen-pistil interaction.

Reason :- Pollen pistil interaction is a dynamic process.

- (1) Both assertion and reason are true and the reason is a correct explanation of the assertion.
- (2) Both assertion and reason are true and the reason is not a correct explanation of the assertion.
- (3) Assertion is true but the reason is false.
- (4) Both assertion and reason are false.

44) **Assertion :-** Apomixis is a form of asexual reproduction, that mimics sexual reproduction.

Reason :- In apomixis there is formation of seed without fertilisation.

- (1) Both assertion and reason are true and the reason is a correct explanation of the assertion.
- (2) Both assertion and reason are true and the reason is not a correct explanation of the assertion.
- (3) Assertion is true but the reason is false.
- (4) Both assertion and reason are false.

45) Read the following statement carefully.

- A. each cell of the sporogenous tissue is capable of giving rise to a microspore tetrad.
- B. *Parthenium* that come into India as a contaminant with imported wheat has become ubiquitous in occurrence and causes pollen allergy.
- C. Ploidy of cell of nucellus is N.
- D. Wind -pollination is quite common in grasses.

Identify the correct statements from the above statements and select the correct option.

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

46) In human which phase of oogenesis runs during menstrual cycle ?

- (1) Multiplication phase
- (2) Yolk synthesis
- (3) Maturation phase
- (4) Growth phase

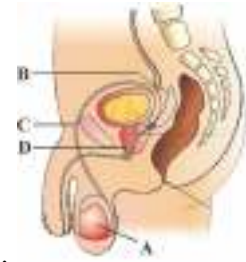
47) Which of the following is **correct** ?

- (1) Estrogen increases after ovulation.
- (2) Graafian follicles mature in luteal phase

(3) Maximum level of progesterone is between 11th to 13th day of menstrual cycle

(4) Oxytocin maintain pregnancy

48) Diagrammatic view of male reproductive system is given below with labelled part A, B, C and D.



Identify the correct option in which correct information for labelled parts.

	A	B	C	D
(1)	Testis-Secondary sex organ	Cowper's gland	Vas-deferense-produce androgen	Prostate paired gland
(2)	Serotum help in temp maintain	Seminal vesicle	Vas deferens-sperm conduction	Prostate paired gland
(3)	Testis-Produce androgen	Prostate gland	Ejaculatory duct	Seminal Vesicle-sperm store
(4)	Testis-Gamet formation	Seminal vesicle paired	Vas deferens sperm conduction	Prostate unpaired

(1) 1

(2) 2

(3) 3

(4) 4

49)

What is the function of interstitial cells of testis ?

(1) Synthesis of estrogen

(2) Gamete production

(3) Synthesis of androgen

(4) Gamete transfer

50) Which of following is a correct match pair ?

(1) Sertoli cells of ovary - Provide nutrition to sperm

(2) Testicular Lobule - About 250 compartments of each testis

(3) Scrotum - No role in normal sperm production

(4) Rete-testis - Seminiferous tubules open in tubuli-recti through rete-testis

51)

Which of the following is incorrect ?

- (1) Primary spermatocyte divide and form secondary spermatocyte and Ist polar body.
- (2) One primary oocyte forms one ootid
- (3) Ist polar body contains complete haploid genome but negligible cytoplasm
- (4) Ovum and second polar body are formed in fallopian tube only when sperm enters in the secondary oocyte

52) How many glands in the list given below related with human male reproductive system.
Seminal vesicle, cowper's gland, Bartholin's gland, prostate gland, ovary, penis.

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

53) Which sequence is correct into male genital tract for sperm movement

- (1) Rete testis → Vasdeferens → Vasaefferentia → Epididymis → Urethra
- (2) Tubuli recti → Rete testis → Vasdeferens → Vasaefferentia → Seminal vesicle → Urethra
- (3) Tubuli recti → Rete testis → Vasaefferentia → Vasdeferens → Epididymis → Urethra
- (4) Tubuli recti → Rete testis → Vasaefferentia → Epididymis → Vasdeferens → Urethra

54) Morula in human is :-

- (1) Solid embryo with 8-16 blastomeres
- (2) Solid embryo with 16-32 blastomeres
- (3) Hollow embryo with 8-16 blastomeres
- (4) Hollow embryo with 16-32 blastomeres

55) 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

56) **Assertion:** Testis are primary sex organs.

Reason: Testis produce gametes & also secretes sex hormones.

- (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.

57) Read the following statements carefully and choose the incorrect one :

- (1) Vagina is a fibromuscular and glandular structure
- (2) Opening of vagina is partially covered by a membrane called hymen
- (3) Clitoris lies at the upper junction of two labia minora
- (4) Mons pubis is a cushion of fatty tissue covered by skin and pubic hair

58) Read the following statements carefully and choose the incorrect statements.

- (i) Liberation of sperm from seminiferous tubules is called spermiation.
- (ii) Sertoli cell synthesise and secrete testicular hormone called androgen.
- (iii) Secretions of bulbourithral gland, lubricate the penis.
- (iv) Glans penis is covered by a loose fold of skin called hymen.

- (1) (i) and (ii)
- (2) (i) and (iv)
- (3) (iii) and (iv)
- (4) (ii) and (iv)

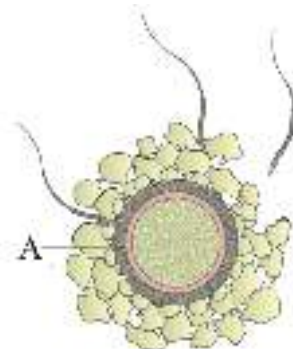
59) How many structures in the list given below are haploid? Spermatozoa, Spermatogonia, Spermatid, Secondary spermatocyte, Primary spermatocyte.

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

60) Which of the following hormone's level is increased during pregnancy in the maternal blood:

- (a) FSH (b) Progesterone (c) Thyroxin
- (d) Cortisol (e) LH (f) Estrogen

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



61) In a given diagram, identify the (A) :

- (1) Plasma membrane
- (2) Zona Pellucida

- (3) Corona Radiata
- (4) Perivitelline space

62) Sexually transmitted infections can also be transmitted by :

- (1) Surgical instruments
- (2) Transfusion of blood
- (3) Sharing of injection needles
- (4) All of these

63) Which one of the following common sexually transmitted diseases is completely curable when detected early and treated properly ?

