NEET-UG EXAMINATION PAPER-2023

(Solved)

Time allowed : 3 hours | Maximum Marks : 800

General Instructions :

Read the following instructions carefully and follow them :

i. This question paper contains **200 questions.** All questions are **compulsory.**

ii. This question paper is divided into **1 sections.**

iii. **Section A** – questions number **1 to 200** are multiple choice questions

iv. There is no overall choice given in the question paper. However, an internal choice has been provided in few questions.

v. Use of calculator is NOT allowed.

Section A

Question 1.

Two particles A and B initially at rest, move towards each other under mutual force of attraction. At an instance when the speed of A is v and speed of B is 3v, the speed of centre of mass is

[4 Marks]

(A) zero

(B) 2v

(C) v

(D) 4v

Question 2.

On the basis of electrical conductivity, which one of the following material has the smallest resistivity?

[4 Marks]

(A) Glass

(B) Silicon

(C) Germanium

(D) Silver

Question 3.

A charge Q μ C is placed at the centre of a cube. The flux coming out from any one of its faces will be (in SI unit)

[4 Marks]

(A) $(2Q / 3\varepsilon_0) \times 10^{-3}$

(B) $(Q / \varepsilon_0) \times 10^{-6}$

(C) $(Q / 6\varepsilon_0) \times 10^{-3}$

(D) $(Q / 6\varepsilon_0) \times 10^{-6}$

Question 4.

A uniform electric field and a uniform magnetic field are acting along the same direction in a certain region. If an electron is projected in the region such that its velocity is pointed along the direction of fields, then the electron

[4 Marks]

(A) Will turn towards right of direction of motion

(B) Speed will decrease

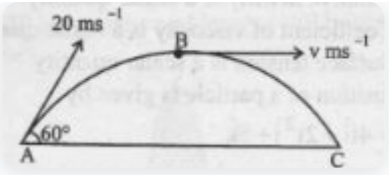
(C) Will turn towards left of direction of motion

(D) Speed will increase

Question 5.

A ball is projected from point A with velocity 20 m s^{-1} at an angle 60° to the horizontal direction. At the highest point B of the path (as shown in figure), the velocity v m s^{-1} of the ball will be

[4 Marks]



(A) Zero

(B) 10

(C) 20

(D) $10\sqrt{3}$

Question 6.

The amount of elastic potential energy per unit volume (in SI unit) of a steel wire of length 100 cm to stretch it by 1 mm is (if Young's modulus of the wire = 2.0×10^{11} N m^{-2})

[4 Marks]

(A) 10^7

(B) 10^5

(C) 10^{11}

(D) 10^{17}

Question 7.

A certain wire A has resistance 81 Ω. The resistance of another wire B of same material and equal length but of diameter thrice the diameter of A will be

[4 Marks]

(A) 729 Ω

(B) 81 Ω

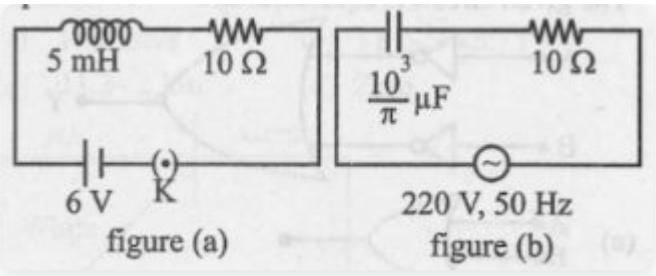
(C) 9 Ω

(D) 243 Ω

Question 8.

If Z_1 and Z_2 are the impedances of the given circuits (a) and (b) as shown in figures, then choose the correct option.

[4 Marks]



(A) $Z_1 = Z_2$

(B) $Z_1 > Z_2$

(C) $Z_1 < Z_2$

(D) $Z_1 + Z_2 = 20\ \Omega$

Question 9.

The ground state energy of hydrogen atom is -13.6 eV. The energy needed to ionize hydrogen atom from its second excited state will be

[4 Marks]

(A) 13.6 eV

(B) 6.8 eV

(C) 3.4 eV

(D) 1.51 eV

Question 10.

The mechanical quantity, which has dimensions of reciprocal of mass (M^{-1}) is

[4 Marks]

(A) Torque

(B) Gravitational constant

(C) Coefficient of thermal conductivity

(D) Angular momentum

Question 11.

A p-type extrinsic semiconductor is obtained when Germanium is doped with

[4 Marks]

(A) Arsenic

(B) Boron

(C) Antimony

(D) Phosphorous

Question 12.

The viscous drag acting on a metal sphere of diameter 1 mm, falling through a fluid of viscosity 0.8 Pa s with a velocity of 2 m s^{-1} is equal to

[4 Marks]

(A) 1.5×10^{-3} N

(B) 15×10^{-3} N

(C) 30×10^{-3} N

(D) 20×10^{-3} N

Question 13.

The maximum power is dissipated for an ac in a/an

[4 Marks]

(A) Inductive circuit

(B) Capacitive circuit

(C) Resistive circuit

(D) LC circuit

Question 14.

According to Gauss law of electrostatics, electric flux through a closed surface depends on

[4 Marks]

(A) The quantity of charges enclosed by the surface

(B) The area of the surface

(C) The shape of the surface

(D) The volume enclosed by the surface

Question 15.

The variation of susceptibility (χ) with absolute temperature (T) for a paramagnetic material is represented as:

[4 Marks]

(A)



(B)



(C)



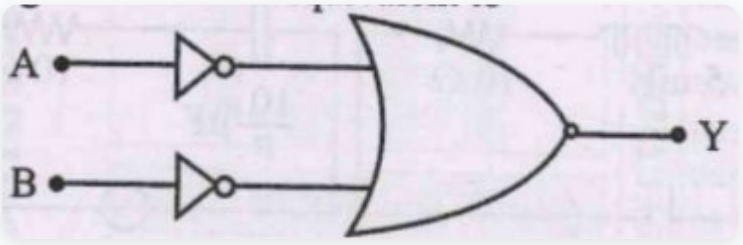
(D)



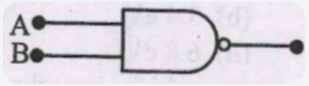
Question 16.

The given circuit is equivalent to

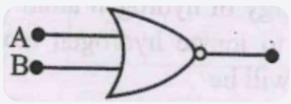
[4 Marks]



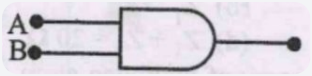
(A)



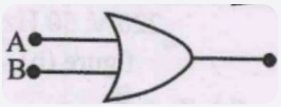
(B)



(C)



(D)



Question 17.

The above figure shows the circuit symbol of a transistor. Select the correct statements given below:

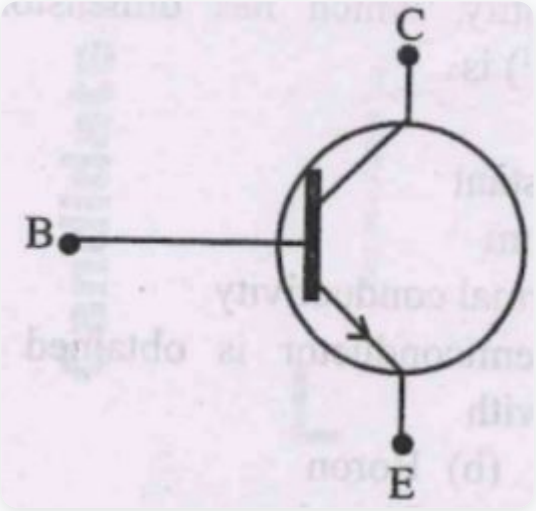
(A) The transistor has two segments of p-type semiconductor separated by a segment of n-type semiconductor.

(B) The emitter is of moderate size and heavily doped.

(C) The central segment is thin and lightly doped.

(D) The emitter base junction is reverse biased in common emitter amplifier circuit.

[4 Marks]



(A) (B) and (C)

(B) (A) and (B)

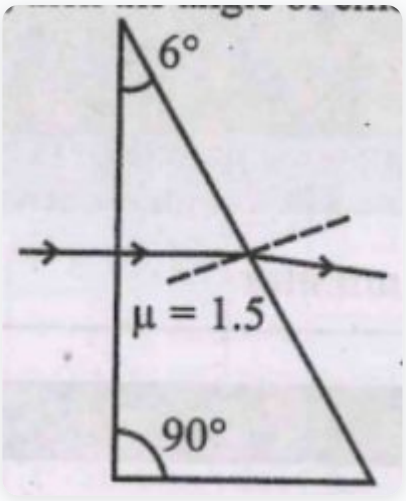
(C) (A) and (D)

(D) (C) and (D)

Question 18.

A horizontal ray of light is incident on the right-angled prism with prism angle 6°. If the refractive index of the material of the prism is 1.5, then the angle of emergence will be

[4 Marks]



(A) 10°

(B) 9°

(C) 4°

(D) 6°

Question 19.

A particle moves with a velocity $(5\hat{i} - 3\hat{j} + 6\hat{k})$ ms^{-1} horizontally under the action of constant force $(10\hat{i} + 10\hat{j} + 20\hat{k})$ N. The instantaneous power supplied to the particle is:

[4 Marks]

(A) Zero

(B) 200 W

(C) 100 W

(D) 140 W

Question 20.

The maximum kinetic energy of the emitted photoelectrons in photoelectric effects is independent of:

[4 Marks]

(A) Frequency of incident radiation

(B) Intensity of incident radiation

(C) Wavelength of incident radiation

(D) Work function of material

Question 21.

The diameter of a spherical bob, when measured with vernier callipers yielded the following values: 3.33 cm, 3.32 cm, 3.34 cm, 3.33 cm and 3.32 cm. The mean diameter to appropriate significant figures is:

[4 Marks]

(A) 3.33 cm

(B) 3.32 cm

(C) 3.328 cm

(D) 3.3 cm

Question 22.

Which of the following statement is not true?

[4 Marks]

(A) Pressure is a vector quality

(B) Relative density is a scalar quantity

(C) Coefficient of viscosity is a scalar quantity

(D) Surface tension is a scalar quantity

Question 23.

