PHYSICS

1 The relation amongst the three elements of Earth's magnetic field, namely horizontal component H, vertical component V and dip angle δ is: (B_E=total magnetic field):

1. V=$B_E$tanδ, H=B_E
2. V=$B_E$sinδ, H=$B_E$cosδ
3. V=$B_E$cosδ, H=$B_E$sin δ
4. V=B_E, H=$B_E$tanδ

2 A proton and an α-particle are accelerated from rest to the same energy. The de-Broglie wavelength λ_p and λ_α are in the ratio:

1. 2 : 1
2. 1 : 1
3. $\sqrt{2}$: 1
4. 4 : 1

3 A truck is stationary and has a bob suspended by a light string in a frame attached to the truck. The truck suddenly moves to the right with an acceleration of a. In the frame of the truck, the pendulum will tilt:

1.	to the left and the angle of inclination of the pendulum with the vertical is $\sin^{-1}\left(\frac{a}{g}\right)$
2.	to the left and the angle of inclination of the pendulum with the vertical is $\cos^{-1}\left(\frac{a}{g}\right)$
3.	to the left and the angle of inclination of the pendulum with the vertical is $\tan^{-1}\left(\frac{a}{g}\right)$
4.	to the left and the angle of inclination of the pendulum with the vertical is $\tan^{-1}\left(\frac{g}{a}\right)$

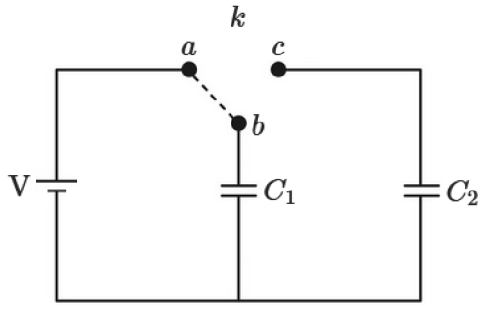
4 The time period of a geostationary satellite is 24 hr at a height $6R_E$ (R_E is the radius of the Earth) from the surface of the earth. The time period of another satellite whose height is $2.5R_E$ from the surface will be:

1.	$6\sqrt{2}$ hr	2.	$12\sqrt{2}$ hr
3.	$\frac{24}{2.5}$ hr	4.	$\frac{12}{2.5}$ hr

5 Two metal spheres, one of radius R and the other of radius $2R$ respectively have the same surface charge density σ. They are brought in contact and separated. What will be the new surface charge densities on them?

1. $\sigma_1 = \frac{5}{6}\sigma,\ \sigma_2 = \frac{5}{6}\sigma$
2. $\sigma_1 = \frac{5}{2}\sigma,\ \sigma_2 = \frac{5}{6}\sigma$
3. $\sigma_1 = \frac{5}{2}\sigma,\ \sigma_2 = \frac{5}{3}\sigma$
4. $\sigma_1 = \frac{5}{3}\sigma,\ \sigma_2 = \frac{5}{6}\sigma$

6 Two identical capacitors C_1 and C_2 of equal capacitance are connected as shown in the circuit. Terminals a and b of the key k are connected to charge capacitor C_1 using a battery of emf V volt. Now disconnecting a and b terminals, terminals b and c are connected. Due to this, what will be the percentage loss of energy?



1.	75%	2.	0%
3.	50%	4.	25%

7 The main scale of a vernier calliper has n divisions/cm. n divisions of the vernier scale coincide with $(n-1)$ divisions of the main scale. The least count of the vernier calliper is:

1. $\frac{1}{(n+1)(n-1)}$ cm
2. $\frac{1}{n}$ cm
3. $\frac{1}{n^2}$ cm
4. $\frac{1}{(n)(n+1)}$ cm

8 A sphere encloses an electric dipole with charges $\pm 3 \times 10^{-6}$ C. What is the total electric flux through the sphere?

1. -3×10^{-6} N-m^2/C
2. zero
3. 3×10^{-6} N-m^2/C
4. 6×10^{-6} N-m^2/C

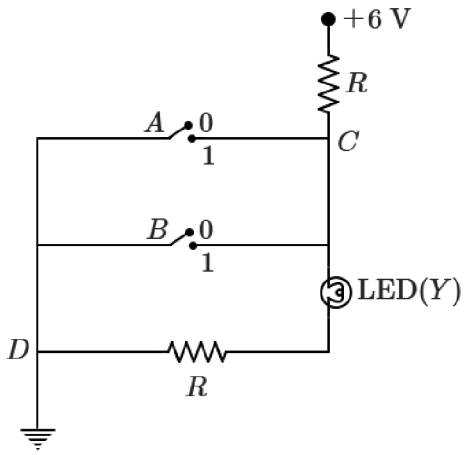
9 The work function of the photosensitive material is 4.0 eV. The longest wavelength of light that can cause photoelectric emission from the substance is (approximately):

1. 3100 nm
2. 966 nm
3. 31 nm
4. 310 nm

10 A body of mass m is kept on a rough horizontal surface (coefficient of friction = μ). A horizontal force is applied to the body, but it does not move. The resultant of normal reaction and the frictional force acting on the object is given by $\vec{F}$ where:

1. $|\vec{F}| = mg + \mu mg$
2. $|\vec{F}| = \mu mg$
3. $|\vec{F}| \leq mg\sqrt{1+\mu^2}$
4. $|\vec{F}| = mg$

11 The circuit diagram shown here corresponds to the logic gate:

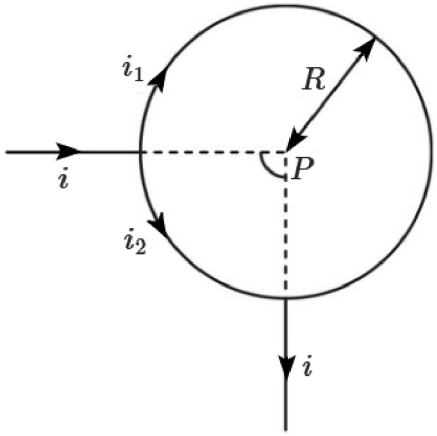


1. NOR
2. AND
3. OR
4. NAND

12 The stress-strain curves are drawn for two different materials X and Y. It is observed that the ultimate strength point and the fracture point are close to each other for material X but are far apart for material Y. We can say that the materials X and Y are likely to be (respectively):

1.	ductile and brittle
2.	brittle and ductile
3.	brittle and plastic
4.	plastic and ductile

13 A straight conductor carrying current I splits into two parts as shown in the figure. The radius of the circular loop is R. The total magnetic field at the centre P of the loop is:



1.	zero	2.	$\frac{3\mu_0 i}{32R}$, inward
3.	$\frac{3\mu_0 i}{32R}$, outward	4.	$\frac{\mu_0 i}{2R}$, inward

14 A circuit when connected to an AC source of 12 V gives a current of 0.2 A. The same circuit when connected to a DC source of 12 V, gives a current of 0.4 A. The circuit is:

1.	series LR	2.	series RC
3.	series LC	4.	series LCR

15 Two bullets are fired horizontally and simultaneously towards each other from the rooftops of two buildings (building being 100 m apart and being of the same height of 200 m) with the same velocity of 25 m/s. When and where will the two bullets collide?

($g = 10$ m/s^2)

1.	After 2 s at a height of 180 m
2.	After 2 s at a height of 20 m
3.	After 4 s at a height of 120 m
4.	They will not collide.