- (1) Gonorrhoea
- (2) Hepatitis-B
- (3) HIV Infection
- (4) Genital herpes

64) Which is not a natural method of contraception ?

- (1) Coitus interruptus
- (2) Periodic abstinence
- (3) Vasectomy
- (4) Lactational amenorrhoea

65) The testis are situated outside the abdominal cavity within a pouch called scrotum, because :

- (1) Temperature in scrotum, are 2 - 2.5°C lower than the normal internal body temperature.
- (2) Temperature in scrotum, are 2 - 2.5°C higher than the normal internal body temperature
- (3) In scrotum, sperm are get nutrition
- (4) Scrotum increase the number of sperms

66) In which technique fertilisation occurs inside the body of female ?

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

67) In test tube baby programme, the embryo more than 8 blastomeres is transferred into uterus, this technique is called as :-

- (1) ZIFT
- (2) GIFT
- (3) IUT
- (4) ICSI

68) Which of the following contraceptive methods can prevent ovulation?

- (1) CuT, Condoms
- (2) Combination of estrogen and progesterone taken orally
- (3) Diaphragms, cervical cap and vaults
- (4) Coitus interruptus and lactational amenorrhoea

69) Which of the following is hormone releasing IUD?

- (1) Lippes loop
- (2) Cu-7
- (3) LNG-20
- (4) Multiload-375

70) **Statement-I** : Amniocentesis is a foetal sex determination test based on the chromosomal pattern in the amniotic fluid surrounding the developing embryo.

Statement-II : If couples are unable to produce children inspite of unprotected sexual cohabitation up to 2 year this is called infertility. It is prevented by assisted reproductive technologies (ART)

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

71) **Assertion** : Lactational amenorrhea (absence of menstruation) method is based on the fact the ovulation and therefore the cycle do not occur during the period of intense lactation following parturition.

Reason : High concentration of prolactin may lead to inhibition of menstrual cycle in lactating mother.

- (1) Both Assertion & Reason are true and the reason is the correct explanation of the assertion
- (2) Assertion & Reason are true but the reason is not the correct explanation of the assertion
- (3) Assertion is true statement but Reason is false
- (4) Both Assertion and Reason are false statements

72) The assisted reproductive technique in which the egg is first fertilized outside the body and then transfer into the fallopian tubes is -

- (1) AI
- (2) IUI
- (3) ZIFT
- (4) GIFT

73) The most common period for amniocentasis during pregnancy is :-

- (1) 12th weeks
- (2) 14th - 15th week

(3) 10th - 12th weeks

(4) 6th - 8th week

74) Which technique is suitable for the females who cannot produce the ovum but can provide a suitable environment for fertilization and further development?

(1) ZIFT

(2) GIFT

(3) IUT

(4) ICSI

75) Which of the following statement is correct ?

(1) IUDs cannot be used as emergency contraceptive to avoid possible pregnancy due to rape.

(2) Failure rate of lactational amenorrhoea is very low.

(3) Lippes loop increases the phagocytosis of sperm in uterus.

(4) Male & female condoms inhibits the ovulation and implantation.

76) How many statements are correct regarding IUDs -

(A) Increase phagocytosis of sperms.

(B) Release Cu ions that suppress sperm motility and fertilizing capacity of sperms.

(C) Make the uterus unsuitable for implantation.

(D) Make the cervix hostile to sperms.

(E) Prevent ovulation.

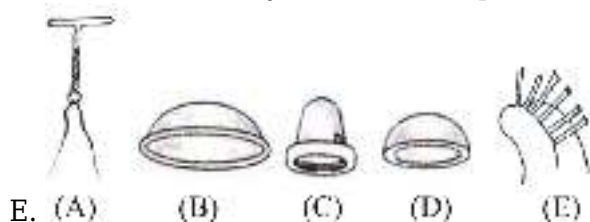
(1) 2

(2) 3

(3) 4

(4) 5

77) Some commonly used contraceptive devices are shown in below diagram. Identify A, B, C, D and



	A	B	C	D	E
(1)	Multiload	Cu T	Diaphragm	Vault cap	Implants
(2)	Cu T	Cervical cap	Vault cap	Diaphragm	Hormone implant
(3)	Cu T	Diaphragm	Cervical cap	Vault cap	Hormone implant
(4)	Multiload	Diaphragm	Cervical cap	Vault cap	Mala-D

(1) 1

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

78) Read the following four (A-D) statements carefully and answer the question given below :

- (A) Maximum one polar body can formed during oogenesis.
 - (B) Corpus Haemorrhagicum is the 1st vascular structure
 - (C) P.G.C. are formed by extra embryonic mesoderm.
 - (D) Corpus luteum start to degenerate after about 9 days of it's formation if fertilization not occurred
- How many statement are correct.

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

79) How many meiosis divisions required to form 132 zygote ?

- (1) 150
- (2) 165
- (3) 132
- (4) 100

80) Read the following statements A-D.

- (A) Vigorous contraction of the uterus at the end of the pregnancy cause delivery of the foetus.
- (B) Parturition is induced by a complex neuroendocrine mechanism.
- (C) The signals for parturition only originated from fully developed foetus.
- (D) Breast-Feeding during the initial period of infant growth is recommended by doctors for bringing up a healthy baby.

How many of the above statements are correct ?

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

81) Read the following statement

- (a) After implantation, finger like projections appear on the trophoblast called chorionic villi
- (b) The blastomeres in the blastocyst are arranged an outer layer called trophoblast.
- (c) Placenta also acts as an endocrine tissue.
- (d) hCG, hPL and Relaxin are produced in women during pregnancy also.

How many of the above statement are wrong.

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

(4) Four

82) Identify the correct match from the columns I, II & III :

Column-I (Contraceptive method)	Column-II (Mechanism)	Column-III (Example)
(A) Copper releasing IUDs	(a) Prevent ovulation	(i) LNG-20
(B) Hormonal releasing IUDs	(b) Destroy sperms	(ii) Today
(C) Daily oral pills	(c) Prevent implantation	(iii) MALA-D
(D) Vaginal cream/Jelly	(d) Suppress sperm motility	(iv) Multiload 375

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

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

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

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

83) **Assertion (A)** : During pregnancy all events of the menstrual cycle stop and there is no menstruation.

