13th Edition

# Target NTA NEET (UG) 2025



## Previous 8 Year-wise Solved Papers
(2024 - 2017) & 10 Mock Tests

- 10 Mock Tests on latest pattern
- 9 Past papers with 100 % Solutions
- Answer Key validated with NTA
- Trend Analysis 2017–2024
- As per Latest Pattern & Syllabus

DISHA™
Publication Inc

DISHA Publications Inc.
A-23 FIEE Complex, Okhla Phase II
New Delhi-110020
Tel: 49842349/ 49842350



**Typeset By**

DISHA DTP Team


## Buying Books from Disha is always Rewarding

**This time we are appreciating your writing Creativity.**
Write a review of the product you purchased on Amazon/ Flipkart

**Take a screen shot / Photo of that review**

**Scan this QR Code ➔**
Fill Details and submit | That's it ... Hold tight n wait.
At the end of the month, you will get a surprise gift from Disha Publication

**Scan this QR code**

## Write To Us At

**feedback_disha@aiets.co.in**

**www.dishapublication.com**

DISHA™
Publication Inc

# Free Sample Contents



This sample book is prepared from the book **"Target NTA NEET (UG) 2025 - Previous 8 Year-wise Solved Papers (2024 - 2017) & 10 Mock Tests 13th Edition | Physics, Chemistry & Biology (Zoology & Botany) |".**


**ISBN -** 9789362252623

**MRP-** 725/-

In case you like this content, you can buy the **Physical Book** or **E-book** using the ISBN provided above.

The book & e-book are available on all leading online stores.

# CONTENTS

Trend Analysis of NEET Papers (2017-2024)

## SOLVED PAPERS



**For future updates on NEET Scan the QR Code.**
**https://bit.ly/3cfB81I.**
**You also get Latest Syllabus, Past NEET Papers, Mock Tests and more content here**

## MOCK TESTS

# 1 MOCK TEST

**Time : 3 Hours 20 Minutes** **Max. Marks : 720**

## INSTRUCTIONS

1. This test consists of Physics, Chemistry, Botany and Zoology questions with equal weightage of 180 marks.
2. There are four parts in the question paper, consisting Part-I Physics (Q.no.1 to 50), Part-II Chemistry (Q.no.51 to 100), Part-III Botany (Q. no. 101 to 150) and Part-IV Zoology (Q. no.151 to 200). Each part is divided into two Sections, Section A consists of 35 multiple choice questions & Section-B consists of 15 Multiple choice questions, out of these 15 questions candidates can choose to attempt any 10 questions.

| | Parts / Sections | Physics | Chemistry | Botany | Zoology | Total | |
|---|---|---|---|---|---|---|---|
| Questions | Section A | 35 | 35 | 35 | 35 | 140 | 200 |
| | Section B | 15 | 15 | 15 | 15 | 60 | |
| To Attempt | Section A | 35 | 35 | 35 | 35 | 140 | 180 |
| | Section B | 10 | 10 | 10 | 10 | 40 | |

3. There will be only one correct choice in the given four choices for each question. For each question 4 marks will be awarded for correct choice, 1 mark will be deducted for incorrect choice and zero mark will be awarded for unattempted question.
4. Once you have evaluated the marks in the test, you should assess it thoroughly with the help of the 'Test Assessment and Analysis sheet' given at the back of the response sheet.

# PART-I : PHYSICS

## Section-A

**1.** Match List I with List II.

| List I | | List II | |
|---|---|---|---|
| A. | Torque | I. | $Nms^{-1}$ |
| B. | Stress | II. | $J\,kg^{-1}$ |
| C. | Latent Heat | III. | Nm |
| D. | Power | IV. | $Nm^{-2}$ |

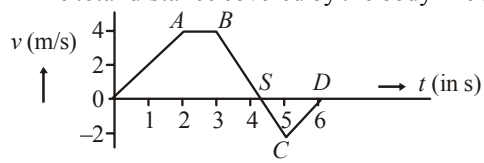
Choose the correct answer from the options given below:
(a) A-III, B-II, C-I, D-IV
(b) A-III, B-IV, C-II, D-I
(c) A-IV, B-I, C-III, D-II
(d) A-II, B-III, C-I, D-IV

**2.** A small toy starts moving from the position of rest under a constant acceleration. If it travels a distance of 10 m in t s, the distance travelled by the toy in the next *t* s will be :
(a) 10m (b) 20m
(c) 30m (d) 40m

**3.** A particle undergoes simple harmonic motion having time period T. The time taken in 3/8th oscillation is
(a) $\frac{3}{8}T$ (b) $\frac{5}{8}T$
(c) $\frac{5}{12}T$ (d) $\frac{7}{12}T$

**4.** The angular velocity of a body changes from $\omega_1$ to $\omega_2$ without applying torque but by changing moment of inertia. The ratio of initial radius of gyration to the final radius of gyration is
(a) $\omega_2 : \omega_1$ (b) $\omega_2^2 : \omega_1^2$
(c) $\sqrt{\omega_2} : \sqrt{\omega_1}$ (d) $1/\omega_2 : 1/\omega_1$

**5.** The velocity ($v$) and time ($t$) graph of a body in a straight line motion is shown in the figure. The point *S* is at 4.333 seconds.
The total distance covered by the body in 6 s is:




(a) $\frac{37}{3}$ m (b) 12m
(c) 11m (d) $\frac{49}{4}$ m

**6.** The work function of aluminium is 4.2 eV. If two photons each of energy 3.5 eV strike an electron of aluminium, then emission of electron will
(a) depend upon the density of the surface
(b) possible
(c) not possible
(d) None of these

**7.** An uncharged paralle plate capacitor having a dielectric of dielectric constant K is connected to a similar air cored parallel plate capacitor charged to a potential $V_0$. The two share the charge, and the common potential becomes V. The dielectric constant K is
(a) $\frac{V_0}{V} - 1$ (b) $\frac{V_0}{V} + 1$
(c) $\frac{V}{V_0} - 1$ (d) $\frac{V}{V_0} + 1$

**8.** Two wires A and B of the same material, having radii in the ratio 1 : 2 and carry currents in the ratio 4 : 1. The ratio of drift speed of electrons in A and B is
(a) 16 : 1 (b) 1 : 16
(c) 1 : 4 (d) 4 : 1

**9.** A ball is projected from the ground with a speed 15 $ms^{-1}$ at an angle θ with horizontal so that its range and maximum height are equal, then tan θ will be equal to
(a) $\frac{1}{4}$ (b) $\frac{1}{2}$
(c) 2 (d) 4

**10.** **Statement I :** The ratio $\frac{C_V}{C_P}$ for a monatomic gas is less than for a diatomic gas.
**Statement II :** The molecules of a monatomic gas have more degrees of freedom than those of a diatomic gas.

