POTENTIAL & CONCEPT EDUCATIONS

Most Trusted Institute of North-East

Academic Session : 2019 - 20

AITS FULL TEST (FT) : FT # 27
(NEET PATTERN)

Target : NEET - 2020

Date : 02nd August, 2020 | Duration : 3 Hours | Max. Marks : 720

COURSE : Dropper, Target, DLP., AITS

Please read the last page of this booklet for the instructions.

Potential & Concept Educations

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PHYSICS

1 A container with a liquid having area of free surface A has an orifice at a depth h with an area a below liquid surface, then the velocity v of flow through the orifice is - (Single option correct)

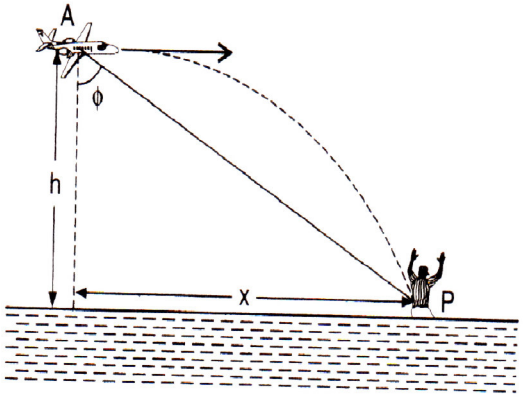
a $\sqrt{2gh}$

b $\sqrt{2gh}\sqrt{\frac{A^2}{A^2-a^2}}$

c $\sqrt{2gh}\sqrt{\frac{A}{A-a}}$

d None of these

2 A relief aeroplane is flying at a constant height of 1960 m with speed 600 km/hr above the ground towards a point directly over a person struggling in flood water (see diagram). At what angle of sight, should the pilot release survival kit if it is to reach the person in water?
($g = 9.8\ m/s^2$)



(Single option correct)

a 30^o

b 45^o

c 90^o

d 60^o

3 Two identical satellites are moving around the earth in circular orbits at heights $3R$ and R respectively where R is the radius of the Earth. The ratio of their kinetic energies is (Single option correct)

a 2 : 1

b 1 : 2

c 3 : 1

d 2 : 3

4 If the length of rod A is (3.25 ± 0.01) cm and that of B is (4.19 ± 0.01) cm, then the rod B is longer than rod A by (Single option correct)

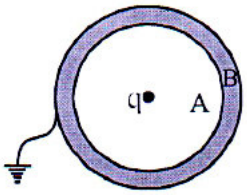
a (0.94 ± 0.00) cm

b (0.94 ± 0.01) cm

c (0.94 ± 0.02) cm

d (0.94 ± 0.005) cm

5 A positive point charge q is placed at the centre of an uncharged metal sphere insulated from the ground. The outside of the sphere is then grounded as shown. Then the ground wire is removed. A is the inner surface and B is the outer surface. Which statement is correct?



(Single option correct)

a The charge on A is -q; that on B is +q

b The charge on B is -q; that on A is +q

c The charge is $\frac{q}{2}$ on A and B

d The charge on A is -q; there is no charge on B

6 A polarized light of intensity I_0 is passed through another polarizer whose pass axis makes an angle of 60^o with the pass axis of the former. What is the intensity of emerging polarized light from second polarizer? (Single option correct)

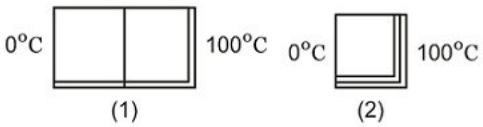
a $I = I_0$

b $I = \frac{I_0}{6}$

c $I = \frac{I_0}{5}$

d $\frac{I_0}{4}$

7 Two identical square rods of metal are welded end to end as shown in the figure (1), 20 cal of heat flows through it in 4 min. If the rods are welded as shown in the figure (2), the same amount of heat will flow through the rods in



(Single option correct)

a 1 min

b 2 min

c 4 min

d 16 min

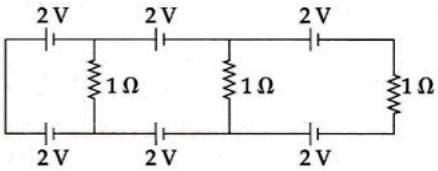
8 A sample of radioactive material has mass m, decay constant λ and molecular weight M. Avogadro's constant $= N_A$. The initial activity of the sample is (Single option correct)

a λm

b $\frac{\lambda m}{M}$

c $\frac{\lambda m N_A}{M}$

d $mN_A e^{\lambda}$

9 

In the above circuit the current in each resistance is: (Single option correct)

a 0 A

b 1 A

c 0.25 A

d 0.5 A

10 The x and y components of a force are 2 N and -3N. The force is (Single option correct)

a $2\hat{i} - 3\hat{j}$

b $2\hat{i} + 3\hat{j}$

c $-2\hat{i} - 3\hat{j}$

d $3\hat{i} + 2\hat{j}$

11 The correct measure of magnetic hardness of a material is (Single option correct)

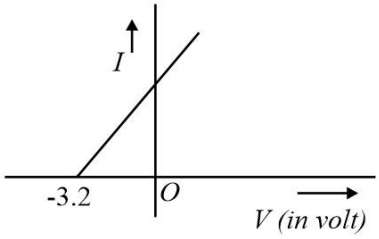
a remanant magnetism

b hysterses loss

c coercivity

d curie temperature

12 In a photoelectric experiment, the relation between the applied potential difference V and the photoelectric current I was found to be as shown in the graph below. If the work function of the cathode plate is 28.8 eV and $h = 6.6 \times 10^{-34}$ J s, the frequency of incident radiation would be nearly $(\text{in } s^{-1})$



(Single option correct)

a 0.436×10^{18} Hz

b 0.436×10^{17} Hz

c 0.775×10^{16} Hz

d 0.775×10^{15} Hz

13 A whistle producing sound waves of frequency 9500 Hz above is approaching a stationary person with speed $v\ ms^{-1}$. The velocity of sound in air is $300\ ms^{-1}$. If the person can hear frequency up to a maximum of 10,000 Hz, the maximum value of v up to which he can hear the whistle is (Single option correct)

a $15\sqrt{2} ms^{-1}$

b $15\ ms^{-1}$

c $30\ ms^{-1}$

d none of these

14 If a cricketer catches a ball of mass 150 g moving with a velocity of $20\ m\ s^{-1}$, then he experiences a force of (Time taken to complete the catch is 0.1 s.)

