PHYSICS

1) If $y = ax^3 + bx + c \log_e x$, then find $\frac{dy}{dx}$.

(1) $3ax^2 + bx + \frac{c}{x}$

(2) $3ax^2 + b + c\log_e x$

(3) $3ax^2 + 0 + \frac{c}{x}$

(4) $3ax^2 + b + \frac{c}{x}$

2) A physical quantity P is given by $P = \frac{a^2b^3}{c\sqrt{d}}$. The percentage error in measurements of a, b, c & d are 1%, 2%, 3% and 4% respectively. The maximum percentage error in the measurement of quantity P will be :

(1) 14%

(2) 16%

(3) 12%

(4) 13%

3) Which of the following options have the same dimensions ?
(a) Velocity, speed (b) Pressure, stress
(c) Force, Impulse (d) Work, energy

(1) a, b, c

(2) a, b, d

(3) a, c, d

(4) b, c, d

4) The respective number of significant figures for the numbers 23.023, 0.0003 and 2.1×10^{-3} are :-

(1) 4,4,2

(2) 5,1,2

(3) 5,1,5

(4) 5,5,2

5) Match list I with list II and select the correct answer by using the codes given below the lists :

	List I (Length or distance)		**List II (Units of length)**

A.	Distance between earth and stars	1.	Micron
B.	Inter atomic distance in a solid	2.	Angstrom
C.	Size of nucleus	3.	Light year
D.	Wavelength of infrared Laser	4.	Fermi
		5.	Kilometre

Codes

	A	B	C	D
(1)	5	4	2	1
(2)	3	2	4	1
(3)	5	2	4	3
(4)	3	4	1	2

(1) 1

(2) 2

(3) 3

(4) 4

6) If the electric field in a region is $\vec{E} = 3x\hat{i}$. What is the potential difference between x = 0 and x = 2m ?

(1) 3 V

(2) – 6 V

(3) – 10 V

(4) 12 V

7) A conducting sphere carries charge density $\sigma = 10^{-6}$ C/m^2. The electric field just outside surface is :-

(1) 1.13×10^5 N/C

(2) 9×10^9 N/C

(3) 3×10^5 N/C

(4) 2.2×10^9 N/C

8) An electric dipole of dipole moment p is placed in a uniform electric field E. The potential energy, when the dipole is aligned anti-parallel to the field is :-

(1) pE

(2) – pE

(3) 0

(4) 2pE

9) Work done in assembling three charges each of q at corners of a triangle of side a is : -

(1) $\frac{3kq^2}{a}$

(2) $\frac{3kq}{a^2}$

(3) $\frac{2kq}{a}$

(4) $\frac{kq}{a^2}$

10) The electric field near a large uniformly charged infinite plate sheet is :-

(1) Zero

(2) Constant

(3) Inversely proportional to distance

(4) Directly proportional to distance

11) Two identical spheres each having charge Q and mass m are suspended at same point by strings of equal length L and reach equilibrium making angle θ with vertical. The expression for Q is :-

(1) $Q = \sqrt{2\pi\varepsilon_0 mgL \sin\theta}$

(2) $Q = \sqrt{4\pi\varepsilon_0 mgL \sin\theta}$

(3) $Q = \sqrt{\pi\varepsilon_0 mgL \tan\theta}$

(4) $Q = 4L\sin\theta\sqrt{\pi\varepsilon_0 mg \tan\theta}$

12) **Assertion (A) :** Work done in moving a charge around a closed path in an electrostatic field is zero.
Reason (R) : Electrostatic force is a conservative force.

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

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

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

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

13) **Statement-I :** Electric field inside an empty cavity in a conductor is always zero.
Statement-II : Potential in the empty cavity of a conductor remains constant.

(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

14) A body covers one-third of the distance with a velocity v_1 , the second one-third of the distance with a velocity v_2 and the remaining distance with a velocity v_3. The average velocity is :

(1) $\frac{v_1 + v_2 + v_3}{3}$

(2) $\frac{3v_1v_2v_3}{v_1v_2+v_2v_3+v_3v_1}$

(3) $\frac{v_1v_2+v_2v_3+v_3v_1}{3}$

(4) $\frac{v_1v_2v_3}{3}$

15) A particle moves along x-axis and its displacement at any time is given by $x(t) = 2t^3 - 3t^2 + 4t$ in SI units. The velocity of the particle when its acceleration is zero, is :

(1) 2.5 m s^{-1}

(2) 3.5 m s^{-1}

(3) 4.5 m s^{-1}

(4) 8.5 m s^{-1}

16) A political party has to start its procession in an area where wind is blowing at a speed of $30\sqrt{2}$ km h^{-1} and party flags on the cars are fluttering along north-east direction. Now the procession starts with a speed of 40 kmh^{-1} towards north and the direction of flags on the cars makes an angle θ with south, then value of θ is :-

(1) $\tan^{-1}(3)$

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

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

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

17) A train 200 m long crosses a bridge 300 m long. It enters the bridge with a speed of 30 ms^{-1} and leaves it with a speed of 50 ms^{-1}. What is the time taken to cross the bridge ?

(1) 2.5 s

(2) 7.5 s

(3) 12.5 s

(4) 15.0 s

18) Three persons are initially at the three corners of an equilateral triangle whose side is equal to d. Each persons now moves with a uniform speed V in such a way that the first moves directly towards the second, the second directly towards the third, the third directly towards the first. The three persons will meet after a time equal to :-

(1) $\frac{d}{V}$ second

(2) $\frac{2d}{3V}$ second

(3) $\frac{2d}{\sqrt{3V}}$ second

(4) $\frac{d}{\sqrt{3V}}$ second

19) The deceleration experienced by a moving motor boat, after its engine is cut-off is given by : $\frac{dv}{dt} = -kv^3$, where k is constant. v is instantaneous speed, v^0 is the speed at cut-off, the speed at a time t after the cut-off is :

(1) $v_0/2$

(2) v_0

(3) v_0e^{-kt}

(4) $\frac{v_0}{\sqrt{(2v_0^2kt + 1)}}$

20) Two parallel rail tracks run north-south. Train A moves towards north with a speed of 54 km h^{-1} and train B moves towards south with a speed of 90 km h^{-1}. The relative speed of B with respect to A is :

(1) 40 ms^{-1} (towards north)

(2) 40 ms^{-1} (towards south)

(3) 10 ms^{-1} (towards north)

(4) 10 ms^{-1} (towards south)

21) The range R of projectile is same when its maximum heights are h_1 and h_2. What is the relation between R, h_1 and h_2 ?

(1) $R = \sqrt{h_1h_2}$

(2) $R = \sqrt{2h_1h_2}$

(3) $R = 2\sqrt{h_1h_2}$

(4) $R = 4\sqrt{h_1h_2}$

22) Two equal resistance when connected in series to a battery consume an electric power of 60 W. If resistances are now connected in parallel to same battery, the power consumed will be :

(1) 240 W

(2) 120 W

(3) 60 W

(4) 30 W

23) Drift speed of electrons, when 1.5 A of current flows in a copper wire of cross sectional area 5 mm^2 is v. If the electron density of copper is 9×10^{28} m^{-3}, the value of v in mms^{-1} is close to :-

(1) 0.3 mms^{-1}

(2) 0.2 mms^{-1}

(3) 2 mms^{-1}

(4) 0.02 mms^{-1}

24) A uniform wire of length □ and radius r has a resistance of 100 Ω. It is recast into a wire of radius $\frac{r}{2}$. The resistance of new wire will be :-

(1) 400 Ω

(2) 100 Ω

(3) 200 Ω

(4) 1600 Ω

25) A 60 W, 220 V bulb is used on 110 V supply. The power consumed will be :-

(1) 15 W

(2) 30 W

(3) 10 W

(4) 5 W

26) A voltmeter has resistance 1000 Ω and range 0 – 10 V. To convert it into a 0 – 100 V voltmeter, what resistance must be connected and how ?

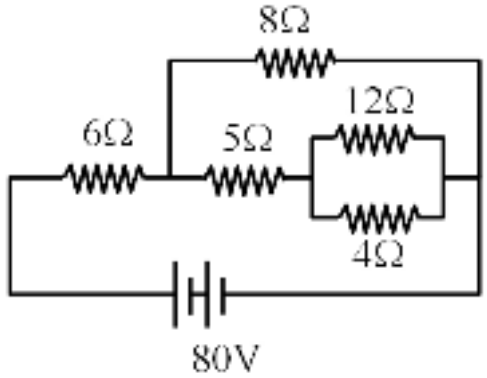
(1) 9000 Ω in parallel

(2) 9000 Ω in series

(3) 100 Ω in series

(4) 10000 Ω in parallel

27) The potential difference across 12 Ω resistor will be :



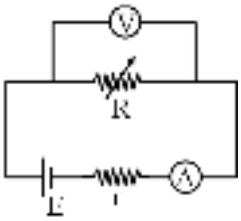
(1) 10 V

(2) 20 V

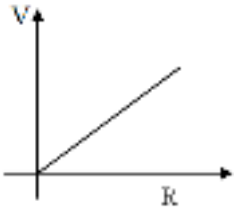
(3) 12 V

(4) 48 V

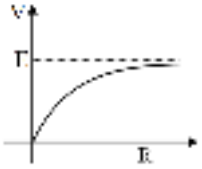
28) For the given circuit the correct graph is :-



(1)

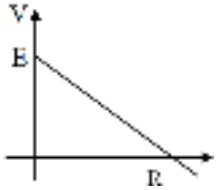


(2)

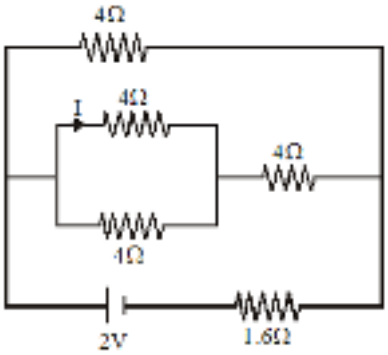


(3)

(4)



29)



Find value of current I in given circuit :-

(1) 0.1 A

(2) 0.2 A

(3) 0.3 A

(4) 0.4 A

30) A parallel plate capacitor with plates of area $1m^2$ each are at separation of 0.1 m . If the electric field between the plates is 100 NC^{-1}, the magnitude of charge on each plate is :

(1) $8.85 \times 10^{-10}C$

(2) 7.85×10^{-10} C

(3) 9.8×10^{-10}C

(4) 6.85×10^{-10}C

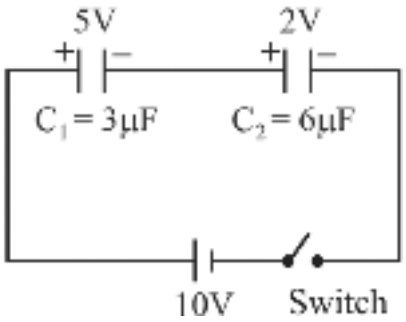
31) 5 capacitors each of capacitance 10 μF are connected in series to a 10V cell. The heat developed is : -

(1) 200 μJ

(2) 100 μJ

(3) 50 μJ

(4) 250 μJ



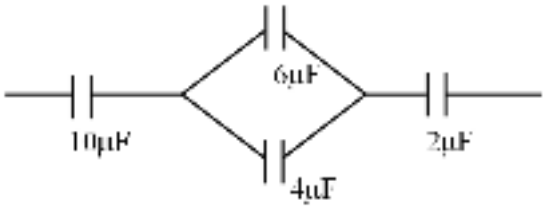
32) Find out the work done by battery when switch is closed :-