16 A tuning fork with a frequency of 800 Hz produces resonance in a resonance column tube with the upper end open and the lower end closed by the water surface. Successive resonances are observed at lengths of 9.75 cm, 31.25 cm, and 52.75 cm. The speed of the sound in the air is:

1.	500 m/s	2.	156 m/s
3.	344 m/s	4.	172 m/s

17 A particle starting from rest moves in a circle of radius r. It attains a velocity of v_0 m/s on completion of n rounds. Its angular acceleration will be:

1. $\frac{v_0}{n}$ rad/s^2
2. $\frac{v_0^2}{2\pi nr^2}$ rad/s^2
3. $\frac{v_0^2}{4\pi nr^2}$ rad/s^2
4. $\frac{v_0^2}{4\pi nr}$ rad/s^2

18 1 g of water of volume 1 cm^3 at 100°C is converted into steam at the same temperature under normal atmospheric pressure $\approx 1 \times 10^5$ Pa. The volume of steam formed equals 1671 cm^3. If the specific latent heat of vaporization of water is 2256 J/g, the change in internal energy is:

1. 2423 J
2. 2089 J
3. 167 J
4. 2256 J

19 A cycle wheel of radius 0.5 m is rotated with a constant angular velocity of 10 rad/s in a region of a magnetic field of 0.1 T which is perpendicular to the plane of the wheel. The EMF generated between its centre and the rim is:

1.	0.25 V	2.	0.125 V
3.	0.5 V	4.	zero

20 A person standing on the floor of an elevator drops a coin. The coin reaches the floor in time t_1, if the elevator is moving uniformly and time t_2, if the elevator is stationary. Then:

1.	$t_1 < t_2$ or $t_1 > t_2$ depending upon whether the lift is going up or down.
2.	$t_1 < t_2$
3.	$t_1 > t_2$
4.	$t_1 = t_2$

21 The rate of radioactive disintegration at an instant for a radioactive sample of half-life 2.2 $\times 10^9 s$ *is* 10^{10} s^{-1}. The number of radioactive atoms in that sample at that instant is:

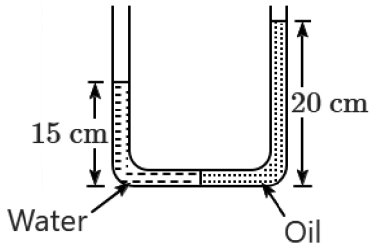
1. 3.7×10^{20}
2. 3.17×10^{17}
3. 3.17×10^{18}
4. 3.17×10^{19}

22 A solid cylinder of mass 2 kg and radius 50 cm rolls up an inclined plane of angle of inclination 30°. The centre of mass of the cylinder has a speed of 4 m/s. The distance travelled by the cylinder on the inclined surface will be [*take* $g = 10\ m/s^2$]:

1.	2.2 m	2.	1.6 m
3.	1.2 m	4.	2.4 m

23 In a U-tube, as shown in the figure, the water and oil are in the left side and right side of the tube respectively. The height of the water and oil columns are 15 cm and 20 cm respectively. The density of the oil is:

[take $\rho_{water} = 1000$ kg/m^3]



1. 1200 kg/m^3
2. 750 kg/m^3
3. 1000 kg/m^3
4. 1333 kg/m^3

24 An LED is constructed from a p-n junction diode using GaAsP. The energy gap is 1.9 eV. The wavelength of the light emitted will be equal to:

1. 10.4×10^{-26} m
2. 654 nm
3. 654 m
4. 654×10^{-11} m

25 A biconvex lens has power P. It is cut into two symmetrical halves by a plane containing the principal axis. The power of one part will be:

1.	0	2.	$\frac{P}{2}$
3.	$\frac{P}{4}$	4.	P

26 A particle of mass $5m$ at rest suddenly breaks on its own into three fragments. Two fragments of mass m each move along mutually perpendicular directions with speed v each. The energy released during the process is:

1.	$\frac{3}{5}mv^2$	2.	$\frac{5}{3}mv^2$
3.	$\frac{3}{2}mv^2$	4.	$\frac{4}{3}mv^2$

27 The radius of the first permitted Bohr orbit for the electron in a hydrogen atom equals $0.5\ \mathring{A}$ and its ground state energy equals -13.6 eV. If the electron in the hydrogen atom is replaced by a muon (μ^-)[charge same as electron and mass 207 m_e], the first Bohr radius and ground state energy will be: (m_e represents the mass of an electron)

1.	0.53×10^{-13} m, -3.6 eV		
2.	25.6×10^{-13} m, -2.8 eV		
3.	2.56×10^{-13} m, -2.8 keV		
4.	2.56×10^{-13} m, -13.6 eV		

28 For a transparent medium relative permeability and permittivity, μ_r and ε_r are 1.0 and 1.44 respectively. The velocity of light in this medium would be:

1.	2.5×10^8 m/s	2.	3×10^8 m/s
3.	2.08×10^8 m/s	4.	4.32×10^8 m/s

29 The value $\gamma = \frac{C_P}{C_V}$ for hydrogen, helium, and another ideal diatomic gas X (whose molecules are not rigid but have an additional vibrational mode), are respectively equal to:

1.	$\frac{7}{5}, \frac{5}{3}, \frac{9}{7}$	2.	$\frac{5}{3}, \frac{7}{5}, \frac{9}{7}$
3.	$\frac{5}{3}, \frac{7}{5}, \frac{7}{5}$	4.	$\frac{7}{5}, \frac{5}{3}, \frac{7}{5}$

30 A double convex lens has a focal length of 25 cm. The radius of curvature of one of the surfaces is double of the other. What would be the radii if the refractive index of the material of the lens is 1.5?

1. 100 cm, 50 cm
2. 25 cm, 50 cm
3. 18.75 cm, 37.5 cm
4. 50 cm, 100 cm

31 Two small spherical metal balls, having equal masses, are made from materials of densities ρ_1 and ρ_2 such that $\rho_1 = 8\rho_2$ and having radii of 1 mm and 2 mm, respectively. They are made to fall vertically (from rest) in a viscous medium whose coefficient of viscosity equals η and whose density is $0.1\rho_2$. The ratio of their terminal velocities would be:

1.	$\frac{79}{72}$	2.	$\frac{19}{36}$
3.	$\frac{39}{72}$	4.	$\frac{79}{36}$

32 The distance covered by a particle undergoing SHM in one time period is: (amplitude = A)

1.	zero	2.	A
3.	2 A	4.	4 A

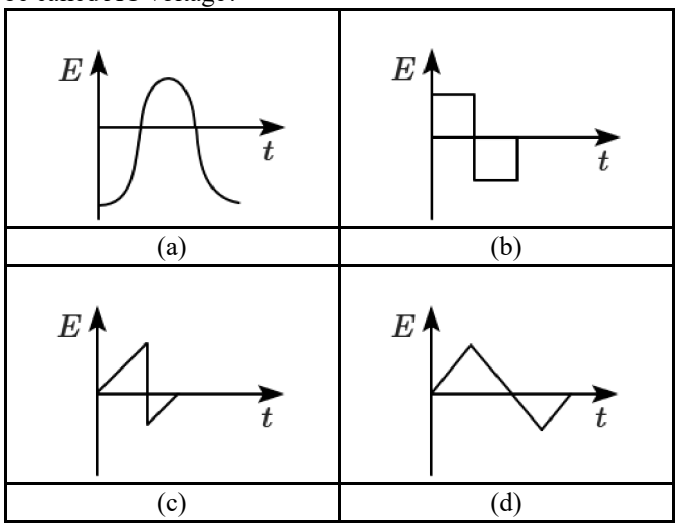
33 Assuming that the gravitational potential energy of an object at infinity is zero, the change in potential energy (final - initial) of an object of mass m when taken to a height h from the surface of the earth (of radius R and mass M), is given by:

1.	$-\frac{GMm}{R+h}$	2.	$\frac{GMmh}{R(R+h)}$
3.	mgh	4.	$\frac{GMm}{R+h}$

34 A deep rectangular pond of surface area A, containing water (density = ρ, specific heat capacity = s), is located in a region where the outside air temperature is at a steady value of -26°C. The thickness of the ice layer in this pond at a certain instant is x. Taking the thermal conductivity of ice as k, and its specific latent heat of fusion as L, the rate of increase of the thickness of the ice layer, at this instant, would be given by:

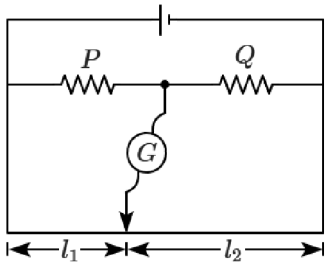
1.	$\frac{26k}{x\rho L - 4s}$	2.	$\frac{26k}{x^2\rho L}$
3.	$\frac{26k}{x\rho L}$	4.	$\frac{26k}{x\rho L + 4s}$

35 The variation of EMF with time for four types of generators is shown in the figures. Which amongst them can be called AC voltage?