(Single option correct)

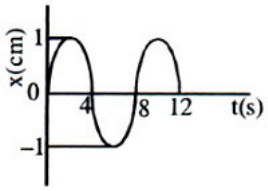
a 300 *N*

b 30 *N*

c 3 *N*

d 0.3 *N*

15 The x-t graph of a particle undergoing simple harmonic motion is shown below. The acceleration of the particle at $t = \frac{2}{3} s$ is



(Single option correct)

a $\frac{\sqrt{3}}{32}\pi^2 \frac{cm}{s^2}$

b $\frac{-\pi^2}{32} \frac{cm}{s^2}$

c $\frac{\pi^2}{32} \frac{cm}{s^2}$

d $-\frac{\sqrt{3}}{32}\pi^2 \frac{cm}{s^2}$

16 A particle of mass m is fixed to one end of a light spring of force constant k and unstretched length l. The system is rotated about the other end of the spring with an angular velocity ω, in gravity-free space. Then increase in the length of the spring will be:

(Single option correct)

a $\frac{m\omega^2 l}{k}$

b $\frac{m\omega^2 l}{k-m\omega^2}$

c $\frac{m\omega^2 l}{k+m\omega^2}$

d None of these

17 The dominant mechanisms for motion of charge carriers in forward and reverse biased silicon *p-n* junctions are

(Single option correct)

a Drift in forward bias, diffusion in reverse bias

b Diffusion in forward bias, drift in reverse bias

c Diffusion in both forward and reverse bias

d Drift in both forward and reverse bias

18 Two rods P and Q of equal lengths have thermal conductivities K_1 and K_2 and cross-sectional areas A_1 and A_2 respectively. If the temperature difference across the ends of each rod is the same, then the condition for which the rate of flow of heat through each of them will be equal, is (Single option correct)

a $\frac{A_1}{A_2} = \frac{K_2}{K_1}$

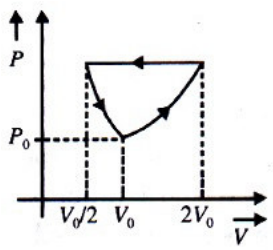
b $\frac{A_1}{A_2} = \frac{K_1}{K_2}$

c $\frac{A_1}{A_2} = \sqrt{\frac{K_1}{K_2}}$

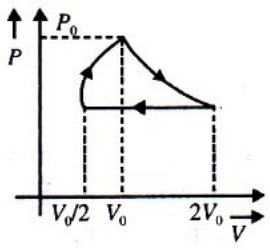
d $\frac{A_1}{A_2} = \left(\frac{K_2}{K_1}\right)^2$

19 One mole of an ideal gas at pressure P_0 and temperature T_0 is expanded isothermally to twice its volume and then compressed at constant pressure to ($V_0/2$) and the gas is brought back to original state by a process in which P α V (pressure is directly proportional to volume). The correct temperature of the process is (Single option correct)

a



b



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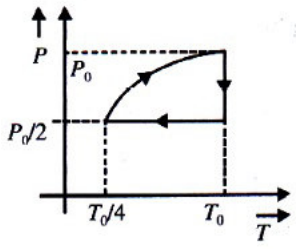

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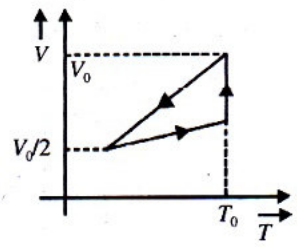
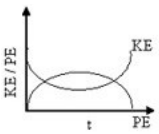


20 A 5 kg mass is projected at an angle of 30° to the horizontal. The curves (best) representing the variation of KE and PE as a function of time is (Single option correct)

a



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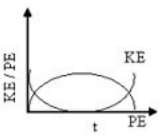

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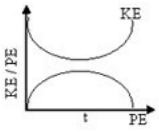

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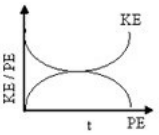
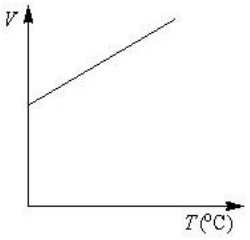


21 Volume-temperature graph at atmospheric pressure for a monoatomic gas (V in m^3, T in celcius) is (Single option correct)

a



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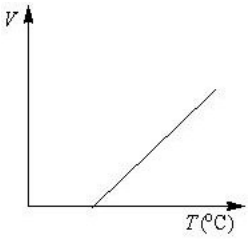
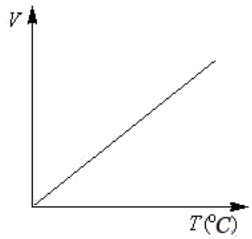
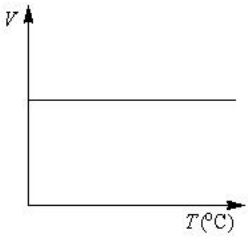


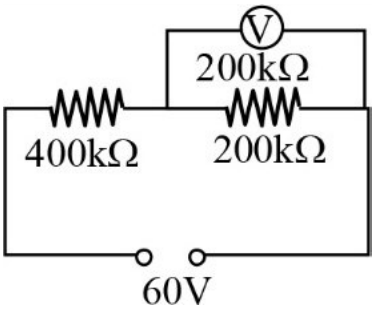
c



d



22 A constant 60 V supply is connected across the two resistors as shown in diagram. Calculate the reading of the voltmeter which has a resistance of 200 kΩ



(Single option correct)

a 12 V

b 15 V

c 20 V

d 30 V

23 Two mutually perpendicular conductors carrying currents I_1 and I_2 lie in one plane. Locus of the point at which the magnetic induction is zero, is a (Single option correct)

a Circle with centre as the point of intersection of the conductor

b Parabola with vertex as the point of intersection of the conductors

c Straight line passing through the point of intersection of the conductors

d Rectangular hyperbola

24 An observer looks at a distant tree of height 10 m with a lens of magnifying power of 20. To the observer the tree appears as (Single option correct)

a 20 times taller.

b 20 times nearer.

c 10 times taller.

d 10 times nearer.

25 A cell of 2V, 1Ω is balanced at 1.9 m. Then what is balanced length for ideal cell of 2V ? (Single option correct)

a 1.9 m

b > 1.9 m

c < 1.9 m

d none of these

26 A body is projected at an angle of $60°$ with the horizontal. If its kinetic energy at its maximum height is $10\ J$, then the height at which its potential energy and kinetic energy have equal values is (consider potential energy at the point of projection to be zero) (Single option correct)

a half of the maximum height

b two third of the maximum height

c one sixth of the maximum height

d insufficient data to solve the problem

27 Two white points are 1 mm apart on a black paper. They are viewed by eye of pupil diameter 3 mm. Approximately, what is the maximum distance at which these dots can be resolved by the eye?