**11.** Sixty four conducting drops each of radius 0.02 m and each carrying a charge of 5 μC are combined to form a bigger drop. The ratio of surface density of bigger drop to the smaller drop will be :
(a) 1 : 4 (b) 4 : 1
(c) 1 : 8 (d) 8 : 1

**12.** Photoelectric current from a given photocell will depend upon
(a) number of photons striking per second
(b) frequency of incident photon
(c) material of the target
(d) None of these

**13.** A circular disc A of radius r is made from an iron plate of thickness t and another circular disc B of radius 4r is made from an iron plate of thickness t/4. The relation between the moments of inertia $I_A$ and $I_B$ is
(a) $I_A > I_B$
(b) $I_A = I_B$
(c) $I_A < I_B$
(d) depends on the actual value of t and r

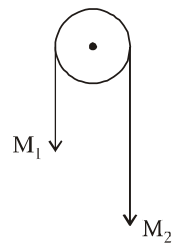
**14.** Einstein's work on photoelectric effect provided support for the equation
(a) $E = h\nu$ (b) $E = mc^2$
(c) $E = \frac{-Rhc}{n^2}$ (d) $K.E. = \frac{1}{2}mv^2$

**15.** A metallic bar is heated from 0ºC to 100ºC. The coeficient of linear expansion is $10^{-5}\ K^{-1}$. What will be the percentage increase in length?
(a) 0.01% (b) 0.1%
(c) 1% (d) 10%

**16.** Given below are two statements :
**Statement-I :** A point charge is brought in an electric field. The value of electric field at a point near to the charge may increase if the charge is positive.
**Statement-II :** An electric dipole is placed in a non-uniform electric field. The net electric force on the dipole will not be zero.
Choose the correct answer from the options given below:
(a) Both statement-I and statement-II are true.
(b) Both statement-I and statement-I are false.
(c) Statement-I is true but statement-II is false.
(d) Statement-I is false but statement-II is true.

**17.** The refracting angle of a prism is A and refractive index of the material of the prism is cot (A/2). Then the angle of minimum deviation will be -
(a) $180 - 2A$ (b) $90 - A$
(c) $180 + 2A$ (d) $180 - 3A$

**18.** Two masses $M_1$ and $M_2$ are tied together at the two ends of a light inextensible string that passes over a frictionless pulley. When the mass $M_2$ is twice that of $M_1$ the acceleration of the system is $a_1$. When the mass $M_2$ is thrice that of $M_1$. The acceleration of the system is $a_2$.
The ratio $\frac{a_1}{a_2}$ will be:
(a) $\frac{1}{3}$
(b) $\frac{2}{3}$
(c) $\frac{3}{2}$
(d) $\frac{1}{2}$




**19.** Ohm's law is not obeyed by
(a) electrolytes (b) discharge tube
(c) vacuum tubes (d) all of the above

**20.** The temperature of an iron block is 140ºF. Its temperature on the Celsius scale is
(a) 60º (b) 160º
(c) 140º (d) 132º

**21.** A gun fires two bullets at 60º and 30º with horizontal. The bullets strike at some horizontal distance. The ratio of maximum height for the two bullets is in the ratio of
(a) 2 : 1 (b) 3 : 1
(c) 4 : 1 (d) 1 : 1

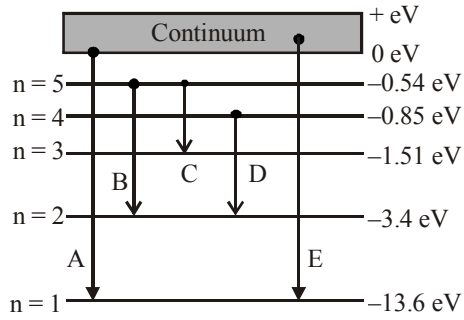
**22.** A generator has an e.m.f. of 440 Volt and internal resistance of 400 Ohm. Its terminals are connected to a load of 4000 Ohm the voltage across the load is
(a) 220 volt (b) 440 volt
(c) 200 volt (d) 400 volt

**23.** Electric field inside a copper wire of length 10 metres, resistance 2 ohm connected to a 10 volt battery is
(a) $1\ Vm^{-1}$ (b) $0.5\ Vm^{-1}$
(c) $10\ Vm^{-1}$ (d) $5\ Vm^{-1}$

**24.** The radius vector, drawn from the sun to a planet, sweeps out equal areas in equal intervals of time. This is the statement of
(a) Kepler's first law (b) Kepler's second aw
(c) Newton's first law (d) Kepler's third law

**25.** Given below are two statements: one is labelled as Assertion (A) and the other is labelled as Reason (R).
**Assertion A :** For a simple microscope, the angular size of the object equals the angular size of the image.
**Reason R :** Magnification is achieved as the small object can be kept much closer to the eye than 25 cm and hence it subtends a large angle.
In the light of the above statements, choose the most appropriate answer from the options given below :
(a) A is false but R is true
(b) A is true but R is false
(c) Both A and R are true but R is NOT the correct explanation of A
(d) Both A and R are true and R is the correct explanation of A

**26.** In the given figure, the energy levels of hydrogen atom have been shown along with some transitions marked A, B, C, D and E. The transitions A, B and C respectively represent :

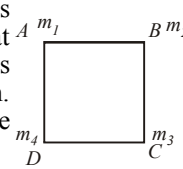



(a) The ionization potential of hydrogen, second member of Balmer series and third member of Paschen series.
(b) The first member of the Lyman series, third member of Balmer series and second member of Paschen series.
(c) The series limit of Lyman series, third member of Balmer series and second member of Pasochen series.
(d) The series limit of Lyman series, second member of Balmer series and second member of Paschen series.