(1) 30 μJ

(2) 60 μJ

(3) 120 μJ

(4) Zero



33)
In the given figure, the charge on the left plate of 10μF capacitor is 30μC. The charge on right plate of 6μF capacitor is :-

(1) – 18μC

(2) – 12μC

(3) 12μC

(4) 18μC

34) A 10 μF capacitor is charged to 100 V. It is then connected across an uncharged capacitor of 30 μF. The loss of energy is :-

(1) 1.25×10^4 μJ

(2) 3.75×10^4 μJ

(3) 2×10^4 μJ

(4) 2.25×10^4 μJ

35) In a vernier calliper, 1 cm on main scale is divided into 10 equal divisions and vernier scale has 20 divisions which are equivalent to 1.90 cm. During measurement of diameter of a pipe, it was observed that zero of vernier lies between 4.5 cm and 4.6 cm and 12^{th} vernier scale division coincides with any of main scale division. If zero error in vernier is – 0.010 cm, the diameter of pipe is given by :-

(1) 4.540 cm

(2) 4.570 cm

(3) 4.620 cm

(4) 4.62 cm

36) A screw gauge has a pitch of 0.5 mm and 100 divisions on its circular scale. When screw is closed, in touch with anvil, 97^{th} division coincides with the reference line. In an experiment to measure thickness of a metal sheet, the main scale reading is 2.0 mm and circular scale reads 26^{th} division coinciding with reference line. The correct thickness of sheet is given by :

(1) 2.145 mm

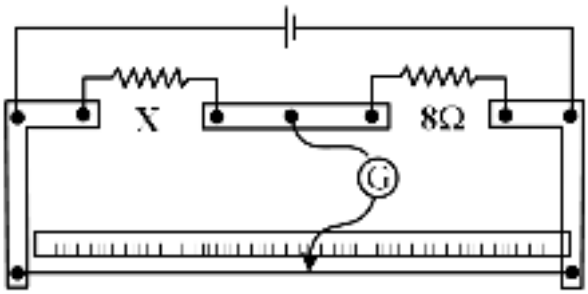
(2) 2.225 mm

(3) 2.245 mm

(4) 2.260 mm

37)

A meter bridge is used to determine an unknown resistance X using a standard 8Ω resistor in a setup arranged as shown in figure. The galvanometer shows null point when jockey is at 62 cm mark. If end corrections are 1 cm and 2 cm respectively, the value of unknown resistance X is given by :



(1) 12.6 Ω

(2) 13.13 Ω

(3) 14.5 Ω

(4) 15.3 Ω

38) A circuit has a current of 5A. The current drops to 4A when 2Ω resistance is inserted in series in circuit. The original resistance of above the circuit is :

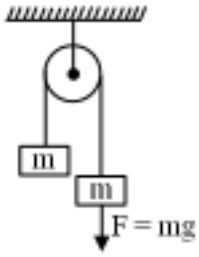
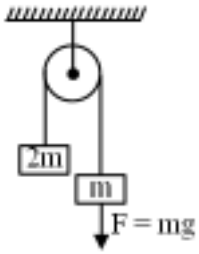
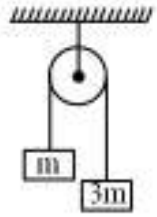
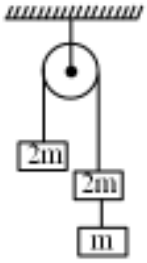
(1) 8Ω

(2) 10Ω

(3) 15Ω

(4) 20Ω

39) Match the column I to the acceleration of blocks in column II (acceleration due to gravity is g and F is an additional force applied to one of the block

	Column-I		**Column-II**
(A)		(P)	$\frac{g}{5}$
(B)		(Q)	$\frac{g}{3}$
(C)		(R)	$\frac{g}{2}$
(D)		(S)	$\frac{2g}{3}$
		(T)	Zero

(1) (A) – R ; (B)– T ; (C) – R ; (D) – P

(2) (A) – P ; (B)– Q ; (C) – T ; (D) – P

(3) (A) – R ; (B)– Q ; (C) – P ; (D) – Q

(4) (A) – P ; (B)– T ; (C) – Q ; (D) – T

40) A block of mass m is connected to another block of mass M by a string (massless). The blocks are kept on a smooth horizontal plane. Initially the block are at rest. Then a constant force F starts acting on the block of mass M to pull it. Find the force on the block of mass m.

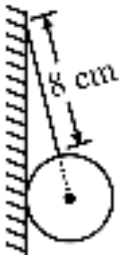
(1) $\frac{mF}{m}$

(2) $\frac{(M+m)F}{m}$

(3) $\frac{mF}{(m+M)}$

(4) $\frac{MF}{(m+M)}$

41) A uniform sphere of weight W and radius 5 cm is being held by string as shown in the figure. The tension in the string will be :



(1) $\frac{12W}{5}$

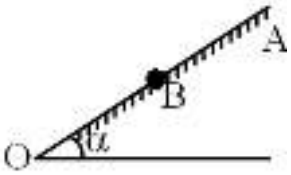
(2) $\frac{5W}{12}$

(3) $\frac{13W}{5}$

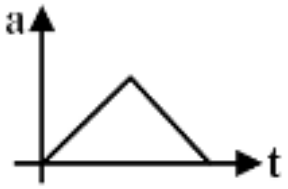
(4) $\frac{13W}{12}$

42)

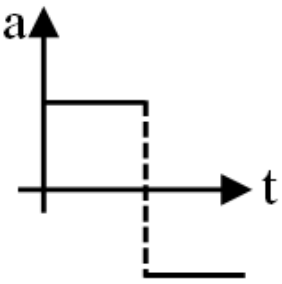
O is a point at the bottom of a rough plane inclined at an angle α to horizontal. Coefficient of friction between AB is $\frac{\tan\alpha}{2}$ and between BO is $\frac{3\tan\alpha}{2}$. B is the middle point of AO. A block is released from rest at A, then which of the following acceleration-time graph is correct ?



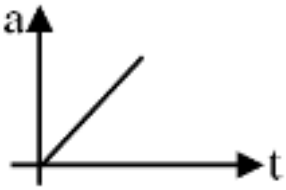
(1)

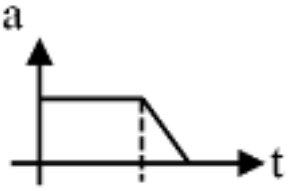


(2)

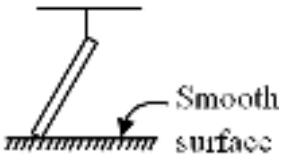


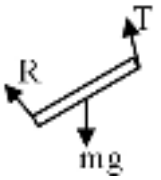
(3)

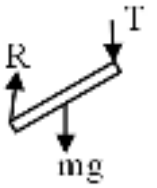


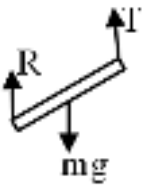
(4) 

43) Which figure represents the correct F.B.D of rod of mass m as shown in figure?



(1) 

(2) 

(3) 

(4) None of these

44) A stream of water flowing horizontally with a speed of 15m/s gushes out of a tube of cross-sectional area $10^{-2}m^2$ and hits at a vertical wall nearby. What is the force exerted by the impact of water, assuming it does not rebound?

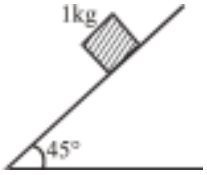
(1) 2200 N

(2) 2250 N

(3) 2150 N

(4) 2350 N

45) If the inclined plane has $\mu_s = 0.5$, then 1 kg mass will be moving with an acceleration :-



(1) $(1/2\sqrt{2})$g downwards

(2) (1/2)g upwards

(3) $(1/4\sqrt{2})$g downwards

(4) $\left(1/\sqrt{2}\right) g$ downwards

CHEMISTRY

1)

If K_1, K_2, K_3 are equilibrium constant for formation of AD, AD_2, AD_3 respectively as follows
A+D ⇌ AD,
AD+D ⇌AD_2,
AD_2 + D ⇌ AD_3.
Then equilibrium constant 'K' for A + 3D ⇌ AD_3 is related as

(1) $K_1 + K_2 + K_3 = K$

(2) $\log K_1 + \log K_2 + \log K_3 = \log K$

(3) $K_1 + K_2 = K_3 + K$

(4) $\log K_1 + \log K_2 = \log K_3 + \log K$

2) One mole PCl_5 is heated in a closed container of one litre capacity. At equilibrium, 80% PCl_5 is dissociate. What should be the value of K_c ?

(1) $(3.2)^{-1}$

(2) 3.2

(3) 2.4

(4) 4.2

3) For a chemical equilibrium

$$\underset{\text{Pink}}{[Co(H_2O)_6]^{+3}}(aq) + 4Cl^{-}(aq) \rightleftharpoons \underset{\text{Blue}}{[CoCl_4]^{-2}}(aq) + 6H_2O$$

at room temperature the equilibrium mixture is blue due to $[CoCl_4]^{-2}$ when equilibrium mixture is cooled then colour of the mixture turns pink then the nature of the reaction will be

(1) Endothermic

(2) Exothermic

(3) Cannot be determine

(4) None

4) $\frac{K_p}{K_c}$ for the following reaction will be

$$SO_{2(g)} + \frac{1}{2} O_{2(g)} \rightleftharpoons SO_{3(g)}$$

(1) RT

(2) $\sqrt{RT}$

(3) $\frac{1}{\sqrt{RT}}$

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

5) For the gas phase reaction
$N_2 + O_2 \rightleftharpoons 2NO \quad \Delta H = +180\ kJ\ mol^{-1}$ Which of the following is true

(1) The value of K changes with changes in pressure

(2) The value of K changes with introduction of NO

(3) The value of K changes with change in concentration of N_2

(4) The value of K changes with change in temperature

6) For the reaction; $PCl_{5(g)} \rightleftharpoons PCl_{3(g)} + Cl_{2(g)}$ the forward reaction at constant temperature is not favoured by :-

(1) Introducing chlorine gas at constant volume

(2) Introducing an inert gas at constant pressure

(3) Introducing PCl_5 at constant volume

(4) Increasing the volume of the container

7) The rate of a gaseous reaction is given by the expression $k[A]^2[B]^3$. The volume of the reaction vessel is reduced to one half of the initial volume. What will be the reaction rate as compared to the original rate "a" ?

(1) $\frac{1}{8}a$

(2) $\frac{1}{32}a$

(3) 2a

(4) 32a

8) The activation energy for a simple chemical reaction A → B is E_a in forward direction. The activation energy for reverse reaction :-

(1) is always double of E_a

(2) is negative of E_a

(3) is always less than E_a

(4) can be less than or more than E_a

9)

Reaction A → D occurs as follows :

$A \xrightarrow{k_1} B$

$B \xrightarrow{k_2} C$

$C \xrightarrow{k_3} D$

$k_2 > k_1 > k_3$, then the rate determining step of the reaction is :

(1) A → B

(2) C → D

(3) B → C

(4) A → D

10)

For given reaction, rate constant is 6.93×10^{-3} hr^{-1} and initial concentration of reactant is 2.5 M. Half life of the reaction is :

(1) 10 hrs

(2) 30 hrs

(3) 20 hrs

(4) 100 hrs

11) A gaseous reaction : $A(g) \rightarrow B(g) + \frac{1}{2} C(g)$ Shows increase in pressure from 150 mm to 200 mm in 10 min. What is the rate of disappearance of A(g) ?