The position of a particle is given by □□(t) = 4t $\hat{i}$ + 2t² $\hat{j}$ + 5$\hat{k}$ where t is in seconds and r in metre. Find the magnitude and direction of velocity v(t), at t = 1 s, with respect to x-axis.

[4 Marks]

(A) $4\sqrt{2}$ ms^{-1}, 60°

(B) $4\sqrt{2}$ ms^{-1}, 45°

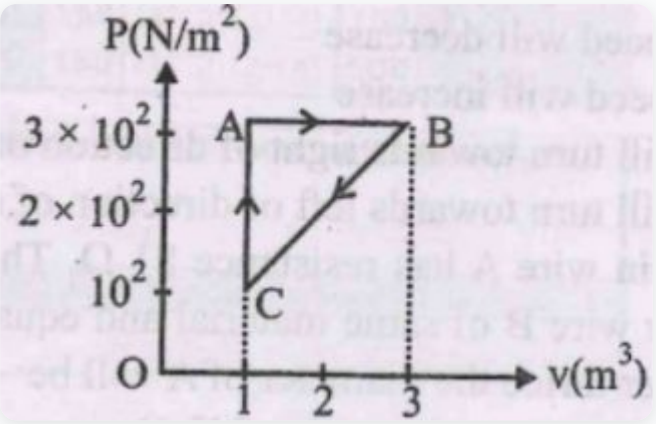
(C) $3\sqrt{2}$ ms^{-1}, 45°

(D) $3\sqrt{2}$ ms^{-1}, 30°

Question 24.

For the given cycle, the work done during isobaric process is:

[4 Marks]



(A) 400 J

(B) 600 J

(C) 200 J

(D) Zero

Question 25.

The de Broglie wavelength associated with an electron, accelerated by a potential difference of 81 V is given by:

[4 Marks]

(A) 1.36 nm

(B) 0.136 nm

(C) 136 nm

(D) 13.6 nm

Question 26.

The 4^{th} overtone of a closed organ pipe is same as that of 3^{rd} overtone of an open pipe. The ratio of the length of the closed pipe to the length of the open pipe is:

[4 Marks]

(A) 9 : 8

(B) 7 : 9

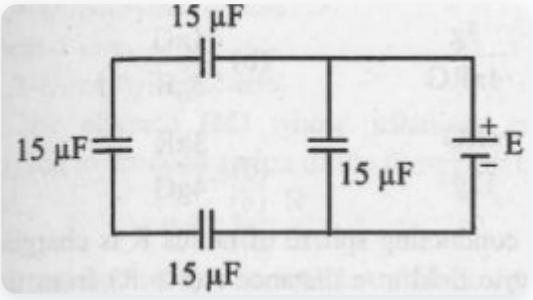
(C) 9 : 7

(D) 8 : 9

Question 27.

The equivalent capacitance of the arrangement shown in figure is

[4 Marks]



(A) 30 μF

(B) 20 μF

(C) 15 μF

(D) 25 μF

Question 28.

ε_0 and μ_0 are the electric permittivity and magnetic permeability of free space respectively. If the corresponding quantities of a medium are $2\varepsilon_0$ and $1.5\ \mu_0$ respectively, the refractive index of the medium will nearly be

[4 Marks]

(A) √2

(B) 2

(C) 3

(D) √3

Question 29.

Along straight wire of length 2 m and mass 250 g is suspended horizontally in a uniform horizontal magnetic field of 0.7 T. The amount of current flowing through the wire will be ($g = 9.8\ ms^{-2}$)

[4 Marks]

(A) 2.75 A

(B) 1.75 A

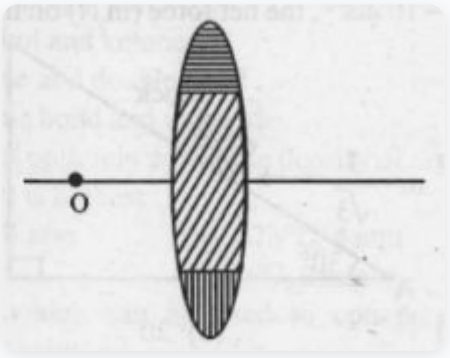
(C) 2.25 A

(D) 2.45 A

Question 30.

A lens is made up of 3 different transparent media as shown in figure. A point object O is placed on its axis beyond 2f. How many real images will be obtained on the other side?

[4 Marks]



(A) No image will be formed

(B) 3

(C) 2

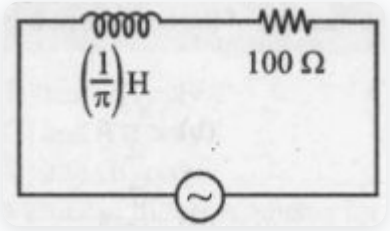
(D) 1

Question 31.

An ac source is connected in the given circuit. The value of ϕ will be

V = 220 sin(100πt + ϕ) volt

[4 Marks]



(A) 30°

(B) 45°

(C) 60°

(D) 90°

Question 32.

A bullet of mass m hits a block of mass M elastically. The transfer of energy is the maximum, when

[4 Marks]

(A) M << m

(B) M >> m

(C) M = 2m

(D) M = m

Question 33.

The escape velocity of a body on the earth surface is 11.2 km/s. If the same body is projected upward with velocity 22.4 km/s, the velocity of this body at infinite distance from the centre of the earth will be

[4 Marks]

(A) 11.2 km/s

(B) 11.2√3 km/s

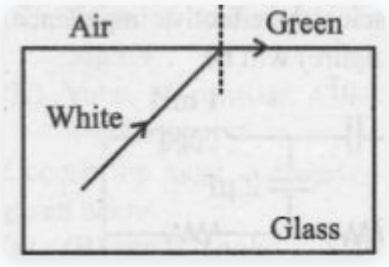
(C) 11.2√2 km/s

(D) Zero

Question 34.

Which set of colours will come out in air for a situation shown in figure?

[4 Marks]



(A) Orange, Red and Violet

(B) Blue, Green and Yellow

(C) Yellow, Orange and Red

(D) All

Question 35.

The wavelength of Lyman series of hydrogen atom appears in

[4 Marks]

(A) Infrared region

(B) Visible region

(C) Far infrared region

(D) Ultraviolet region

Question 36.

A particle is executing uniform circular motion with velocity □□ and acceleration □□ . Which of the following is true?

[4 Marks]

(A) □□is not a constant; □□ is not a constant

(B) □□ is a constant □□ is not a constant

(C) □□ is a constant; □□ is a constant

(D) □□ is not a constant; □□ is a constant

Question 37.

A 1 kg object strikes a wall with velocity 1 ms^{-1} at an angle of 60° with the wall and reflects at the same angle. If it remains in contact with wall for 0.1 s, then the force exerted on the wall is

[4 Marks]

(A) 20/3 N

(B) 10√3 N

(C) 30√3 N

(D) Zero

Question 38.

A simple pendulum oscillating in air has a period of √3 s. If it is completely immersed in non-viscous liquid, having density $(1/4)^{th}$ of the material of the bob, the new period will be

[4 Marks]

(A) (2 / √3) s

(B) 2√3 s

(C) (√3 / 2) s

(D) 2 s

Question 39.

An object is mounted on a wall. Its image of equal size is to be obtained on a parallel wall with the help of a convex lens placed between these walls. The lens is kept at distance x in front of the second wall. The required focal length of the lens will be

[4 Marks]

(A) x / 2

(B) x / 4

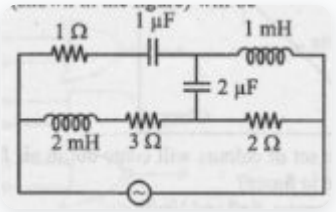
(C) Less than x / 4

(D) More than x / 4 but less than x / 2

Question 40.

For very high frequencies, the effective impedance of the circuit (shown in the figure) will be

[4 Marks]



(A) 4 Ω

(B) 6 Ω

(C) 1 Ω

(D) 3 Ω

Question 41.

A copper wire of radius 1 mm contains 10^{22} free electrons per cubic metre. The drift velocity for free electrons when 10 A current flows through the wire will be (Given, charge on electron = 1.6×10^{-19} C)

[4 Marks]

(A) $(6.25 / \pi)$ m s^{-1}

(B) $(6.25 \times 10^5 / \pi)$ m s^{-1}

(C) $(6.25 \times 10^4 / \pi)$ m s^{-1}

(D) $(6.25 / \pi) \times 10^3$ m s^{-1}

Question 42.

A container of volume 200 cm^3 contains 0.2 mole of hydrogen gas and 0.3 mole of argon gas. The pressure of the system at temperature 200 K (R = 8.3 J K^{-1} mol^{-1}) will be

[4 Marks]

(A) 4.15×10^5 Pa

(B) 6.15×10^5 Pa

(C) 4.15×10^6 Pa

(D) 6.15×10^6 Pa

Question 43.

A constant torque of 100 N m turns a wheel of moment of inertia 300 kg m^2 about an axis passing through its centre. Starting from rest, its angular velocity after 3 s is

[4 Marks]

(A) 10 rad/s

(B) 1 rad/s

(C) 15 rad/s

(D) 5 rad/s

Question 44.

The emf of a cell having internal resistance 1 Ω is balanced against a length of 330 cm on a potentiometer wire. When an external resistance of 2 Ω is connected across the cell, the balancing

length will be

[4 Marks]

(A) 330 cm

(B) 220 cm

(C) 332 cm

(D) 115 cm

Question 45.

If R is the radius of the earth and g is the acceleration due to gravity on the earth surface. Then the mean density of the earth will be

[4 Marks]

(A) $3g / (4\pi RG)$

(B) $4\pi G / (3gR)$

(C) $3gR / 4gG$

(D) $\pi RG / 12g$

Question 46.

If a conducting sphere of radius R is charged. Then the electric field at a distance r (r > R) from the centre of the sphere would be, (V = potential on the surface of the sphere)

[4 Marks]

(A) RV / r^2

(B) V / r

(C) rV / R^2

(D) R^2V / r^3

Question 47.