[Take wavelength of light = 500 nm] (Single option correct)

a 5 m

b 1 m

c 6 m

d 3 m

28 At a temperature of $30\ °C$, the susceptibility of a paramagnetic material is found to be X. Its susceptibility at $333\ °C$ is (Single option correct)

a $0.5\ X$

b $2\ X$

c $11.1\ X$

d $0.09\ X$

29 Given θ is the angle between $\vec{A}$ and $\vec{B}$ which are unit vectors. Then $\left|\vec{A} \times \vec{B}\right|$ is equal to

(Single option correct)

a $\sin\theta$

b $\cos\theta$

c $\tan\theta$

d $\cot\theta$

30 A negative test charge is moving near a long straight wire carrying a current. The force acting on the test charge is parallel to the direction of the current. The motion of the charge is: (Single option correct)

a Away from the wire

b Towards the wire

c Parallel to the wire along the current

d Parallel to the wire opposite to the current

31 The efficiency of a Carnot engine working between 800 K and 500 K is - (Single option correct)

a 0.4

b 0.625

c 0.375

d 0.5

32 A particle of charge equal to that of an electron, $-e$, and mass 208 times the mass of electron (called μ - meson) moves in a circular orbit around a nucleus of charge +3e. (Take the mass of the nucleus to be infinite). Assuming that Bohr model of the atom is applicable to this system:

Derive an expression for the radius of the n^{th} Bohr orbit (Single option correct)

a $\frac{\varepsilon_0 n^2 h^2}{208\pi m_e e^2}$

b $\frac{\varepsilon_0 n^2 h^2}{3\pi m_e e^2}$

c $\frac{\varepsilon_0 n^2 h^2}{624\pi m_e e^2}$

d $\frac{\varepsilon_0 n^2 h^2}{64\pi m_e e^2}$

33 Consider a car moving along a straight horizontal road with a speed of $72\frac{km}{h}$. If the coefficient of static friction between the tyres and the road is 0.5, the shortest distance in which the car can be stopped is (taking $g = 10\frac{m}{s^2}$) (Single option correct)

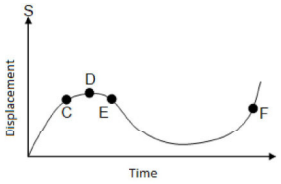
a 30m

b 40m

c 72m

d 20m

34 The displacement time graph of a moving particle is shown below



The instantaneous velocity of the particle is negative at the point (Single option correct)

a C

b E

c D

d F

35 A body falls from a height h = 200m. The ratio of distance travelled in each 2s, during t = 0 to t = 6s of the journey is (Single option correct)

a 1:4:9

b 1:2:4

c 1:3:5

d 1:2:3

36 Temperature at which the kinetic energy of gas molecule is half of the value of kinetic energy at $27°C$ is (Single option correct)

a $13.5\ °C$

b $150\ °C$

c $75\ K$

d $-123°C$

37 The dimensional formula for the magnetic field is (Single option correct)

a $[MT^{-2}A^{-1}]$

b $[ML^2T^{-1}A^{-2}]$

c $[MT^{-2}A^{-2}]$

d $[MT^{-1}A^{-2}]$

38 A truck of mass 10 metric ton runs at $3\ m\ s^{-1}$ along a level track and collides with a loaded truck of mass 20 metric ton, standing at rest. If the trucks couple together, the common speed after the collision is (Single option correct)

a $1\ m\ s^{-1}$

b $0.1\ ms^{-1}$

c $0.5\ ms^{-1}$

d $0.3\ ms^{-1}$

39 A point charge q is placed at a distance of R from the centre of a conducting shell of inner radius $2R$ and outer radius $3R$. The electric potential at the centre of the shell will be (Single option correct)

a $\frac{1}{4\pi\varepsilon_0}\left(\frac{q}{2R}\right)$

b $\frac{1}{4\pi\varepsilon_0}\left(\frac{4q}{3R}\right)$

c $\frac{1}{4\pi\varepsilon_0}\left(\frac{5q}{6R}\right)$

d $\frac{1}{4\pi\varepsilon_0}\left(\frac{5q}{3R}\right)$

40 The natural frequency (f_0) of oscillations in L - C circuit is given by (Single option correct)

a $\frac{1}{2\pi}\frac{1}{\sqrt{LC}}$

b $\frac{1}{2\pi}\sqrt{LC}$

c $\frac{1}{\sqrt{LC}}$

d $\sqrt{LC}$

41 When an unpolarized light of intensity I_0 is incident on a polarizing sheet, the intensity of the light which gets absorbed is (Single option correct)

a $\frac{1}{5}I_0$

b $\frac{1}{3}I_0$

c $\frac{1}{2}I_0$

d $\frac{1}{4}I_0$

42 Two coils are at fixed locations. When coil 1 has no current and the current in the coil 2 increases at the rate 15.0 As^{-1}, the emf in coil 1 is 25.0 mV. When coil 2 has current of 3.6 A the flux linkage in coil 2 is (Single option correct)

a 4.0 mWb

b 6.0 mWb

c 10.0 mWb

d 16.0 mWb

43 A body of mass 5 kg under the action of constant force $\vec{F} = F_x\hat{i} + F_y\hat{j}$ has velocity at $t = 0$ s as $\vec{u} = \left(6\hat{i} - 2\hat{j}\right)$m/s and at $t = 10$ s as $\vec{v} = +6\hat{j}$ m/s. The force $\vec{F}$ is : (Single option correct)

a $\left(-3\hat{i} + 4\hat{j}\right)$N

b $\left(-\frac{3}{5}\hat{i} + \frac{4}{5}\hat{j}\right)$N

c $\left(3\hat{i} - 4\hat{j}\right)$N

d $\left(\frac{3}{5}\hat{i} - \frac{4}{5}\hat{j}\right)$N

44 An earth orbiting satellite has solar energy collecting panel with total area $5\ m^2$. If solar radiations are perpendicular and completely absorbed, the average force associated with the radiation pressure is

(Solar constant$= 1.4\ kWm^{-2}$) (Single option correct)

a 2.33×10^{-3} N

b 2.33×10^{-4} N

c 2.33×10^{-5} N

d 2.33×10^{-6} N

45 A ballet dancer is rotating about his own vertical axis on smooth horizontal floor with a time period 0.5 sec. The dancer folds himself close to his axis of rotation due to which his radius of gyration decreases by 20%, then his time period is (Single option correct)

a 0.1 sec

b 0.25 sec

c 0.32 sec

d 0.4 sec

CHEMISTRY

1 Ethyl isocyanide on hydrolysis in acidic medium generates

(Single option correct)

a Propanoic acid and ammonium salt

b Ethanoic acid and ammonium salt

c Methylamine salt and ethanoic acid

d Ethylamine and methanoic acid

2 An ore like zinc blende is concentrated by (Single option correct)

a Froth floatation

b Magnetic separation

c Leaching

d Washing with water

3 The reaction, $N_2O_5\ (g) \rightleftarrows 2\ NO_2\ (g) + \frac{1}{2}\ O_2\ (g)$, is started with initial pressure of $N_2O_5\ (g)$ equal to 600 torr. What fraction of $N_2O_5\ (g)$ decomposed when total pressure of the system is 960 torr ? (Single option correct)