**27.** Select the correct statement(s) from the following.
I. Wavelength of microwaves is greater than that of ultraviolet rays.
II. The frequency of infrared rays is lesser than that of ultraviolet rays.
III. The frequency of microwaves is lesser than that of infrared rays
IV. Gamma ray has largest frequency in the electromagnetic spectrum
(a) I and II (b) II and III
(c) III and IV (d) I, II, III and IV

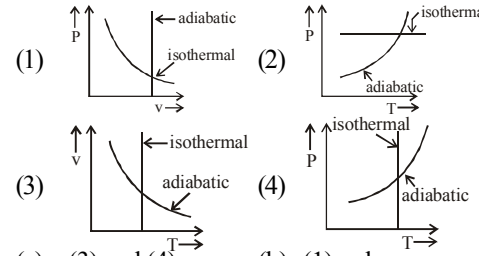
**28.** A body of mass 10 kg and velocity 10 m/s collides with a stationary body of mass 5 kg. After collision both bodies stick to each other, velocity of the bodies after collision will be
(a) $\frac{3}{10}$ m/s (b) $\frac{18}{3}$ m/s
(b) $\frac{9}{20}$ m/s (d) $\frac{20}{3}$ m/s

**29.** Four particles of masses $m_1, m_2, m_3$ and $m_4$ are placed at the vertices $A, B, C$ and $D$ as respectively of a square shown. The COM of the system will lie at diagonal $AC$ if




(a) $m_1 = m_3$ (b) $m_2 = m_4$
(c) $m_1 = m_2$ (d) $m_3 = m_4$

**30.** Which one is the correct option for the two different thermodynamic processes?



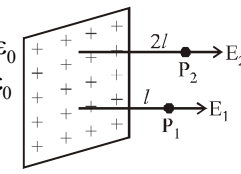

(a) (3) and (4) (b) (1) only
(c) (3) and (1) (d) (2) and (3)

**31.** The r.m.s. velocity of oxygen molecule at 16ºC is 474 m/sec. The r.m.s. velocity in m/s of hydrogen molecule at 127ºC is
(a) 1603 (b) 1896
(c) 2230.59 (d) 2730

**32.** To demonstrate the phenomenon of interference, we require two sources which emit radiation
(a) of the same frequency
(b) of different wavelengths
(c) of the same frequency and having a definite phase relationship
(d) of nearly the same frequency

**33.** The oscillating electric and magnetic field vectors of electromagnetic wave are oriented along
(a) the same direction and in phase
(b) the same direction but have a phase difference of 90º
(c) mutually perpendicular directions and are in phase
(d) mutually perpendicular directions but has a phase difference of 90º

**34.** In the figure, a very large plane sheet of positive charge is shown. $P_1$ and $P_2$ are two points at distance $l$ and $2l$ from the charge distribution. If $\sigma$ is the surface charge density, then the magnitude of electric fields $E_1$ and $E_2$ at $P_1$ and $P_2$ respectively are :




(a) $E_1 = \sigma/\varepsilon_0, E_2 = \sigma/2\varepsilon_0$
(b) $E_1 = 2\sigma/\varepsilon_0, E_2 = \sigma/\varepsilon_0$
(c) $E_1 = E_2 = \sigma/2\varepsilon_0$
(d) $E_1 = E_2 = \sigma/\varepsilon_0$

**35.** If $v_e$ and $v_0$ represent the escape velocity and orbital velocity of a satellite corresponding to a circular orbit of radius R, then
(a) $v_e = v_o$
(b) $v_e = \sqrt{2}\, v_o$
(c) $v_e = (1/\sqrt{2})\, v_o$
(d) $v_e$ and $v_o$ are not related

## Section-B

**36.** Match the thermodynamic processes taking place in a system with the correct conditions. In the table : $\Delta Q$ is the heat supplied, $\Delta W$ is the work done and $\Delta U$ is change in internal energy of the system.

| | Process | | Condition |
|---|---|---|---|
| (I) | Adiabatic | (A) | $\Delta W = 0$ |
| (II) | Isothermal | (B) | $\Delta Q = 0$ |
| (III) | Isochoric | (C) | $\Delta U \neq 0, \Delta W \neq 0, \Delta Q \neq 0$ |
| (IV) | Isobaric | (D) | $\Delta U = 0$ |

(a) (I)-(A), (II)-(B), (III)-(D), (IV)-(D)
(b) (I)-(B), (II)-(A), (III)-(D), (IV)-(C)
(c) (I)-(A), (II)-(A), (III)-(B), (IV)-(C)
(d) (I)-(B), (II)-(D), (III)-(A), (IV)-(C)

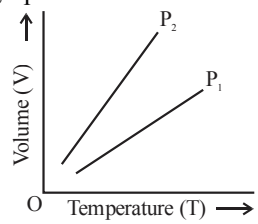
**37.** A galvanometer coil has a resistance of 15Ω and gives full scale deflection for a current of 4 mA. To convert it to an ammeter of range 0 to 6 A
(a) 10 mΩ resistance is to be conncected in parallel to the galvanometer
(b) 10 mΩ esistance is to be connected in series with the galvanometer
(c) 0.1 Ω resistance is to be connected in parallel to the galvanometer
(d) 0.1 Ω resistance is to be connected in series with the galvanometer

**38.** A uniform rod of mass m, length $\ell$, area of cross-section A has Young's modulus Y. If it is hanged vertically, elongation under its own weight will be

(a) $\frac{mg\ell}{2AY}$ (b) $\frac{2mg\ell}{AY}$
(c) $\frac{mg\ell}{AY}$ (d) $\frac{mgY}{A\ell}$

**39.** For a perfect gas, two pressures $P_1$ and $P_2$ are shown in figure. The graph shows:

(a) $P_1 > P_2$
(b) $P_1 < P_2$
(c) $P_1 = P_2$
(d) Insufficient data to draw any conclusion