To produce an instantaneous displacement current of 2 mA in the space between the parallel plates of a capacitor of capacitance 4 μF, the rate of change of applied variable potential difference (dV / dt) must be

[4 Marks]

(A) 200 V/s

(B) 400 V/s

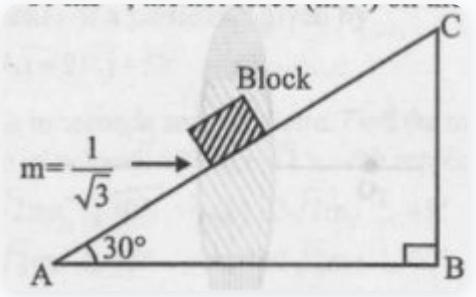
(C) 500 V/s

(D) 800 V/s

Question 48.

A block of mass 2 kg is placed on an inclined rough surface AC (as shown in figure) of coefficient of friction μ. If g = 10 ms^{-2}, the net force (in N) on the block will be

[4 Marks]



(A) 19

(B) 20

(C) 10√3

(D) Zero

Question 49.

An emf is generated by an ac generator having 100 turn coil, of loop area 1 m^2. The coil rotates at a speed of one revolution per second and placed in a uniform magnetic field of 0.05 T perpendicular to the axis of rotation of the coil. The maximum value of emf is

[4 Marks]

(A) 31.4 V

(B) 3.14 V

(C) 6.28 V

(D) 62.8 V

Question 50.

The angular momentum of an electron moving in an orbit of hydrogen atom is 1.5 (h / π). The energy in the same orbit is nearly

[4 Marks]

(A) -1.3 eV

(B) -1.4 eV

(C) -1.5 eV

(D) -1.6 eV

Question 51.

Which amongst the following compounds will show geometrical isomerism?

[4 Marks]

(A) 2-Methylprop-1-ene

(B) Pent-1-ene

(C) 3,4-Dimethylhex-3-ene

(D) 2,3-Dimethylbut-2-ene

Question 52.

Select the element (M) whose trihalides cannot be hydrolysed to produce an ion of the form $[M(H_2O)_6]^{3+}$.

[4 Marks]

(A) B

(B) Al

(C) Ga

(D) In

Question 53.

The correct option for the rate law that corresponds to overall first order reaction is

[4 Marks]

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

(B) Rate = k $[A]^{-1/2}$ $[B]^{3/2}$

(C) Rate = k $[A]^{0}$ $[B]^{2}$

(D) Rate = k [A] [B]

Question 54.

Which one of the following represents all isoelectronic species?

[4 Marks]

(A) Na^{+}, Mg^{2+}, O^{-}, F^{-}

(B) Ca^{2+}, Ar, K^{+}, Cl^{-}

(C) Na^{+}, Cl^{-}, O^{-}, NO^{+}

(D) N_2O, N_2O_4, NO^{+}, NO

Question 55.

Cheilosis occurs due to deficiency of _____

[4 Marks]

(A) Riboflavin

(B) Pyridoxamine

(C) Thiamine

(D) Nicotinamide

Question 56.

Consider the given reaction:

The functional groups present in compound "X" are

[4 Marks]



(A) Alcohol and aldehyde

(B) Alcohol and ketone

(C) Ketone and double bond

(D) Double bond and aldehyde

Question 57.

The correct option in which the density of argon (Atomic mass = 40) is highest

[4 Marks]

(A) 0°C, 2 atm

(B) 273°C, 4 atm

(C) STP

(D) 0°C, 4 atm

Question 58.

Reagents which can be used to convert alcohols to carboxylic acids, are

(A) CrO_3 – H_2SO_4

(B) $K_2Cr_2O_7$ + H_2SO_4

(C) $KMnO_4$ + KOH / H_3O^+

(D) Cu, 573 K

(E) CrO_3 , $(CH_3CO)_2O$

Choose the most appropriate answer from the options given below.

[4 Marks]

(A) (B), (C) and (D) only

(B) (A), (B) and (C) only

(C) (B), (D) and (E) only

(D) (A), (B) and (E) only

Question 59.

The correct order of dipole moments for molecules NH_3, H_2S, CH_4 and HF, is

[4 Marks]

(A) $HF > NH_3 > H_2S > CH_4$

(B) $NH_3 > HF > CH_4 > H_2S$

(C) $CH_4 > H_2S > NH_3 > HF$

(D) $H_2S > NH_3 > HF > CH_4$

Question 60.

Molar conductance of an electrolyte increases with dilution according to the equation:

$\Lambda_m = \Lambda^\circ_m - A\sqrt{c}$

Which of the following statements are true?

(A) This equation applies to both strong and weak electrolytes.

(B) Value of the constant A depends upon the nature of the solvent.

(C) Value of constant A is same for both $BaCl_2$ and $MgSO_4$.

(D) Value of constant A is same for both $BaCl_2$ and $Mg(OH)_2$.

Choose the most appropriate answer from the options given below.

[4 Marks]

(A) (A) and (B) only

(B) (A), (B) and (C) only

(C) (B) and (D) only

(D) (B) and (C) only

Question 61.

Identify 'X' in above reactions.

[4 Marks]

$$R-COOH \xrightarrow[(ii)H_2O/HCl]{(i)\text{"X"}} R-CH_2OH$$

$$R-CH=CH_2 \xrightarrow[(ii)H_2O,NaOH,H_2O_2]{(i)\text{"X"}} R-CH_2-CH_2-OH$$

(A) H_2/Pd

(B) B_2H_6

(C) $LiAlH_4$

(D) $NaBH_4$

Question 62.

Given below are two statements: one is labelled as Assertion (A) and the other is labelled as Reason (R).

Assertion (A): Ionisation enthalpy increases along each series of the transition elements from left to right. However, small variations occur.

Reason (R): There is corresponding increase in nuclear charge which accompanies the filling of electrons in the inner d-orbitals.

In the light of the above statements, choose the most appropriate answer from the options given below.

[4 Marks]

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

(B) Both (A) and (R) are correct but (R) is not the correct explanation of (A)

(C) (A) is not correct but (R) is correct

(D) (A) is correct but (R) is not correct

Question 63.

Which one of the following statements is incorrect related to Molecular Orbital Theory?

[4 Marks]

(A) In the formation of bonding molecular orbital, the two electron waves of the bonding atoms reinforce each other.

(B) The π* antibonding molecular orbital has a node between the nuclei.

(C) A π-bonding molecular orbital has larger electron density above and below the internuclear axis.

(D) Molecular orbitals obtained from 2p_x and 2p_y orbitals are symmetrical around the bond axis.

Question 64.

Which amongst the following is used in controlling depression and hypertension?

[4 Marks]

(A) Equanil

(B) Prontosil

(C) Seldane

(D) Valium

Question 65.

Given below are two statements:

Statement I: The value of wave function, ψ depends upon the coordinates of the electron in the atom.

Statement II: The probability of finding an electron at a point within an atom is proportional to the orbital wave function.

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

[4 Marks]

(A) Both Statement I and Statement II are true

(B) Both Statement I and Statement II are false

(C) Statement I is false but Statement II is true

(D) Statement I is true but Statement II is false

Question 66.

Match List-I with List-II.

Choose the correct answer from the options given below:

[4 Marks]

List-I (Mixtures/Sample)	List-II (Technique used for purification)
(A) Glycerol from spent lye	(I) Steam distillation
(B) Chloroform + Aniline	(II) Fractional distillation
(C) Fractions of crude oil	(III) Distillation under reduced pressure
(D) Aniline + Water	(IV) Distillation

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

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

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

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

Question 67.

Which of the following is correctly matched?

[4 Marks]

(A) Acidic oxides ⇒ Mn_2O_7, SO_2, TeO_3

(B) Amphoteric oxides ⇒ BeO, Ga_2O_3, GeO

(C) Basic oxides ⇒ In_2O_3, K_2O, SnO_2

(D) Neutral oxides ⇒ CO, NO_2, N_2O

Question 68.

The density of 1 M solution of a compound 'X' is 1.25 g mL^{-1}. The correct option for the molality of solution is (Molar mass of compound X = 85 g)

[4 Marks]

(A) 1.165 m

(B) 0.858 m

(C) 1.208 m

(D) 0.705 m

Question 69.

Given below are two statements:

Statement I: High density polythene is formed in the presence of catalyst triethylaluminium and titanium tetrachloride.

Statement II: High density polymers are chemically inert.

In the light of the above statements, choose the correct answer from the options given below

[4 Marks]

(A) Both Statement I and Statement II are true.

(B) Both Statement I and Statement II are false.

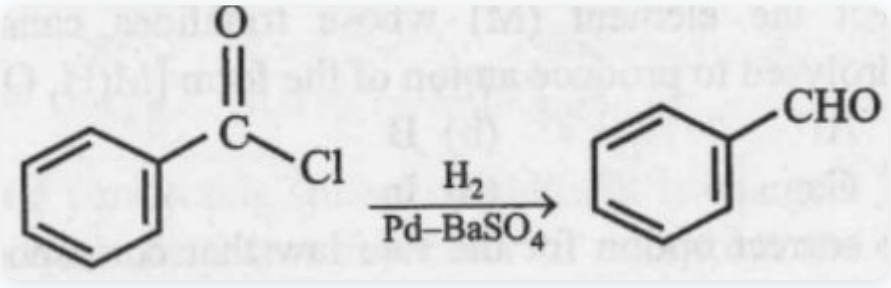
(C) Statement I is correct but Statement II is false.

(D) Statement I is incorrect but Statement II is true.

Question 70.

The following conversion is known as

[4 Marks]



(A) Etard reaction

(B) Rosenmund reaction

(C) Gattermann-Koch reaction

(D) Stephen reaction

Question 71.

Match List – I with List – II.

Choose the correct answer from the options given below:

[4 Marks]

List – I (Hydride)	List – II (Type of hydride)
(A) NaH	(I) Electron precise
(B) PH_3	(II) Saline
(C) GeH_4	(III) Metallic
(D) $LaH_{2.87}$	(IV) Electron rich

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

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

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

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

Question 72.