Reason (R) : Level of progesterone and oestrogen are very high during pregnancy.

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

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

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

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

84) Given below are two statements.

Statement - 1 : The uterus open into vagina through narrow cervix.

Statement - 2 : Cervical canal along with uterus form a birth canal.

In the light of the above statements choose the correct answer from the option given below.

(1) Both statement-1 and Statement-2 are true.

(2) Both statement-1 and Statement-2 are false

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

(4) Statement-1 is false but Statement-2 is true.

85) First movement of Foetus and appearance of hair on head are usually seen.

(1) 5th month

(2) 2nd month

(3) 3rd month

(4) 1st month

86) Surgically removal of uterus is known as

- (1) Hystrectomy
- (2) Oophorectomy
- (3) Orcheodectomy
- (4) Vasectomy

87) Match the column-I with column-II

	Column-I		Column-II
(A)	Head	I	Enzymes
(B)	Middle piece	II	Sperm motility
(C)	Acrosome	III	Energy
(D)	Tail	IV	Genetic material

Choose the correct answer from the option given below.

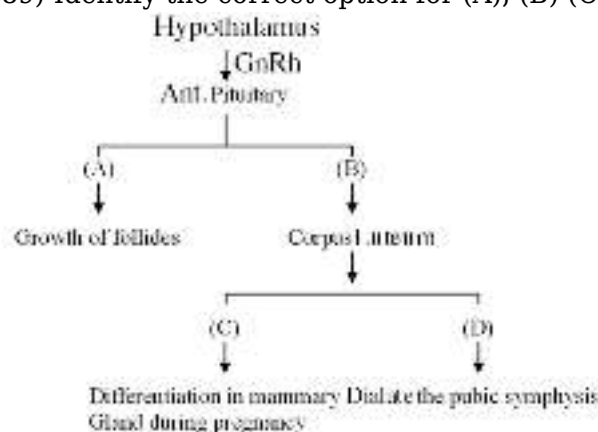
- (1) (A) - IV, (B) - III, (C) - I, (D) - II
- (2) (A) - IV, (B) - III, (C) - II, (D) - I
- (3) (A) - III, (B) - IV, (C) - II, (D) - I
- (4) (A) - III, (B) - II, (C) - I, (D) - IV

88) **Assertion (A)** : Oxytocin is called parturating hormon.

Reason (R) : Oxytocin relax the pubic symphysis at the time of child birth.

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

89) Identify the correct option for (A), (B) (C), (D) with respect to role of hormones in female.



- (1) FSH, LH, PRL, Relaxin
- (2) FSH, LH, oxytocin, relaxin
- (3) FSH, LH, Progesterone, oxytocin
- (4) FSH, LH, Progesterone, Relaxin

90) Given below are two statements one is labelled as Assertion (A) and other is labelled as a

Reason (R)

Assertion (A) : The mammary glands of the female undergo differentiation during pregnancy.

Reason (R) : Level of oxytocin hormone are very high at the time of parturition.

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

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

CHEMISTRY

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

BIOLOGY

Q.	91	92	93	94	95	96	97	98	99	100	101	102	103	104	105	106	107	108	109	110
A.	3	1	4	2	3	2	1	1	1	3	3	3	3	3	2	1	3	2	1	3
Q.	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130
A.	1	2	4	1	3	3	4	3	2	2	4	1	2	2	1	3	2	3	3	2
Q.	131	132	133	134	135	136	137	138	139	140	141	142	143	144	145	146	147	148	149	150
A.	4	2	2	1	4	3	1	4	3	2	1	4	4	1	4	1	1	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.	2	4	1	3	1	4	3	2	3	4	1	3	2	2	3	3	3	4	2	4
Q.	171	172	173	174	175	176	177	178	179	180										
A.	1	3	1	3	1	1	1	3	4	2										

SOLUTIONS

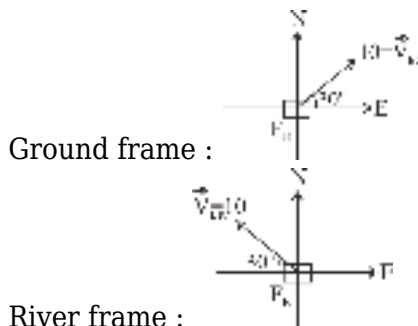
PHYSICS

1) Time given, $t = 140$ sec.

Time taken to complete one round = 40 sec.

Hence, athlete will complete three and a half rounds in the given time and his displacement will be $2R$.

2)



$$\begin{aligned}\vec{V}_{BG} &= \vec{V}_{BR} + \vec{V}_{RG} \\ \Rightarrow 5\sqrt{3}\hat{i} + 5\hat{j} &= -5\sqrt{3}\hat{i} + 5\hat{j} + \vec{V}_{RG}\end{aligned}$$

$$\Rightarrow \vec{V}_{RG} = 10\sqrt{3}\hat{i}$$

$$3) s = kt^{1/2}$$

$$\frac{d^2s}{dt^2} = -\frac{1}{4}kt^{-3/2}$$

As t increases, the retardation decreases.

$$4) t = \sqrt{\frac{2h}{g}}$$

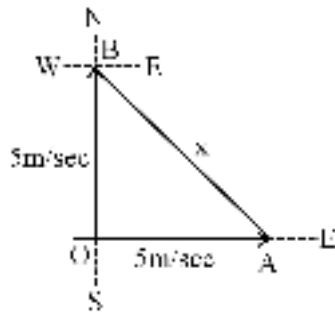
$$5) t = t_1 + t_2$$

$$= \sqrt{\frac{2h}{g}} + \frac{h}{v} = 2.05s$$

$$\Rightarrow \sqrt{\frac{2 \times 19.6}{9.8}} + \frac{19.6}{v} = 2.05$$

$$\Rightarrow v = 392 \text{ ms}^{-1}$$

6) Let OA and OB represents the respective velocities in the east and north directions. Then, AB = x represent the change in velocity.