(1) 20 mm min^{-1}

(2) 10 mm min^{-1}

(3) 5 mm min^{-1}

(4) 8 mm min^{-1}

12) Consider the following statements :-
(i) Increase in concentration of reactant increases the rate of a zero order reaction
(ii) Rate constant k is equal to 'A' if $E_a = 0$
(iii) Rate constant k is equal to 'A' if $E_a = \infty$
(iv) $\log_e$ k vs T is a straight line
(v) $\log_e$ k vs 1/T is straight line
Correct statement are :-

(1) (i) and (iv)

(2) (ii) and (v)

(3) (iii) and (iv)

(4) (ii) and (iii)

13) For the reaction $AB(g) \rightleftharpoons A(g) + B(g)$, AB is 33.3% dissociated at a total equilibrium pressure of P. Therefore, P is correctly related to K_p by which of the following option :

(1) $P = K_p$

(2) $P = 3K_p$

(3) $P = 4K_p$

(4) $P = 8K_p$

14) The rate of reaction is tripled for 10°C rise in temperature. The increase in the reaction rate as a result of temperature rise from 20°C to 60°C is :-

(1) 81 times

(2) 243 times

(3) 729 times

(4) 614 times

15) The following data is given for reaction between A and B :-

S.No.	[A] mol. l^{-1}	[B] mol. l^{-1}	Rate mol. $l^{-1}sec^{-1}$
I	1×10^{-2}	2×10^{-2}	2×10^{-4}
II	2×10^{-2}	2×10^{-2}	4×10^{-4}
III	2×10^{-2}	4×10^{-2}	8×10^{-4}

Which of the following are correct statements :-

(a) Rate constant of the reaction is 1 sec^{-1}

(b) Rate law of the reaction is k[A][B]

(c) Rate of reaction increases four times on doubling the concentration of both the reactant.

(1) a, b and c

(2) a and b

(3) b and c

(4) c alone

16) 5.6 litres of a gas at STP are found to have a mass of 22g. The molecular mass of the gas in amu is:-

(1) 22

(2) 44

(3) 88

(4) 32

17) The number of oxygen atoms present in 20.4 g of Al_2O_3 are equal to the number of :-

(1) Oxygen atoms in 3.6 g of water

(2) Oxygen atoms in 5.4 g of water

(3) Hydrogen atoms in 5.4 g of water

(4) Hydrogen atoms in 10.8 g of water

18) In the reaction, $4A + 2B + 3C \rightarrow A_4B_2C_3$, what will be the number of moles of product formed, starting from 1 mol of A, 0.6 mol of B and 0.72 mol of C :-

(1) 0.25

(2) 0.3

(3) 0.24

(4) 2.32

19) The recommended daily dose is 17.6 milligrams of vitamin C (ascorbic acid) having formula

$C_6H_8O_6$
Match the following column :-

	Column-I		Column-II
(i)	Number of O- atom in above sample	(a)	10^{-4} moles
(ii)	Number of H-atom in above sample	(b)	3.6×10^{20} atoms
(iii)	Moles of vitamin-C that should be consumed daily	(c)	4.8×10^{20} atoms

(1) (i) – (b), (ii) – (a), (iii) – (c)

(2) (i) – (a), (ii) – (c), (iii) – (b)

(3) (i) – (c), (ii) – (b), (iii) – (a)

(4) (i) – (b), (ii) – (c), (iii) – (a)

20) Match the following column

	Column-I		Column-II
i	Empirical formula	a	The reactant, which get consumed first
ii	Molecular formula	b	The simplest whole number ratio of various atoms
iii	Limiting reagent	c	The exact number of different types of atoms present in a molecule
iv	Molar mass	d	The mass of one mole of a substance in grams

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

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

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

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

21) $CaCO_3$ is 90% pure. Volume of CO_2 collected at STP when 10 g of $CaCO_3$ is decomposed is -

(1) 2.016 litres

(2) 1.008 litres

(3) 10.08 litres

(4) 20.16 litres

22) In the following reaction :
$4NH_{3(g)} + 5O_{2(g)} \rightarrow 4NO_{(g)} + 6H_2O$ ()
When 1 mole ammonia and 1 mole of O_2 are mixed, then the number of moles of NO formed will be:

(1) 0.8

(2) 0.7

(3) 0.6

(4) 0.5

23)

Consider three electron jumps described below for the hydrogen atom :-
X : n = 3 to n = 1 Y : n = 4 to n = 2
Z : n = 5 to n = 3

for which transition will the electron experience the largest change in orbit radius ?

(1) X

(2) Y

(3) Z

(4) all have same change

24) Which two orbitals are located along the axis, and not between the axis ?

(1) d_{xy}, d_{z^2}

(2) d_{xy}, p_z

(3) d_{yz}, p_x

(4) p_z, $d_{x^2-y^2}$

25) According to Heisenberg's uncertainty principle, the product of uncertainties in position and velocities for an electron of mass 9.1×10^{-31} kg is :-

(1) $2.8 \times 10^{-3}\ m^2\ s^{-1}$

(2) $3.8 \times 10^{-7}\ m^2\ s^{-1}$

(3) $5.8 \times 10^{-5}\ m^2\ s^{-1}$

(4) $2.5 \times 10^{-1}\ m^2\ s^{-1}$

26) The ratio of minimum and maximum wavelengths of Lyman series in spectrum of Li^{+2} ion is :-

(1) 4 : 27

(2) 3 : 4

(3) 4 : 9

(4) 4 : 3

27) The difference in angular momentum associated with the e^- in two successive orbits of atom is :-

(1) $\frac{h}{\pi}$

(2) $\frac{h}{2\pi}$

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

(4) $(n-1)\frac{h}{Z}$

28) The maximum probability of finding electrons in d_{xy} orbital is :-

(1) along x and y axis

(2) along x and z axis

(3) along y and z axis

(4) at an angle of 45° with x axis

29) The possible correct set of quantum number for the unpaired electron of Cl atom is :-

(1) $2, 0, 0, +\frac{1}{2}$

(2) $2, 1, -1, +\frac{1}{2}$

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

(4) $3, 0, \pm\frac{1}{2}$

30) The kinetic and potential energy of electron in 3rd shell of H-atom in eV are respectively :-

(1) –1.51, –3.02

(2) 1.51, –3.02

(3) –3.02, 1.51

(4) 1.51, –1.51

31) Choose correct option :
Statement-I (S_1) :- Zn is a d-block element but not a transition element.
Statement-II (S_2) :- Zn shows only +2 oxidation state.

(1) S_1 & S_2 both are correct.

(2) S_1 & S_2 both are incorrect.

(3) S_1 is correct but S_2 is incorrect.

(4) S_1 is incorrect but S_2 is correct.

32) Select the correct statements is/are -
(A) Ionisation enthalpy is always positive (for a neutral atom)
(B) The second ionisation enthalpy will be higher than the first ionisation enthalpy.
(C) Ionisation enthalpy of alkali metals are highest in each period.
(D) Ionisation enthalpy of noble gases are highest in each period.

(1) (A), (C) are correct

(2) (A), (B), (D) are correct

(3) (A), (B), (C), (D) are correct

(4) (C), (D) are correct

33)

Calculate the total number of the π-bonds in the following diatomic species ?
B_2, C_2, O_2, N_2, F_2, Li_2

(1) 8

(2) 4

(3) 2

(4) 6

34) **Assertion :** In boron family, down the group electronegativity regularly decreases.
Reason : Atomic size of Ga is nearly equal to size of Al.

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

(2) Assertion is incorrect but Reason is correct.

(3) Assertion is correct but Reason is incorrect.

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

35) **Assertion (A) :** First ionization energy for nitrogen is lower than oxygen.
Reason (R) : Across a period effective nuclear charge increases.

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

(2) Both assertion and reason are true and reason is a correct explanation of assertion

(3) Assertion is true but reason is false

(4) Assertion is false but reason is true

36) Correct order of Ionization Energy is:

(1) $O > S > O^- > S^-$

(2) $O > S > S^- > O^-$

(3) $S^- > S > O^- > O$

(4) $S > O > S^- > O^-$

37) Match group I and Group II and select the correct answer?

	Group I		**Group II**
A	Correct order for 1st ionization enthalpy	I	Ne < Be < B < Li < C
B	Correct order for negative value of electron gain enthalpy	II	Be < B < C < N < O
C	Correct order for electronegativity	III	B < Be < C < O < N

(1) A–I, B– II, C–III

(2) A–I, B–III, C–II

(3) A–III, B–II, C–I

(4) A–III, B–I, C–II

38)

Lanthanoid contraction will not have any influence when we compare size of :-

(1) Zr & Hf

(2) Y & La

(3) Mo & W

(4) Tc & Re

39) Which of the following statement is/are correct.
[T for True and F for false]
(a) Hybrid orbitals form stronger bond than pure atomic orbital.
(b) In canonical structure there is a difference in the arrangement of atoms.
(c) Symmetrical molecule, always contain same bond angle
(d) VSEPR theory can explain the square planar geometry of XeF_4.

(1) T F F T

(2) F T F T

(3) T T T T

(4) F F T T

40) Which of the following is not correctly matched ?

(1) $H_2O > NH_3 > CH_4$: Dipole moment

(2) $CaCl_2 > FeCl_2 > FeCl_3$: Melting point

(3) $NH_4^+ > NH_3 > NH_2^-$: Bond angle

(4) $Cl_2 > F_2 > Br_2$: Boiling point

41) In which of the following conversion planar compound changed into non-planar compound ?
(a) $ClF_3 \rightarrow ClF_4^-$
(b) $NH_2^- \rightarrow NH_4^+$
(c) $I_3^+ \rightarrow I_3^-$
(d) $SO_2 \rightarrow SO_3$

(1) a & b

(2) b & d

(3) only b

(4) a & c

42) Which of the following molecule has both pπ – pπ and pπ –dπ bond.

(1) $POCl_3$

(2) XeO_3

(3) SO_3

(4) CO_2

43) Which of the following species is **not** stable ?

(1) $[SiF_6]^{2-}$

(2) $[GeCl_6]^{2-}$

(3) $[Sn(OH)_6]^{2-}$

(4) $[SiCl_6]^{2-}$

44) Which of the following statements is false for XeO_3F_2 ?

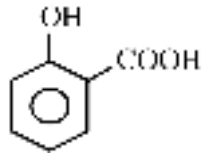
(1) Hybridisation of Xe is sp^3d

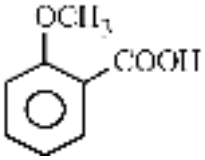
(2) The compound is non-polar and non-planar

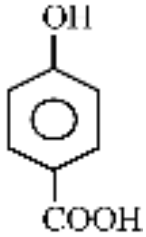
(3) The compound has pπ–pπ bonding

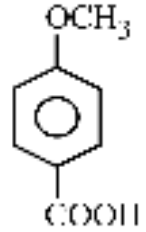
(4) The compound has pπ–dπ bonding

45) Which of the following has strongest intra molecular hydrogen bonding :-

(1) 

(2) 

(3) 

(4) 

BIOLOGY

1) Match the column I and column II and select the correct option from given table?