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

36 The metre bridge shown is in a balanced position with $\frac{P}{Q}=\frac{l_1}{l_2}$. If we now interchange the position of the galvanometer and the cell, will the bridge work? If yes, what will be the balanced condition?



1.	Yes, $\frac{P}{Q}=\frac{l_1-l_2}{l_1+l_2}$	2.	No, no null point
3.	Yes, $\frac{P}{Q}=\frac{l_2}{l_1}$	4.	Yes, $\frac{P}{Q}=\frac{l_1}{l_2}$

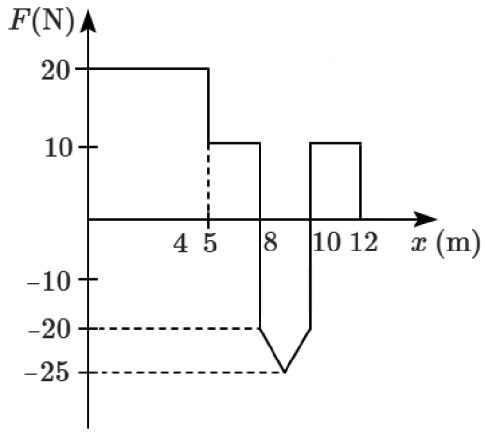
37 An object kept in a large room having an air temperature of 25°C takes 12 min to cool from 80°C to 70°C. The time taken to cool for the same object from 70°C to 60°C would be nearly:

1. 10 min
2. 12 min
3. 20 min
4. 15 min

38 A person travelling in a straight line moves with a constant velocity v_1 for a certain distance x and with a constant velocity v_2 for the next equal distance. The average velocity v is given by the relation:

1.	$\frac{1}{v}=\frac{1}{v_1}+\frac{1}{v_2}$	2.	$\frac{2}{v}=\frac{1}{v_1}+\frac{1}{v_2}$
3.	$\frac{v}{2}=\frac{v_1+v_2}{2}$	4.	$v=\sqrt{v_1v_2}$

39 An object of mass 500 g initially at rest is acted upon by a variable force whose x-component varies with x in the manner shown. The velocities of the object at the points $x=8$ m and $x=12$ m would have the respective values of nearly:



1.	18 m/s and 22.4 m/s	2.	23 m/s and 22.4 m/s
3.	23 m/s and 20.6 m/s	4.	18 m/s and 20.6 m/s

40 A mass falls from a height h and its time of fall t is recorded in terms of time period T of a simple pendulum. On the surface of the earth, it is found that $t=2T$. The entire setup is taken on the surface of another planet whose mass is half of that of the Earth and whose radius is the same. The same experiment is repeated and corresponding times are noted as t' and T'. Then we can say:

1. $t'=\sqrt{2}T$
2. $t'>2T'$
3. $t'<2T'$
4. $t'=2T'$

41 Two toroids 1 and 2 have total no. of turns 200 and 100 respectively with average radii 40 cm and 20 cm respectively. If they carry the same current i, what will be the ratio of the magnetic fields along the two loops?

1. 1 : 1
2. 4 : 1
3. 2 : 1
4. 1 : 2

42 In Young's double-slit experiment, if there is no initial phase difference between the light from the two slits, a point on the screen corresponding to the fifth minimum has a path difference:

1.	$\frac{5\lambda}{2}$	2.	$\frac{10\lambda}{2}$
3.	$\frac{9\lambda}{2}$	4.	$\frac{11\lambda}{2}$

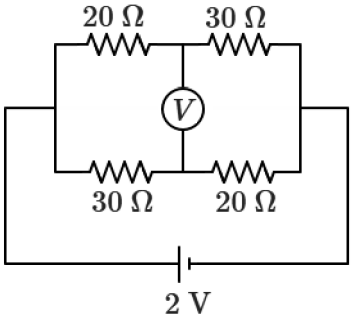
43 The angular width of the central maximum in the Fraunhofer diffraction for $\lambda = 6000\ \mathring{A}$ is θ_0. When the same slit is illuminated by another monochromatic light, the angular width decreases by 30%. The wavelength of this light is:

1.	$1800\ \mathring{A}$	2.	$4200\ \mathring{A}$
3.	$420\ \mathring{A}$	4.	$6000\ \mathring{A}$

44 An object flying in the air with velocity $(20\hat{i} + 25\hat{j} - 12\hat{k})$ suddenly breaks into two pieces whose masses are in the ratio of 1 : 5. The smaller mass flies off with a velocity $(100\hat{i} + 35\hat{j} + 8\hat{k})$. The velocity of the larger piece will be:

1. $4\hat{i} + 23\hat{j} - 16\hat{k}$
2. $-100\hat{i} - 35\hat{j} - 8\hat{k}$
3. $20\hat{i} + 15\hat{j} - 80\hat{k}$
4. $-20\hat{i} - 15\hat{j} - 80\hat{k}$

45 The reading of an ideal voltmeter in the circuit shown is:

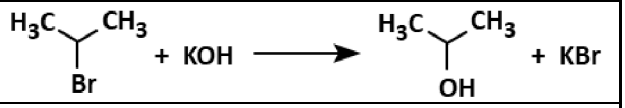


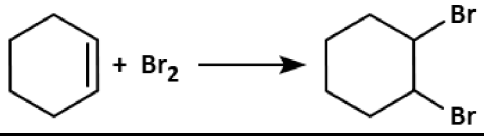
1.	0.6 V	2.	0 V
3.	0.5 V	4.	0.4 V

CHEMISTRY

46 A few reactions are given below:

i. $CH_3CH_2CH_2Br + KOH \rightarrow CH_3CH = CH_2 + KBr + H_2O$

ii. 

iii. 

Select the reaction type for the above reactions:

	(i)	(ii)	(iii)
1.	Elimination	Substitution	Addition
2.	Elimination	Substitution	Substitution
3.	Substitution	Addition	Addition
4.	Elimination	Elimination	Addition

47 The crystal field stabilization energy (CFSE) for $[CoCl_6]^{4-}$ is 18000 cm^{-1}.

The CFSE for $[CoCl_4]^{2-}$ will be:

1. 6000 cm^{-1}
2. 16000 cm^{-1}
3. 18000 cm^{-1}
4. 8000 cm^{-1}

48 The standard electrode potential (E°) values of Al^{3+}/ Al, Ag^+ / Ag, K^+ / K, and Cr^{3+} / Cr are –1.66 V, 0.80 V, –2.93 V, & –0.79 V respectively. The correct decreasing order of the reducing power of the metal is:

1.	Ag > Cr > Al > K	2.	K > Al > Cr > Ag
3.	K > Al > Ag > Cr	4.	Al > K > Ag > Cr

49 The correct order of ionic radii is:

1. $H^- > H^+ > H$
2. $Na^+ > F^- > O^{2-}$
3. $F^- > O^{2-} > Na^+$
4. $N^{3-} > Mg^{2+} > Al^{3+}$

50 Match the catalyst with the process:

	Catalyst		Process
(i)	V_2O_5	(a)	The oxidation of ethylene to ethanal
(ii)	$TiCl_4 + Al(CH_3)_3$	(b)	Polymerisation of alkynes
(iii)	$PdCl_2$	(c)	Oxidation of SO_2 in the manufacture of H_2SO_4
(iv)	Nickel complexes	(d)	Polymerisation of ethylene

Which of the following is the correct matching of Catalyst & Process?