From figure, $x^2 = 5^2 + 5^2 = 2 \times 5^2$

or $x = \sqrt{2} \times 5\text{m/s}$

Now acceleration, $a = \frac{x}{t}$

$$\boxed{a = \frac{\sqrt{2} \times 5}{10} = \frac{1}{\sqrt{2}} \text{ m/sec}^2 \text{ (towards N-W).}}$$

$$7) v^2 = u^2 + 2as \text{ or } v^2 - u^2 = 2as$$

Maximum retardation, $a = \frac{v^2}{2s}$. When the initial velocity is nv then the distance over which it can be stopped is given by :

$$s_n = \frac{u_0^2}{2a} = \frac{(nv)^2}{2(v^2/2s)} = n^2s.$$

8) According to 3rd equation of motion,

$$v^2 - u^2 = 2gh$$

Where, $v = 3v$ and $u = v$

$$9) v = \alpha t_1 = \beta t_2 \quad \therefore \frac{\alpha}{\beta} = \frac{t_2}{t_1}$$

If $\beta = 3\alpha$, then $t_1 = 3t_2$

Since, $t_1 + t_2 = 8 \text{ sec}$, hence $t_1 = 6 \text{ sec}$

10)

$$\text{Upward motion : } -h = ut_1 - \frac{1}{2}gt_1^2 \dots(1)$$

$$\text{Downward motion : } h = ut_2 + \frac{1}{2}gt_2^2 \dots(2)$$

from equation (1) & (2)

$$u(t_1 + t_2) = \frac{1}{2}g(t_1^2 - t_2^2) \quad u = \frac{1}{2}g(t_1 - t_2)$$

put it into equation (2)

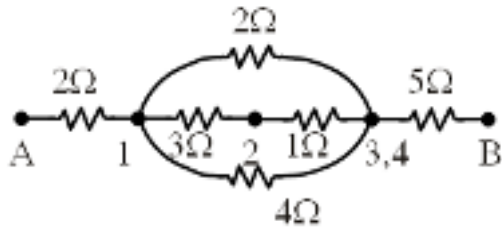
$$h = \frac{1}{2}g(t_1 - t_2)t_2 + \frac{1}{2}gt_2^2 \quad h = \frac{1}{2}gt_1t_2 \dots\dots\dots(3)$$

when drop the body

$$h = \frac{1}{2}gt^2$$

compare with equation (3)

$$t = \sqrt{t_1 t_2}$$



11)

$$R_{\text{net}} = 8\Omega$$

12) Given : $x = 6t^2 - t^3$

$$\frac{dx}{dt} = 12t - 3t^2$$

$$\frac{dx}{dt} = 0 \quad \text{or } t = 4\text{s}$$

Now, again differentiating eqn. (i), we get;

$$\frac{d^2x}{dt^2} = 12 - 6t = 12 - 6(4) = -12 \quad (\text{at } t = 4\text{s})$$

Since, $\frac{d^2x}{dt^2}$ is negative, hence $t = 4\text{ s}$ gives the maximum value for $x - t$ curve.

Moreover, acceleration, $a = \frac{d^2x}{dt^2}$,

$$\text{at } t = 0; \quad \frac{d^2x}{dt^2} = 12 \text{ m/s}^2$$

13) Suppose v be the velocity of the body after falling through half the distance. Then

$$s = \frac{39.2}{2} = 19.6 \text{ m, } u = 0 \text{ and } g = 9.8 \text{ m/s}^2$$

$$\text{NO}_2, v^2 = u^2 + 2gh = 0 + 2 \times 9.8 \times 19.6$$

$$\therefore v = 19.6 \text{ m/s}$$

When the acceleration due to gravity ceases to act, the body travels with the uniform velocity of 19.6 m/s.

So it hits the ground with velocity 19.6 m/s.

14) Suppose the vehicle accelerates for distance s_1 , then $v^2 = 2\alpha s_1$

Suppose the vehicle retards for distance s_2 , then $v^2 = 2\beta s_2$

$$\square \quad \frac{v^2}{2\alpha} + \frac{v^2}{2\beta} = S_1 + S_2$$

$$\text{or } \frac{v^2}{8} + \frac{v^2}{12} = 3000$$

$$\text{or } v = 120 \text{ m}$$

$$\text{Now, } v = \alpha t_1 \text{ or } t_1 = \frac{v}{\alpha} = \frac{120}{4} = 30\text{s}$$

$$\text{and } v = \beta t_2 \text{ or } t_2 = \frac{v}{\beta} = \frac{120}{6} = 20\text{s}$$

$$t = t_1 + t_2 = 30 \text{ s} + 20 \text{ s} = 50 \text{ s}.$$

$$15) s = ut + \frac{1}{2}at^2 = 4 \times 5 - \frac{1}{2} \times 9.8 \times 25$$

= 20 - 122.5 = - 102.5 m This shows that the body is 102.5 m below the initial position, i.e., height of the body = 120.5 - 102.5 = 18 m.

16) Here relative velocity of the train w.r.t. other train = $V - v$

$$\text{Hence, } 0 - (V - v)^2 = 2ax \text{ or } a = - \frac{(V - v)^2}{2x}.$$

$$\square \text{ Minimum retardation} = - \frac{(V - v)^2}{2x}$$

17)

$$v_T - v_M = \frac{100}{10}$$

$$\Rightarrow v_M = 15 - 10 = 5 \text{ m/s}$$

$$t = \frac{100}{v_T + v_M} = \frac{100}{15 + 5} = 5 \text{ s}$$

18) If a particle travels with speeds v_1, v_2, v_3, \dots during time intervals t_1, t_2, t_3, \dots respectively.