a 0.05

b 0.1

c 0.2

d 0.4

4 Equal volumes of monoatomic and diatomic gases are taken at same temperature and pressure. The ratio of adiabatic exponents of the gases will be- (Single option correct)

a 1

b 2

c 1.67

d 1.19

5 What will be the volume of O_2 Liberated at NTP by passing 5A current For 193 Sec. through acidified water. (Single option correct)

a 56 mL

b 112 mL

c 158 mL

d 965 mL

6 Heating mixture of Cu_2O and Cu_2S will give (Single option correct)

a $Cu + SO_3$

b $CuO + CuS$

c Cu_2SO_3

d $Cu + SO_2$

7 The sequence of ionic mobility in aqueous solution is (Single option correct)

a $Rb^+ > K^+ > Cs^+ > Na^+$

b $Na^+ > K^+ > Rb^+ > Cs^+$

c $K^+ > Na^+ > Rb^+ > Cs^+$

d $Cs^+ > Rb^+ > K^+ > Na^+$

8 In which of the following salts only cationic hydrolysis is involved? (Single option correct)

a CH_3COONH_4

b CH_3COONa

c NH_4Cl

d Na_2SO_4

9 If H_2SO_4 ionises as $H_2SO_4 + 2H_2O \rightarrow 2H_3O^+ + SO_4^{2-}$, then total number of ions produced by 0.1 Molar and 1 L aqueous H_2SO_4 will be: (Single option correct)

a 9.03×10^{21}

b 3.01×10^{22}

c 6.02×10^{22}

d 1.8×10^{23}

10 The energy of an electron in the first orbit of $H-$ atom is $-13.6\ eV$. The possible energy values of the excited state for electrons in Bohr orbits of Li^{2+} ions is/are- (Single option correct)

a $-3.0\ eV$

b $-30.6\ eV$

c $-13.6\ eV$

d Both B & C are correct

11 pH of a $1000\ cc$ solution is 2. It will not change if (Single option correct)

a $100\ cc$ of water is added to it

b $100\ cc$ of $0.1\ M\ HCl$ is added to it

c 100 cc (N/100) HCl is added to it

d $1\ cc$ of $0.1\ M\ HCl$ is added to it.

12 Which of the following is acidic (Single option correct)

a CH_3OH

b C_6H_5OH

c $(CH_3)_2CHOH$

d CH_3CH_2OH

13 A mixture of CH_4 and C_2H_2 occupied a certain volume at a total pressure equal to 63 torr. The same gas mixture was burnt to CO_2 and $H_2O(l)$. $CO_2(g)$ alone was collected in the same volume and at the same temperature, the pressure was found to be 69 torr.
What was the mole fraction of CH_4 in the original gas mixture? (Single option correct)

a $\frac{19}{21}$

b $\frac{19}{20}$

c $\frac{17}{18}$

d $\frac{15}{16}$

14 Which one of the following is not the representative element ? (Single option correct)

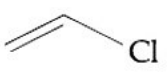
a Fe

b K

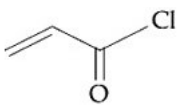
c Ba

d N

15 Which of the following compounds will not undergo Friedel Craft's reaction with benzene? (Single option correct)

a 

b 

c 

d 

16 Fill in the blank :

$^{235}_{92}U + {}^{1}_{0}n \rightarrow ? + {}^{92}_{36}Kr + 3{}^{1}_{0}n$ (Single option correct)

a $^{141}_{56}Ba$

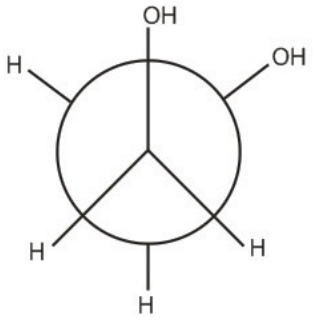
b $^{139}_{56}Ba$

c $^{139}_{54}Ba$

d $^{141}_{54}B$

17 Which of the following conformers for ethylene glycol is most stable ? (Single option correct)

a



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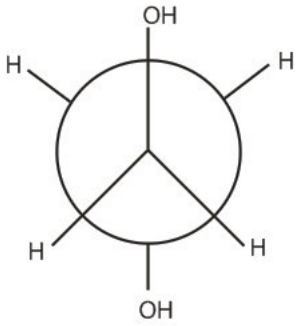

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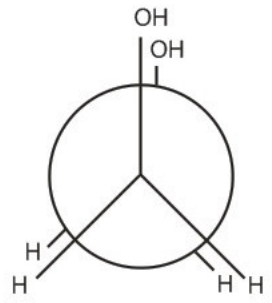

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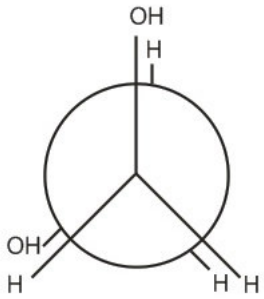


18 In the Rosenmund's reaction
$BaSO_4$: (Single option correct)

a Promotes catalytic activity of Pd

b Removes the HCl formed in the reaction

c Deactivates palladium

d Activates palladium

19 The correct statement for the molecule CsI_3, is : (Single option correct)

a It is a covalent molecule.

b It contains Cs^+ and I_3^- ions.

c It contains Cs^{3+} and I^- ions.

d It contains Cs^+, I^- and lattice I_2 molecule.

20 $CH_3COOH \xrightarrow{Br_2/P} (Y) \xrightarrow[(ii)\ H_3O^+]{(i)\ KCN} (X)$

Here (X) is: (Single option correct)

a Glycollic acid

b α-Hydroxypropionic acid

c Succinic acid

d Malonic acid

21 The enthalpy and entropy change for the reaction :

$$Br_2(l) + Cl_2(g) \rightarrow 2BrCl(g)$$

are 30 kJ mol^{-1} and 105 J K^{-1} mol^{-1} respectively. The temperature at which the reaction will be in equilibrium is (Single option correct)

a 300 K

b 285.7 K

c 273 K

d 450 K

22 Chloroform, when kept open, is oxidised to (Single option correct)

a CO_2

b $COCl_2$

c CO_2 , Cl_2

d None of these

23 The number of metamers possible for $C_4H_{10}O$ is (Single option correct)

a 1

b 2

c 3

d 4

24 Which of the following is a hypnotic drug (Single option correct)

a Luminal

b Salol

c Catechol

d paracetamol

25 A compound contains 1.08 mol of Na, 0.539 mol of Cu and 2.16 mol of F. Its aqueous solution shows osmotic pressure which is three times that of urea having same molar concentration. The formula of the compound is : (Single option correct)

a $Na_4[CuF_6]$

b $Na[CuF_4]$

c $Na_2[CuF_4]$

d $Na_2[CuF_3]$

26 Four successive members of the first row transition elements are listed below with atomic numbers. Which one of them is expected to have the highest $E^0_{M^{3+}/M^{2+}}$ value ? (Single option correct)

a Fe (Z = 26)

b Co (Z = 27)

c Cr (Z = 24)

d Mn (Z = 25)