Incorrect set of quantum numbers from the following is

[4 Marks]

(A) n = 5, l = 2, m_l = -2, -1, +1, +2, m_s = +1/2

(B) n = 4, l = 3, m_l = -3, -2, -1, 0, +1, +2, +3, m_s = -1/2

(C) n = 5, l = 3, m_l = -3, -2, -1, 0, +1, +2, +3, m_s = +1/2

(D) n = 4, l = 2, m_l = -2, -1, 0, +1, +2, m_s = -1/2

Question 73.

Given below are two statements: one is labelled as Assertion (A) and the other is labelled as Reason (R).

Assertion (A): Lithium and beryllium unlike their other respective group members form compounds with pronounced ionic character.

Reason (R): Lithium and Magnesium have similar properties due to diagonal relationship.

In the light of the above statements, choose the correct answer from the options given below:

[4 Marks]

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

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

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

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

Question 74.

The correct value of cell potential in volt for the reaction that occurs when the following two half cells are connected, is

Fe^{2+}_((aq)) + $2e^- \rightarrow Fe(s)$, $E° = -0.44$ V

$Cr_2O_7^{2-} + 14H^+ + 6e^- \rightarrow 2Cr^{3+} + 7H_2O$, $E° = +1.33$ V

[4 Marks]

(A) +0.01 V

(B) +0.89 V

(C) +2.65 V

(D) +1.77 V

Question 75.

An acidic buffer is prepared by mixing:

[4 Marks]

(A) Equal volumes of equimolar solutions of weak acid and weak base.

(B) Weak acid and it's salt with strong base.

(C) Strong acid and it's salt with strong base.

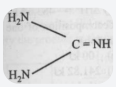
(D) Strong acid and it's salt with weak base.

Question 76.

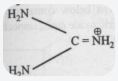
Which amongst the following compounds/species is least basic?

[4 Marks]

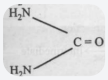
(A)



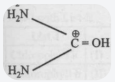
(B)



(C)



(D)



Question 77.

The correct van der Waals equation for 1 mole of a real gas is

[4 Marks]

(A) $(p + an^2/v^2)(v^2 - nb) = RT$

(B) $(p + an^2/v^2)(V - nb) = nRT$

(C) $(p + V^2/a)(V - b) = RT$

(D) $(p + a/V^2)(V - b) = RT$

Question 78.

The E° values for $Al^+/Al = +0.55$ V and $Tl^+/Tl = -0.34$ V, $Al^{3+}/Al = -1.66$ V and $Tl^{3+}/Tl = +1.26$ V. Identify the incorrect statement.

[4 Marks]

(A) Tl^{3+} is a good reducing agent than Tl^+.

(B) Tl can be easily oxidised to Tl^+ than Tl^{3+}.

(C) Al^+ is unstable in solution.

(D) Al is more electropositive than Tl.

Question 79.

Given below are two statements:

Statement I: Hydrated chlorides and bromides of Ca, Sr and Ba on heating undergo hydrolysis.

Statement II: Hydrated chlorides and bromides of Be and Mg on heating undergo dehydration.

In the light of the above statements, choose the correct answer from the options given below:

[4 Marks]

(A) Both Statement I and Statement II are false.

(B) Both Statement I and Statement II are true.

(C) Statement I is incorrect but Statement II is true.

(D) Statement I is correct but Statement II is false.

Question 80.

Which of the following forms a set of a complex and a double salt, respectively?

[4 Marks]

(A) $K_2PtCl_2 \cdot 2NH_3$ and $KAl(SO_4)_2 \cdot 12H_2O$

(B) $NiCl_2 \cdot 6H_2O$ and $NiCl_2(H_2O)_4$

(C) $CuSO_4 \cdot 5H_2O$ and $CuCl_2 \cdot 4NH_3$

(D) $PtCl_2 \cdot 2NH_3$ and $PtCl_4 \cdot 2HCl$

Question 81.

For a reaction $3A \rightarrow 2B$

The average rate of appearance of B is given by $\Delta[B] / \Delta t$ The correct relation between the average rate of appearance of B with the average rate of disappearance of A is given in option

[4 Marks]

(A) $\Delta[A] / \Delta t$

(B) $-2\Delta[A] / 3\Delta t$

(C) $-\Delta[A] / \Delta t$

(D) $-3\Delta[A] / 2\Delta t$

Question 82.

For a weak acid HA, the percentage of dissociation is nearly 1% at equilibrium. If the concentration of acid is 0.1 mol L^{-1}, then the correct option for its Ka at the same temperature is

[4 Marks]

(A) 1×10^{-4}

(B) 1×10^{-6}

(C) 1×10^{-5}

(D) 1×10^{-3}

Question 83.

Which of the following is a positively charged sol?

[4 Marks]

(A) Silver sol

(B) Sb_2S_3 sol

(C) Methylene blue sol

(D) Congo red sol

Question 84.

Which amongst the following reaction of alkyl halides produces isonitrile as a major products?

(A) R - X + HCN →

(B) R - X + AgCN →

(C) R - X + KCN →

(D) R - X + NaCN —(H_2O / C_2H_5OH) —→

Choose the most appropriate answer from the options given below

[4 Marks]

(A) (B) only

(B) (A) and (B) only

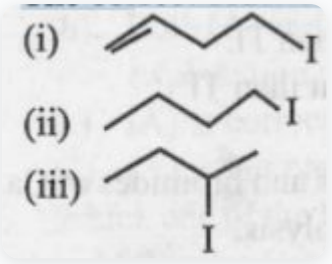
(C) (D) only

(D) (C) and (D) only

Question 85.

The correct order for the rate of α–β dehydrohalogenation for the following compounds is _____.

[4 Marks]



(A) (iii) < (ii) < (i)

(B) (ii) < (iii) < (i)

(C) (ii) < (i) < (iii)

(D) (i) < (ii) < (iii)

Question 86.

Type of isomerism exhibited by compounds $[Cr(H_2O)_6]Cl_3$, $[Cr(H_2O)_5Cl]Cl_2 \cdot H_2O$, $[Cr(H_2O)_4Cl_2]Cl \cdot 2H_2O$ and the value of coordination number (CN) of central metal ion in all these compounds, respectively is:

[4 Marks]

(A) Solvate isomerism, CN = 6

(B) Ionisation isomerism, CN = 4

(C) Geometrical isomerism, CN = 4

(D) Optical isomerism, CN = 4

Question 87.

Given below are two statements:

Statement I: In an organic compound when inductive and electromeric effects operate in opposite directions, the inductive effect predominates.

Statement II: Hyperconjugation is observed in o-xylene. In the light of the above statements, choose the correct answer from the options given below

[4 Marks]

(A) Both Statement I and Statement II are true.

(B) Both Statement I and Statement II are false.

(C) Statement I is true but Statement II is false.

(D) Statement I is false but Statement II is true.

Question 88.

Choose the correct sequence of reagents in the conversion of 4-nitrotoluene to 2-bromotoluene.

[4 Marks]

(A) $NaNO_2$/HCl; Sn/HCl; Br_2; H_2O/H_3PO_2

(B) Sn/HCl; $NaNO_2$/HCl; Br_2; H_2O/H_3PO_2

(C) Sn/HCl; Br_2; $NaNO_2$/HCl; H_2O/H_3PO_2

(D) Br_2; Sn/HCl; $NaNO_2$/HCl; H_2O/H_3PO_2

Question 89.

How are edge length 'a' of the unit cell and radius 'r' of the sphere related to each other in ccp structure? (Choose correct option for your answer.)

[4 Marks]

(A) $a = 2 / \sqrt{2}r$

(B) $a = 4r / \sqrt{3}$

(C) $a = 2r$

(D) $a = r / 2\sqrt{2}$

Question 90.

Which statement is not true about photochemical smog?

[4 Marks]

(A) Plants like Pinus, Juniparus can help in reducing the photochemical smog.

(B) Photochemical smog is harmful to humans but has no effect on plants.

(C) Common components of photochemical smog are ozone, nitric oxide, acrolein, formaldehyde and peroxyacetyl nitrate.

(D) Photochemical smog occurs in warm, dry and sunny climate.

Question 91.

How many number of tetrahedral voids are formed in 5 mol of a compound having cubic close packed structure? (Choose the correct option)

[4 Marks]

(A) 3.011×10^{24}

(B) 6.022×10^{24}

(C) 3.011×10^{25}

(D) 1.550×10^{24}

Question 92.

The correct option for a redox couple is

[4 Marks]

(A) Cathode and anode together

(B) Both the reduced and oxidized forms involve same element

(C) Both are oxidised forms involving same element

(D) Both are reduced forms involving same element

Question 93.

Consider the following reaction:

$2H_2(g) + O_2(g) \rightarrow 2H_2O(g)$ $\Delta rH° = -483.64$ kJ.

What is the enthalpy change for decomposition of one mole of water? (Choose the right option).

[4 Marks]

(A) 100 kJ

(B) 18 kJ

(C) 120.9 kJ

(D) 241.82 kJ

Question 94.

The correct sequence given below containing neutral, acidic, basic and amphoteric oxide each, respectively, is

[4 Marks]

(A) ZnO, NO, CaO, CO_2

(B) NO, ZnO, CO_2, CaO

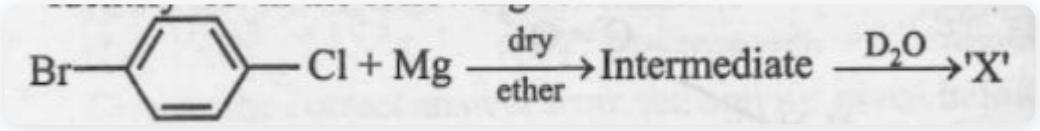
(C) NO, CO_2, CaO, ZnO

(D) NO, CO_2, ZnO, CaO

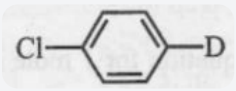
Question 95.