	Column-I		**Column-II**
(a)	Family	(i)	Poales

(b)	Order	(ii)	Angiospermae
(c)	Class	(iii)	Dicotyledonae
(d)	Division	(iv)	Poaceae

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

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

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

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

2) **Assertion :** Potato and brinjal are two different species but both belong to the same Genus *Solanum.*
Reason : Genus comprises a group of related species which has more characters in common in comparison to species of other Genera.

(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.

3) Nomenclature ensure that :

(1) Each organism has only one name.

(2) Description of any organism should enable the people (in any part of the world) to arrive at the same name

(3) Such a name has not been used for any other known organism

(4) All of the above

4) How many from the followings belong to Deuteromycetes ?
Albugo, Puccinia, Colletotrichum, Ustilago, Aspergillus, Saccharomyces, Rhizopus, Alternaria, Neurospora, Agaricus.

(1) One

(2) Three

(3) Two

(4) Four

5) Protista differ from Monera in having-

(1) Cell wall

(2) Autotrophic nutrition

(3) Flagella

(4) Nuclear membrane

6) Which of following fungus is used extensively in biochemical and genetic work ?

(1) Yeast

(2) *Aspergillus*

(3) *Claviceps*

(4) *Neurospora*

7) According to five kingdom system, how many kingdoms can include only heterotrophic organisms ?

(1) Two

(2) Three

(3) Four

(4) One

8) Under favourable conditions, bacteria undergo __A__ while under unfavourable conditions they form __B__. Complete the above statement by choosing the correct option for A and B respectively :

(1) Fragmentation, Ascospores

(2) Binary fission, Fruiting bodies

(3) Binary Fission, Spores

(4) Fragmentation, conidia

9) A prion is a :

(1) Causative agent of mad-cow disease

(2) Proteinaceous infectious particle

(3) Causative agent of citrus canker disease

(4) Both (1) & (2)

10) Which of the following option gives the **correct** categorisation of the tissue systems found in plants :-

	A Epidermal tissue system	**B** Ground tissue system	**C** Vascular tissue system
(1)	Bulliform cells	Primary xylem	Cambium
(2)	Stomata	Pericycle	Medullary Rays
(3)	Trichomes	Hypodermis	Vascular Bundles
(4)	Root hair	Endodermis	Epiblema

(1) 1

(2) 2

(3) 3

(4) 4

11) **Assertion (A) :** All tissues except epidermis and vascular bundles constitute the ground tissue.
Reason (R) : The xylem and phloem together constitue vascular bundles.

(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.

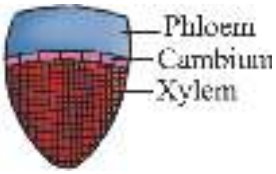
12)

Match the column-I with column-II and give the correct answer from the given options :

	Column-I		**Column-II**
(i)	Differentiated Mesophyll	(a)	Dicot Root
(ii)	Bulliform cells	(b)	Dicot leaf
(iii)	Casparian strips	(c)	Dicot stem
(iv)	Collenchymatous Hypodermis	(d)	Monocot leaf

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

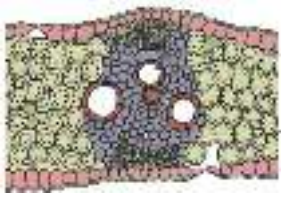
13) Select the correct option in respect of given diagram:-



(1) Present in dicot & gymnosperm stems.
(2) Present in monocot stems
(3) Present in dicot roots
(4) Present in fern Rhizome

14) Select the correct option for monocot stems ?

(1) Parenchymatous Hypodermis
(2) Xylem is exarch
(3) Well developed pith
(4) Scattered vascular bundles

15) 

Identify the given diagrame and select the correct option in respect of given diagrame ?

(1) Stomata only on lower surface
(2) Almost equal stomata on both the surface
(3) Found in mango plant
(4) Both 2 and 3

16) Conjoint, collateral and open vascular bundles are found in :-

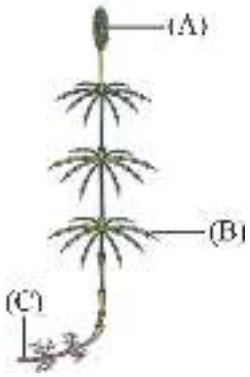
(1) Wheat stem
(2) Sunflower stem
(3) Mango leaf
(4) Maize root

17) Usually more than six exarch xylem bundles are found in ?

(1) Dicot root
(2) Monocot root
(3) Dicot stem
(4) Monocot stem

18) Pith is well developed and large in :-

(1) Dicot root
(2) Monocot root
(3) Monocot Stem
(4) Dicot leaf

19) 

Identify A, B, C parts from the above given diagram :-

	A	B	C
(1)	Sporangium	Node	Rhizome

(2)	Strobilus	Branch	Rhizome
(3)	Strobilus	Branch	Rhizoid
(4)	Sporophyll	Internode	Rhizoid

(1) 1

(2) 2

(3) 3

(4) 4

20)

Which of the following is heterosporous fern ?

(1) *Selaginella*

(2) *Salvinia*

(3) *Lycopodium*

(4) *Dryopteris*

21) Match the column I, II & III. Find out the correct option which show correct match :-

	Column-I		**Column-II**		**Column-III**
A	Chlorophyceae	i	Chlorophyll **a, d**	a	Mannitol, Laminarin
B	Rhodophyceae	ii	Chlorophyll **a, c**	b	Starch
C	Phaeophyceae	iii	Chlorophyll **a, b**	c	Floridean, Starch

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

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

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

(4) A-i-b, B-ii-a, C-iii-c

22) **Statement-1 :** In red algae, sexual reproduction is Oogamous and accompanied by complex post fertilization development. **Statement-2 :** Red algae reproduce sexually by non-motile gametes.

(1) Statement-1 is False but Statement-2 are True.

(2) Both Statement-1 & Statement-2 are True.

(3) Statement-1 is True but Statement-2 is False.

(4) Both Statement-1 & Statement-2 are False.

23) Given below are two statements :
Statement-I : Mosses along with lichens are the first organisms to colonise rocks and hence, are of great ecological importance.
Statement-II : Lichens degrade rocks making them suitable for the growth of other plants.
In the light of the above statements choose the correct answer from the options given below :

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

(2) Both Statement-I and Statement-II are incorrect.

(3) Statement-I is correct and Statement-II is incorrect.

(4) Statement-I is incorrect but Statement-II is correct.

24) **Assertion :** In gymnosperm the male and female gametophytes do not have independent free living existence.
Reason : All gymnosperm are heterosporous.

(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.

25)

Algin is the cell wall coating of :-

(1) Green algae

(2) Red algae

(3) Brown algae

(4) All algae

26) 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

27)

Which of the following is correct for Bryophyte ?

(1) Possess well - differentiated vascular tissue.

(2) Produce seeds

(3) They have true root, stem or leaves.

(4) Called amphibians of the plant kigdom.

28) Match the column-I with column-II and select correct option :-

Column-I		**Column-II**	
A.	Whorled phyllotaxy	I.	Alstonia
B.	Diadelphous androecium	II.	Pea

C.	False septum (replum)	III	Argemone
D.	Perigynous flower	IV	Rose

Option :-

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

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

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

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

29) Which is incorrect pair regarding position of ovary respect to Thalamus ?

(1) Superior ovary - Mustard

(2) Half inferior ovary - peach

(3) Half superior ovary - rose

(4) Inferior ovary - Lupin

30) When a pair of leaves arise at each node and lie opposite to each other found in :

(1) Chinarose, Guava

(2) Mustard, Calotropis

(3) Sunflower, Alstonia

(4) Guava, Calotropis

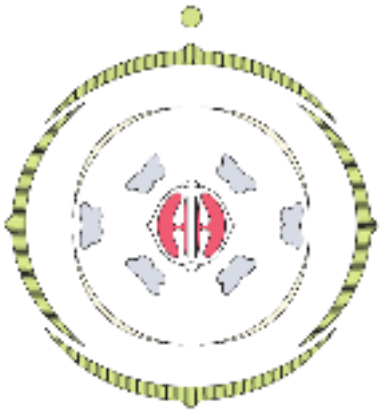
31) **Statement-I :-** Leaves exhibits marked variation in their shape-size, margin apex and extent of incisions of leaf blade.
Statement-II :- The leaves also get modified into other structure such as tendril, spines for climbing and protection respectively.

(1) Statement I & II both are correct

(2) Statement I & II both are incorrect

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

(4) Statement I is incorrect and Statement II is correct



32) Which character not represent by given floral diagram

(1) Sepal four, not united

(2) Valvate aestivation

(3) Tetradynamous stamen, ovary superior

(4) Bilocular ovary

33) Read all statement carefully and select **incorrect** statement :-

(1) Leaves originate from shoot apical meristem

(2) Leaves are arranged in an acropetal order

(3) Some plants of arid regions like *Euphorbia* modify their stem into flattened and contain chlorophyll

(4) When a shoot tip transforms into a flower it is always solitary

34) **Statement-I :-** In wheat plant, the primary root is short lived and replaced by a large number of roots which originate from the base of the stem.
Statement-II :- A few millimetres above the root cap is the region of elongation. The cells of this region are very small, thin walled with dense cytoplasm.

(1) Both statement I and Statement II are correct

(2) Both statement I and Statement II are incorrect

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

(4) Statement I is incorrect and Statement II is correct

35) Match the column-I with column-II and select correct option :-

Column-I		**Column-II**	
A.	Vexillary aestivation	I.	Sunflower
B.	Inferior ovary	II.	Tobacco
C.	Replum (False septum)	III.	Mustard
D.	Fumigatory plant	IV.	Indigofera

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

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

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

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

36) In given example how many plants show zygomorphic symmetry in their flower ?
Mustard, Radish, Tomato, Sunhemp, *Lupin*, Muliathi, *Indigofera, Asparagus, Colchicum*, *Aloe*, Gulmohur, Bean.

(1) Six

(2) Seven

(3) Eight

(4) Nine

37) Monoecious plant

(1) Prevents geitonogamy but not autogamy.
(2) Prevent autogamy but not geitonogamy.
(3) Prevent both geitonogamy and autogamy
(4) Both 2 and 3

38)

The inner wall of pollen grain is thin and continuous layer made up of _____ and _____ .

(1) Sporopollenin and pectin
(2) Pectin and cellulose
(3) Cellulose and sporopollenin
(4) Sporopollenin and pollen kit

39) How many nuclei and gametes are involved in double fertilization respectively.

(1) 3 and 3 respectively
(2) 5 and 2 respectively
(3) 3 and 5 respectively
(4) 5 and 3 respectively

40) What would be the ploidy of cells of the microspore tetrad.

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

41) Syncarpous gynoecium is found in :-

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

42) Which of the following plant does not show monoecious condition?

(1) Maize
(2) Cucumber
(3) Datepalm
(4) Coconut

43) Choose the statement which are unrelated for embryo development in flowering plant :-

(1) develops at micropyle end of the ovule.
(2) Early stages of embryo development differs in monocot and dicots.