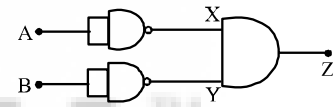

**40.** Consider the following statements : In a streamline flow of a liquid
I. the kinetic energies of all particles arriving at a given point are same.
II. the momenta of all particles arriving at a given point are same.
III. the speed of particles are below the critical velocity.
IV. The fluid is moving in the form of layers of different velocities.
Which of the statements given above are correct?
(a) II & IV only (b) II & III only
(c) I &IV only (d) I, II & III

**41.** An object undergoing SHM takes 0.5 s to travel from one point of zero velocity to the next such point. The distance between those points is 50 cm. The period, frequency and amplitude of the motion is
(a) 1s, 1Hz, 25 cm (b) 2s, 1Hz, 50 cm
(c) 1s, 2Hz, 25 cm (d) 2s, 2Hz, 50 cm

**42.** A plane wave of wavelength 6250 Å is incident normally on a slit of width $2 \times 10^{-2}$ cm. The width of the principal maximum on a screen distant 50 cm will be
(a) $312.5 \times 10^{-3}$ cm (b) $312.5 \times 10^{-3}$ m
(c) $312.5 \times 10^{-3}$ m (d) 312 m

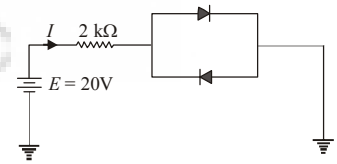
**43.** In a p-type semi-conductor germanium is doped with
(a) aluminium (b) boron
(c) gallium (d) all of these

**44.** Identify the logic operation carried out by the given circuit :-




(a) OR (b) AND
(c) NOR (d) NAND

**45.** Assuming the diodes to be of silicon with forward resistance zero, the current I in the following circuit is




(a) 0 (b) 9.65 mA
(c) 10 mA (d) 10.36 mA

**46.** For using a multimeter to identify diode from electrical components. Choose the correct statement out of the following about the diode:
(a) It is two terminal device which conducts current in both directions.
(b) It is two terminal device which conducts current in one direction only.
(c) It does not conduct current gives an initial deflection which decays to zero.
(d) It is three terminal device which conducts current in one direction only between central terminal and either of the remaining two terminals.

**47.** The binding energy per nucleon of deuteron $\left({}_1^2H\right)$ and helium nucleus $\left({}_2^4He\right)$ is 1.1 MeV and 7 MeV respectively. If two deuteron nuclei react to form a single helium nucleus, then the energy released is

(a) 23.6 MeV (b) 26.9 MeV
(c) 13.9 MeV (d) 19.2 MeV

**48.** The ratio of wavelengths of proton and deuteron accelerated by potential $V_p$ and $V_d$ is 1 : $\sqrt{2}$. Then, the ratio of $V_p$ to $V_d$ will be

(a) 1 : 1 (b) $\sqrt{2}$ : 1
(c) 3 : 1 (d) 4 : 1

**49.** Light wave traveling in air along x-direction is given by $E_y = 540 \sin \pi \times 10^4 (x - ct)$ $Vm^{-1}$. Then, the peak value of magnetic field of wave will be (Given $c = 3 \times 10^8$ $ms^{-1}$)

(a) $18 \times 10^{-7}$ T (b) $54 \times 10^{-7}$ T
(c) $54 \times 10^{-8}$ T (d) $18 \times 10^{-9}$ T

**50.** The equations of two waves are given by :
$y_1 = 5\sin 2\pi (x - vt)$ cm
$y_2 = 3\sin 2\pi (x - vt + 1.5)$ cm
These waves are simultaneously passing through a string. The amplitude of the resulting wave is

(a) 2 cm (b) 4 cm
(c) 5.8 cm (d) 8 cm

## PART-II : CHEMISTRY

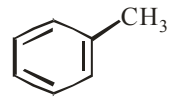
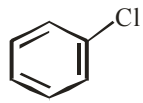
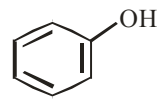
### Section-A

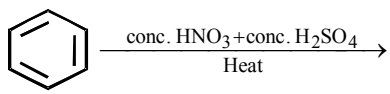
**51.** Given below are two statements :
**Statement I:** $S_8$ solid undergoes disproportionation reaction under alkaline conditions to form $S^{2-}$ and $S_2O_3^{2-}$

**Statement II:** $ClO_4^-$ can undergo disproportionation reaction under acidic condition.
In the light of the above statements, choose the **most appropriate answer** from the options given below :

(a) Both statement I and II are correct.
(b) Both statement I and II are incorrect.
(c) Statement I is correct but statement II is incorrect.
(d) Statement II is correct but statement I is incorrect.

**52.** Which of the following compound will most easily be attacked by an electrophile?

(a) 
(b) 
(c) 
(d) 

**53.** 

$X \xrightarrow{Cl_2/FeCl_3} Y$
The product Y is

(a) *p*-chloronitrobenzene
(b) *m*-chloronitrobenzene
(c) *o*-chloronitrobenzene
(d) *o*-*p*-dichloronitrobenzene

**54.** The Molarity (M) of an aqueous solution containing 5.85 g of NaCl in 500 mL water is :
(Given : Molar Mass Na : 23 and Cl : 35.5 $gmol^{-1}$)

(a) 20 (b) 0.2
(c) 2 (d) 4

**55.** An example of electrophilic substitution reaction is

(a) Chlorination of methane
(b) Conversion of methyl chloride to methyl alcohol
(c) Nitration of benzene
(d) Formation of ethylene from ethyl alcohol.