Then, total distance travelled = $v_1 t_1 + v_2 t_2 + v_3 t_3 + \dots$

total time taken = $t_1 + t_2 + t_3 + \dots$

So, average speed if then,

$$\text{or } V_{av} = \frac{v_1 t_1 + v_2 t_2 + v_3 t_3 + \dots}{t_1 + t_2 + t_3 + \dots}$$

If $t_1 = t_2 = t_3 = \dots = t$

$$\text{Then, } V_{av} = \frac{(v_1 + v_2 + v_3 + \dots)t}{nt}$$

$$= \frac{v_1 + v_2 + v_3 + \dots}{n}$$

or

It means that, average speed is equal to arithmetic mean of individual speeds, when individual time of travel is same.

$$19) u_x = 1 ; u_y = 2$$

$$R = \frac{2u_x u_y}{g} = \frac{2 \times 1 \times 2}{10} = \frac{2}{5}$$

$$\tan \theta = \frac{u_y}{u_x} = \frac{2}{1} = 2$$

$$y = x \tan \theta \left(1 - \frac{x}{R} \right)$$

$$y = x(2) \left(1 - \frac{x}{2/5} \right)$$

$$y = 2x \left(1 - \frac{5x}{2} \right)$$

$$\square y = 2x - 5x^2$$

20) It is only in case of parabolic motion that the direction and magnitude of the acceleration remains same. In uniform circular motion, though magnitude of acceleration remains constant but direction changes from moment to moment.

$$21) I = \frac{12}{6} = 2A$$

$$P = I^2 R = (2)^2(1) = 4W$$

22) For upper loop. by KVL

$$E_1 + E_2 = i_2 x - i_1 y$$

$$\Rightarrow E_1 - i_2 x + E_2 + i_1 y = 0$$

$$23) n = \frac{I}{eAv_d}$$

$$= \frac{5}{(1.6 \times 10^{-19})(0.5 \times 10^{-6})(10^{-3})}$$

$$24) R = \frac{\rho \ell}{A} = \frac{\rho \ell^2}{V}$$

$$\ell = \sqrt{\frac{RV}{\rho}} = \sqrt{\frac{3 \times 3}{\rho}} = \frac{3}{\sqrt{\rho}}$$

25)

$$R_T = R_0(1 + \alpha \Delta T)$$

$$110 = 100[1 + \alpha(500)]$$

$$\Rightarrow \alpha = 2 \times 10^{-4} \text{ } ^\circ\text{C}^{-1}$$

26) For balanced WSB, no current flows in BD branch. So R_2 can be any finite value.

$$\text{Also } \frac{10}{30} = \frac{R_1}{9} \Rightarrow R_1 = 3\Omega$$

27)

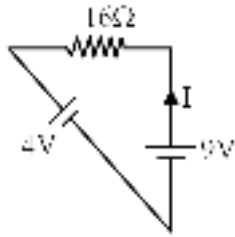
$$\text{Mobility } (\mu) = \frac{v_d}{E} = \frac{(v_d)\ell}{V}$$

$$= \frac{(5 \times 10^{-4})(40 \times 10^{-2})}{80}$$

$$= 2.5 \times 10^{-6} \text{ m}^2/\text{V-sec}$$

28)

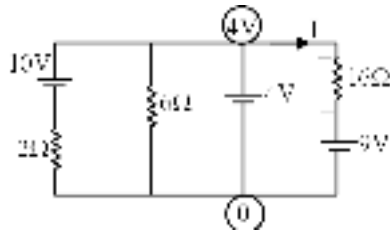
Consider a part of circuit



$$9 - 16I - 4 = 0$$

$$I = \frac{5}{16} \text{ A}$$

OR



$$4 - 16I - 9 = 0$$

$$16I = -5 \Rightarrow I = \frac{-5}{16} \text{ A}$$

i.e. current flows from

$$0\text{V to } 4\text{V}, I = \frac{5}{16} \text{ A}$$

29)

Its a balanced WSB

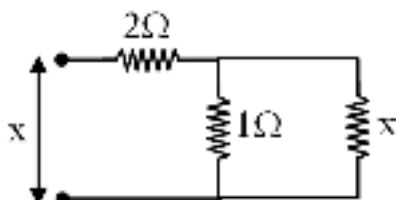
$$R_{\text{net}} = \frac{(10 + 20)(10 + 5)}{(10 + 20) + (10 + 5)} = 10\Omega$$

$$i = \frac{E}{R_{\text{net}}} = \frac{5\text{V}}{10\Omega} = \frac{1}{2} \text{ A} = 0.5\text{A}$$

30) Using nodal method

$$\frac{V_A - 10}{2} + \frac{V_A - 5}{1} + \frac{V_A - 10}{1} = 0$$

$$V_A = 8 \text{ V}$$



31)

$$x = 2 + \frac{x}{x+1}$$

$$x^2 + x = 2x + 2 + x$$

$$x^2 - 2x - 2 = 0$$

$$x = \frac{2 + \sqrt{12}}{2} = 1 + \sqrt{3}$$

$$\begin{aligned} 32) \quad R &= R_g \left(\frac{V}{V_g} - 1 \right) \\ &= 200 \left(\frac{20}{2 \times 10^{-3} (200)} - 1 \right) \\ &= 9800 \, \Omega \end{aligned}$$

$$33) \quad S = \frac{ig \, G}{i - ig} = \frac{1 \times 0.81}{10 - 1} = 0.09 \, \Omega$$

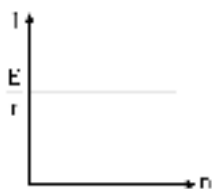
34) As slope of s-t graph decreases with t, so v-t will decrease. At the top of the graph slope is zero, so velocity is zero. In the downward journey slope of s-t graph increases negatively. So velocity represented by it will be negative.

35)

$$\begin{aligned} R_{eq} &= 4\Omega, \quad I = \frac{8V}{4\Omega} = 2A \\ \text{Ammeter reading} &= 2A \times \frac{6}{(6+3)} = \frac{4}{3}A \end{aligned}$$

$$\begin{aligned} 36) \quad I &= \frac{2E - E}{3r} = \frac{E}{3r} \\ V_A - E + \frac{E}{3r}r &= V_B \\ \Rightarrow V_A - V_B &= \frac{2E}{3} \end{aligned}$$

$$37) \quad I = \frac{E_1 + E_2 + \dots + E_n}{r_1 + r_2 + \dots + r_n} = \frac{nE}{nr} = \frac{E}{r}$$



$$\begin{aligned} 38) \quad I_{net} &= \frac{10}{5} = 2A \\ I_{\text{each cell}} &= \frac{2}{3}A \end{aligned}$$

39)

$$V = E - Ir$$

with increase in I, V decreases linearly.