27 Root mean square velocity of O_2 at STP is $\left(\text{in } \frac{cm}{s}\right)$ (Single option correct)

a 4.61×10^4

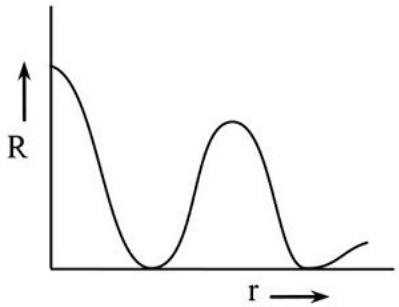
b 2.6×10^4

c 46.1×10^4

d 26.0×10^4

28 The radial probability distribution curve for $2s$ electron appears like - (Single option correct)

a



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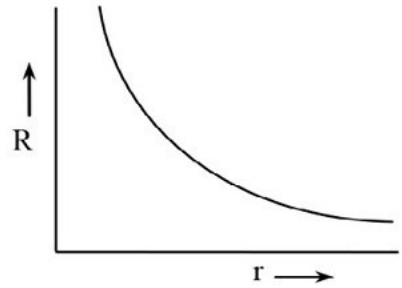
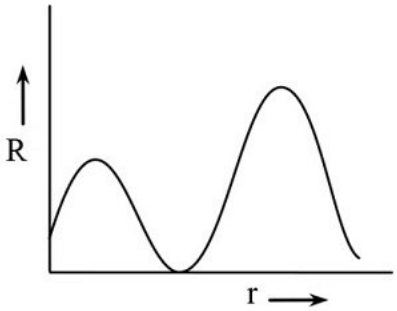


c



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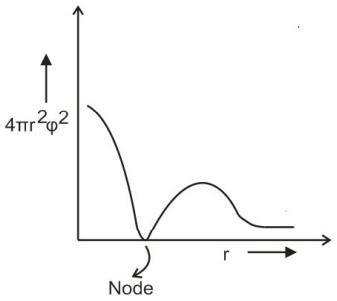


29 At solution containing 12.5 g of non-electrolyte substance in 175 of water gave boiling point elevation of 0.70 K. Calculate the molar mass of the substance. Molal elevation constant (K_b) for water $0.52\ K\ kg\ mol^{-1}$? (Single option correct)

a 53

b 65

c 84

d 79

30 The number of atoms in 100 g of an FCC crystal with density d $= 10$ g/cm^3 and cell edge equal to 100 pm, is equal to (Single option correct)

a 1×10^{25}

b 2×10^{25}

c 3×10^{25}

d 4×10^{25}

31 99% of a first order reaction was completed in 32 min. When will 99.9% of the reaction complete? (Single option correct)

a 24 min

b 8 min

c 4 min

d 48 min

32 How many nitrogen atoms are in 0.25 mole of $Ca(NO_3)_2$? (Single option correct)

a 3.0×10^{23}

b 6.0×10^{23}

c 9.0×10^{23}

d 12.0×10^{23}

33 Bleeding is stopped by the application of ferric chloride. This is because: (Single option correct)

a The blood starts flowing in opposite direction

b The blood reacts and forms a solid, which seals the blood vessel

c The blood is coagulated and thus the blood vessel is sealed

d The ferric chloride seals the blood vessel

34 Given the equilibrium system

$NH_4Cl\,(s) \rightleftharpoons NH_4^+\,(aq) + Cl^-\,(aq)$

$(\Delta H = +3.5\ \text{kcal/mol}).$

What change will shift the equilibrium to the right? (Single option correct)

a Decreasing the temperature

b Increasing the temperature

c Dissolving $NaCl$ crystals in the equilibrium mixture

d Dissolving NH_4NO_3 crystals in the equilibrium mixture

35 For which order reaction half-life period is independent of initial concentration of reactant? (Single option correct)

a Zero

b First

c Second

d Third

36 H_2S is passed through an acidified solution of Ag, Cu and Zn. Which forms precipitate (Single option correct)

a Ag , Zn

b Zn , Cu

c Cu , Ag

d Ag ,Zn ,Cu

37 Nylon-6,6 and polythene are examples of

(Single option correct)

a Copolymerisation biomolecules and Additional polymerisation respectively

b Condensation polymerisation and Copolymerisation polymerisation respectively

c Condensation polymerisation and Additional polymerisation respectively

d None of these

38 A body centre cubic lattice is made up of two different types of atoms A and B. Atom A occupies the body centre and B occupying the corner positions. One of the corners is left unoccupied per unit cell. Empirical formula of such a solid is (Single option correct)

a AB

b A_2B_2

c A_5B_7

d A_8B_7

39 Sodium chloride is an ionic compound, whereas hydrogen chloride is mainly covalent because (Single option correct)

a Sodium is less reactive

b Hydrogen is non - metal

c Hydrogen chloride is a gas

d Electronegativity difference in the case of hydrogen and chlorine is less than 2.1

40 IUPAC name of the compound given below is-

$CH_3 - C \equiv C - \underset{\displaystyle CH_3}{\underset{|}{CH}} - \underset{\displaystyle CH_2-CH_3}{\underset{|}{C}} = CH_2$ (Single option correct)

a 3-Methylene-4-methyl-5-heptene

b 2-ethyl-3-methyl-hex-1-en-4-yne

c 5-Methylene-4-methyl-2-heptyne

d 5-Ethyl-4-methyl-2-hexyn-5-ene

41 Acetone on treatment with $CH_3 - Mg - I$ and on further hydrolysis gives (Single option correct)

a Isopropyl alcohol

b Primary alcohol

c Acetic acid

d 2-methyl 2-propanol

42 2-Methylbutan-2-ol can be obtained by the acid catalyzed hydration of (Single option correct)

a $CH_3CH_2CH = CH_2$

b $CH_3CH = CHCH_2$

c $(CH_3)_2C = CHCH_3$

d Either of the three

43 Evaluate equivalent weight of As_2O_3 :

$As_2O_3 + 5H_2O \rightarrow 2AsO_4^{3-} + 10H^+ + 4e^-$ (Single option correct)

a $E_{As_2O_3} = \frac{M_{As_2O_3}}{3}$

b $E_{As_2O_3} = \frac{M_{As_2O_3}}{4}$

c $E_{As_2O_3} = \frac{M_{As_2O_3}}{5}$

d $E_{As_2O_3} = \frac{M_{As_2O_3}}{2}$

44 If in a solvent, n simple molecules of solute combine to form an associated molecule, α is the degree of association, the van't Hoff's factor is equal to (Single option correct)

a $\frac{1}{1 - n\alpha}$

b $1 - \alpha + n\alpha$

c $1 - \alpha + \frac{\alpha}{n}$

d $\frac{\alpha}{n} - 1 + \alpha$

45 Which of the following statements is false? (Single option correct)

a The main reason for river water pollution is industrial and domestic sewage discharge

b Surface water contains a lot of organic matter, mineral nutrients and radioactive materials

c Oil spill in sea water causes heavy damage to fishery

d Oil slick in a sea water increases DO value

BIOLOGY

1. Which of the following show pulmonary respiration (Single option correct)

a. Human
b. Sponge
c. Fish
d. Coelentrate

2. The two chromatids of a metaphase chromosome represent (Single option correct)

a. Replicated chromosomes to be separated at anaphase
b. Homologous chromosomes of a diploid set
c. Non-homologous chromosomes joined at the centromere
d. Maternal and paternal chromosomes joined at the centromere