(3) In most of the plants zygote divide first by transverse division

(4) Most zygote divide only after certain amount of endosperm is formed.

44) **Statement I :** Polar nuclei are situated below the egg apparatus in central cell.
Statement-II : Filiform apparatus guiding the pollen tube into the synergid.

(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.

45) **Assertion :** Geitonogamy is functionally cross pollination and genetically self pollination.
Reason : It involves pollinating agents but pollen grains come from the same plant.

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

(2) Both Assertion and Reason are true but 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.

46) Transfer of semen into the female genital tract is known as :-

(1) Ejaculation

(2) Implantation

(3) Fertilization

(4) Insemination

47) In oogenesis process after birth, which division is completed prior to ovulation ?

(1) 1st meiotic division

(2) 2nd meiotic division

(3) 1st mitotic division

(4) 2nd mitotic division

48) The chances of fertilization are very high during which days of menstruation cycle ?

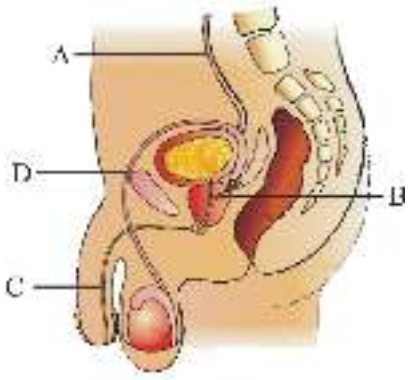
(1) First 5 days

(2) Last 7 days

(3) 10^{th} to 17^{th} day

(4) 21^{st} to 25^{th} day

49) It is a diagrammatic sectional view of male reproductive system. In it identify common duct which is formed by fusion of terminal end of vas deferens and duct of seminal vessicle



(1) A

(2) B

(3) D

(4) C

50) ***Assertion (A):-*** Implants can be used as a good method of contraception.
Reason (R):- It releases estrogen which suppress sperm motility.

(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

51) Read the following statements (A-D) :-
(A) The first movement of the foetus and appearance of hair on the head are usually observed during fifth month of pregnancy.
(B) The presence of hCG in maternal blood or urine is indicator of pregnancy.
(C) Scientifically it is correct to say that the sex of the baby is determined by the father, not by the mother
(D) The corpus luteum secretes large amount of progesterone which is essential for maintenance of the endometrium
How many statement are correct in given statements ?

(1) Four

(2) Three

(3) Two

(4) One

52) Choose the **incorrect** statement about human oogenesis :-

(1) Oogonia are formed after birth

(2) Oogenesis is initiated during the embryonic development

(3) No more gamete mother cells are formed in females after birth

(4) At puberty primary follicles are present in ovary.

53) **Statement-I:** The menstrual phase is followed by the follicular phase.
Statement-II: During follicular phase the primary follicles in the ovary grow to become a fully

mature Corpus Luteum.

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

54) Match the following and choose the correct answer :

(A)	Fertilization	(i)	Fundus Part of uterus
(B)	Implantation	(ii)	Ovary
(C)	Capacitation	(iii)	Ampulla
(D)	Folliculogenesis	(iv)	Vagina

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

55) Which of the following hormone act at the Leydig cell to synthesis and secretion of Androgen.

(1) FSH
(2) GnRh
(3) Thyroxin
(4) LH

56) Given below are four statements (a-d) regarding assisted reproductive technologies :- (a) ZIFT - The zygote or early embryo (upto 8 cells) transferred into the fallopian tube
(b) ICSI - A sperm is directly injected into the ovum to form an embryo in the laboratory
(c) AI - The semen collected either from the husband or healthy donor is artificially introduced into the vagina
(d) GIFT - Transfer of ovum collected from a donor into the fallopian tube of another female who cannot produce ovum but can provide suitable environment for fertilisation and development
Which of the above statements are correct :

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

57) Effect of the hormone releasing IUDs compared to copper releasing IUDs is :-

(1) Suppressing the sperm motility
(2) Reducing the fertilising capacity of sperm
(3) Making the uterus unsuitable for implantation and cervix hostile to sperm

(4) Increasing phagocytosis of sperm within the uterus

58) **Statement I :** All members of animalia kingdom are multicellular.
Statement II : All animals exhibit the same pattern of organisation of cells.

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

59) **Assertion (A) :** Sponges exhibit cellular level of organisation.
Reason (R) : In sponges, the cells are arranged as loose cell aggregates.

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

60) How many characters are correct for cyclostomata.
(A) Ectoparasites on some fishes.
(B) Sucking and circular mouth with jaws.
(C) Scales are absent.
(D) Paired fins are present.
(E) Cranium absent
(F) Closed circulation.

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

61) Digestion is only intracellular in :-

(1) *Pennatula*, *Gorgonia*
(2) *Sycon*, *Spongilla*
(3) *Pennatula*, Sycon
(4) *Gorgonia*, Bath spong

62) In echinodermata development is indirect because in echinodermata.

(1) Larva is absent
(2) Larva is present
(3) Fertilisation is external
(4) Reproduction is sexual

63) Select the incorrect match :-

(1) *Ascaris* → dioecious
(2) *Nereis* → dioecious
(3) *Apis* → dioecious
(4) Earthworm → dioecious

64) Select the incorrect statement for sea-horse.

(1) Sea-horse is a mammal.
(2) Sea-horse is a bony fish.
(3) Sea-horse is a cold-blooded animal.
(4) Sea-horse has air-bladder.

65) Which of the following group belongs to true fishes ?

(1) Dog fish, Cat fish
(2) Cat fish, Jelly fish
(3) Devil fish, Cuttle fish
(4) Star fish, Fighting fish

66) Match the following–

	Column–I		**Column–II**
(i)	*Psittacula*	(a)	Blue whale
(ii)	*Struthio*	(b)	Krait
(iii)	*Bangarus*	(c)	Parrot
(iv)	*Balaenoptera*	(d)	Ostrich

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

67) Match the column-I and column-II correctly.

Column-I		**Column-II**	
1.	Pseudo coelomate	(A)	Ctenophora
2.	Diploblastic	(B)	Annelida
3.	Radial symmetry	(C)	Aschelminthes
4.	Metameric segmentation	(D)	Echinodermata

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

(4) 1–(C), 2–(A), 3–(D), 4–(B)

68)

Radhika wants to classify some animals under the phylum chordata. Some characters are found only in animals of chordata with the help of these characters Radhika can classify organisms under chordata.
Select the characters found in chordates only from given below and help Radhika :-
(a) Presence of cloaca and ventral nerve cord
(b) Presence of notochord
(c) Dorsal tubular nerve cord

(d) Bilateral symmetry, triploblastic and dorsal heart (e) Post anal tail
(1) b, c and e
(2) a, b, d
(3) a, b, d and e
(4) a, d and e

69) Animal A says "when we were larva, we had all chordate characters but when we developed into adults we have only single chordate character that is pharyngeal gills. Animal A is :-

(1) *Ascidia*
(2) *Branchiostoma*
(3) *Petromyzon*
(4) *Obelia*

70) **Statement-I:** Columnar epithelium is found in stomach & intestine & help in secretion & diffusion.
Statement-II: Adhering junction perform cementing to keep neighboring cells together.

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

71)

Which fibre provide strength & present in bundles.

(1) Elastic
(2) Reticular
(3) Collagen
(4) Both 2 & 3

72) **Assertion (A):** Frog exhibit sexual dimorphism.
Reason (R): Vocal sac & copulatory pad present in male frog only.

(1) Both A & R are wrong

(2) Assertion is correct R is wrong
(3) A is correct But R is not true explanation of A
(4) Both A & R are correct and R is correct explanation of A

73) Which is not includes in fore-brain of frog.

(1) Olfactory lobe
(2) Cerebral hemisphere (Paired)
(3) Corpus Callosum
(4) Diencephalon (Unpaired)

74) In male frog, cloaca is used to pass:-

(1) Faecal matter
(2) Sperm
(3) Urine
(4) All of these

75) Find out incorrect statement regarding frog.

(1) Frog is ureotelic animal
(2) 10 pairs cranial nerve present
(3) External ear is well developed with tympanum
(4) Hind brain consist of medulla oblongata & cerebellum

76) Find out incorrect match

(1) Malpighian Tubule → 100 – 150
(2) Spiracles → 10 pairs
(3) Hepatic Caeca → 6-8 pair
(4) Abdomen → 10 Segment

77) **Statement-I:** Malpighian Tubule is lined by glandular & ciliated cells.
Statement-II: In Cockroach fat body, Nephrocyte & Urecose gland help in excretion.

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

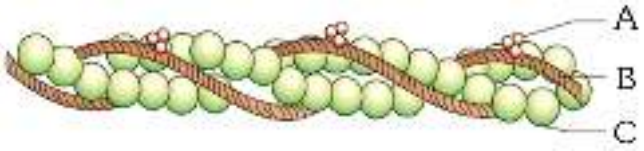
78) Find out incorrect statement about Cockroach.

(1) Three ganglia lies in thorax, six in abdomen
(2) Exchange of gases takes place at tracheoles
(3) Mosaic vision with more resolution but less sensitivity
(4) Supra-oesophageal ganglion supplies nerve to antennae & compound eye

79) Cockroach sperm are stored in:-

(1) Phallic gland
(2) Long tubule
(3) Vas deferns
(4) Seminal vesicle

80) Find out A, B and C in given figure?



(1) A - Troponin , B - Tropomyosin, C - F-actin
(2) A- Troponin, B-F-actin, C- Tropomyosin
(3) A - Tropomyosin, B - F-actin, C - Troponin
(4) A- F-actin, B-Tropomyosin, C- Troponin

81) Select the correct statement for pelvic girdle.

(1) Consists of one coxal bone
(2) Two halves of pelvic bone meet ventrally to form the pubic symphysis.
(3) Each coxal bone is formed by fusion of 2 bones.
(4) At the fusion of the 2 bones accetabulum cavity is present.

82) The joint between the adjecent vertebrae in the vertebral column is :-

(1) Cartilagenous joint
(2) Hing joint
(3) Pivot joint
(4) Fibrous joint

83) Which of the following bone is not a part of appendicular skeleton.

(1) Sternum
(2) Humerus
(3) Femur
(4) Tibia

84) Acromian process are present in.

(1) Radius
(2) Ulna
(3) Scapula
(4) Femuor

85) Match the column-I with column-II and select the correct option.

	Column-I		Column-II
(i)	Saddle joint	(a)	Between Humerus & Petoral girdle.
(ii)	Gliding joint	(b)	Carpal and metacarpal of thumb.
(iii)	Hing joint	(c)	Between carpals.
(iv)	Ball & Socket joint	(d)	Between Phalanges

(1) i – b, ii – c, iii – d, iv – a

(2) i – b, ii – d, iii – a, iv – c

(3) i – a, ii – b, iii – c, iv – d

(4) i – d, ii – a, iii – c, iv – d

86) Given two statement choose correct option.
Statement-I : Cell of the human body exhibit three main types of movement namely Amoeboid, ciliary and muscular.
Statement-II : Ciliary movement occurs in most of our body organs.