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

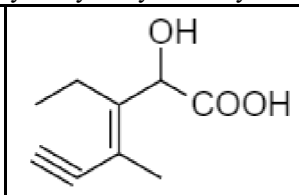
1. (i)-(c), (ii)-(d), (iii)-(a), (iv)-(b)
2. (i)-(a), (ii)-(b), (iii)-(c), (iv)-(d)
3. (i)-(a), (ii)-(n), (iii)-(b), (iv)-(d)
4. (i)-(c), (ii)-(a), (iii)-(d), (iv)-(b)

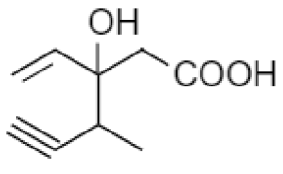
51 Arrange the following species in increasing order of their dipole moments:
NH_3,NF_3,BF_3,H_2O

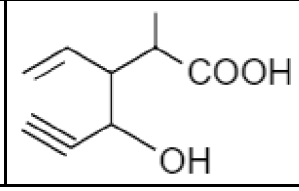
1. $NH_3 < BF_3 < NF_3 < H_2O$
2. $BF_3 < NF_3 < NH_3 < H_2O$
3. $BF_3 < NH_3 < NF_3 < H_2O$
4. $H_2O < NF_3 < NH_3 < BF_3$

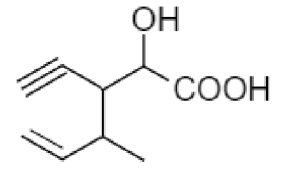
52 When neutral or faintly alkaline $KMnO_4$ is treated with potassium iodide, iodide ion is converted into 'X'. 'X' is:
1. I_2
2. IO_4^-
3. IO_3^-
4. IO^-

53 Which structure corresponds to the IUPAC name 3-Ethyl-2-hydroxy-4-methylhex-3-en-5-ynoic acid?

1. 

2. 

3. 

4. 

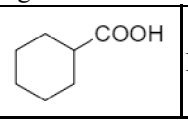
54 For a reaction, activation energy $E_a = 0$ and the rate constant at 200 K is $1.6 \times 10^6 s^{-1}$. The rate constant at 400K will be [Given that gas constant, R=8.314 J K^{-1} mol^{-1}]
1. 3.2×10^4 s^{-1}
2. $1.6 \times 10^6 s^{-1}$
3. 1.6×10^3 s^{-1}
4. 3.2×10^6 s^{-1}

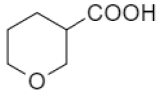
55 Which of the following is a paramagnetic compound?
1. N_2
2. H_2
3. Li_2
4. O_2

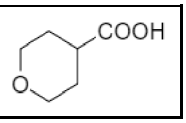
56 Which structure(s) of proteins remains(s) intact during denaturation process?
1. Both secondary and tertiary structures
2. Primary structure only
3. Secondary structure only
4. Tertiary structure only

57 In hydrogen atom, what is the de Broglie wavelength of an electron in the second Bohr orbit is: [Given that Bohr radius, $a_0 = 52.9\ pm$]
1. 211.6 pm
2. 211.6 πpm
3. 52.9 πpm
4. 105.8 pm

58 What is the correct order of the carboxylic acids' strength?

I. 

II. 

III. 

1.	I > II > III	2.	II > III > I
3.	III > II > I	4.	II > I > III

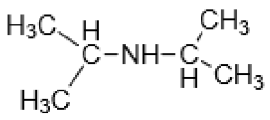
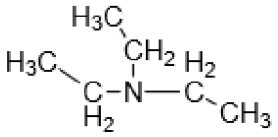
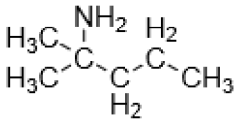
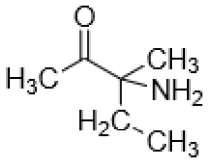
59 An ideal gas expands isothermally from $10^{-3} m^3$ *to* 10^{-2} m^3 at 300 K against a constant pressure of 10^5 Nm^{-2}. The work done by the gas is:

1.	+270 kJ	2.	–900 J
3.	+900 kJ	4.	–900 kJ

60 The alkane that gives only one monochloro product on chlorination with Cl_2 in presence of diffused sunlight is-

1.	2,2,-Dimethylbutane	2.	Neopentane
3.	n-Pentane	4.	Isopentane

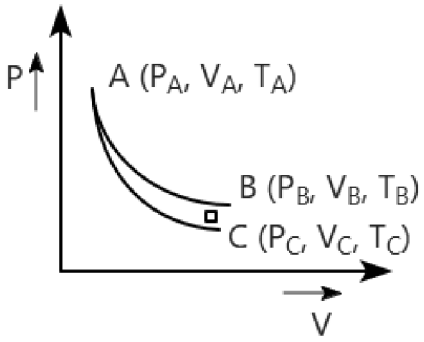
61 Which amine reacts with Hinsberg's reagent to produce an alkali insoluble product?

1.		2.	
3.		4.	

62 The molar solubility of CaF_2 $(K_{sp} = 5.3 \times 10^{-11})$ in 0.1 M solution of NaF will be:

1.	5.3×10^{-11} mol L^{-1}	2.	5.3×10^{-8} mol L^{-1}
3.	5.3×10^{-9} mol L^{-1}	4.	5.3×10^{-10} mol L^{-1}

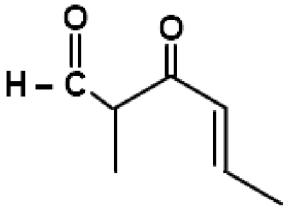
63 Reversible expansion of an ideal gas under isothermal and adiabatic conditions are as shown in the figure:



AB→Isothermal expansion
AC→Adiabatic expansion
Which of the following options is not correct?
1. $\Delta S_{isothermal} > \Delta S_{adiabatic}$
2. $T_A = T_B$
3. $W_{isothermal} > W_{adiabatic}$
4. $T_C > T_A$

64 Limiting molar conductivity of NH_4OH (i.e., $\Lambda^0_{m(NH_4OH)}$ is equal to -
1. $\Lambda^0_{m(NaOH)} + \Lambda^0_{m(NaCl)} - \Lambda^0_{m(NaOH)}$
2. $\Lambda^0_{m(NaOH)} + \Lambda^0_{m(NaCl)} - \Lambda^0_{m(NH_4Cl)}$
3. $\Lambda^0_{m(NH_4OH)} + \Lambda^0_{m(NH_4Cl)} - \Lambda^0_{m(HCl)}$
4. $\Lambda^0_{m(NH_4Cl)} + \Lambda^0_{m(NaOH)} - \Lambda^0_{m(NaCl)}$

65 The IUPAC name of the compound



is:
1. 5-formylhex-2-en-3-one
2. 5-methyl-4-2-en-5-el
3. 3-keto-2-methylhex-5-enal
4. 3-keto-2-methylhex-4-enal