Identify 'X' in the following reaction.

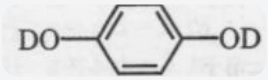
[4 Marks]



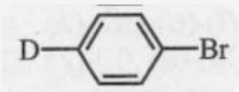
(A)



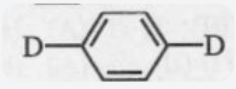
(B)



(C)



(D)



Question 96.

Read the following statements and choose the set of correct statements:

(A) Chrome steel is used for cutting tools and crushing machines.

(B) The fine dust of aluminium is used in paints and lacquers.

(C) Copper is used for reduction of alcohol.

(D) Zinc dust is used as a reducing agent in the manufacture of paints.

(E) Iron is used for galvanising zinc.

Choose the most appropriate answer from the options given below:

[4 Marks]

(A) (B), (C) and (D) only

(B) (A), (B) and (D) only

(C) (A) and (D) only

(D) (D) and (E) only

Question 97.

Which amongst the following aqueous solutions of electrolytes will have minimum elevation in boiling point? Choose the correct option.

[4 Marks]

(A) 1 M NaCl

(B) 0.1 M $MgSO_4$

(C) 0.1 M KCl

(D) 0.05 M NaCl

Question 98.

Given below are two statements : one is labelled as Assertion (A) and the other is labelled as Reason (R).

Assertion (A) : Ionisation enthalpies of early actinoids are lower than for early lanthanoids.

Reason (R) : Electrons are entering 5f orbitals in actinoids which experience greater shielding from nuclear charge.

In the light of the above statements, choose the correct answer from the options given below:

[4 Marks]

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

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

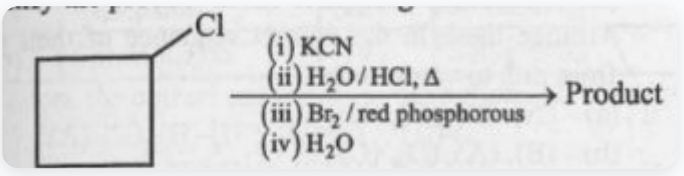
(C) (A) is false but (R) is true.

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

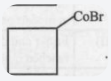
Question 99.

Identify the product in the following reaction.

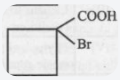
[4 Marks]



(A)



(B)



(C)



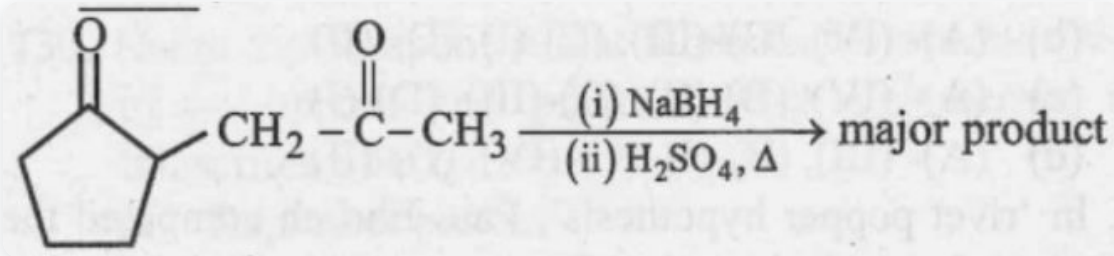
(D)



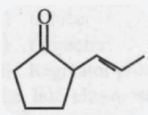
Question 100.

The major product formed in the following conversion is

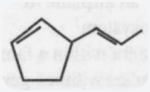
[4 Marks]



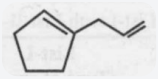
(A)



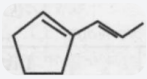
(B)



(C)



(D)



Question 101.

Doubling of the number of chromosomes can be achieved by disrupting mitotic cell division soon after

[4 Marks]

(A) Prophase

(B) Metaphase

(C) Anaphase

(D) Telophase

Question 102.

Match List-I with List-II

Choose the correct answer from the options given below:

[4 Marks]

	List-I		List-II
(A)	Chlorophyll a	(I)	Yellow to yellow orange
(B)	Chlorophyll b	(II)	Yellow green
(C)	Xanthophyll	(III)	Blue green
(D)	Carotenoid	(IV)	Yellow

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

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

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

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

Question 103.

Which classes of algae possess pigment fucoxanthin and pigment phycoerythrin, respectively?

[4 Marks]

(A) Rhodophyceae and Phaeophyceae

(B) Chlorophyceae and Rhodophyceae

(C) Phaeophyceae and Chlorophyceae

(D) Phaeophyceae and Rhodophyceae

Question 104.

Ligation of foreign DNA at which of the following site will result in loss of tetracycline resistance of pBR322?

[4 Marks]

(A) EcoR I

(B) BamH I

(C) Pst I

(D) Pvu I

Question 105.

Plants offer rewards to animals in the form of pollen and nectar and the animals facilitate the pollination process. This is an example of :

[4 Marks]

(A) Commensalism

(B) Mutualism

(C) Competition

(D) Amensalism

Question 106.

In which of the following sets of families, the pollen grains are viable for months?

[4 Marks]

(A) Rosaceae, Liliaceae and Poaceae

(B) Leguminosae, Solanaceae and Rosaceae

(C) Brassicaceae, Liliaceae and Poaceae

(D) Solanaceae, Poaceae and Liliaceae

Question 107.

The species of plants that plays a vital role in controlling the relative abundance of other species in a community is called _____.

[4 Marks]

(A) Exotic species

(B) Keystone species

(C) Alien species

(D) Endemic species

Question 108.

The dissolution of synaptonemal complex occurs during

[4 Marks]

(A) Diakinesis

(B) Leptotene

(C) Pachytene

(D) Diplotene

Question 109.

Match List-I with List-II.

Choose the correct answer from the options given below:

[4 Marks]

	List-I		List-II
(A)	Hydrarch succession	(I)	Gradual change in the species composition
(B)	Xerarch succession	(II)	Faster and climax reached quickly
(C)	Ecological succession	(III)	Lichens to mesic conditions
(D)	Secondary succession	(IV)	Phytoplankton to mesic conditions

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

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

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

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

Question 110.

In river poper hypothesis, Paul Ehrlich compared the rivets in an airplane to

[4 Marks]

(A) Ecosystem

(B) Genera within a family

(C) Species within a genus

(D) Genetic diversity

Question 111.

Match List-I with List-II.

Choose the correct answers from the options given below:

[4 Marks]

	List-I (Type of cross)		List-II (Phenotypic ratio)
(A)	Monohybrid Cross	(I)	1 : 1
(B)	Dihybrid Cross	(II)	1 : 2 : 1
(C)	Incomplete dominance	(III)	3 : 1
(D)	Test Cross	(IV)	9 : 3 : 3 : 1

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

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

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

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

Question 112.

Match List-I with List-II.

Choose the correct answer from the options given below:

[4 Marks]

	List-I		List-II
(A)	Protein	(I)	C = C double bonds
(B)	Unsaturated fatty acid	(II)	Phosphodiester bond
(C)	Nucleic acid	(III)	Glycosidic bonds
(D)	Polysaccharide	(IV)	Peptide bonds

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

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

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

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

Question 113.

The phenomenon which is influenced by auxin and also played a major role in its discovery:

[4 Marks]

(A) Root initiation

(B) Phototropism

(C) Gravitropism

(D) Apical Dominance

Question 114.

In Calotropis, aestivation is:

[4 Marks]

(A) Valvate

(B) Vexillary

(C) Twisted

(D) Imbricate

Question 115.

Given below are two statements:

Statement I: RuBisCO is the most abundant enzyme in the world.

Statement II: Photorespiration does not occur in C_4 plants.

In the light of the above statements, choose the most appropriate answer from the options given below:

[4 Marks]

(A) Both Statement I and Statement II are correct

(B) Statement I is incorrect but Statement II is correct

(C) Statement I is correct but Statement II is incorrect

(D) Both Statement I and Statement II are incorrect

Question 116.

Consider the following tissues in the stellar region of a stem showing secondary growth.

(A) Primary xylem

(B) Secondary xylem

(C) Primary phloem

(D) Secondary phloem

Arrange these in the correct sequence of their position from pith towards cortex.

[4 Marks]

(A) (A), (B), (C), (D)

(B) (B), (A), (D), (C)

(C) (A), (B), (D), (C)

(D) (B), (A), (C), (D)

Question 117.

Identify the correct statements regarding Mass flow hypothesis.

(A) Mass flow is faster than diffusion.

(B) Mass flow is the result of pressure difference between the end points.

(C) Different substances involved in mass flow move at different paces.

(D) Mass flow can result through either a positive or a negative hydrostatic pressure gradient.

Choose the correct answer from the options given below:

[4 Marks]

(A) (A), (C), (D) only

(B) (B), (C), (D) only

(C) (A), (B), (C) only

(D) (A), (B), (D) only

Question 118.

Fatty acids are connected with the respiratory pathway through:

[4 Marks]

(A) Pyruvic acid

(B) Dihydroxy acetone phosphate

(C) α-Ketoglutaric acid

(D) Acetyl CoA

Question 119.

Inulin is a polymer of:

[4 Marks]

(A) Amino acids

(B) Glucose

(C) Fructose

(D) Galactose

Question 120.

A heterozygous pea plant with violet flowers was crossed with a homozygous pea plant with white flowers.

Violet is dominant over white. Which one of the Following represents the expected combinations among 40 progenies formed?

[4 Marks]

(A) 30 produced violet and 10 produced white flowers

(B) 20 produced violet and 20 produced white flowers

(C) All 40 produced white flowers

(D) All 40 produced violet flowers

Question 121.

The amount of nutrients such as carbon, nitrogen, potassium and calcium present in the soil at any given time is referred to as:

[4 Marks]

(A) Humus

(B) Detritus

(C) Standing state

(D) Standing crop

Question 122.

Thermostable DNA polymerase used in PCR was isolated from:

[4 Marks]

(A) Bacillus thuringiensis

(B) Agrobacterium tumefaciens

(C) Thermus aquaticus

(D) Escherichia coli

Question 123.