40)

For copper, resistivity increases non linearly with the increase in temperature, as shown in graph ρ -T in option (3)

$$41) \frac{R}{8} = \frac{60}{40} \Rightarrow R = \frac{60}{40} \times 8 = 12\Omega; A = \frac{\pi d^2}{4}$$

$$\rho = \frac{RA}{\ell} = 12 \times \frac{22}{7} \times \frac{0.7 \times 0.7}{4} \times \frac{10^{-6}}{1.1}$$

$$\Rightarrow \rho = 4.2 \times 10^{-6} \Omega\text{-m}$$

42)

Sensitivity of meter bridge does not depend upon thickness of bridge wire. Meter bridge wire should be of high resistivity and low temperature coefficient of resistance.

$$43) \text{ Case-1: } \frac{R}{2} = \frac{60}{40} \Rightarrow R = 3\Omega$$

$$\text{Case-2: } R \propto \rho \frac{\ell}{A}$$

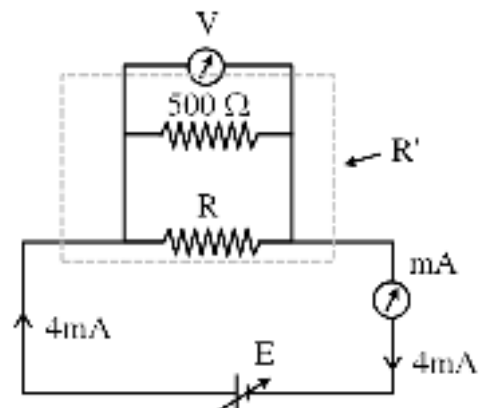
$$\rho' \rightarrow 0.8\rho \Rightarrow R' = 0.8 \times 3\Omega = 2.4\Omega$$

Let new balance point is at x cm

$$\frac{2.4}{2} = \frac{100-x}{x} \Rightarrow 1.2x = 100 - x$$

$$\Rightarrow 2.2x = 100 \Rightarrow x = 45.4 \text{ cm}$$

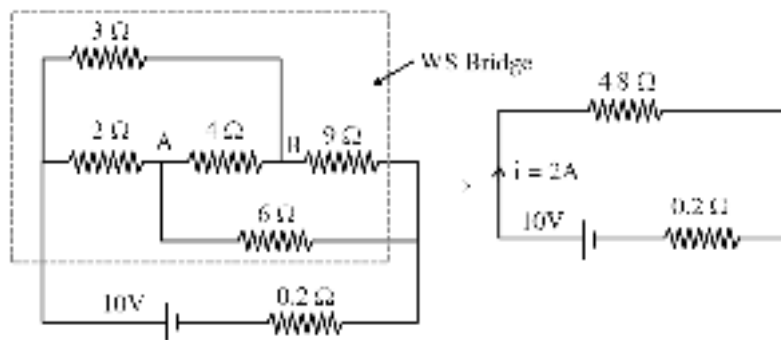
44) From graph, taking main current as $I = 24 \text{ mA}$ and $E = 6V$



Let the equivalent resistance of $(R \parallel 500\Omega) = R'$

$$R' = \frac{6V}{\frac{24mA}{500R}} = 250\Omega$$

$$\Rightarrow \frac{500R}{500 + R} = 250\Omega \Rightarrow R = 500\Omega$$



45)

As A & B are equipotential, PD across them is zero.

$$i = \frac{10}{(4.8 + 0.2)} = 2A$$

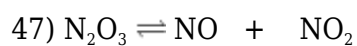
CHEMISTRY

46)

Endothermic reaction

$T \uparrow, K \uparrow$, forward reaction

$\Delta n_g > 0$ so $P \downarrow \rightarrow$ forward reaction



$$\frac{1-\alpha}{1+\alpha}P \quad \frac{\alpha}{1+\alpha}P \quad \frac{\alpha}{1+\alpha}P$$

$$\Rightarrow K_p = \frac{\alpha^2 P}{1-\alpha^2} = \frac{0.2}{1-0.2} \times 10 = 2.5 \text{ atm}$$

48) $\Delta n_{(g)} = 3 - 0 = 3$

$$49) 5 \times 10^3 = \frac{2.2 \times 10^{-2} \times 2.2 \times 10^{-4}}{[HI]^2}$$

$$\square [HI] = \left(\frac{4.84 \times 10^{-6}}{5 \times 10^3} \right)^{1/2} = 3.11 \times 10^{-5} M$$

50) $K_p = K_c(RT)^{\Delta n_g}$ if $\Delta n_g < 0$, $K_p < K_c$

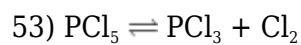
51) $K_{eq} = \frac{K_f}{K_b}$

$$K_b = \frac{10^5}{100} = 10^3$$



$$\square \quad 2C \rightleftharpoons A + 2B; K_c = \frac{1}{40}$$

$$\square \quad \text{for } C \rightleftharpoons B + \frac{1}{2}A; K_c = \left(\frac{1}{40}\right)^{1/2}$$



$$Q_c = \frac{[\text{PCl}_3][\text{Cl}_2]}{[\text{PCl}_5]}$$

$Q_c > K_c$ "Backward"

$$54) K_p = \frac{(P_{\text{CH}_4})(P_{\text{H}_2\text{S}})^2}{(P_{\text{CS}_2})(P_{\text{H}_2})^4}$$

Unit of K_p : atm^{-2}

$$55) \text{ moles} = \frac{64}{128} = 0.5$$

$$\text{molarity} = \frac{0.5}{2} = 0.25 \text{ L}$$

56)

If pressure is increased in physical equilibrium then equilibrium will shift towards more density and hence more ice will melt.

$$57) \quad \text{AB}_3(\text{g}) \rightleftharpoons \text{AB}_2(\text{g}) + \frac{1}{2} \text{B}_2(\text{g})$$

At eqm $\begin{array}{ccc} 800-x & x & x/2 \\ x & & \end{array}$

$$800 - x + x + \frac{x}{2} = 900 \Rightarrow x = 200$$

$$\% \text{ dissociated} = \frac{200}{800} \times 100 = 25$$

$$58) \quad \text{PCl}_{5(\text{g})} \rightleftharpoons \text{PCl}_{3(\text{g})} + \text{Cl}_{2(\text{g})}; \quad \alpha = \frac{x}{10}$$

t = 0	10	0	0	$0.5 \times 10 = x$
t = t _{eq}	10 - x	x	x	$x = 5$
	10 - 5	5	5	
	5	5	5	

total moles at equilibrium = 5 + 5 + 5 = 15

$$59) \quad \therefore \ln K = \frac{-\Delta H}{RT} + I$$

$\Rightarrow \Delta H = -ve \Rightarrow \text{Exothermic reaction}$

$$60) 2AB_3 \rightleftharpoons A_2 + 3B_2 \quad 8 \quad 0 \quad 0$$

8-2x	x	3x
4	2	6

$$K_C = \frac{(2)(6)^3}{(4)^2} = 27$$

$$61) K_C = [Q]^2 [R] \quad \dots\dots(I)$$

At new eq^m,

$$K_C = [2Q]^2 [R]' \quad \dots\dots(II)$$

From (I) and (II)

$$[Q]^2 [R] = 4 [Q]^2 [R]'$$

$$\Rightarrow \frac{[R]}{4} = [R]'$$

62)

For reaction $\Delta H = -ve$ and $\Delta n_g = -ve$
☐ High P, Low T, favour product formation.