**56.** In the depression of freezing point experiment

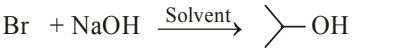
A. Vapour pressure of the solution is less than that of pure solvent
B. Vapour pressure of the solution is more than that of pure solvent
C. Only solute molecules solidify at the freezing point
D. Only solvent molecules solidify at the freezing point

(a) A and D only (b) B and C only
(c) A and C only (d) A only

**57.** For a reaction $A \xrightarrow{K_1} B \xrightarrow{K_2} C$
If the rate of formation of B is set to be zero then the concentration of B is given by:

(a) $K_1K_2[A]$ (b) $(K_1 - K_2)[A]$
(c) $(K_1 + K_2)[A]$ (d) $(K_1/K_2)[A]$

**58.** Which of the following does not represent the correct order of the properties indicated
(a) $Ni^{2+} > Cr^{2+} > Fe^{2+} > Mn^{2+}$ (size)
(b) Sc > Ti > Cr > Mn (size)
(c) $Mn^{2+} > Ni^{2+} < Co^{2+} < Fe^{2+}$ (unpaired electron)
(d) $Fe^{2+} > Co^{2+} > Ni^{2+} > Cu^{2+}$ (unpaired electron)

**59.** 
For which solvent rate of $S_N2$ will be maximum?
(a) Benzene
(b) 100% $H_2O$
(c) 100% acetone
(d) 75% $H_2O$ + 25% acetone

**60.** The electrons, identified by quantum numbers n and l (i) n = 4, l = 1 (ii) n = 4, l = 0 (iii) n = 3, l = 2 (iv) n = 3, l = 1 can be placed in order of increasing energy, from the lowest to highest, as
(a) (iv) < (ii) < (iii) < (i)
(b) (ii) < (iv) < (i) < (iii)
(c) (i) < (iii) < (ii) < (iv)
(d) (iii) < (i) < (iv) < (ii)

**61.** In an adiabatic process which of the following is true?
(a) q = + w (b) q = 0
(c) $\Delta E = q$ (d) $P\Delta V = 0$

**62.** In which of the following cases, the stability of two oxidation states is correctly represented
(a) $Ti^{3+} > Ti^{4+}$ (b) $Mn^{2+} > Mn^{3+}$
(c) $Fe^{2+} > Fe^{3+}$ (d) $Cu^{+} > Cu^{2+}$

**63.** Given below are two statements :
**Statements I :** Potassium permanganate on heating at 573 K forms potassium manganate.
**Statements II :** Both potassium permanganate and potassium manganate are tetrahedral and paramagnetic in nature.
In the light of the above statements, choose the **most appropriate** answer from the options given below :
(a) Both statement I and II are correct.
(b) Both statement I and II are incorrect.
(c) Statement I is correct but statement II is incorrect.
(d) Statement II is correct but statement I is incorrect.

**64.** The major organic product in the reaction, $CH_3 — O — CH(CH_3)_2 + HI \rightarrow$ Product is
(a) $ICH_2OCH(CH_3)_2$
(b) $CH_3OC(CH_3)_2$ (I)
(c) $CH_3I + (CH_3)_2CHOH$
(d) $CH_3OH + (CH_3)_2CHI$

**65.** Match List-I with List-II, match the gas evolved during each reaction.

| List-I | | List-II | |
|---|---|---|---|
| (A) | $(NH_4)_2Cr_2O_7 \xrightarrow{\Delta}$ | (I) | $H_2$ |
| (B) | $KMnO_4 + HCl \rightarrow$ | (II) | $N_2$ |
| (C) | $Al + NaOH + H_2O \rightarrow$ | (III) | $O_2$ |
| (D) | $NaNO_3 \xrightarrow{\Delta}$ | (IV) | $Cl_2$ |

Choose the correct answer from the options given below :
(a) (A) – (II), (B) – (III), (C) – (I), (D) – (IV)
(b) (A) – (III), (B) – (I), (C) – (IV), (D) – (II)
(c) (A) – (II), (B) – (IV), (C) – (I), (D) – (III)
(d) (A) – (III), (B) – (IV), (C) – (I), (D) – (II)

**66.** Given below are two statements : one is labelled as **Assertion (A)** and the other is labelled as **Reason (R)**
**Assertion (A) :** At 10°C, the density of a 5M solution of KCl [atomic masses of K and Cl are 39 & 35.5 g $mol^{-1}$]. The solution is cooled to –21°C. The molality of the solution will remain unchanged.
**Reason (R) :** The molality of a solution does not change with temperature as mass remains unaffected with temperature.
In the light of the above statements, choose the correct answer from the options given below:
(a) If both Assertion and Reason are correct and the Reason is a correct explanation of the Assertion.
(b) If both Assertion and Reason are correct but Reason is not a correct explanation of the Assertion.
(c) If the Assertion is correct but Reason is incorrect.
(d) If the Assertion is incorrect and Reason is correct.

**67.** If uncertainty in position and velocity are equal then uncertainty in momentum will be
(a) $\frac{1}{2}\sqrt{\frac{mh}{\pi}}$ (b) $\frac{1}{2}\sqrt{\frac{h}{\pi m}}$
(c) $\frac{h}{4\pi m}$ (d) $\frac{mh}{4\pi}$

**68.** If $Ni^{2+}$ is replaced by $Pt^{2+}$ in the complex $[NiCl_2Br_2]^{2-}$, which of the following properties are expected to get changed?

A. Geometry
B. Geometrical isomerism
C. Optical isomerism
D. Magnetic properties

(a) A, B and C (b) A, B and D
(c) A and D (d) B and C

**69.** Which of the following shows iso-structural species?

(a) $NH_4^+$ and $NH_2^-$

(b) $CH_3^-$ and $CH_3^+$

(c) $SO_4^{2-}$, $PO_4^{3-}$ and $[BF_4^-]$

(d) $NH_4^+$ and $NH_3$

**70.** Match List-I with List-II

| List-I | List-II |
|---|---|
| (A) Glucose + HI | (I) Gluconic acid |
| (B) Glucose + $Br_2$ | (II) Glucose water pentacetate |
| (C) Glucose + acetic | (III) Saccharic acid anhydride |
| (D) Glucose + $HNO_3$ | (IV) Hexane |

Choose the correct answer from the options given below:

(a) (A)-(IV), (B)-(I), (C)-(II), (D)-(III)
(b) (A)-(IV), (B)-(III), (C)-(II), (D)-(I)
(c) (A)-(III), (B)-(I), (C)-(IV), (D)-(II)
(d) (A)-(I), (B)-(III), (C)-(IV), (D)-(II)

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

**Assertion (A) :** $CH_2 = CH - CH_2 - Cl$ is an example of allyl halide.

**Reason (R) :** Allyl halides are the compounds in which the halogen atom is attached to $sp^2$ hybridised carbon atom.

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

(a) If both Assertion and Reason are correct and the Reason is a correct explanation of the Assertion.
(b) If both Assertion and Reason are correct but Reason is not a correct explanation of the Assertion.
(c) If the Assertion is correct but Reason is incorrect.
(d) If the Assertion is incorrect and Reason is correct.