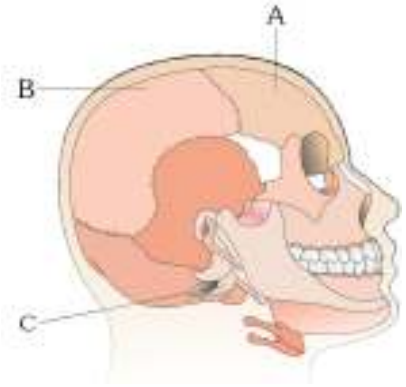
(1) Statement-I correct but statement-II incorrect.

(2) Both statement-I and II correct.

(3) Statement-I incorrect but statement-II correct.

(4) Both statement-I and II incorrect.

87) Examine the figure of Human skull and Identify the parts labelled as A, B, & C.



(1) A - Sphenoid bone, B - Parietal bone, C - Occipital bone

(2) A - Frontal Bone, B- Parietal bone, C- Hyoid bone

(3) A - Frontal bone , B- Parietal bone, C - Occipital Condyle.

(4) A -Frontal bone , B- Nasal bone, C- Occipital bone

88) **Assertion:** Joints are points of contact between bones or between bone and cartilages.
Reason : Joints are not essential for all types of movement involving the bony parts of the body.

(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 and Reason are incorrect.

(4) Assertion is correct but Reason is false.

89) Rapid sparms in muscles due to low Ca^{++} in body fluid know as .

(1) Tetany
(2) Muscular dystrophy
(3) Myasthenia gravis
(4) Arthritis

90) Each limb of human made of how many bones.

(1) 60
(2) 30
(3) 120
(4) 29

ANSWER KEYS

PHYSICS

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

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	1	3	4	1	4	4	2	4	2	2	4	1	3	3	3	3	4	1
Q.	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85
A.	1	1	3	4	3	2	2	4	3	2	1	2	4	2	4	2	4	2	1	4
Q.	86	87	88	89	90															
A.	3	3	4	3	1															

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	4	3	4	4	1	3	4	3	2	2	1	4	2	2	2	2	2	2
Q.	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130
A.	2	2	1	2	3	4	4	2	4	4	1	3	3	3	3	1	2	2	4	1
Q.	131	132	133	134	135	136	137	138	139	140	141	142	143	144	145	146	147	148	149	150
A.	2	3	2	4	1	4	1	3	2	3	1	1	3	4	4	4	3	2	4	2
Q.	151	152	153	154	155	156	157	158	159	160	161	162	163	164	165	166	167	168	169	170
A.	2	2	4	1	1	3	4	1	1	2	3	4	3	4	3	3	1	3	4	1
Q.	171	172	173	174	175	176	177	178	179	180										
A.	2	1	1	3	1	1	3	4	1	2										

SOLUTIONS

PHYSICS

1) $\frac{dy}{dx} = \frac{d}{dx}\left(ax^3 + bx + c\log_e x\right)$
$= 3ax^2 + b + \frac{c}{x}$

2) $P = \frac{a^2b^3}{c\sqrt{d}} = \frac{a^2b^3}{cd^{1/2}}$
$\frac{\Delta p}{p} = \left[2\frac{\Delta a}{a} + 3\frac{\Delta b}{b} + \frac{\Delta c}{c} + \frac{1}{2}\left(\frac{\Delta d}{d}\right)\right] \times 100$
$\frac{\Delta p}{p} = 2(1\%) + 3(2\%) + (3\%) + \frac{1}{2}(4\%)$
$\frac{\Delta p}{p} = 13\%$

3)

(a) [Velocity] = [Speed] = $[LT^{-1}]$
(b) [Pressure] = [Stress] = $\frac{F}{A} = [ML^{-1}T^{-2}]$
(c) Impulse = Force × Time ⇒ [Force] $\neq$ [Impulse]
(d) [Work] = [Energy] = $[ML^2T^{-2}]$

4)

23.023 → 5 sig. figures
0.0003 → 1 sig. figure
2.1×10^{-3} → 2 sig. figures

5) Size of nucleus = fm
Atomic radii is in the range of $\simeq A^\circ$
Wavelength of infrared rays $\simeq \mu m$
Distance between stars and earth = light year (ly)

6) $\Delta V = -\int \vec{E}.d\vec{r} \quad = -\int_0^2 3x dx = -3\int_0^2 \frac{x^2}{2} = -6V$

7) $E = \frac{\sigma}{\varepsilon_0} = \frac{10^{-6}}{8.85 \times 10^{-12}} = 1.13 \times 10^5 N/C$

8) $U = -PE\cos\theta$; $\theta = 180° \Rightarrow U = PE$

9)

$W = U_f - U_i = \dfrac{3kq^2}{a}$

10) $E = \dfrac{\sigma}{2\varepsilon_0}$ = constant

$E \neq f(r)$

11) $\tan\theta = \dfrac{F_e}{mg}$, $F_e = \dfrac{Q^2}{4\pi\in_0(2L\sin\theta)^2}$

12)

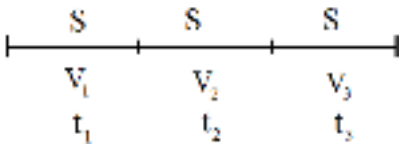
Electrostatic field is conservative force field and work done in moving an object in closed path in conservative force field is zero.

13) $E = -\dfrac{dV}{dr}$

for empty cavity in conductor

V = constant

and E = 0



14)

$V_1 = \dfrac{S}{t_1}$, $V_2 = \dfrac{S}{t_2}$, $V_3 = \dfrac{S}{t_3}$

$V_{av} = \dfrac{3S}{t_1 + t_2 + t_3}$

$= \dfrac{3S}{\frac{S}{V_1} + \frac{S}{V_2} + \frac{S}{V_3}}$

$v_{av} = \dfrac{3V_1V_2V_3}{V_1V_2 + V_2V_3 + V_3V_1}$

15)

$x(t) = 2t^3 - 3t^2 + 4t$

$V(t) = \frac{d}{dt}(x(t))$

$= 6t^2 - 6t + 4$

$a(t) = \frac{d}{dt}(v(t))$

$a(t) = 12t - 6$

$a(t) = 0 \Rightarrow 12t - 6 = 0$

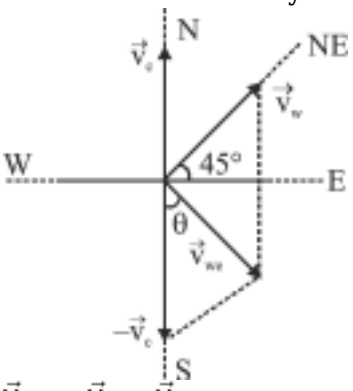
$t = \frac{1}{2}$

so $V\left(\frac{1}{2}\right) = 6\left(\frac{1}{2}\right)^2 - 6 \times \frac{1}{2} + 4$

$= \frac{3}{2} + 1$

$\Rightarrow V\left(\frac{1}{2}\right) = \frac{5}{2} = 2.5 m/s$

16) When the procession is stationary, the flags flutter along the north-east direction. It means wind is flowing along the north-east direction. The flags will start fluttering along the direction of the relative velocity of wind w.r.t. procession.



$\vec{v}_{wc} = \vec{v}_w - \vec{v}_c$

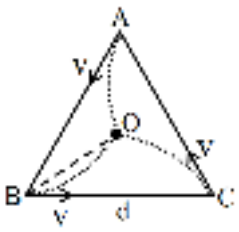
$= \left(30\sqrt{2}\cos 45°\hat{i} + 30\sqrt{2}\sin 45°\hat{j}\right) - 40\hat{j}$

$= 30\hat{i} - 10\hat{j}(ms^{-1})$

$\tan\theta = \frac{30}{10} = 3$

17) Total distance covered while crossing the bridge
= (200 + 300) m
= 500 m. Using $\upsilon^2 - u^2 = 2ax$,
we find $a = 1.6\ ms^{-2}$
and using $\upsilon = u + at$, we find t = 12.5 s.

18)



$OB = \frac{d}{2\cos 30^o} = \frac{d}{\sqrt{3}}$

$t = \frac{OB}{V\cos 30^o}$

$t = \frac{2d}{3V}$

19) Hence, $\frac{dv}{dt} = -kv^3$

or $\frac{dv}{v^3} = -kdt$ or $\int_{v_0}^{v} \frac{dv}{v^3} = \int_0^t -kdt$

or $\left[-\frac{1}{2v^2}\right]_{v_0}^{v} = -kt$

or $\frac{1}{2v_0^2} - \frac{1}{2v^2} = -kt$

$\frac{1}{2v^2} = \frac{1 + 2v_0^2kt}{2v_0^2}$ or $v^2 = \frac{v_0^2}{1 + 2v_0^2kt}$

$v \frac{v_0}{\sqrt{2v_0^2kt + 1}}$

20) $\vec{V_A}$ = 54 km/h towards N = $54\hat{j}$ $\vec{V_B}$ = 90 km/h towards S = $-90\hat{j}$

$\vec{V}_{BA} = \vec{V}_B - \vec{V}_A$

$= -90\hat{j} - 54\hat{j}$

$= -144\hat{j}$ km/h

= 40 m/s ($-\hat{j}$)

= 40 m/s towards S

21) Range is same for angle of projection 0 and (90° – 0)

$R = \frac{u^2 \sin 2\theta}{g}; h_1 = \frac{u^2 \sin^2\theta}{2g}$ and $h_2 = \frac{u^2 \cos^2\theta}{2g}$

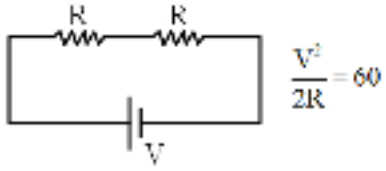
Hence, $\sqrt{h_1 h_2} = \frac{u^2 \sin\theta \cos\theta}{2g}$

$= \frac{1}{4}\left[\frac{u^2 \sin 2\theta}{g}\right] = \frac{R}{4}$.

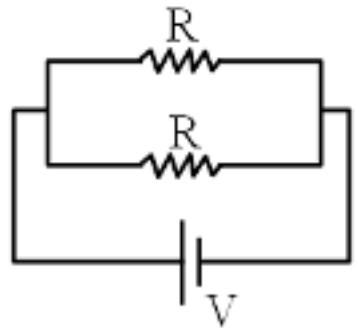
22) $P_{series} = \frac{P}{2} = 60$

$P_{parallel}$ = 2P = 240 W

OR



$\frac{V^2}{2R} = 60$



$\frac{V^2}{\frac{R}{2}} = 2 \times 120$

$= 240$ W

23) $v = \frac{I}{neA}$

$= \frac{1.5}{9 \times 10^{28} \times 1.6 \times 10^{-19} \times 5 \times 10^{-6}} = 0.02\text{mm/s}$

24) $R = \frac{\rho \ell}{A} = 100\Omega$

$R' = \frac{\rho \ell \times A}{A \times A} = \frac{\rho v_0 1}{A^2} = \frac{\rho v_0 1}{\pi r^4}$

$R' \propto \frac{1}{r^4}$ $\frac{100}{R'} = \frac{r^4}{16 \times r^4}$ R' = 1600 Ω

25) $P \propto V^2$

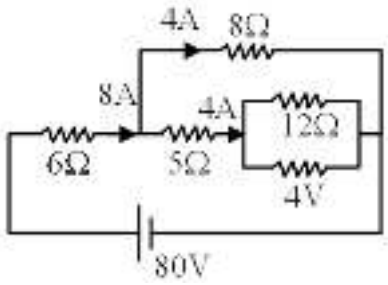
$\Rightarrow P = \left(\frac{110}{220}\right)^2 60 = 15$ W

26) $R = R_g \left(\frac{V}{V_g} - 1\right)$

$= 1000 \left(\frac{100}{10} - 1\right)$

$= 9000\ \Omega$

27)



$R_{eq} = 10\Omega$

$I = \frac{80}{10} = 8Amp$

$I_{12\Omega} = \frac{4 \times 4}{16} = 1Amp$

$V_{12\Omega} = 1 \times 12 = 12\ V$

28) $I = \frac{E}{R + r}$

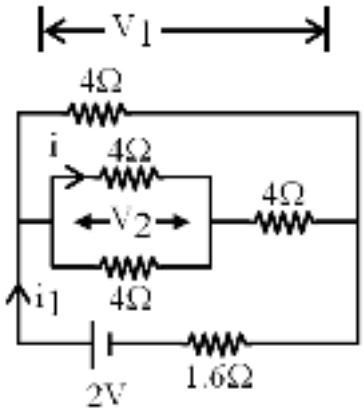
$V = IR = \frac{ER}{R + r} = \frac{E}{1 + \frac{r}{R}}$

If $R \to 0$, $V = 0$

If $R \to \infty$, $V = E$

Option (2) matched.