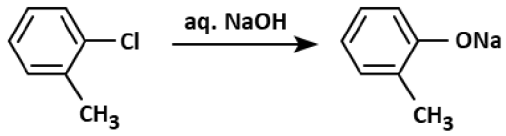
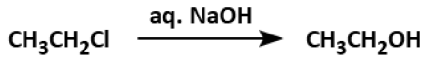
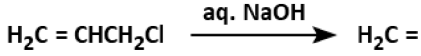
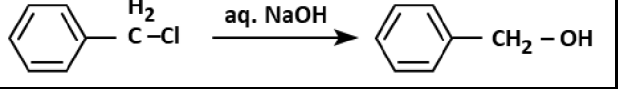
66 The compound among the following that used in cosmetic surgery is:
1. Silica
2. Silicates
3. Silicones
4. Zeolites

67 The major products C and D formed in the following reaction respectively are:

$$CH_3CH_2CH_2OC(CH_3)_3 \xrightarrow[\Delta]{\text{Excess } HI} C + D$$

1. $H_3C\text{-}CH_2\text{-}CH_2\text{-}I$ and $I\text{-}C(CH_3)_3$
2. $H_3C\text{-}CH_2\text{-}CH_2\text{-}OH$ and $I\text{-}C(CH_3)_3$
3. $H_3C\text{-}CH_2\text{-}CH_2\text{-}I$ and $HO\text{-}C(CH_3)_3$
4. $H_3C\text{-}CH_2\text{-}CH_2\text{-}OH$ and $HO\text{-}C(CH_3)_3$

68 Among the following, which hydrolysis reaction occurs at the slowest rate:

1.	
2.	
3.	
4.	

69 Limiting molar conductivities, for the given solutions, are :

$\lambda_m^0\left(H_2SO_4\right) = x$ S $cm^2\ mol^{-1}$

$\lambda_m^0\left(K_2SO_4\right) = y$ S $cm^2\ mol^{-1}$

$\lambda_m^0\left(CH_3COOK\right) = z$ S $cm^2\ mol^{-1}$

From the data given above, it can be concluded that λ_m^0 in ($S\ cm^2\ mol^{-1}$) for CH_3COOH will be :

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

70 Which of the following cannot act both as a Bronsted acid and as a Bronsted base?

1. HCO_3^-
2. NH_3
3. HCl
4. HSO_4^-

71 In the following reaction,

$$CH_3C \equiv CH \xrightarrow[\text{Red hot iron tube}]{873K} A$$

The number of (σ) bonds present in the product (A) is:

1.	21	2.	9
3.	24	4.	18

72 Match the oxide given in Column I with its property given in Column II:

	Column I		**Column II**
(i)	Na_2O	(a)	Neutral
(ii)	Al_2O_3	(b)	Basic
(iii)	N_2O	(c)	Acidic
(iv)	Cl_2O_7	(d)	Amphoteric

Which of the following options is correct?

	(i)	**(ii)**	**(iii)**	**(iv)**
1.	(b)	(a)	(d)	(c)
2.	(c)	(b)	(a)	(d)
3.	(a)	(d)	(b)	(c)
4.	(b)	(d)	(a)	(c)

73 A first-order reaction has a rate constant of 2.303×10^{-3} s^{-1}. The time required for 40 g of this reactant to reduce to 10 g will be

[Given that $\log_{10} 2 = 0.3010$]

1.	230.3 s	2.	301 s
3.	2000 s	4.	602 s

74 A reagent that can distinguish cis-cyclopenta-1,2-diol from the trans-isomer is:

1. Ozone
2. MnO_2
3. Aluminium isopropoxide
4. Acetone

75 The vapor of secondary alcohol passed over heated copper at 573 K yield:

1.	A carboxylic acid	2.	An aldehyde
3.	A ketone	4.	An alkene

76 A compound "X", upon reaction with H_2O, produces a colourless gas "Y" with a rotten fish smell. Gas 'Y' is absorbed in a solution of $CuSO_4$ to give Cu_3P_2 as one of the products. The compound 'X' will be:

1. Ca_3P_2
2. NH_4Cl
3. As_2O_3
4. $Ca_3(PO_4)_2$

77 The oxidation state of Cr in CrO_6 is -

1.	–6	2.	+12
3.	+6	4.	+4

78 The pH of a 0.01 M NaOH (aq) solution will be:

1.	7.01	2.	2
3.	12	4.	9

79 The correct statement regarding a solution of two components A and B exhibiting positive deviation from ideal behaviour is :

1.	Intermolecular attractive force between A-A and B-B are stronger than those between A-B
2.	$\Delta_{mix}H = 0$ at constant T and P
3.	$\Delta_{mix}V = 0$ at constant T and P
4.	Intermolecular attractive forces between A-A and B-B are equal to those between A-B

80 The most stable carbocation among the following is:

1.	$(CH_3)_3\overset{+}{C}CHCH_3$	2.	$CH_3CH_2\overset{+}{C}HCH_2CH_3$
3.	$(CH_3)_2\overset{+}{C}CH_2CH_2CH_3$	4.	$CH_3CH_2\overset{+}{C}H_2$

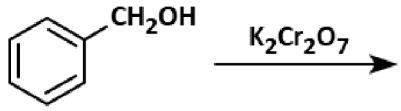
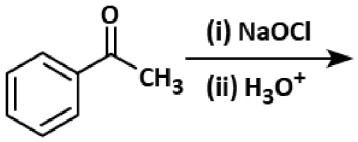
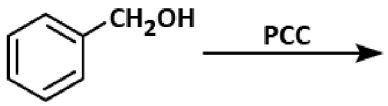
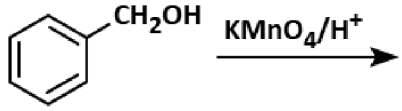
81 Orbital having 3 angular nodes and 3 total nodes is:

1. 5 p
2. 3 d
3. 4 f
4. 6 d

82 The number of hydrogen bonded water molecules(s) associated with $CuSO_4.5H_2O$ is:

1.	3	2.	1
3.	2	4.	5

83 Mark the reaction among the following that does not give benzoic acid as the major product:

1.	
2.	
3.	
4.	

84 What is the correct order of electron gain enthalpy from least negative to most negative for the elements C, Ca, Al, F, and O?

1. Al < Ca < O < C < F
2. Al < O < C < Ca < F
3. C < F < O < Al < Ca
4. Ca < Al < C < O < F

85 Aluminium chloride in acidified aqueous solution forms a complex 'A'.
The formula of A and hybridisation state of Al in 'A' is respectively:

1. $[Al(H_2O)_6]^{3+}$, sp^3d^2
2. $[Al(H_2O)_4]^{3+}$, sp^3
3. $[Al(H_2O)_4]^{3+}$, dsp^2
4. $[Al(H_2O)]^{3+}$, d^2sp^3

86 Identify the correct formula of 'oleum' from the following

1. $H_2S_2O_7$
2. H_2SO_3
3. H_2SO_4
4. $H_2S_2O_8$

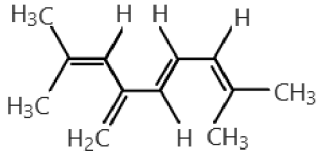
87 The product formed by the reaction of an aldehyde with a primary amine is:

1. Ketone
2. Carboxylic acid
3. Aromatic acid
4. Schiff base

88 The density of a 2 M aqueous solution of NaOH is 1.28 g/cm^3. The molality of the solution is:
[molecular mass of NaOH = 40 $gmol^{-1}$]

1.	1.20 m	2.	1.56 m
3.	1.67 m	4.	1.32 m

89 The total number of pi-bond electrons in the following structure are:



1.	4	2.	8
3.	12	4.	16

90 Among the following oxoacids of phosphorus, the strongest reducing property is for:

1. $H_4P_2O_7$
2. H_3PO_3
3. H_3PO_2
4. H_3PO_4

BIOLOGY

91 The term ecosystem was coined by:

1.	A.G. Tansley	2.	E. Haeckel
3.	E. warming	4.	E.P. Odum

92 Which of the following statements about methanogens is not correct?

1.	They can be used to produce biogas.
2.	They are found in the rumen of cattle and their excreta.
3.	They grow aerobically and breakdown cellulose-rich food.
4.	They produce methane gas.