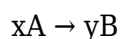
63)

- * On increasing pressure, reaction shift towards less moles.
- * On increasing volume, reaction shift towards more moles.
- * When $\Delta n_g = 0$, No effect on reaction.
- * On increasing concentration of reactant, Reaction shift in forward direction.

64)

fact

65)



$$ROR = \frac{-1}{x} \frac{d[A]}{dt} = \frac{1}{y} \frac{d[B]}{dt}$$

$$\Rightarrow \frac{-1}{x} \frac{d[A]}{dt} = \frac{1}{y} \frac{d[B]}{dt}$$

$$-\frac{d[A]}{dt} = \frac{x}{y} \frac{d[B]}{dt}$$

Taking log on both sides

$$\log \left[-\frac{d[A]}{dt} \right] = \log \left(\frac{d[B]}{dt} \frac{x}{y} \right)$$

$$\log \left[-\frac{d[A]}{dt} \right] = \log \frac{x}{y} + \log \frac{d[B]}{dt} \quad \dots(i)$$

from question

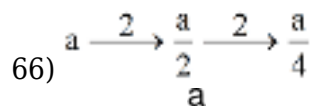
$$\log \left[-\frac{d[A]}{dt} \right] = \log \frac{d[B]}{dt} + \log 2 \quad \dots(ii)$$

compare the equation (i) & (ii)

$\frac{x}{y}$

$$\frac{x}{y} = 2$$

$$x : y = 2 : 1$$



$$\text{remaining} = \frac{a}{4} = 25 \% \text{ after 24 hr}$$

67)

Order may be positive negative fractional. Molecularity is whole number.

68) **Explanation :**

For zero order reaction, two statements are given and correct option is to be found.

Concept :

For zero order reaction :

$$[A]_t = [A]_0 - kt$$

$$kt = [A]_0 - [A]_t$$

$$k = \frac{[A]_0 - [A]_t}{t}$$

Rate law for zero order reaction :

$$\text{rate} = k$$

$$\text{Unit of rate} = \text{unit of } k = \frac{\text{mol}}{\text{L}} \text{sec}^{-1}$$

Both statements are correct.

Final answer : Both statement I and statement II are correct.

Correct option is (3)

$$69) \ln k = \ln A - \frac{E_a}{R} \left(\frac{1}{T} \right)$$

In $\ln k$ v/s $\frac{1}{T}$ graph

$$\text{Slope} = - \frac{E_a}{R}$$

$$-5 \times 10^3 = \frac{-E_a}{8.314}$$

$$E_a = 5 \times 10^3 \times 8.314$$

$$= 41500 \text{ J mol}^{-1} \text{ or } 41.5 \text{ kJ mol}^{-1}$$

$$70) (t_{1/2})_{\text{zero}} = \frac{[A]_0}{2K}$$

$$100\text{s} = \frac{0.02\text{M}}{2K}$$

$$K = \frac{2 \times 100}{0.02} = 1 \times 10^{-4} \text{ mol L}^{-1} \text{ s}^{-1}$$

71) Z_{AB} = Collision frequency

$$72) \text{ For first order reaction } k = \frac{1}{t} \ln \left[\frac{A_0}{A_t} \right]$$

For 99% completion,

$$[A]_0 = 100, [A]_t = 1$$

$$k = \frac{1}{t} \ln \left[\frac{100}{1} \right]$$

$$k = \frac{2.303 \log_{10} 100}{t}$$

$$k = \frac{2.303 \times 2}{t}$$

$$k = \frac{4.606}{t}$$

$$t = \frac{4.606}{k}$$

$$73) r = k[X]^2$$

$$74) t = \frac{2.303}{k} \log \frac{[A]_0}{[A]_t}$$

75) $t_{1/2}$ is independent of $[AB_2]_0$

□ It is a 1st order reaction

and for 1st order reaction

$$t_{75\%} = 2t_{1/2}$$

76) For zero order reaction $[A]_t = [A]_0 - kt$

77) Old NCERT, Pg # 114

78)

A. Question: For an exothermic reaction $X \rightarrow Y$, the activation energy of the forward reaction is 30 kJ/mol. If the enthalpy change (ΔH) for the reaction is -20 kJ/mol, then the activation energy of the backward reaction is (in kJ/mol):

B. Given Data:

A. Activation energy of forward reaction $(E_a)_f = 30 \text{ kJ/mol}$

B. Enthalpy change $(\Delta H) = -20 \text{ kJ/mol}$ (exothermic reaction)

C. Concept: The relationship between the activation energies of the forward and backward reactions and the enthalpy change is :

D. Solution : $\Delta H = (E_a)_f - (E_a)_b$

Where

A. ΔH = Enthalpy change of the reaction

B. $(E_a)_f$ = Activation energy of the forward reaction

C. $(E_a)_b$ = Activation energy of the back ward reaction

E. Mathematical Calculation:

We are given $\Delta H = -20 \text{ kJ/mol}$ and $(E_a)_f = 30 \text{ kJ/mol}$. We need to find $(E_a)_b$. Rearranging the equation:

$(E_a)_b = (E_a)_f - \Delta H$; $(E_a)_b = 30 \text{ kJ/mol} - (-20 \text{ kJ/mol})$ $(E_a)_b = 30 \text{ kJ/mol} + 20 \text{ kJ/mol}$; $(E_a)_b = 50 \text{ kJ/mol}$

F. Final Answer:

The activation energy of the backward reaction is 50 kJ/mol (Option 3).