3. When an organ is transplanted and is rejected by the body, the lymphocytes involved are (Single option correct)

a. T-cells
b. B-cells
c. Neutrophils
d. None

4. Select the correct option related to placentation seen in sweet pea? (Single option correct)

a. The gynoecium is monocarpellary and Axile placentation
b. The gynoecium is bicarpellary and Free central placentation
c. The gynoecium is monocarpellary and Marginal placentation
d. The Gynoecium is bicarpellary and Basal placentation

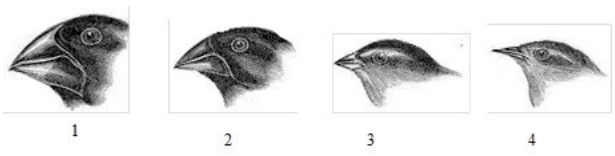
5. Statement I: Biolistics method of gene transfer is an example of direct gene transfer.

Statement II: In the biolistics method, PBR^{322} is used. (Single option correct)

a. Statement-1 is true, Statement-2 is true; Statement-2 is not the correct explanation of Statement-1.
b. Statement-1 is false, Statement-2 is true.
c. Statement-1 is true, Statement-2 is false.
d. Statement-1 is true, Statement-2 is true; Statement-2 is the correct explanation of Statement-1.

6. An undifferentiated layer, mesoglea, is present in (Single option correct)

a. *Fasciola*
b. *Ancylostoma*
c. *Hirudinaria*
d. *Adamsia*

7. 

Darwin noticed this changing pattern of finches on which of the following Islands: (Single option correct)

a. Keeling Islands
b. Galapagos Islands
c. Wallace Islands
d. Cape Verde Islands

8 *cryIIAb* and *cryIAb* produce toxins that control (Single option correct)

a Cotton bollworms and corn borer, respectively
b Corn borer and cotton bollworms, respectively
c Tobacco budworms and nematodes, respectively
d Nematodes and tobacco budworms, respectively

9 For transformation with recombinant DNA, the bacterial cells must first be made competent which means (Single option correct)

a Should increase their metabolic reactions
b Should decrease their metabolic reactions
c Increase efficiency with which DNA enters the bacterium
d Ability to divide fast

10 Which of the following is the main factor of desertification (Single option correct)

a Tourism
b Irrigated agriculture
c Over-grazing
d All of these

11 Corpus luteum in mammals is present in (Single option correct)

a Heart and initiates atrial contraction
b Brain and connects the two cerebral hemispheres
c Ovaries and produces progesterone
d Skin and acts as a pain receptor

12 Number of death and birth in the last stage of plateau growth curve of a population will be (Single option correct)

a Equal unlike of middle stage
b Unequal with more deaths
c Unequal with less deaths
d Equal like of middle stage

13 Transgenic plants are the one that is (Single option correct)

a Generated by introducing foreign DNA into a cell and regenerating a plant from that cell.
b Produced after protoplast fusion in artificial medium.
c Grown in artificial medium after hybridization in the field
d Produced by a somatic embryo in artificial medium.

14 In which one of the following techniques blastomeres up to 8 cell stage is introduced into the fallopian tube? (Single option correct)

a Intra cytoplasmic sperm injection (ICSI)
b Intra uterine insemination (IUI)
c Gamete intra fallopian transfer (GIFT)
d Zygote intra fallopian transfer (ZIFT)

15 Which of the following blood cells engulf pathogens rapidly?
(Single option correct)

a Basophils
b Neutrophils
c Acidophils
d Monocytes (Macrophages)

16 How many ATP molecules could maximally be generated from one molecule of glucose, if the complete oxidation of one mole of glucose to CO_2 and H_2O yields 686 kcal and the useful chemical energy available and the high energy phosphate bond of one mole of ATP is 12 kcal? (Single option correct)

a Thirty
b Fifty -seven
c One
d Two

17 Certain genetic disorders show a higher proportion of males to be affected as compared to females that are affected. Such genetic disorders can arise due to (Single option correct)

a Recessive character carried by Y-chromosomes
b Dominant character carried by Y-chromosome
c Dominant trait carried by X chromosome
d Recessive trait carried by X-chromosome

18 A plant requires magnesium for (Single option correct)

a Protein synthesis
b Chlorophyll synthesis
c Cell wall development
d Holding cells together

19 Heterocysts are found in certain (Single option correct)

a Bacteriophage
b *Escherichia coli*
c *Anabaena*
d Mycoplasmas

20 Long fibres of cotton seed are known as (Single option correct)

a Coir
b Fuzz
c Lint
d Flax

21 Which of the following meristems is responsible for extrastelar secondary growth in dicotyledonous stem ? (Single option correct)

a Intrafascicular cambium
b Interfascicular cambium
c Intercalary meristem
d Phellogen

22 The most abundant, harmful and universal waste product of metabolism is (Single option correct)

a CO_2
b Uric acid
c H_2O
d None of these

23 Which one among the following is the richest source of protein? (Single option correct)

a Black gram
b Bengal gram
c Gibberellins
d Soyabeen

24 The specific characteristic of C_4-plants is (Single option correct)

a Bulliform cells
b Isobilateral leaf
c Kranz anatomy
d Parallel veins configuration

25 Kingdom Plantae includes (Single option correct)

a Algae, Bryophytes and Pteridophytes only.

b Algae, Bryophytes, Pteridophytes, Gymnosperms and Angiosperms only.

c Algae, Fungi, Pteridophytes, Gymnosperms and Angiosperms only.

d Algae, Pteridophytes, Gymnosperms and Angiosperms only.