29)



$R_{eq} = \frac{(2 + 4)(4)}{2 + 4 + 4} + 1.6$

$R_{eq} = 4\Omega$

$i_i = \frac{E}{R_{eq}} = \frac{2V}{4\Omega} = 0.5A$

V_1 = TPD of cell = E – ir = 2 – (0.5) (1.6) = 1.2V

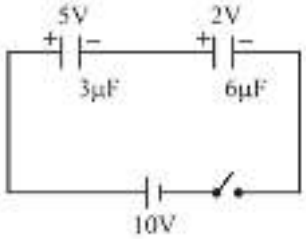
$V_2 = \frac{2}{2 + 4}(V_1) = \frac{1}{3}(1.2V) = 0.4V$

$i = \frac{V_2}{4} = \frac{0.4}{4} = 0.1A$

30) $E = \frac{q}{A\varepsilon_0} \Rightarrow q = EA\varepsilon_0 = 8.85 \times 10^{-10}C$

31) Heat $= \frac{1}{2}C_{eq}.V^2$

$= \frac{1}{2}(2\mu)(10)^2 = 100\mu J$



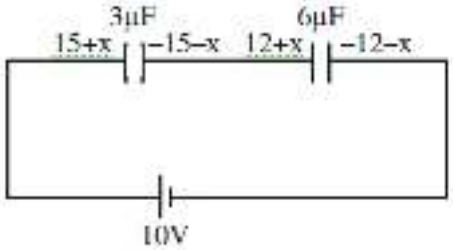
32)

Initial charge on

3μ F :- $q_i = 3 \times 5 = 15\mu C$

6μ F :- $q_i = 6 \times 2 = 12\ \mu C$

Let x charge flows through the battery



Apply KVL

$$\frac{12+x}{6}+\frac{15+x}{3}-10=0$$

12 + x + 30 + 2x = 60

3x = 18

x = 6μc

Work done by battery = Ex = 10 × 6 = 60 μJ

33) Let charge on 6 μF and 4μF be q_1 & q_2

$\Rightarrow q_1 + q_2 = 30$; $\frac{q_1}{6}=\frac{q_2}{4} \Rightarrow q_1 = 18\mu C$

On right plate ⇒ – 18μC

34) $\text{Loss} = \frac{1}{2}\frac{C_1C_2}{(C_1+C_2)}(V_1-V_2)^2 = \frac{1}{2}\frac{10(30)}{40}(100)^2$

$= 3.75 \times 10^4\ \mu J$

35) 1 MSD = 0.1 cm & 1 VSD = $\frac{1.90}{20} = 0.095$ cm

LC = 0.1 cm – 0.095 cm = 0.005 cm.

MSR = 4.5 cm, VSR = 12 × 0.005 = 0.060 cm

Corrected reading of diameter

= 4.5 cm + 0.060 cm – (– 0.010 cm)

= 4.570 cm

36) $LC = \frac{0.5}{100} = 0.005mm$; Zero Error (ZE) is negative

ZE = – (100 – 97) × LC = – 3 × 0.005 mm = – 0.015 mm

Correct reading of thickness of sheet :

= 2.0 mm + (26 × 0.005 mm) + 0.015 mm = 2.145 mm

Ans (1)

37) $\frac{X}{8} = \frac{62+1}{38+2} \Rightarrow X = \frac{63}{40} \times 8 = 12.6\Omega$

38) Let R be the original resistance of the given circuit and V be the supply voltage.

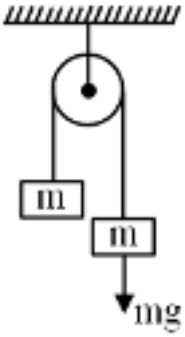
$\frac{V}{R} = 5$ ..... (1)

When 2Ω is introduced $\frac{V}{R+2} = 4$ ..... (2)

From (1) and (2)

$\frac{R+2}{R} = \frac{5}{4} \Rightarrow 4R + 8 = 5R$

$\Rightarrow R = 8\Omega$



39) (A)

2mg – T = ma ... (1)

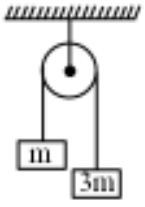
T – mg = ma ... (2)

mg = 2 ma

$\boxed{a = \frac{g}{2}}$

(B) $F_{net} = 0$

a = 0



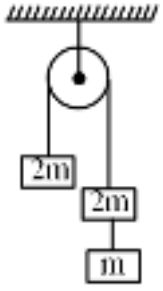
(C)

3mg – T = 3 ma

T – mg = ma

2ma = 4ma

$\boxed{a = \frac{g}{2}}$



(D)

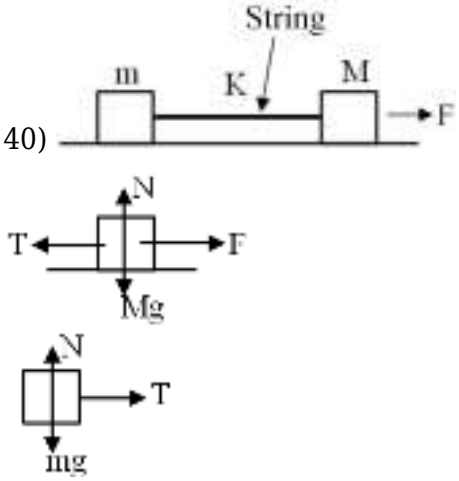
3mg – T = 3ma

T – 2mg = 2ma

mg = 5 ma

$$\boxed{a = \frac{g}{5}}$$

40)



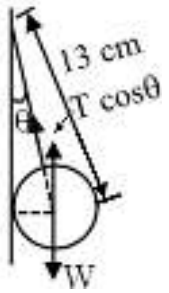
F – T = Ma, T = ma

$$a = \frac{F}{(M+m)}$$

Then force on m is

$$T = m\left(\frac{F}{M+m}\right)$$

41) T cosθ = W



$$T = \frac{W}{\cos\theta}$$

$$\boxed{T = \frac{13W}{12}}$$

42)

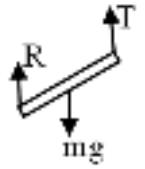
Ans (2)

For motion between AB

$$a = g\frac{\sin\alpha}{2} \text{ (downwards)}$$

For motion between BO

$$a = g\frac{\sin\alpha}{2} \text{ (upwards)}$$

43) 

44) $F = \rho A v^2$

$F = 10^3 \times 10^{-2} \times (15)^2$

$= 2250$ N

45) $a = g(\sin\theta - \mu\cos\theta)$

$a = g(\sin 45^\circ - 0.5 \cos 45^\circ)$

$a = \frac{g}{\sqrt{2}}\left(1 - \frac{1}{2}\right) = \frac{g}{2\sqrt{2}}$

CHEMISTRY

46) $A + D \rightleftharpoons AD$, K_1 ..... (1)

$AD + D \rightleftharpoons AD_2$, K_2 ..... (2)

$AD_2 + D \rightleftharpoons AD_3$, K_3 ..... (3)

$A + D_3 \rightleftharpoons AD_3$, K .....(4)

(4) = (1) + (2) + (3)

$k = k_1 \times k_2 \times k_3$

$\log k = \log k_1 + \log k_2 + \log k_3$

47) $PCl_5 \rightleftharpoons PCl_3 + Cl_2$

1–0.8 .8 .8

$K_c = \frac{0.8 \times 0.8}{.2} = 3.2$

48) NCERT Pg. # 205 (Para - 1)

49) $\frac{K_p}{K_c} = (RT)^{\Delta ng}$

$\frac{K_p}{K_c} = (RT)^{-\frac{1}{2}}$

$\because \quad \Delta n_g = -\frac{1}{2}$

$\frac{K_p}{K_c} = \frac{1}{\sqrt{RT}}$

50)

Value of K depends only on temperature

51) This will favour backward reaction to consume added Cl_2

52) Rate = $k[A]^2[B]^3 = a$
When volume is reduced to one half then conc. of reactants will be doubled.
Rate = $k[2A]^2 [2B]^3 = 32k [A]^2 [B]^3 = 32a$

53) In exothermic and endothermic reactions will be more and less than E_a respectively.

54) RDS is slowest step.

55) $t_{1/2} = \frac{0.693}{K} = \frac{0.693}{6.93 \times 10^{-3}}$

56) $A(g) \rightarrow B(g) + \frac{1}{2} C(g)$
150 0 0
$150 - x + x + \frac{x}{2} = 200$
$150 + \frac{x}{2} = 200$
$x = 100$
$\frac{-d[A]}{dt} = \frac{100}{10} = 10$ mm min^{-1}.