79)
$$\text{ROR} = \frac{(\text{ROD})_A}{3} = \frac{(\text{ROD})_B}{2} = (\text{ROA})_C$$

80)

$$K = A e^{-E_a/RT}$$

Catalyst changes E_a so K will change

T will change K

81) For elementary reaction sum of stoichiometry coefficient of reactant is its molecularity.

82)

$$r = K [A] [Z]$$

$$K_{eq} = \frac{[A]^2}{[X][Y]}; [A] = \sqrt{K_{eq} \times [X]^{1/2} [Y]^{1/2}}$$

83)

NCERT Pg. # 118

84)
$$\frac{t_{60}}{t_{20}} = \frac{\log \left(\frac{100}{40} \right)}{\log \left(\frac{100}{80} \right)}$$

$$\frac{t_{60}}{t_{20}} = \frac{(\log 5 - \log 2)}{(\log 5 - \log 4)}$$

$$= \frac{0.4}{0.1} = 4$$

85) $36 \text{ g O}_2 = \frac{36}{32} = 1.125 \text{ mol L}^{-1} \text{ min}^{-1}$

$$-2 \frac{1}{dt} \frac{d[\text{H}_2\text{O}_2]}{dt} = \frac{d[\text{O}_2]}{dt}$$

$$\square - \frac{d[\text{H}_2\text{O}_2]}{dt} = 2 \times \frac{d[\text{O}_2]}{dt} = 2 \times 1.125$$

$$= 2.25 \text{ mol L}^{-1} \text{ min}^{-1}$$

86)

K decreases as temperature decreases

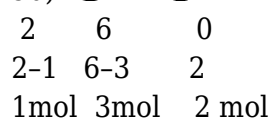
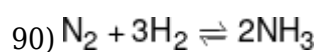
87) NCERT (2021-2022) edition chemical equilibrium, Pg#206

88) $K = \frac{K_2}{\sqrt{K_1}}$

89)

If K_{eq} maximum, stability of oxide minimum

$$\square \uparrow K_{eq} = \frac{[\text{Nitrogen}][\text{oxygen}]}{[\text{oxide of nitrogen}]} \downarrow$$



$$K_C = \frac{[\text{NH}_3]^2}{[\text{N}_2][\text{H}_2]^3} = \frac{\left(\frac{2}{1}\right)^2}{\left(\frac{1}{1}\right)\left(\frac{3}{1}\right)^3} = \frac{4}{27}$$

BIOLOGY

91) NCERT XII Pg. # 4, Fig. 1.1

92) NCERT XII Pg. # 5

93) NCERT XII Pg. # 6, Fig. 1.3(b)

- 94) NCERT XII Pg. # 6
- 95) NCERT XII Pg. # 7
- 96) NCERT XII Pg. # 7
- 97) NCERT XII Pg. # 7
- 98) NCERT XII Pg. # 9
- 99) NCERT XII Pg. # 10
- 100) NCERT XII Pg. # 11
- 101) NCERT XII Pg. # 8
- 102) NCERT XII Pg. # 15
- 103) NCERT XII Pg. # 9
- 104) NCERT XII Pg. # 12
- 105) NCERT XII Pg. # 10
- 106) NCERT XII Pg. # 20
- 107) NCERT XII Pg. # 15
- 108) NCERT XII Pg. # 13
- 109) NCERT XII Pg. # 12
- 110) NCERT XII Pg. # 22
- 111) NCERT XII Pg. # 18
- 112) NCERT XII Pg. # 18

- 113) NCERT XII Pg. # 18
- 114) NCERT XII Pg. # 19
- 115) NCERT XII Pg. # 19
- 116) NCERT XII Pg. # 4
- 117) NCERT XII Pg. # 5
- 118) NCERT XII Pg. # 12
- 119) NCERT XII Pg. # 12
- 120) NCERT XII Pg. # 10
- 121) NCERT XII Pg. # 13
- 122) NCERT XII Pg. # 18
- 123) NCERT XII Pg. # 13
- 124) NCERT XII Pg. # 4,5
- 125)
- NCERT XIIth Pg. # 9, 10, 11
- 126) NCERT XII Pg. # 13
- 127) NCERT XII Pg. # 14
- 128) NCERT XII Pg. # 12,13
- 129) NCERT XII Pg. # 19
- 130) NCERT Pg. # 5, 9, 13, 18
- 131) NCERT XII Pg. # 15

132) NCERT XII Pg. # 14, 16

133) NCERT XII Pg. # 17

134) NCERT XII Pg. # 22

135) NCERT Pg. # 6,7,10, 13

136)

NCERT-XII Pg. # 34

137)

NCERT-XII Pg.#34, 35

138)

NCERT XII Pg. # 29

Fig 2.3 (a)

139)

NCERT-XII Pg. # 27

140) NCERT-XII Pg. # 27, 28

141)

NCERT XII Pg. # 33

142)

NCERT XII Pg. # 28

143)

NCERT XII Pg. # 27

144)

NCERT XIIth, Pg # 37

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146) NCERT-XII Pg # 27

147) NCERT Pg.# 30

148)

NCERT XIIth Pg # 27, 28

149)

NCERT XII Pg # 33

150)

NCERT XIIth Pg. # 37

151) NCERT-XIIth Pg. # 35, Fig- 2.10

152)

NCERT XII Pg # 47

153) NCERT XII Pg # 47

154)

NCERT XII, Pg # 45

155)

NCERT XII, Pg # 27

156)

NCERT XII, Pg # 48

157) NCERT(XII) Page # 48

158) NCERT(XII) Pg # 44

159)

NCERT XII Pg # 44

160)

NCERT Pg # 42

Amniocentesis is preferred between 14 to 16 weeks to detect chromosomal abnormalities.

161)

NCERT XII, Pg # 44

162)

NCERT XII Pg # 48

163)

NCERT XII, Pg # 42

164)

NCERT XII Pg # 48

165)

NCERT XII Pg. # 44, 45

166)

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168)

NCERT XII, Pg # 33, 34

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170) NCERT-XII, Pg. # 37

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172)

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173)

NCERT-XIIth Pg # 33, 34

174)

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175)

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177)

NCERT-XIIth Pg # 32

178)

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179)

NCERT-XIIth Pg # 32, 33

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NCERT-XIIth Pg # 38