26 Which of the following set of examples is correct with respect to escaping time as a response to abiotic factors? (Single option correct)

a Bacteria, fungi and all plants - Thick spores

b Bear and fishes - Hibernation

c Zooplanktons and phytoplanktons - Diapause

d Snails and fishes - Aestivation

27 Chipko movement was launched for the protection of (Single option correct)

a Forests

b Livestock

c Wetlands

d Grasslands

28 Who discovered "ribosomes" in animal cells? (Single option correct)

a Watson

b Temin

c Chaudhary

d Palade

29 What is antisense technology?

(Single option correct)

a A cell displaying a foreign antigen used for synthesis of antigens

b Production of somaclonal variants in tissue cultures

c When a piece of RNA that is complementary in sequence is used to stop expression of a specific gene

d RNA polymerase producing DNA

30 Statement I: According to the 2001 census report, the population growth rate was still around 1.7%.
Statement I: At this rate if population increases then our population could double in 33 years. (Single option correct)

a Statement I is true and statement II is false

b Statement II is true and statement I is false

c Both the statements are true

d Both the statements are false

31 Which one of the following immune system components does not correctly match with its respective role? (Single option correct)

a Interferons - secreted by virus infected cells and protects non - infected cells from further viral infection

b B-lymphocytes - produce antibodies into blood in response to pathogens to fight with them

c Macrophages - mucus secreting cells that trap microbes entering in the body

d IgA - present in colostrum in early days of lactation to protect infant from diseases

32 Which of the following organisms are correctly paired with its life span? (Single option correct)

a Crow - 15 years

b Butterfly - 3 weeks

c Parrot - 40 years

d Crocodile - 100-150 years

33 In how many steps, CO_2 is released in aerobic respiration of pyruvic acid (Single option correct)

a One
b Six
c Three
d Twelve

34 Movements of leaves of sensitive plant, *Mimosa pudica* are due to (Single option correct)

a Thermonasty
b Seismonasty
c Hydrotropism
d Chemonasty

35 Given below are four statements (I–IV) regarding the human blood circulatory system.

(I) In the treatment of angina pectoris, nitrous oxide and nitroglycerine are used.
(II) Veins have thinner walls and broader lumen than arteries.
(III) Artificial pacemakers are used in arrhythmia.

How many of the above are correct statements?

(Single option correct)

a I only
b I, II and III
c III only
d I and II

36 What are flocs? (Single option correct)

a Masses of fungi with root of higher plants
b Association of fungi with algae
c Masses of bacteria with fungi
d Masses of bacteria with leguminous plants

37 Category among following is (Single option correct)

a Species
b Malvaccae
c Thalmiflorae
d Dicotyledonae

38 In which of the following tissue preparations, signet ring appearance is obtained? (Single option correct)

a Epithelial tissue
b Dense connective tissue
c Adipose tissue
d Reticular tissue

39 FAD is a coenzyme derived from (Single option correct)

a Riboflavin
b Vitamin-B_{12}
c Thiamine
d Niacin

40 Which one is correct sequence in glycolysis? (Single option correct)

a G-6-P→PEP → 3-PGAL → 3-PGA
b G-6-P→3-PGAL → 3-PGA → PEP
c G-6-P→PEP → 3-PGA → 3-PGAL
d G-6-P→3-PGA →3-PGAL → PEP

41 Which of the following feature of vector is required to identify the transformed cell? (Single option correct)

a Selectable marker
b ori site
c Rop
d Restriction site

42 Given below is an incomplete table about hormones, their source glands and one major effect of each on the body in humans. Identify the correct option for the three blanks A, B, and C.

Source gland	Hormone	Function
A	Oestrogen	Maintenance of secondary sexual characters
Alpha cells of islets of Langerhans	B	Raises blood sugar level
Anterior pituitary	C	Over secretion leads to gigantism

(Single option correct)

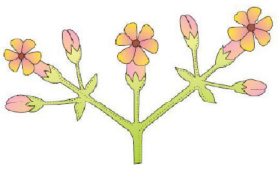
a A-Ovary; B-Glucagon; C-Growth hormone
b A-Placenta; B-Insulin; C-Vasopressin
c A-Ovary; B-Insulin; C-Calcitonin
d A-Placenta; B-Glucagon; C-Calcitonin

43 Arrange the following options in the ascending order of their BOD value.

I. Sample of highly polluted pond water.
II. Sample from unpolluted pond water.
III. Distilled water. (Single option correct)

a III → I → II
b II → III → I
c III → II → I
d I → III → II

44 Identify the given diagram.



(Single option correct)

a Racemose infloresence
b Cymose inflorescence
c Verticilastar inflorescence
d Hypenthodium

45 During photorespiration, the oxygen-consuming reaction(s) occur in (Single option correct)

a Stroma of chloroplasts and peroxisomes
b Grana of chloroplasts and peroxisomes
c Stroma of chloroplasts
d Stroma of chloroplasts and mitochondria

46 Which are exclusively viviparous (Single option correct)

a Bony fishes
b Cartilagenous fishes
c Sharks
d Whales

47 Which of the following is used as bio-fertiliser (Single option correct)

a *Nostoc*

b *Funaria*

c *Volvox*

d *Rhizopus*

48 Plasmodium is inoculated in humans by (Single option correct)

a Female Culex

b Male Culex

c Male and female Anopheles

d Female Anopheles

49 One celled suspensor is found in (Single option correct)

a *Solanum*

b *Hedera*

c *Petunia*

d *Triticum*

50 Sperm cells are produced in (Single option correct)

a Seminiferous tubules

b Interstitial cells

c Epididymis

d Prostate gland

51 Hydrolytic enzymes which act on low pH are called as (Single option correct)

a Peroxidases

b Hydrolases

c A-amylases

d Proteases

52 Which one of the following is the correct matching of three items and their grouping category? (Single option correct)

a

	Items	Group
(a)	ilium, ischium, pubis	coxal bones of pelvic girdle

b

	Items	Group
(b)	actin, myosin, rhodopsin	muscle proteins

c

	Items	Group
(c)	cytosine, uracil, thiamine	pyrimidines

d

	Items	Group
(d)	malleus, incus, cochlea	ear ossicles

53 Which bacteria are utilized in the biogas plant? (Single option correct)

a Methanogens

b Nitrifying

c Ammonifying

d Denitrifying

54 Write one of the following correctly matched Sexually Transmitted Disease (STD) with its pathogen? (Single option correct)

a AIDS– *Basillus anthrocis*

b Syphilis – *Treponema pallidum*

c Uretheritis– *Entamoeba gingivalls*

d Gonorrhoea – *Leishmania donovani*

55 IARI, New Delhi developed which variety of beans which is protein enriched :- (Single option correct)

a Pusa sawni
b Pusa Gaurav
c Pusa A-4
d Lablab

56 Which of the following does not match? (Single option correct)

a Muscular movement - ATP
b Heart - pace-maker
c Monocyte - Haemoglobin
d Nerve - acetylcholine