57)

For zero order, $r = k \times [conc.]^0$
(i) = incorrect
By Arrhenius equation, $k = A \times e^{-Ea/RT}$
$k = A$ whe $E_a = 0$
$\ln k = \ln A - \frac{E_a}{RT}$
$\ln k$ vs $\frac{1}{T} \Rightarrow$ linear
(iii), (iv) = incorrect
(ii), (v) = correct

58) % dissociation = 33.3 %
$\alpha = \frac{1}{3}$

	$AB(g) \rightleftharpoons$	$A(g) +$	$B(g)$
P_i	$P°$	0	0
P_{eq}	$\frac{2P^o}{3}$	$\frac{P^o}{3}$	$\frac{P^o}{3}$

$$\frac{4P^o}{3} = P$$

$$P^o = \frac{3P}{4}$$

$$K_P = \frac{\frac{P}{4} \times \frac{P}{4}}{\frac{P}{2}}$$

$$= \frac{P}{8}$$

$P = 8\ K_P$

59)

$\mu = 3$

$\Delta T = 60 - 20 = 40°C$

$r_{new} = r \times \mu^{(\Delta T/10)} = r \times 3^{(40/10)}$

$= r \times 3^4 = 81r$

60) $\frac{r_2}{r_1} = \left(\frac{A_2}{A_1}\right)^x$

$$\frac{4 \times 10^{-4}}{2 \times 10^{-4}} = \left(\frac{2 \times 10^{-2}}{1 \times 10^{-2}}\right)^x$$

$2^x = 2 \Rightarrow x = 1$

$$\frac{r_3}{r_2} = \left(\frac{B_3}{B_2}\right)^y$$

$$\frac{8 \times 10^{-4}}{4 \times 10^{-4}} = \left(\frac{4 \times 10^{-2}}{2 \times 10^{-2}}\right)^y$$

$2^y = 2 \Rightarrow y = 1$

$r = K[A]\ [B]$

61)

$$\text{Moles of gas} = \frac{5.6}{22.4} = \frac{1}{4}$$

$$\frac{22}{M_w} = \frac{1}{4}$$

$M_w = 88$

62)

$$\text{Moles of } Al_2O_3 = \frac{20.4}{102}$$

$= 0.2$

Moles of O-atom $= 0.2 \times 3$

$= 0.6$

Moles of H-atom in 5.4 g

$$H_2O = \frac{5.4}{18} \times 2 = 0.6$$

63) $4A + 2B + 3C \rightarrow A_4B_2C_3$

1 mol 0.6 mol 0.72 mol

$\frac{1}{4}$ $\frac{0.6}{2}$ $\frac{0.72}{3}$

0.25 0.3 0.24

(C) is LR

3 mol of C will give = 1 mol product

1 mol of C will give = $\frac{1}{3}$ mol product

0.72 mol will give = $\frac{0.72}{3}$ = 0.24 mol

64)

Moles of $C_6H_8O_6$ = $\frac{17.6 \times 10^{-3}}{176}$

$= 10^{-4}$

No. of O-atom = $10^{-4} \times 6 \times 6 \times 10^{23}$

$= 3.6 \times 10^{20}$

No. of H-atom = $10^{-4} \times 8 \times 6 \times 10^{23}$

$= 4.8 \times 10^{20}$

65)

LR : The reactant which is lesser then required amount and completely consumed during reaction.

66)

$CaCO_3 \rightarrow CaO + CO_2$

10g

90% pure

Moles of CO_2 = $\frac{10 \times 0.9}{100} = 0.09$

Vol. of CO_2 at STP = 22.4×0.09

= 2.016 L

67)

$4NH_3 + 5O_2 \rightarrow 4NO + 6H_2O$

1mol 1mol

(LR)

Moles of NO = $\frac{4}{5} \times$ moles of O_2

$= \frac{4}{5} \times 1 = 0.8$

68) $\Delta r \propto n_2^2 - n_1^2$

69) $d_{x^2-y^2}, d_{z^2}$ and all P orbitals are axial orbitals.

70) $\Delta x.m\Delta V = \frac{h}{4\pi}$

$$\Delta x.\Delta V = \frac{6.62 \times 10^{-34}}{4\pi \times 9.1 \times 10^{-31}}$$
$$= 5.8 \times 10^{-5}$$

71)

For max. wave length in lyman series

$$\frac{1}{\lambda_{2\to1}} = Rz^2\left(\frac{1}{1^2} - \frac{1}{2^2}\right) = \frac{3}{4}Rz^2 \quad \left|\begin{array}{l}\lambda_{\infty\to1} = \frac{1}{Rz^2} \\ \frac{\lambda_{\infty\to1}}{\lambda_{2\to1}} = \frac{3}{4}\end{array}\right.$$

$$\lambda_{2\to1} = \frac{4}{3} \times \frac{1}{Rz^2}$$

For min wavelength of lyman series

$$\frac{1}{\lambda_{\infty\to1}} = Rz^2\left(\frac{1}{1^2} - \frac{1}{\infty^2}\right) = Rz^2$$

72) $mvr = \frac{nh}{2\pi}$

73)

d_{xy} is non axial orbital so electron density is max. between xy plane.

74)

Cl $1s^2$, $2s^2$ $2p^6$, $3s^2$ $3p^5$
n = 3, □ = 1 m = ± 1, 0
s = $\pm \frac{1}{2}$

75) **Explanation**
The potential energy is negative and twice the magnitude of the total energy because the electron is bound in the electric potential of the nucleus.
Given Data
Principal quantum number (*n*): 3 (third shell)
Energy of the electron in the nth shell of the hydrogen atom: $En = \frac{-13.6}{n^2}eV$
Concepts
1. Kinetic energy (*KE*): In the Bohr model, the magnitude of the kinetic energy of the electron is equal to the magnitude of its total energy but opposite in sign:

KE=-En
2. Potential energy (*PE*): The potential energy of the electron in the Bohr model is:
PE = 2 x En
Calculation
1. Total Energy (*En*): Substituting *n*=3 into the total energy formula:

$$En = -\frac{13.6}{3^2} = -\frac{13.6}{9} = -1.51eV$$

Kinetic Energy (*KE*): Using the relation *KE* = - *En*:
KE = -(-1.51) = 1.51 eV
2. Potential Energy (PE*PE*): Using the relation PE=2xEn:
PE = 2x(-1.51) = -3.02 eV
Answer

A. **Kinetic Energy (KE):** 1.51 eV
B. **Potential Energy (PE):** -3.02 eV

76) NCERT Pg. # 81 (3.6.3)

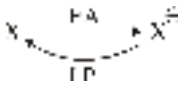
77)

Ionisation energy is a endothermic process.
Ionisation energy II is always more than ionisation energy I.
In each period I.P of inert gas is highest.

78) **Explanation :** Question is asking about which option is correct.
Concept : Isotopes, have the same number of protons and electrons, meaning they have the same electronic configuration and same nuclear charge Since ionization energy primarily depends on the number of electrons and nuclear charge, which is the same for isotopes, their first IP values are same.

79) NCERT, Pg. # 88

80) NCERT (11^{th}) page # 86 (part -I)

81) {IP of x^- = EA of x} 

82)

Concept

83)

Answer - Option(2)
Explanation - Lanthanoid contraction significantly affects elements that come after the lanthanoids in the periodic table. This effect is seen most prominently in elements of groups

where the corresponding 4d and 5d elements have nearly identical radii due to the poor shielding of f-electrons.
Concept - Lanthanoid contraction does not influence the comparison between Y and La because it primarily affects elements after the lanthanoids.

84)

PCl_5 is symmetrical molecule but has 180°, 120° & 90° bond angle.

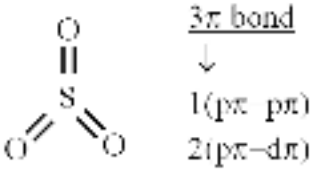
85)

Boiling point of halogen depends on Vanderwaal force.
$F_2 < Cl_2 < Br_2 < I_2$

86)

(a) $ClF_3 \rightarrow ClF_4^{\ominus}$
(T-shape) (square planar)
(b) $NH_2^{\ominus} \rightarrow NH_4^{\oplus}$
(V-shape) (Tetrahedral)
(c) $I_3^{\oplus} \rightarrow I_3^{\ominus}$
(angular) (Linear)
(d) $SO_2 \rightarrow SO_3$
(angular) (Trigonal planar)

87)



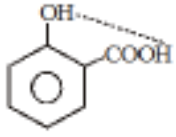
SO_3

3π bond
↓
1(pπ pπ)
2(pπ–dπ)

sp^2

88) $SiCl_6^{2-}$ does not exist since
(i) size of Cl^- is large so it cannot accommodate around Si^{+4} due to limitation of size.
(ii) Interaction between lone pair of chloride ion and Si^{+4} is not very strong

89) This compound has pπ–dπ bonding.

90) 

BIOLOGY

91) NCERT Pg # 8

92) NCERT Pg # 7

93)

NCERT Pg # 4,5

94)

NCERT Pg # 17,18

95) NCERT-XI, Pg # 14

96) NCERT Pg. # 18

97)

NCERT Pg # 11

98) NCERT-Page # 14

99)

NCERT-XI, Pg # 21

100)

NCERT Pg. No. 72-76

101) NCERT Pg. # 72

102) NCERT XI Page No. # 74, 76, 77

103) NCERT (XI^{th}) Pg. # 73

104) NCERT-XI, (E) Pg. # 93

105) NCERT (XI) (E) Pg. # 75

106)

NCERT Pg. # 76

107)

NCERT XI, Page # 74

108) NCERT Page No. # 74

109) NCERT XIth Pg.# 31, Fig-3.3(b)

110)

NCERT XI^{th} Pg. # 32

111)

NCERT XI Pg. # 27 (Table 3.1)

112) NCERT - Pg. # 27, 29

113)

NCERT Pg # 29

114) NCERT - Pg. # 33

115)

NCERT Pg. # 27

116)

NCERT Pg. # 26

117)

NCERT Pg. # 29,30

118) NCERT Pg. # 61, 63, 64

119) NCERT Pg. # 63

120) NCERT Pg. # 61

121) NCERT Pg. # 60

122) NCERT Pg. # 67

123) NCERT Pg. # 69, 70

124) NCERT Pg. # 67

125) NCERT Pg. # 58

126) NCERT Pg. # 73, 79, 81

127) NCERT Pg # 15

128)

NCERT 12^{th} Pg # 7

129) NCERT Pg. # 18

130) NCERT Pg. # 5

131) NCERT Pg. # 9

132) NCERT Pg. # 15

133) NCERT Pg. # 18, 19

134) NCERT_Pg. # 11

135) NCERT Pg. # 12

136)

NCERT XII Pg. No. # 48

137)

NCERT XII Pg. No. # 32

138)

NCERT XII Pg. No. # 44

139)

NCERT XII Pg. No. # 29, Fig. 2.3(a)

140)

NCERT XII Pg. No. # 45

141)

NCERT XII Pg. No. # 33,36,38

142)

NCERT-XII, Pg. # 32

143) NCERT XII Pg. No. # 34

144)

NCERT XII Pg. No. # 32,35

145)

NCERT XII Pg No # 31

146)

NCERT XII Pg. No. # 48

147)

NCERT XII Pg. No. # 44

148) NCERT Pg # 37

149) NCERT Pg # 37

150) NCERT Pg # 47

151) NCERT Pg # 41

152) NCERT Pg # 45

153) NCERT Pg # 43

154) NCERT Pg # 48

155) NCERT Pg # 48

156)

NCERT Pg. No. # 49-50

157) NCERT Pg. # 47 - 48

158)

NCERT Pg # 46

159) NCERT (XI^{th}) Pg. # 55

160) NCERT_XII_101, 102

161)

NCERT_XII_103

162) Old_NCERT_XII_Pg. No. - 116

163) Old NCERT_Pg. No. - 118

164)

Old NCERT Pg. No. 119

165) NCERT_XII_Pg. No. 118

166)

NCERT_XII_Pg. No. 113, 112

167) NCERT_XII_Pg. No. 114

168)

NCERT_XII_Pg. No. 114

169) NCERT_XII_Pg. No. 114

170) NCERT Pg. # 221

171) NCERT Pg. # 226

172)

NCERT Pg # 227

173) NCERT Pg. # 224, 225

174) NCERT Pg. # 226

175) NCERT Pg. # 226-227

176) NCERT Pg. # 217

177) NCERT Pg. # 224

178) NCERT Pg. # 227

179) NCERT Pg. # 227

180) NCERT Pg. # 225