93 Match the organisms in **Column-I** with habitats in **Column-II**.

Column-I		Column-II	
(a)	Halophiles	(i)	Hot springs
(b)	Thermoacidophiles	(ii)	Aquatic environment
(c)	Methanogens	(iii)	Guts of ruminants
(d)	Cyanobacteria	(iv)	Salty areas

Select the correct answer from the options given below:

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

94 Which of the following nucleic acids is present in an organism having 70 S ribosomes only?

1. Single-stranded DNA with a protein coat
2. Double-stranded circular naked DNA
3. Double-stranded DNA enclosed in nuclear membrane
4. Double-stranded circular DNA with histone proteins

95 For a biocontrol agent to be part of an integrated pest management, it should be:

1.	species-specific and symbiotic
2.	free living and broad spectrum
3.	narrow spectrum and symbiotic
4.	species-specific and inactive on non-target organisms

96 In the dicot root, the vascular cambium originates from:

1.	Tissue located below the phloem bundles and a portion of pericycle tissue above protoxylem
2.	Cortical region
3.	Parenchyma between endodermis and pericycle
4.	Intrafascicular and interfascicular tissue in a ring

97 Removal of shoot tips is a very useful technique to boost the production of tea leaves. This is because:

1.	Gibberellins prevent bolting and are inactivated.
2.	Auxins prevent leaf drop at early stages.
3.	Effect of auxins is removed and the growth of lateral buds is enhanced.
4.	Gibberellins delay the senescence of leaves.

98 Match the placental types **Column-I** with their examples **Column-II**.

Column-I		Column-II	
(a)	Basal	(i)	Mustard
(b)	Axile	(ii)	China rose
(c)	Parietal	(iii)	*Dianthus*
(d)	Free central	(iv)	Sunflower

Choose the correct answer from the following options:

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

99 Which of the following statements is correct?

1. Lichens do not grow in polluted areas.
2. Algal component of lichens is called mycobiont.
3. Fungal component of lichens is called phycobiont.
4. Lichens are not good pollution indicators.

100 Match the items of **Column-I** with **Column-II**:

	Column-I		Column-II
(a)	XX-XO method of sex determination	(i)	Turner's syndrome
(b)	XX-XY method of sex Determination	(ii)	Female heterogametic
(c)	Karyotype-45	(iii)	Grasshopper
(d)	ZW-ZZ method of Sex Determination	(iv)	Female homogametic

Select the correct option from the following:

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

101 From the following, identify the correct combination of salient features of the Genetic Code:

1.	Universal, Non-ambiguous, Overlapping
2.	Degenerate, Overlapping, Commaless
3.	Universal, Ambiguous, Degenerate
4.	Degenerate, Non-overlapping, Non-ambiguous

102 Exploration of molecular, genetic, and species level diversity for novel products of economic importance is known as:
1. Biopiracy
2. Bioenergetics
3. Bioremediation
4. Bioprospecting

103 Which of the following shows whorled phyllotaxy?
1. Mustard
2. China rose
3. *Alstonia*
4. *Calotropis*

104 Which is the most common type of embryo sac in angiosperms?
1. Tetrasporic with one mitotic stage of division
2. Monosporic with three sequential mitotic divisions
3. Monosporic with two sequential mitotic divisions
4. Bisporic with two sequential mitotic divisions

105 Which of the following cell organelles is present in the highest number in secretory cells?

1.	Mitochondria	2.	Golgi complex
3.	Endoplasmic reticulum	4.	Lysosomes

106 After meiosis I, the resultant daughter cells have

1.	same amount of DNA as in the parent cell in S
2.	twice the amount of DNA in comparison to haploid
3.	same amount of DNA in comparison to haploid gamete
4.	four times the amount of DNA in comparison to haploid gamete

107 Among the following pairs of microbes, which pair has both the microbes that can be used as biofertilizers?
1. *Aspergillus* and *Rhizopus*
2. *Rhizobium* and *Rhizopus*
3. Cyanobacteria and *Rhizobium*
4. *Aspergillus* and Cyanobacteria

108 Match column I with column II.

	Column I		**Column II**
(a)	Golgi apparatus	(i)	Synthesis of protein
(b)	Lysosomes	(ii)	Trap waste and excretory products
(c)	Vacuoles	(iii)	Formation of glycoproteins and glycolipids
(d)	Ribosomes	(iv)	Digesting biomolecules

Choose the right match from the options given below:

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

109 What type of pollination takes place in *Vallisneria*?

1.	Pollination occurs in submerged conditions by water.
2.	Flowers emerge above the surface of water and pollination occurs by insects.
3.	Flowers emerge above the water surface and pollen is carried by the wind.
4.	Male flowers are carried by water currents to female flowers at the surface of the water.

110 In a marriage between a male with blood group A and a female with blood group B, the progeny had either blood group AB or B. What could be the possible genotype of the parents?
1. I^A i (Male) ; I^B I^B (Female)
2. I^A I^A (Male) ; I^B I^B (Female)
3. I^A I^A (Male) ; I^B i (Female)
4. I^A i (Male) ; I^B i(Female)

111 In Hatch and Slack pathway, the primary CO_2 acceptor is -
1. Oxaloacetic acid
2. Phosphoglyceric acid
3. Phosphoenol pyruvate
4. Rubisco

112 In which one of the following, both autogamy and geitonogamy are prevented?
1. Wheat
2. Papaya
3. Castor
4. Maize

113 Identify the possible link A in the following food chain.
Green plant→Insect→Frog→A→Eagle
1. Rabbit
2. Wolf
3. Cobra
4. Parrot

114 Which scientist experimentally proved that DNA is the sole genetic material in bacteriophage?
1. Beadle and Tatum
2. Messelson and Stahl
3. Hershey and Chase
4. Jacob and Monod

115 What will be the sequence of mRNA produced by the following stretch of DNA?
3' ATGCATGCATGCATG 5' TEMPLATE STRAND
5' TACGTACGTACGTAC 3' CODING STRAND
1. 3' AUGCAUGCAUGCAUG 5'
2. 5' UACGUACGUACGUAC 3'
3. 3' UACGUACGUACGUAC 5'
4. 5' AUGCAUGCAUGCAUG 3'

116 Which of the following is against the rules of ICBN?

1.	Hand written scientific names should be underlined.
2.	Every species should have a generic name and a specific epithet.
3.	Scientific names are in Latin and should be italicized.
4.	Generic and specific names should be written starting with small letters.

117 Crossing over takes place between which chromatids and in which stage of the cell cycle?

1.	Non-sister chromatids of non-homologous chromosomes at Zygotene stage of prophase I.
2.	Non-sister chromatids of homologous chromosomes at Pachytene stage of prophase I.
3.	Non-sister chromatids of homologous chromosomes at Zygotene stage of prophase I.
4.	Non-sister chromatids of non-homologous chromosomes at Pachytene stage of prophase I.