57 6 -furfuryl adenine is (Single option correct)

a An auxin
b A gibberellin
c A cytokinin
d A vitamin

58 The information about the plant specimens, the herbarium compiled and published in a book form is known as (Single option correct)

a Flora
b Fauna
c Herbarium
d Catalogue

59 The most significant value of vegetative propagation is that (Single option correct)

a It enables rapid production of genetic variation
b It is a mean of production of genetic of individuals genetically identical to the parent
c It ensures that the progeny are safe from attack of diseases and pests
d It is an ancient practice

60 Which of the following is incorrect about Klinefelter's syndrome? (Single option correct)

a A chromosomal disorder
b Karyotype of 44 + XXY
c Gynaecomastia
d Fertile males

61 Which of the following step of translation does not consume a high energy phosphate bond (Single option correct)

a Translocation
b Amino acid activation
c Peptidyl transferase reaction
d Aminoacyl tRNA binding to A-site

62 In the following which one is the example of Bryophyta that has elaborate mechanism of spore dispersal? (Single option correct)

a *Polysiphonia*
b *Polytrichum*
c *Dictyota*
d *Marchantia*

63 Passive absorption of water is related to all, except (Single option correct)

a Apoplastic pathway
b Transpiration pull plays the major role
c Development of a positive pressure in xylem
d Water absorption through the roots

64 During mitosis, number of chromosomes
(Single option correct)

a Changed
b Doesn't change
c May be change if cell is mature
d May be change if cell is immature

65 The retina of mammalian eye is composed of (Single option correct)

a Cones only
b Rods only
c Rods and cones
d Rods, cones and neuroglial cells

66 The hyphae of *Aspergillus* are: (Single option correct)

a Aseptate and multinucleate
b Septate and branched
c Aseptate and branched
d Septate and uninucleate

67 Which one is polymer? (Single option correct)

a Sucrose
b Glycogen
c Fructose
d Lactose

68 Chlorosis is caused due to the deficiency of (Single option correct)

a Magnesium
b Calcium
c Boron
d Copper

69 Selective permeability identifies the process of transmission through the semipermeable membrane is called (Single option correct)

a Diffusion
b Osmosis
c Plasmolysis
d Imbibition

70 Organisms, attached to substratum generally possess
(Single option correct)

a Radial symmetry
b Asymmetrical body
c Single opening of digestive canal
d Cilia to create water current

71 Match the source gland with its respective hormone and function and select the correct option. (Single option correct)

a

Source gland	Hormone	Function
Anterior pituitary	Oxytocin	Contraction of uterine muscles

b

Source gland	Hormone	Function
Anterior pituitary	Vasopressin	Induces reabsorption of water

c

Source gland	Hormone	Function
Thymus	Thymosin	Proliferation of T-lymphocytes

d

Source gland	Hormone	Fun
α – cells of islets of Langerhans	Glucagon	Uptake of gluco

72 Bulliform cells are found in (Single option correct)

a Grasses - Adaxial epidermal cells of dorsiventral leaves

b Grasses - Abaxial epidermal cells of dorsiventral leaves

c Grasses - Adaxial epidermal cells of isobilateral leaves

d Grasses - Abaxial epidermal cells of isobilateral leaves

73 Water stress in plants causes decrease in photosynthesis because :-

(A) it reduces the CO_2 availability
(B) it reduces the surface area of the leaves
(C) it reduces the metabolic activities of leaves

Choose the correct option from the following :- (Single option correct)

a A and B are correct but C is incorrect

b A and C are correct but B is incorrect

c A, B and C all are incorrect

d A, B and C all are correct

74 Which of the following technique is employed for the separation and identification of phytohormones (Single option correct)

a Polarizing microscopy

b Autoradiography

c Gas chromatography

d Cell fractionations

75 Majority of proteins (of intracellular use) are not synthesized on:

A - Ribosomes produced in the nucleolus
B - Ribosomes attached with ER and nuclear membrane
C - Ribosomes present in the chloroplast
D - Free ribosomes of eukaryotic cells
E - Ribosomal sub-units forming polyribosomes which are found in peri-mitochondrial space of prokaryotic cells (Single option correct)

a A and D

b B, C and D

c D and E

d A, C and E

76 Which of the following animal has a network of neurons but does not comprise the brain? (Single option correct)

a *Sycon*

b *Pleurobrachia*

c *Hydra*

d *Periplaneta*

77 The end product of ornithine cycle is (Single option correct)

a Ammonia

b Urea

c Arginine

d Carbon dioxide

78 During ionic flux, uptake of ions into inner space is (Single option correct)

a Active

b Passive

c Energy-dependent

d Both active and energy-dependent

79 A cell swells up when kept in (Single option correct)

a Hypotonic solution
b Hypertonic solution
c Isotonic solution
d All of the above

80 An ecosystem resist change because it is in a state of (Single option correct)

a Imbalance
b Homeostasis
c Shortage of components
d Deficiency of light

81 The speed of migration of ions in an electric field during gel electrophoresis depends on

(Single option correct)

a Magnitude of charge and mass of molecules
b Magnitude of charge, size and shape of molecules
c Magnitude of charge, shape and mass of molecules
d Shape and size of the molecule

82 Which one of the following is wrongly matched? (Single option correct)

a Fungi – Chitin
b Plasma membrane - Phospholipid
c Bacteria – Lipopolysaccharide
d Endodermis – Suberin

83 When a person is suffering from poor renal reabsorption then which of the following will not help in the maintenance of blood volume ? (Single option correct)

a Decreased glomerular filtration
b Increased ADH secretion
c Decreased arterial pressure in kidney
d Increased arterial pressure in kidney

84 The sensation of fatigue in the muscles after prolonged strenuous physical work, is caused by (Single option correct)

a A decrease in the supply of oxygen
b Minor wear and tear of muscle fibres
c The depletion of glucose
d The accumulation of lactic acid

85 The situation where indigenous knowledge of nature, originating with indigenous people, is used by others for profit, without taking proper permission from them and with little or no compensation or recognition to the indigenous people themselves is known as (Single option correct)

a Biopatents
b Biopiracy
c Biological diversity
d Ethical issues

86 ***Peripatus*** is a connecting link between (Single option correct)

a Ctenophora and Platyhelminthes
b Mollusca and Echinodermata
c Annelida and Arthropoda
d Coelenterata and Porifera

87 After ovulation the graafian follicle becomes an endocrine organ called (Single option correct)

a Corpus luteum
b Ovarian tube
c Globulin
d Fibrin

88 Mature male gametophyte is made up of (Single option correct)

a One cell

b Two cells

c Three cells

d Four cells

89 Endemic plants are those, which are (Single option correct)

a Cosmopolitan in distribution

b Restricted to grow over certain areas

c Found in Arctic region

d Gregarious in habit

90 Bananas are seedless because they (Single option correct)

a Reproduce asexually

b Are triploid

c Are sprayed with hormone

d Are parthenocarpic