Match List-I with List-II.

Choose the correct answer from the options given below:

[4 Marks]

	List-I		List-II
(A)	Pteropsida	(I)	Psilotum
(B)	Lycopsida	(II)	Equisetum
(C)	Psilopsida	(III)	Adiantum
(D)	Sphenopsida	(IV)	Selaginella

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

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

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

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

Question 124.

What will happen if fresh water lake gets contaminated by addition of polluted water with high BOD?

[4 Marks]

(A) Amount of dissolved oxygen in the lake will decrease

(B) The lake will remain unaffected

(C) Number of submerged aquatic plants in the lake will increase

(D) Number of aquatic animals in the lake will increase

Question 125.

Nitrates and phosphates flowing from agricultural farms into water bodies are a significant cause of:

[4 Marks]

(A) Mineralisation

(B) Stratification

(C) Eutrophication

(D) Humification

Question 126.

Transfer of pollen grains from anther to stigma of another flower of same plant is known as:

[4 Marks]

(A) Autogamy

(B) Cleistogamy

(C) Geitonogamy

(D) Xenogamy

Question 127.

Match List-I with List-II.

Choose the correct answer from the options given below:

[4 Marks]

	List-I		List-II
(A)	Auxin	(I)	Promotes female flower formation in cucumber
(B)	Gibberellin	(II)	Overcoming apical dominance
(C)	Cytokinin	(III)	Increase in the length of grape stalks
(D)	Ethylene	(IV)	Promotes flowering in pineapple

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

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

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

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

Question 128.

How many times decarboxylation occurs during each TCA cycle?

[4 Marks]

(A) Once

(B) Twice

(C) Many

(D) Thrice

Question 129.

For chemical defence against herbivores, *Calotropis* has:

[4 Marks]

(A) Distasteful quinine

(B) Toxic ricin

(C) Cardiac glycosides

(D) Strychnine

Question 130.

Name the component that binds to the operator region of an operon and prevents RNA polymerase from transcribing the operon.

[4 Marks]

(A) Repressor protein

(B) Inducer

(C) Promoter

(D) Regulator protein

Question 131.

The last chromosome sequenced in Human Genome Project was :

[4 Marks]

(A) Chromosome 22

(B) Chromosome 14

(C) Chromosome 6

(D) Chromosome 1

Question 132.

In which disorder change of single base pair in the gene for beta globin chain results in change of glutamic acid to valine?

[4 Marks]

(A) Haemophilia

(B) Phenylketonuria

(C) Sickle cell anaemia

(D) Thalassemia

Question 133.

The transverse section of a plant part showed polyarch, radial and exarch xylem, with endodermis and pericycle. The plant part is identified as :

[4 Marks]

(A) Dicot stem

(B) Monocot stem

(C) Monocot root

(D) Dicot root

Question 134.

In a pea flower, five petals are arranged in a specialized manner with one posterior, two lateral and two anterior. These are named as _____, _____ and _____ respectively.

[4 Marks]

(A) Standard, Wings and Keel

(B) Keel, Wings and Standard

(C) Vexillum, Keel and Standard

(D) Keel, Standard and Carina

Question 135.

During symport two different molecules move across the membrane

[4 Marks]

(A) in same direction with the help of same carrier

(B) in opposite direction with the help of same carrier

(C) in same direction with the help of different carriers located at different sites in the same cell

(D) in same direction with the help of different carriers located at a common site

Question 136.

Which of the following mineral ion is not remobilized in plants?

[4 Marks]

(A) Nitrogen

(B) Potassium

(C) Phosphorus

(D) Calcium

Question 137.

Match List-I with List-II.

Choose the correct answer from the options given below.

[4 Marks]

	List-I		List-II
(A)	Nitrococcus	(I)	Denitrification
(B)	Rhizobium	(II)	Conversion of ammonia to nitrite
(C)	Thiobacillus	(III)	Conversion of nitrite to nitrate
(D)	Nitrobacter	(IV)	Conversion of atmospheric nitrogen to ammonia

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

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

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

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

Question 138.

In angiosperms the correct sequence of events in formation of female gametophyte in the ovule is

(A) 3 successive free nuclear divisions in functional megaspores.

(B) Degeneration of 3 megaspores.

(C) Meiotic division in megaspore mother cell.

(D) Migration of 3 nuclei towards each pole.

(E) Formation of wall resulting in seven celled embryo sac.

Choose the correct answer from the options given below.

[4 Marks]

(A) (B), (C), (A), (D), (E)

(B) (C), (B), (A), (D), (E)

(C) (A), (B), (C), (D), (E)

(D) (C), (E), (A), (D), (B)

Question 139.

Match List-I with List-II.

Choose the correct answer from the options given below.

[4 Marks]

	List-I		List-II
(A)	Kanamycin	(I)	Delivers genes into animal cells
(B)	*ClaI*	(II)	Selectable marker
(C)	Disarmed retro-viruses	(III)	Restriction site
(D)	Kanamycin Rgene	(IV)	Antibiotic resistance

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

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

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

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

Question 140.

Which of the following statements is true?

[4 Marks]

(A) Most algal genera are diplontic

(B) Seed bearing plants follow haplontic pattern

(C) All pteridophytes exhibit haplo-diplontic pattern

(D) Most bryophytes do not have haplo-diplontic life cycle

Question 141.

Consider the following plant tissues:

(A) Axillary buds

(B) Fascicular vascular cambium

(C) Interfascicular cambium

(D) Cork cambium

(E) Intercalary meristem

Identify the lateral meristems among the above.

[4 Marks]

(A) (A), (B), (C) and (E) only

(B) (A), (B), (D) and (E) only

(C) (A), (C) and (D) only

(D) (B), (C) and (D) only

Question 142.

A certain plant homozygous for yellow seeds and red flowers was crossed with a plant homozygous for green seeds and white flowers. The F_1 plants had yellow seeds and pink flowers. The F_1 plants

were selfed to get F_2 progeny. Assuming independent assortment of the two characters, how many phenotypic categories are expected for these characters in the F_2 generation?

[4 Marks]

(A) 4

(B) 6

(C) 9

(D) 16

Question 143.

Given below are two statements :

Statement I: The process of translocation through phloem is unidirectional but through xylem, it is bidirectional.

Statement II: The most readily mobilized elements are phosphorus, sulphur, nitrogen and potassium.

In the light of the above statements, choose the most appropriate answer from the options given below :

[4 Marks]

(A) Both Statement I and Statement II are correct

(B) Statement I is correct but Statement II is incorrect

(C) Both Statement I and Statement II are incorrect

(D) Statement I is incorrect but Statement II is correct

Question 144.

Which of the following statements is not correct?

[4 Marks]

(A) Cells in the meristematic phase of growth exhibit abundant plasmodesmatal connections.

(B) Phase of cell elongation of plant cells is characterized by increased vacuolation.

(C) Plant growth is generally determinate.

(D) Plant growth is measurable.

Question 145.

Which of the following statement is incorrect about Agrobacterium tumifaciens?

[4 Marks]

(A) It is used to deliver gene of interest in both prokaryotic as well as eukaryotic host cells.

(B) It transforms normal plant cells into tumorous cells.

(C) 'Ti' plasmid from Agrobacterium tumifaciens used for gene transfer is not pathogenic to plant cells.

(D) It delivers 'T-DNA' into plant cell.

Question 146.

Given below are two statements :

Statement I : The process of copying genetic information from one strand of the DNA into RNA is termed as transcription.

Statement II : A transcription unit in DNA is defined primarily by the three regions in the DNA, i.e., a promotor, the structural gene and a terminator.

In the light of the above statements, choose the correct answer from the options given below :

[4 Marks]

(A) Both Statement I and Statement II are true

(B) Both Statement I and Statement II are false

(C) Statement I is false but Statement II is true

(D) Statement I is true but Statement II is false

Question 147.

Which scientist conducted an experiment with ^{32}P and ^{35}S labelled phages for demonstrating that DNA is the genetic material?

[4 Marks]

(A) F. Griffith

(B) O.T. Avery, C.M. MacLeod and M. McCarty

(C) James D. Watson and F.H.C. Crick

(D) A.D. Hershey and M.J. Chase

Question 148.

Which out of the following statements is incorrect?

[4 Marks]

(A) Cyclic photophosphorylation involves both PS I and PS II

(B) Stroma lamellae lack PS II and NADP reductase

(C) Grana lamellae have both PS I and PS II

(D) Both ATP and NADPH + H^+ are synthesised during non-cyclic photophosphorylation.

Question 149.

During which stages of mitosis and meiosis, respectively does the centromere of each chromosome split?

[4 Marks]

(A) Telophase, Anaphase I

(B) Anaphase, Anaphase II

(C) Metaphase, Metaphase II

(D) Prophase, Telophase I

Question 150.

Match the following.

Select the correct option :

[4 Marks]

	Type of flower		Example
(A)	Zygomorphic	(I)	Mustard
(B)	Hypogynous	(II)	Plum
(C)	Perigynous	(III)	*Cassia*
(D)	Epigynous	(IV)	Cucumber

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

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

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

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

Question 151.

Which of the following statements are correct with respect to the hormone and its function?

(A) Thyrocalcitonin (TCT) regulates the blood calcium level.

(B) In males, FSH and androgens regulate spermatogenesis.

(C) Hyperthyroidism can lead to goitre.

(D) Glucocorticoids are secreted in Adrenal Medulla.

(E) Parathyroid hormone is regulated by circulating levels of sodium ions.

Choose the most appropriate answer from the options given below :

[4 Marks]

(A) (B) and (C) only

(B) (A) and (D) only

(C) (C) and (E) only

(D) (A) and (B) only

Question 152.

'X' and 'Y' are the components of Binomial nomenclature. This naming system was proposed by 'Z' :

[4 Marks]

(A) X - Specific epithet, Y - Generic name, Z - Carolus Linnaeus

(B) X - Generic name, Y - Specific epithet, Z - R.H. Whittaker

(C) X - Generic name, Y - Specific epithet, Z - Carolus Linnaeus

(D) X - Specific epithet, Y - Generic name, Z - R.H. Whittaker

Question 153.