118 Carnivorous animals - lions and leopards, occupy the same niche but lions predate mostly larger animals and leopards take smaller ones. This mechanism of competition is referred to as:
1. Character displacement
2. Altruism
3. Resource partitioning
4. Competitive exclusion

119 Where is the respiratory electron transport system (ETS) located in plants?
1. Mitochondrial matrix
2. Outer mitochondrial membrane
3. Inner mitochondrial membrane
4. Intermembrane space

120 The decline in the population of Indian native fishes due to the introduction of *Clarias gariepinus* in river Yamuna can be categorised as:
1. Co-extinction
2. Habitat fragmentation
3. Over exploitation
4. Alien species invasion

121 In the process of transcription in Eukaryotes, the RNA polymerase I transcribe -
1. mRNA with additional processing, capping and tailing
2. tRNA, 5 S rRNA and snRNAs
3. rRNAs - 28 S, 18 S and 5.8 S
4. Precursor of mRNA, hnRNA

122 Non-membranous nucleoplasmic structures in the nucleus, are the sites for active synthesis of:

1.	protein	2.	mRNA
3.	rRNA	4.	tRNA

123 Bicarpellary ovary with obliquely placed septum is seen in:
1. Brassica
2. *Aloe*
3. Solanum
4. *Sesbania*

124 One scientist cultured *Cladophora* in a suspension of *Azotobacter* and illuminated the culture by splitting light through a prism. He observed that bacteria accumulated mainly in the region of:

1.	Violet and green light
2.	Indigo and green light
3.	Orange and yellow light
4.	Blue and red light

125 The contrasting characteristics generally in a pair used for identification of animals in Taxonomic Key are referred to as:
1. Lead
2. Couplet
3. Doublet
4. Alternate

126 Mad cow disease in cattle is caused by an organism which has:
1. Inert crystalline
2. Abnormally folded protein
3. Free RNA without protein coat
4. Free DNA without protein coat

127 Male gametes are flagellated in:
1. *Polysiphonia*
2. *Anabaena*
3. *Ectocarpus*
4. *Spirogyra*

128 Between which of the following, the relationship is not an example of commensalism?

1.	Orchid and the tree on which it grows
2.	Cattle Egret and grazing cattle
3.	Sea Anemone and Clownfish
4.	Female wasp and fig species

129 Regeneration of damaged growing grass following grazing is largely due to:

1.	Lateral meristem	2.	Apical meristem
3.	Intercalary meristem	4.	Secondary meristem

130 In order to increase the yield of sugarcane crops, which of the following plant growth regulators should be sprayed?

1.	Ethylene	2.	Auxins
3.	Gibberellins	4.	Cytokinins

131 What initiation and termination factors are involved in transcription in prokaryotes?
1. σ and ρ, respectively
2. α and β, respectively
3. β and γ, respectively
4. α and σ, respectively

132 The production of gametes by the parents the formation of zygotes, the F_1 and F_2 plants can be understood using

1.	Pie diagram	2.	A pyramid diagram
3.	Punnett square	4.	Wenn diagram

133 In which genetic condition, each cell in the affected person, has three sex chromosomes XXY?
1. Thalassemia
2. Klinefelter's Syndrome
3. Phenylketonuria
4. Turner's Syndrome

134 Match the following RNA polymerases with their transcribed products:

	Column-I		**Column-II**
(a)	RNA polymerase I	(i)	tRNA
(b)	RNA polymerase II	(ii)	rRNA
(c)	RNA polymerase III	(iii)	hnRNA

Select the correct option from the following:

Options:	(a)	(b)	(c)
1.	i	iii	ii
2.	i	ii	iii
3.	ii	iii	i
4.	iii	ii	i

135 Western Ghats have a large number of plant and animal species that are not found anywhere else. Which of the following terms will you use to notify such species?

1.	Endemic	2.	Vulnerable
3.	Threatened	4.	Keystone

136 Which of the following conditions will stimulate parathyroid gland to release parathyroid hormone?
1. Fall in active Vitamin D levels
2. Fall in blood Ca^{+2} levels
3. Fall in bone Ca^{+2} levels
4. Rise in blood Ca^{+2} levels

137 Choose the correctly matched pair:
1. Tendon-Specialized connective tissue
2. Adipose tissue-Dense connective tissue
3. Areolar tissue- Loose connective tissue
4. Cartilage- Loose connective tissue

138 Identify the correct statement on 'inhibin':

1.	Is produced by granulosa cells in the ovary and inhibits the secretion of FSH
2.	Is produced by granulosa cells in the ovary and inhibits the secretion of LH
3.	Is produced by nurse cells in the testes and inhibits the secretion of LH
4.	Inhibits the secretion of LH, FSH and prolactin.

139 Match the following parts of a nephron with their function:

(a)	Descending limb of Henle's loop	(i)	Reabsorption of salts only
(b)	Proximal convoluted tubule	(ii)	Reabsorption of water only
(c)	Ascending limb of Henle's loop	(iii)	Conditional reabsorption of sodium ions
(d)	Distal convoluted tubule	(iv)	Reabsorption of ions, water, and organic nutrients

Select the correct option from the following:

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

140 A specialised nodal tissue embedded in the lower corner of the right atrium, close to atrio-ventricular septum, delays the spreading of impulses to heart apex for about 0.1 sec.
This delay allows -
1. blood to enter aorta.
2. the ventricles to empty completely.
3. blood to enter pulmonary arteries.
4. the atria to empty completely.

141 Match the items in Column - I with those in Column - II:

	Column I		**Column II**
(a)	Podocytes	(i)	Crystallised oxalate
(b)	Protonephridia	(ii)	Annelids
(c)	Nephridia	(iii)	Amphioxus
(d)	Renal calculi	(iv)	Filtration slits

Select the correct option from the following:

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

142 Erythropoiesis starts in:
1. kidney
2. liver
3. spleen
4. red bone marrow

143 Which part of the tobacco plant is infected by *Meloidogyne incognita*?

1.	Leaf	2.	Stem
3.	Root	4.	Flower

144 Which of the following organic compounds is the main constituent of Lecithin?
1. Arachidonic acid
2. Phospholipid
3. Cholesterol
4. Phosphoprotein

145 Which of the following statements is correct about the origin and evolution of men?

1.	Agriculture came around 50,000 years back.
2.	The *Dryopithecus* and *Ramapithecus* primates existing 15 million years ago, walked like men.
3.	*Homo habilis* probably ate meat.
4.	Neanderthal men lived in Asia between 100000 and 40000 years back.

146 Which of the following animals are true coelomates with bilateral symmetry ?
1. Adult Echinoderms
2. Aschelminthes
3. Platyhelminthes
4. Annelids

147 Which of the following characteristics is mainly responsible for the diversification of insects on land:
1. Segmentation
2. Bilateral symmetry
3. Exoskeleton
4. Eyes

148 In Bt cotton, the Bt toxin present in plant tissue as pro-toxin is converted into active toxin due to:
1. alkaline pH of the insect gut
2. acidic pH of the insect gut
3. action of gut microorganisms
4. presence of conversion factors in the insect gut

149 Which of the following depicts the correct pathway of transport of sperms?

1.	Rete testis → Efferent ductules → Epididymis → Vas deferens
2.	Rete testis → Epididymis → Efferent ductules → Vas deferens
3.	Rete testis → Vas deferens → Efferent ductules → Epididymis
4.	Efferent ductules → Rete testis → Vas deferens → Epididymis

150 Artificial light, extended work-time and reduced sleep-time disrupt the activity of:
1. Thymus gland
2. Pineal gland
3. Adrenal gland
4. Posterior pituitary gland

151 Match the following cell structure with its characteristic feature:

	Column I		**Column II**
(a)	Tight junctions	(i)	Cement neighboring cells together to form a sheet
(b)	Adhering junctions	(ii)	Transmit information through chemicals to another cell
(c)	Gap junctions	(iii)	Establish a barrier to prevent leakage of fluid across epithelial cells
(d)	Synaptic junctions	(iv)	Cytoplasmic channels to facilitate communication between adjacent cells

Select the correct option from the following:

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

152 "Ramachandran plot" is used to confirm the structure of:
1. RNA
2. Proteins
3. Triacylglycerides
4. DNA

153 In RNAi, the genes are silenced using:

1.	dsRNA	2.	ssDNA
3.	ssRNA	4.	dsDNA

154 Which of the following sexually transmitted diseases do not specifically affect reproductive organs?
1. Genital warts and Hepatitis-B
2. Syphilis and Genital herpes
3. AIDS and Hepatitis B
4. Chlamydiosis and AIDS

155 Humans have acquired an immune system that produces antibodies to neutralize pathogens. Still innate immune system is present at the time of birth because it:

1.	is very specific and uses different macrophages
2.	produces memory cells for mounting a fast secondary response
3.	has natural killer cells that can phagocytose and destroy microbes
4.	provides passive immunity

156 All the components of the nodal tissue are autoexcitable. Why does the SA node act as the normal pacemaker?

1.	SA node has the lowest rate of depolarisation
2.	SA node is the only component to generate the threshold potential.
3.	Only SA node can convey the action potential to the other
4.	SA node has the highest rate of depolarisation.