**72.** Match List I with List II

| List I (Name of reaction) | | List II (Reagent used) |
|---|---|---|
| A Hell–Volhard–Zelinsky reaction | I. | $NaOH + I_2$ |
| B Iodoform reaction | II. | (i) $CrO_2Cl_2, CS_2$ (ii) $H_2O$ |
| C Etard reaction | III. | (i) $Br_2$/red phosphorus (ii) $H_2O$ |
| D Gatterman–Koch reaction | IV. | CO, HCl, anhyd. $AlCl_3$ |

Choose the correct answer from the options given below:

(a) A–III, B–II, C–I, D–IV
(b) A–III, B–I, C–IV, D–II
(c) A–I, B–II, C–III, D–IV
(d) A–III, B–I, C–II, D–IV

**73.** Consider the following reactions:

(i) $H^+(aq) + OH^-(aq) = H_2O(l)$, $\Delta H = -X_1$ kJ mol$^{-1}$

(ii) $H_2(g) + \frac{1}{2}O_2(g) = H_2O(l)$, $\Delta H = -X_2$ kJ mol$^{-1}$

(iii) $CO_2(g) + H_2(g) = CO(g) + H_2O$, $\Delta H = -X_3$ kJ mol$^{-1}$

(iv) $C_2H_2(g) + \frac{5}{2}O_2(g) = 2CO_2(g) + H_2O(l)$' $\Delta H = +4X_4$ kJ mol$^{-1}$

Enthalpy of formation of $H_2O$ (l) is

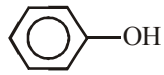
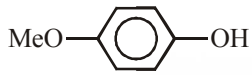
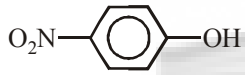
(a) $+X_3$ kJ mol$^{-1}$ (b) $-X_4$ kJ mol$^{-1}$
(c) $+X_1$ kJ mol$^{-1}$ (d) $-X_2$ kJ mol$^{-1}$

**74.** Given below are two statements.

**Statement I :** The presence of weaker $\pi$ - bonds make alkenes less stable than alkanes.

**Statement II :** The strength of the double bond is greater than that of carbon-carbon single bond.

In the light of the above statements, choose the *correct* answer from the options given below.
(a) Both statement I and II are correct.
(b) Both statement I and II are incorrect.
(c) Statement I is correct but statement II is incorrect.
(d) Statement II is correct but statement I is incorrect.

**75.** The correct order for acidity of the following hydroxyl compound is:
A. $CH_3OH$
B. $(CH_3)_3COH$
C. 
D. 
E. 

**76.** Given below are two statements :
**Statement I :** $[Ni(CN)_4]^{2-}$ is square planar and diamagnetic complex with $dsp^2$ hybridization for Ni but $[Ni(CO)_4]$ is tetrahedral paramagnetic and with $sp^3$-hybridization for Ni.
**Statement II :** $[NiCl_4]^{2-}$ and $[Ni(CO)_4]$ both have same *d*-electron configuration have same geometry and are paramagnetic.
In light the above statements choose the correct answer form the options given below:
(a) Both statement I and II are correct.
(b) Both statement I and II are incorrect.
(c) Statement I is correct but statement II is incorrect.
(d) Statement II is correct but statement I is incorrect.

**77.** Solubility product of a salt AB is $1 \times 10^{-8}$ in a solution in which the concentration of $A^+$ ions is $10^{-3}$ M. The salt will precipitate when the concentration of $B^-$ ions is kept
(a) between $10^{-8}$ M to $10^{-7}$ M
(b) between $10^{-7}$ M to $10^{-8}$ M
(c) $> 10^{-5}$ M
(d) $< 10^{-8}$ M

**78.** Sucrose in water is dextro-rotatory, $[a]_D = +66.4°$. When boiled with dilute HCl, the solution becomes leavo-rotatory, $[a]_D = -20°$. In this process the sucrose molecule breaks into
(a) L-glucose + D-fructose
(b) L-glucose + L-fructose
(c) D-glucose + D-fructose
(d) D-glucose + L-fructose

**79.** Select correct statement(s).
(a) Cyanamide ion ($CN_2^{2-}$) is isoelectronic with $CO_2$ and has the same linear structure
(b) $Mg_2C_3$ reacts with water to form propyne
(c) $CaC_2$ has NaCl type lattice
(d) All of the above

**80.** For $-\overset{O}{\overset{\|}{C}}-\overset{\cdot\cdot}{N}H-$(peptide bond)
Which statement is incorrect about peptide bond?
(a) C — N bond length in proteins is longer than usual bond length of the C — N bond
(b) Spectroscopic analysis shows planar structure of the $-\overset{O}{\overset{\|}{C}}-NH-$ group
(c) C — N bond length in proteins is smaller than usual bond length of the C—N bond
(d) None of the above

**81.** In the precipitation of the iron group (III) in qualitative analysis, ammonium chloride is added before adding ammonium hydroxide to :
(a) prevent interference by phosphate ions
(b) decrease concentration of $^-OH$ ions
(c) increase concentration of $Cl^-$ ions
(d) increase concentration of $NH_4^+$ ions

**82.** In nitrogen family, the H-M-H bond angle in the hydrides gradually becomes closer to 90° on going from N to Sb. This shows that gradually
(a) The basic strength of the hydrides increases
(b) Almost pure *p*-orbitals are used for M-H bonding
(c) The bond energies of M-H bonds increase
(d) The bond pairs of electrons become nearer to the central atom

**83.** For reaction $aA \rightarrow xP$, when [A] = 2.2 mM, the rate was found to be 2.4 $mMs^{-1}$. On reducing concentration of A to half, the rate changes to 0.6 $mMs^{-1}$. The order of reaction with respect to A is :
(a) 1.5 (b) 2.0
(c) 2.5 (d) 3.0

**84.** Match Column-I with Column-II.

| | Column-I | | Column-II |
|---|---|---|---|
| (A) | Catalyst alters the rate | (p) | cannot be fraction or zero of reaction |
| (B) | Molecularity | (q) | proper orientation is not there always. |
| (C) | Second half life of first order reaction | (r) | by lowering the activation energy |
| (D) | Energetically favourable reactions are sometimes slow | (s) | is same as the first |

(a) A – (q), B – (r), C – (s), D – (p)
(b) A – (r), B – (s), C – (p), D – (q)
(c) A – (r), B – (p), C – (s), D – (q)
(d) A – (p), B – (r), C – (s), D – (q)

**85.** Given below are two statements :
**Statement I :** The nucleophilic addition of sodium hydrogen sulphite to an aldehyde or a ketone involves proton transfer to form a stable ion.
**Statement II :** The nucleophilic addition of hydrogen cyanide to an aldehyde or a ketone yields amine as final product.
In the light of the above statements, choose the **most appropriate** answer from the options given below :
(a) Both statement I and II are correct.
(b) Both statement I and II are incorrect.
(c) Statement I is correct but statement II is incorrect.
(d) Statement II is correct but statement I is incorrect.