Select the sequence of steps in Respiration.

(A) Diffusion of gases (O_2 and CO_2) across alveolar membrane.

(B) Diffusion of O_2 and CO_2 between blood and tissues.

(C) Transport of gases by the blood.

(D) Pulmonary ventilation by which atmospheric air is drawn in and CO_2 rich alveolar air is released out.

(E) Utilisation of O_2 by the cells for catabolic reactions and resultant release of CO_2.

Choose the correct answer from the options given below:

[4 Marks]

(A) (C), (B), (A), (E), (D)

(B) (B), (C), (E), (D), (A)

(C) (D), (A), (C), (B), (E)

(D) (A), (C), (B), (E), (D)

Question 154.

Which of the following is/are cause(s) of biodiversity losses?

[4 Marks]

(A) Over-exploitation only

(B) Habitat loss and fragmentation only

(C) Over-exploitation, habitat loss and fragmentation

(D) Climate change only

Question 155.

Match List-I with List-II.

Choose the correct answer from the options given below:

[4 Marks]

List-I	List-II
(A) Terpenoides	(I) Codeine
(B) Lectins	(II) Diterpenes
(C) Alkaloids	(III) Ricin
(D) Toxins	(IV) Concanavalin A

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

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

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

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

Question 156.

Match List-I with List-II.

Choose the correct answer from the options given below:

[4 Marks]

List-I	List-II
(A) Palm bones	(I) Phalanges
(B) Wrist bones	(II) Metacarpals
(C) Ankle bones	(III) Carpals
(D) Digit bones	(IV) Tarsals

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

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

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

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

Question 157.

Which of the following sexually transmitted infections are completely curable?

[4 Marks]

(A) Genital herpes and Genital warts

(B) HIV infection and Trichomoniasis

(C) Hepatitis-B and Genital herpes

(D) Syphilis and Trichomoniasis

Question 158.

Which of the following can act as molecular scissors?

[4 Marks]

(A) RNA polymerase

(B) DNA polymerase

(C) Restriction enzymes

(D) DNA ligase

Question 159.

Select correct sequence of substages of Prophase-I of meiotic division:

(A) Zygotene

(B) Pachytene

(C) Diakinesis

(D) Leptotene

(E) Diplotene

Choose the correct answer from the options given below:

[4 Marks]

(A) (D), (A), (B), (E), (C)

(B) (A), (B), (D), (E), (C)

(C) (A), (D), (B), (C), (E)

(D) (D), (B), (A), (E), (C)

Question 160.

Given below are two statements:

Statement I: RNA being unstable, mutate at a faster rate.

Statement II: RNA can directly code for synthesis of proteins, hence can easily express the characters.

In the light of the above statements, choose the correct answer from the options given below:

[4 Marks]

(A) Both Statement I and Statement II are false

(B) Both Statement I and Statement II are true

(C) Statement I is correct but Statement II is false

(D) Statement I is incorrect but Statement II is true

Question 161.

Given below are two statements:

Statement I : Goblet cells are unicellular glands.

Statement II : Earwax is the secretion of exocrine gland.

In the light of the above statements, choose the correct answer from the options given below:

[4 Marks]

(A) Both Statement I and Statement II are true

(B) Statement I is true but Statement II is false

(C) Statement I is false but Statement II is true

(D) Both Statement I and Statement II are false

Question 162.

If there are 250 snails in a pond, and within a year their number increases to 2500 by reproduction. What should be their birth rate per snail per year?

[4 Marks]

(A) 25

(B) 15

(C) 10

(D) 9

Question 163.

Given below are two statements regarding oogenesis.

Statement I : The primary follicles get surrounded by more layers of granulosa cells, a theca and shows fluid filled cavity antrum. Now it is called secondary follicle.

Statement II : Graafian follicle ruptures to release the secondary oocyte from the ovary by the process called ovulation.

In the light of the above statements, choose the correct answer from the options given below:

[4 Marks]

(A) Both Statement I and Statement II are false

(B) Both Statement I and Statement II are true

(C) Statement I is incorrect but Statement II is true

(D) Statement I is correct but Statement II is false

Question 164.

House fly belongs to _____ family.

[4 Marks]

(A) Calliphoridae

(B) Cyprinidae

(C) Hominidae

(D) Muscidae

Question 165.

Diacetyl morphine is also called as:

[4 Marks]

(A) Crack

(B) Smack

(C) Amphetamine

(D) Barbiturate

Question 166.

Which of the following statements are correct?

(A) Reproductive health refers to total well-being in all aspects of reproduction.

(B) Amniocentesis is legally banned for sex determination in India.

(C) "Saheli" - a new oral contraceptive for females was developed in collaboration with ICMR (New Delhi).

(D) Amniocentesis is used to determine genetic disorders and survivability of foetus.

Choose the most appropriate answer from the options given below:

[4 Marks]

(A) (A), (B) and (D) only

(B) (A) and (C) only

(C) (B) and (C) only

(D) (D) and (C) only

Question 167.

Which one of the following is the quiescent stage of cell cycle?

[4 Marks]

(A) G_1

(B) G_2

(C) G_0

(D) M

Question 168.

Match List-I with List-II.

Choose the correct answer from the options given below:

[4 Marks]

	List-I (ECG)		List-II (Electrical activity of heart)
(A)	P-wave	(I)	Depolarisation of ventricles
(B)	QRS complex	(II)	End of systole
(C)	T wave	(III)	Depolarisation of atria
(D)	End of T wave	(IV)	Repolarisation of ventricles

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

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

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

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

Question 169.

Which of the following is not a secondary metabolite?

[4 Marks]

(A) Anthocyanin

(B) Curcumin

(C) Morphine

(D) Lecithin

Question 170.

Given below are two statements:

Statement I : Intra Cytoplasmic Sperm Injection (ICSI) is another specialised procedure of in-vivo fertilisation.

Statement II : Infertility cases due to inability of the male partner to inseminate female can be corrected by artificial insemination (AI).

In the light of the above statements, choose the correct answer from the options given below :

[4 Marks]

(A) Both Statement I and Statement II are true

(B) Statement is incorrect but Statement II is true

(C) Both Statement I and Statement I are false

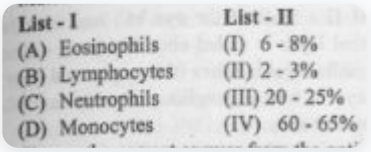
(D) Statement 1is correct but Statement II is false

Question 171.

Match List-I with List-II.

Choose the correct answer from the options given below.

[4 Marks]



List - I	List - II
(A) Eosinophils	(I) 6 - 8%
(B) Lymphocytes	(II) 2 - 3%
(C) Neutrophils	(III) 20 - 25%
(D) Monocytes	(IV) 60 - 65%

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

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

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

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

Question 172.

Select incorrect statement, regarding chemical structure of insulin.

[4 Marks]

(A) C-peptide is not present in mature insulin molecule.

(B) Polypeptide chains A and B are linked by disulphide bridges.

(C) Mature insulin molecule consists of three polypeptide chains - A, B and C.

(D) Insulin is synthesized as prohormone which contains extra stretch of C-peptide.

Question 173.

Given below are two statements : one is labelled as Assertion (A) and the other is labelled as Reason (R).

Assertion (A) : Ascending limb of loop of Henle is impermeable to water and allows transport of electrolytes actively or passively.

Reason (R) : Dilution of filtrate takes place due to efflux of electrolytes in the medullary fluid.

In the light of the above statements, choose the correct answer from the options given below :

[4 Marks]

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

(B) Both (A) and (R) are true but (R) is not the correct explanation of (A)

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

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

Question 174.

Match List-I with List-II.

Choose the correct answer from the options given below.

[4 Marks]

List - I	List - II
(A) Typhoid	(I) Protozoan
(B) Elephantiasis	(II) Salmonella
(C) Ringworm	(III)Aschelminthes
(D) Malaria	(IV) Microsporum

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

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

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

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

Question 175.

The Cockroach is :

[4 Marks]

(A) Ureotelic only

(B) Ureotelic and Uricotelic

(C) Uricotelic only

(D) Ammonotelic only

Question 176.

Brainstem of human brain consists of:

[4 Marks]

(A) Amygdala, Hippocampus and Corpus Callosum

(B) Mid-brain, Pons and Medulla Oblongata

(C) Thalamus, Hypothalamus and Corpora quadrigemina

(D) Forebrain, Cerebellum and Pons

Question 177.

Match List-I with List-II.

Choose the correct answer from the options given below.

[4 Marks]

List-I	List-II
(A) Non-medicated IUDs	(i) Multiload 375
(B) Copper releasing IUDs	(ii) Rubber barrier
(C) Hormone releasing IUDs	(iii) Lippes loop
(D) Vaults	(iv) LNG- 20

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

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

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

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

Question 178.

Which one of the following acts as an inducer for lac operon?

[4 Marks]

(A) Galactose

(B) Glucose

(C) Sucrose

(D) Lactose

Question 179.

Identify the fossil of man who showed the following characteristics.

(A) Brain capacity of 1400 cc

(B) Used hides to protect their body

(C) Buried their dead bodies

In the light of above statements, choose the correct answer from the options given below:

[4 Marks]

(A) Homo habilis

(B) Australopithecus

(C) Homo erectus

(D) Neanderthal man

Question 180.

Arrange the sequence of different hormones for their role during gametogenesis.

(A) Gonadotropin LH stimulates synthesis and secretion of Androgen

(B) Gonadotropin releasing hormone from hypothalamus

(C) Androgen stimulates spermatogenesis

(D) Gonadotropin FSH helps in the process of spermiogenesis

(E) Gonadotropins from anterior pituitary gland

Choose the correct answer from the options given below:

[4 Marks]

(A) (B), (E), (A), (C), (D)

(B) (D), (B), (A), (C), (E)

(C) (E), (A), (D), (B), (C)

(D) (C), (A), (D), (E), (B)

Question 181.