157 An enzyme catalysing the removal of nucleotides from ends of DNA is:

1.	DNA ligase	2.	Endonuclease
3.	Exonuclease	4.	Protease

158 No new follicles develop in the luteal phase of the menstrual cycle because :

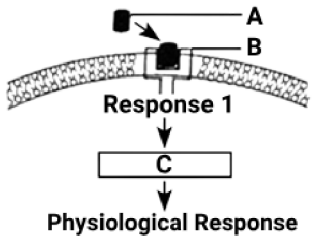
1.	Follicles do not remain in the ovary after ovulation
2.	FSH levels are high in the luteal phase
3.	LH levels are high in the luteal phase
4.	Both FSH and LH levels are low in the luteal phase

159 Which of the following receptors are specifically responsible for maintenance of balance of body and posture?
1. Basilar membrane and otoliths
2. Hair cells and organ of corti
3. Tectorial membrane and macula
4. Crista ampullaris and macula

160 Which of the following statements is not correct?

1.	An action potential in an axon does not move backward because the segment behind is in a refractory phase.
2.	Depolarization of hair cells of cochlea results in the opening of the mechanically gated Potassium- ion channels.
3.	Rods are very sensitive and contribute to daylight vision.
4.	In the knee-jerk reflex, stimulus is the stretching of muscle and response is its contraction.

161 Identify A, B and C in the diagrammatic representation of the mechanism of hormone action.



Select the correct option from the following:

1.	A = Steroid Hormone; B = Hormone receptor Complex; C = Protein
2.	A = Protein Hormone; B = Receptor; C = Cyclic AMP
3.	A = Steroid Hormone; B = Receptor; C = Second Messenger
4.	A = Protein Hormone; B = Cyclic AMP; C = Hormone-receptor Complex

162 Which of the following are correctly matched with respect to their taxonomic classification?

1.	Centipede, millipede, spider, scorpion-Insecta
2.	House fly, butterfly, tsetse fly, silverfish-Insecta
3.	Spiny anteater, sea urchin, sea cucumber- Echinodermata
4.	Flying fish, cuttlefish, silverfish- Pisces

163 Coca alkaloid or cocaine is obtained from:

1.	*Papaver somniferum*	2.	Atropa belladonna
3.	*Erythroxylum coca*	4.	*Datura*

164 Which one of the following statements is wrong?

1.	Algae increase the level of dissolved oxygen in the immediate environment
2.	Algin is obtained from red algae and carrageenan from brown algae
3.	Agar-agar is obtained from *Gelidium* and *Gracilaria*
4.	*Laminaria* and *Sargassum* are used as food

165 Match the following enzymes with their functions:

	Column-I		**Column-II**
(a)	Restriction endonuclease	(i)	joins the DNA fragments
(b)	Exonuclease	(ii)	extends primers on genomic DNA template
(c)	DNA ligase	(iii)	cuts DNA at a specific position
(d)	Tag polymerase	(iv)	removes nucleotides from the ends of DNA

Select the correct option from the following:

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

166 Given below are four statements pertaining to the separation of DNA fragments using gel electrophoresis. Identify the incorrect statements:

(a)	DNA is a negatively charged molecule and so it is loaded on gel towards the anode terminal.
(b)	DNA fragments travel along the surface of the gel, whose concentration does not affect the movement of DNA.
(c)	The smaller the DNA fragment, the greater the distance it travels through it.
(d)	Pure DNA can be visualized directly by exposing it to UV radiation.

Choose the correct answer from the options given below:

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

167 Which of the following diseases is an auto-immune disorder?

1.	Myasthenia gravis	2.	Arthritis
3.	Osteoporosis	4.	Gout

168 Which of the following is a correct statement?

1. IUDs once inserted need not be replaced.
2. IUDs are generally inserted by the user herself.
3. IUDs increase phagocytosis of sperms in the uterus.
4. IUDs suppress gametogenesis.

169 The two antibiotic resistance genes on vector pBR 322 are for:

1. Ampicillin and Tetracycline
2. Ampicillin and Chloramphenicol
3. Chloramphenicol and Tetracycline
4. Tetracycline and Kanamycin

170 In Australia, marsupials and placental mammals have evolved to share many similar characteristics. This type of evolution may be referred to as:

1.	Adaptive Radiation	2.	Divergent Evolution
3.	Cyclical Evolution	4.	Convergent Evolution

171 A population of a species invades a new area. Which of the following condition will lead to adaptive radiation?

1.	Area with a large number of habitats having very low food supply
2.	Area with a single type of vacant habitat
3.	Area with many types of vacant habitats
4.	Area with many habitats occupied by a large number of species

172 A selectable marker is used to:

1.	help in eliminating the non-transformants so that the transformants can be regenerated.
2.	identify the gene for the desired trait in an alien organism.
3.	select a suitable vector for transformation in a specific crop.
4.	mark a gene on a chromosome for isolation using a restriction enzyme.

173 Prosthetic groups differ from co-enzymes, in which:

1.	they require metal ions for their activity.
2.	they (prosthetic groups) are tightly bound to apoenzymes.
3.	their association with apoenzymes is transient.
4.	they can serve as co-factors in a number of enzyme-catalyzed reactions.

174 Match the following joints with the bones involved:

	Column-I		**Column-II**
(a)	Gliding joint	(i)	Between carpal and metacarpal of thumb
(b)	Hinge joint	(ii)	Between Atlas and Axis
(c)	Pivot joint	(iii)	Between the Carpals
(d)	Saddle joint	(iv)	Between Humerus and Ulna

Select the correct option from the following:

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

175 Select the correct statement:

1.	Expiration occurs due to external intercostal muscles.
2.	Intrapulmonary pressure is lower than atmospheric pressure during inspiration.
3.	Inspiration occurs when atmospheric pressure is less than intrapulmonary pressure.
4.	Expiration is initiated due to the contraction of the diaphragm.

176 The maximum volume of air a person can breathe in after a forced expiration is known as:

1. Expiratory Capacity
2. Vital Capacity
3. Inspiratory Capacity
4. Total Lung Capacity

177 Which of the following hormones is responsible for both the milk ejection reflex and the foetal ejection reflex?

1.	Estrogen	2.	Prolactin
3.	Oxytocin	4.	Relaxin

178 Match the following genera with their respective phylum :

	Column I		**Column II**
(a)	*Ophiura*	(i)	Mollusca
(b)	*Physalia*	(ii)	Platyhelminthes
(c)	*Pinctada*	(iii)	Echinodermata
(d)	*Planaria*	(iv)	Coelenterata

Select the correct option :

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

179 Which of the following statements is INCORRECT?

1.	Cockroaches exhibit mosaic vision with less sensitivity and more resolution
2.	A mushroom-shaped gland is present in the 6^{th}-7^{th} abdominal segments of male
3.	A pair of spermatheca is present in the 6^{th} segment of female cockroach
4.	Female cockroach possesses sixteen ovarioles in the ovaries

180 The exploitation of bioresources of a nation by multinational companies without authorization from the concerned country is referred to as:

1.	Bioweapon	2.	Biopiracy
3.	Bioethics	4.	Biowar