## Section-B

**86.** Which of the following is correct order of acidity?
(a) $HCOOH > CH_3COOH > ClCH_2COOH > C_2H_5COOH$
(b) $ClCH_2COOH > HCOOH > CH_3COOH > C_2H_5COOH$
(c) $CH_3COOH > HCOOH > ClCH_2COOH > C_2H_5COOH$
(d) $C_2H_5COOH > CH_3COOH > HCOOH > ClCH_2COOH$

**87.** Given below are two statements: One is labelled as **Assertion A** and the other is labelled as **Reason R**.
**Assertion A:** Butan -1- ol has higher boiling point than ethoxyethane.
**Reason R:** Extensive hydrogen bonding leads to stronger association of molecules.
In the light of the above statements, choose the correct answer from the options given below:
(a) If both Assertion and Reason are correct and the Reason is a correct explanation of the Assertion.
(b) If both Assertion and Reason are correct but Reason is not a correct explanation of the Assertion.
(c) If the Assertion is correct but Reason is incorrect.
(d) If the Assertion is incorrect and Reason is correct.

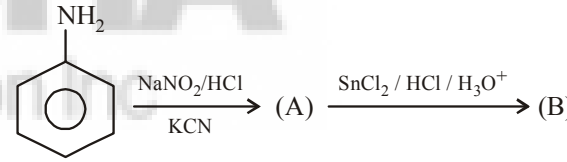
**88.** For the reaction $2NO + Br_2 \longrightarrow 2NOBr$, the following mechanism has been given

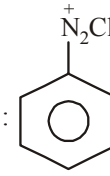
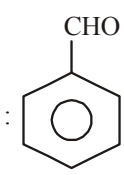
$$NO + Br_2 \xrightarrow{fast} NOBr_2$$

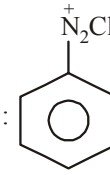
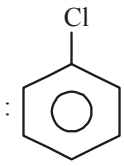
$$NOBr_2 + NO \xrightarrow{slow} 2NOBr$$

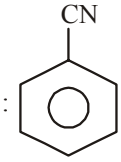
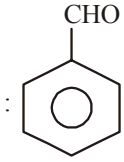
Hence, rate law is
(a) $k'[NO]^2[Br_2]$ (b) $k'[NO][Br_2]$
(c) $k'[NOBr_2][NO]$ (d) $k'[NO][Br_2]^2$

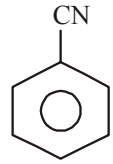
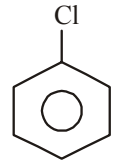
**89.** 'A' and 'B' in the following reactions are :




(a) (A) :  (B) : 


(b) (A) :  (B) : 


(c) (A) :  (B) : 

(d) (A) :  (B) : 

**90.** Which of the following reactions is used to make a fuel cell?

(a) $Cd(s) + 2Ni(OH)_3(s) \longrightarrow CdO(s) + 2Ni(OH)_2(s) + H_2O(l)$

(b) $Pb(s) + PbO_2(s) + 2H_2SO_4(aq) \longrightarrow 2PbSO_4(s) + 2H_2O(l)$

(c) $2H_2(g) + O_2(g) \longrightarrow 2H_2O(l)$

(d) $2Fe(s) + O_2(g) + 4H^+(aq) \longrightarrow 2Fe^{2+}(aq) + 2H_2O(l)$

**91.** Which does not exist ?

(a) $[SiCl_6]^{2-}$ (b) $[GeF_6]^{2-}$

(c) $[CCl_6]^{2-}$ (d) $[SnCl_6]^{2-}$

**92.** Given below are two statements :

**Statement I** : Noradrenaline is a neurotransmitter.

**Statement II** : Low level of noradrenaline is not the cause of depression in human.

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

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

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

(c) Both Statement I and Statement II are correct

(d) Both Statement I and Statement II are incorrect

**93.** The unit of equivalent conductivity is

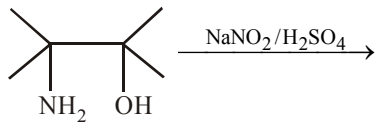
(a) $S\,cm^{-2}$

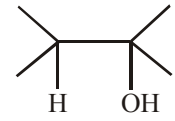
(b) ohm $cm^2$ (g - equivalent)

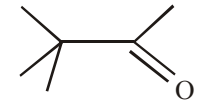
(c) ohm cm

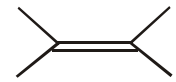
(d) $ohm^{-1}cm^2$ (g equivalent)$^{-1}$

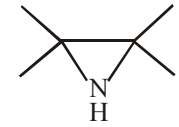
**94.** The major product of the reaction




(a) 


(b) 


(c) 

(d) 


**95.** Fluorination of an aromatic ring is easily accomplished by treating a diazonium salt with $HBF_4$. Which of the following conditions is correct about this reaction?

(a) NaF/Cu (b) $Cu_2O/H_2O$

(c) Only heat (d) $NaNO_2/Cu$

**96.** **Statement I :** According to Bohr's model of an atom, qualitatively the magnitude of velocity of electron increases with decrease in positive charges on the nucleus as there is no strong hold on the electron by the nucleus.

**Statement II :** According to Bohr's model of an atom, qualitatively the magnitude of velocity of electron increases with decrease in principal quantum number.