Given below are two statements:

Statement I : In bacteria, the mesosomes are formed by the extensions of plasma membrane.

Statement II: The mesosomes, in bacteria, help in DNA replication and cell wall formation.

In the light of the above statements, choose the most appropriate answer from the options given below:

[4 Marks]

(A) Both Statement I and Statement II are correct

(B) Both Statement I and Statement II are incorrect

(C) Statement I is correct but Statement II is incorrect

(D) Statement I is incorrect but Statement II is correct

Question 182.

Match List-I with List-II.

Choose the correct answer from the options given below.

[4 Marks]

	List-I		List-II
(A)	Deforestation	(I)	Responsible for heating of Earth's surface and atmosphere
(B)	Reforestation	(II)	Conversion of forested areas to non-forested areas
(C)	Green-house effect	(III)	Natural ageing of lake by nutrient enrichment of its water
(D)	Eutrophication	(IV)	Process of restoring a forest that once existed but was removed

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

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

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

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

Question 183.

Select the correct statements about sickle cell anaemia.

(A) There is a change in gene for beta globin.

(B) In the beta globin, there is valine in the place of Lysine.

(C) It is an example of point mutation.

(D) In the normal gene U is replaced by A.

Choose the correct answer from the options given below:

[4 Marks]

(A) (A), (B) and (D) only

(B) (A) and (C) only

(C) (B), (C) and (D) only

(D) (B) and (D) only

Question 184.

Given below are two statements:

Statement I : The nose contains mucus-coated receptors which are specialised for receiving the sense of smell and are called olfactory receptors.

Statement II : Wall of the eye ball has three layers. The external layer is called choroid (dense connective tissue), middle layer is sclera (thin pigmented layer) and internal layer is retina (ganglion cells, bipolar cells and photoreceptor cells).

In the light of the above statements, choose the correct answer from the options given below:

[4 Marks]

(A) Both Statement I and Statement II are true

(B) Both Statement I and Statement II are false

(C) Statement I is true but Statement II is false

(D) Statement I is false but Statement II is true

Question 185.

Match List-I with List-II.

Choose the correct answer from the options given below.

[4 Marks]

	List-I		List-II
(A)	Contractile vacuole	(I)	*Asterias*
(B)	Water vascular system	(II)	*Amoeba*
(C)	Canal system	(III)	*Spongilla*
(D)	Flame cells	(IV)	*Taenia*

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

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

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

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

Question 186.

Arrange the events of Renin - Angiotensin mechanism in correct sequence.

(A) Activation of JG cells and release of renin.

(B) Angiotensin II activates release of aldosterone.

(C) Fall in glomerular blood pressure.

(D) Reabsorption of Na^+ and water from distal convoluted tubule.

(E) Angiotensinogen is converted to Angiotensin I and then to Angiotensin II.

Choose the correct answer from the options given below :

[4 Marks]

(A) (A), (D), (E), (C), (B)

(B) (C), (A), (E), (B), (D)

(C) (A), (D), (C), (B), (E)

(D) (B), (A), (E), (D), (C)

Question 187.

Select the correct statements :

(A) Platyhelminthes are triploblastic pseudocoelomate and bilaterally symmetrical organisms.

(B) Ctenophores reproduce only sexually and fertilization is external.

(C) In tapeworm, fertilization is internal but sexes are not separate.

(D) Ctenophores are exclusively marine, diploblastic and bioluminescent organisms.

(E) In sponges, fertilization is external and development is direct.

Choose the correct answer from the options given below:

[4 Marks]

(A) (A) and (E) only

(B) (B) and (D) only

(C) (A), (C) and (D) only

(D) (B), (C) and (D) only

Question 188.

Select the correct sequential steps regarding absorption of fatty acids and glycerol, in intestine.

(A) Micelles are reformed into small protein coated fat globules called chylomicrons.

(B) Micelles move into intestinal mucosa.

(C) Fatty acids and glycerol are incorporated into small droplets called micelles.

(D) Lacteals release the absorbed substances into blood stream.

(E) Chylomicrons are transported into lacteals.

Choose the correct answer from the options given below

[4 Marks]

(A) (A), (E), (B), (D), (C)

(B) (D), (E), (B), (C), (A)

(C) (C), (B), (A), (E), (D)

(D) (B), (C), (E), (A), (D)

Question 189.

Given below are two statements :

Statement I : In cockroach, the forewings are transparent and prothoracic in origin.

Statement II : In cockroach, the hind wings are opaque, leathery and mesothoracic in origin.

In the light of the above statements, choose the correct answer from the options given below :

[4 Marks]

(A) Both Statement I and Statement II are true

(B) Statement I is correct but Statement II is false

(C) Both Statement I and Statement II are false

(D) Statement I is incorrect but Statement II is true

Question 190.

Match List-I with List-II.

Choose the correct answer from the options given below.

[4 Marks]

	List-I		List-II
(A)	Cytokine barriers	(I)	Mucus coating of respiratory tract
(B)	Cellular barriers	(II)	Interferons
(C)	Physiological barriers	(III)	Neutrophils and Macrophages
(D)	Physical barriers	(IV)	Tears and Saliva

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

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

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

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

Question 191.

With reference to Hershey and Chase experiments. Select the correct statements.

(A) Viruses grown in the presence of radioactive phosphorus contained radioactive DNA.

(B) Viruses grown on radioactive sulphur contained radioactive proteins.

(C) Viruses grown on radioactive phosphorus contained radioactive protein.

(D) Viruses grown on radioactive sulphur contained radioactive DNA.

(E) Viruses grown on radioactive protein contained radioactive DNA.

Choose the most appropriate answer from the options given below :

[4 Marks]

(A) (A) and (C) only

(B) (B) and (D) only

(C) (D) and (E) only

(D) (A) and (B) only

Question 192.

The salient features of genetic code are :

(A) The code is palindromic

(B) UGA act as initiator codon

(C) The code is unambiguous and specific

(D) The code is nearly universal

Choose the most appropriate answer from the options given below :

[4 Marks]

(A) (B) and (C) only

(B) (A) and (B) only

(C) (B) and (C) only

(D) (A) and (D) only

Question 193.

Select the correct statements regarding dissolved Oxygen and Biochemical oxygen demand.

(A) BOD is inversely related to dissolved oxygen.

(B) Low dissolved oxygen and high BOD lead to loss of aquatic life.

(C) High BOD leads to high dissolved oxygen.

(D) Both BOD and dissolved oxygen are indicator of health of a water body.

(E) Both BOD and dissolved oxygen are affected by amount of organic matter in the water body.

Choose the most appropriate answer from the options given below :

[4 Marks]

(A) (A), (B), (C), (D) only

(B) (B), (C), (D), (E) only

(C) (A), (B), (D), (E) only

(D) (A), (B), (C), (E) only

Question 194.

Select the incorrect statement with respect to Multiple Ovulation Embryo Transfer (MOET) Technology.

[4 Marks]

(A) Cow is administered with hormones to induce super-ovulation.

(B) Super-ovulating cow is either mated with elite bull or is artificially inseminated.

(C) It is used to increase herd size in a short time.

(D) Fertilised eggs at 4 to 6 cells - stages are recovered non-surgically from super-ovulating cow and transferred to surrogate mother.

Question 195.

Match List-I with List-II.

Choose the correct answer from the options given below.

[4 Marks]

	List-I		List-II
(A)	Gene therapy	(I)	Separation of DNA fragments
(B)	RNA interference	(II)	Diagnostic test for AIDS
(C)	ELISA	(III)	Cellular defence
(D)	Gel electrophoresis	(IV)	Allows correction of a gene defect

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

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

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

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

Question 196.

Given below are two statements:

Statement I : Parathyroid hormone acts on bones and stimulates the process of bone resorption.

Statement II : Parathyroid hormone along with Thyrocalcitonin plays a significant role in carbohydrate metabolism.

In the light of the above statements, choose the correct answer from the options given below :

[4 Marks]

(A) Both Statement I and Statement II are true

(B) Both Statement I and Statement II are false

(C) Statement I is correct but Statement II is false

(D) Statement I is incorrect but Statement II is true

Question 197.

Select the correct statement/s with respect to mechanism of sex determination in Grasshopper.

(A) It is an example of female heterogamety.

(B) Male produces two different types of gametes either with or without X chromosome.

(C) Total number of chromosomes (autosomes and sex chromosomes) is same in both males and females.

(D) All eggs bear an additional X chromosome besides the autosomes.

Choose the correct answer from the options given below:

[4 Marks]

(A) (A) only

(B) (A) and (C) only

(C) (B) and (D) only

(D) (A), (C) and (D) only

Question 198.

Match List-I with List-II.

Choose the correct answer from the options given below.

[4 Marks]

List-I	List-II
(A) Columnar epithelium	(I) Ducts of glands
(B) Ciliated epithelium	(II) Inner lining of stomach and intestine
(C) Squamous epithelium	(III) Inner lining of bronchioles
(D) Cuboidal epithelium	(IV) Endothelium

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

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

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

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

Question 199.

Given below are two statements: one is labelled as Assertion (A) and the other is labelled as Reason (R).

Assertion (A) : A person goes to high altitude and experiences "Altitude Sickness" with symptoms like breathing difficulty and heart palpitations.

Reason (R) : Due to low atmospheric pressure at high altitude, the body does not get sufficient oxygen.

In the light of the above statements, choose the correct answer from the options given below :

[4 Marks]

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

(B) Both (A) and (R) are true but (R) is not the correct explanation of (A)

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

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

Question 200.

Which of the following statements are correct with respect to Golgi apparatus?

(A) It is the important site of formation of glycoprotein and glycolipids.

(B) It produces cellular energy in the form of ATP.

(C) It modifies the protein synthesized by ribosomes on ER.

(D) It facilitates the transport of ions.

(E) It provides mechanical support.

Choose the most appropriate answer from the options given below :

[4 Marks]

(A) (A) and (D) only

(B) (D) and (E) only

(C) (B) and (C) only

(D) (A) and (C) only