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

(a) Both Statement I and Statement II are false

(b) Both Statement I and Statement II are true

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

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

**97.** Match List-I with List-II

| List-I | List-II |
|---|---|
| (A) $[PtCl_4]^{2-}$ | (I) $sp^3d$ |
| (B) $BrF_5$ | (II) $d^2sp^3$ |
| (C) $PCl_5$ | (III) $dsp^2$ |
| (D) $[Co(NH_3)_6]^{3+}$ | (IV) $sp^3d^2$ |

(a) (A) → (II), (B) → (IV), (C) → (I), (D) → (III)

(b) (A) → (III), (B) → (IV), (C) → (I), (D) → (II)

(c) (A) → (III), (B) → (I), (C) → (IV), (D) → (II)

(d) (A) → (II), (B) → (I), (C) → (IV), (D) → (III)

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

**Assertion (A) :** Ketoses give Seliwanoff's test faster than aldoses.

**Reason (R) :** Ketoses undergo b-elimination followed by formation of furfural.

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

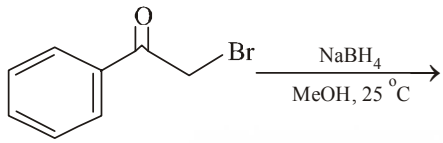
(a) If both Assertion and Reason are correct and the Reason is a correct explanation of the Assertion.

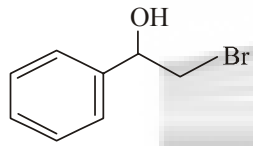
(b) If both Assertion and Reason are correct but Reason is not a correct explanation of the Assertion.

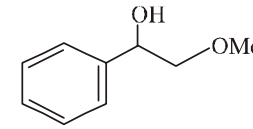
(c) If the Assertion is correct but Reason is incorrect.

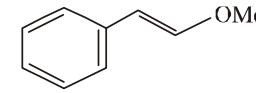
(d) If the Assertion is incorrect and Reason is correct.

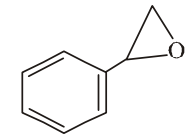
**99.** The major product of the following reaction is :




(a) 


(b) 


(c) 


(d) 


**100.** The standard Gibbs energy for the given cell reaction in kJ $mol^{-1}$ at 298 K is:

$Zn(s) + Cu^{2+}(aq) \rightarrow Zn^{2+}(aq) + Cu(s)$,

$E^{\circ} = 2$ V at 298 K

(Faraday's constant, F = 96000 C $mol^{-1}$)

(a) – 384 (b) 384

(c) 192 (d) – 192

## PART-III : BOTANY

### Section-A

**101.** The hormone which controls cell division and cell differentiation is

(a) ABA (b) auxin

(c) gibberellin (d) cytokinin

**102.** Respiratory Quotient (R.Q.) is defined as:

(a) vol. of $O_2$/vol. of $CO_2$

(b) vol. of $CO_2$ /vol. of $O_2$

(c) vol. of $O_2$/vol. of $N_2$

(d) vol. of $N_2$/vol. of $CO_2$

**103.** Isolated metabolic reaction outside the body performed in a test tube is

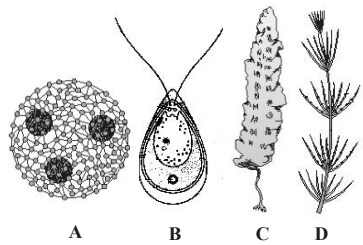
(a) Living

(b) Non - living

(c) Neither living nor non - living

(d) Both (a) and (b)

**104.** Choose the correct option.




| | A | B | C | D |
|---|---|---|---|---|
| (a) | *Volvox* | *Chlamydo-monas* | *Laminaria* | *Chara* |
| (b) | *Chara* | *Laminaria* | *Volvox* | *Chlamydo-monas* |
| (c) | *Laminaria* | *Volvox* | *Chlamyd-omonas* | *Chara* |
| (d) | *Chlamyd-omonas* | *Chara* | *Laminaria* | *Volvox* |

**105.** Connecting link between glycolysis and Krebs cycle before entering Krebs cycle, pyruvate is converted to

(a) oxaloacetate

(b) phosphoenol pyruvate

(c) pyruvate

(d) acetyl CoA

**106.** Match the columns and find out the correct combination:

| | **Column - I** | | **Column - II** |
|---|---|---|---|
| (A) | Family | (i) | Anacardiaceae |
| (B) | Kingdom | (ii) | Sapindales |
| (C) | Order | (iii) | Homo |
| (D) | Genus | (iv) | Animalia |

(a) (A) – (i), (B) – (iv), (C) – (ii), (D) – (iii)

(b) (A) – (iv), (B) – (i), (C) – (iii), (D) – (ii)

(c) (A) – (i), (B) – (ii), (C) – (iii), (D) – (iv)

(d) (A) – (iii), (B) – (ii), (C) – (iv), (D) – (i)

**107.** Match the columns and choose the appropriate option.

| | Column - I | | Column - II |
|---|---|---|---|
| (A) | Coccus | (i) | Spherical |
| (B) | Bacillus | (ii) | Spiral |
| (C) | Vibrium | (iii) | Rod |
| (D) | Spirillum | (iv) | Comma |

(a) (A) – (ii) (B) – (iii) (C) – (i) (D) – (iv)
(b) (A) – (ii) (B) – (i) (C) – (iii) (D) – (iv)
(c) (A) – (i) (B) – (iii) (C) – (iv) (D) – (ii)
(d) (A) – (iii) (B) – (ii) (C) – (i) (D) –(iv)

**108.** The enzyme used for joining two DNA fragments is called:
(a) ligase
(b) restriction endonuclease
(c) DNA polymerase
(d) gyrase

**109.** Thorn is a modification of
(a) stem (b) leaf
(c) stipule (d) root

**110.** Match the column and find the correct combination

| | Column-I | | Column-II |
|---|---|---|---|
| A. | *Volvox* | (i) | Marine |
| B. | *Ulothrix* | (ii) | Colonial |
| C. | Kelps | (iii) | Motile spores |
| D. | Zoospores | (iv) | Filamentous |

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

**111.** Match the Column-I and Column-II and find out the correct combination:

| | Column-I | | Column-II |
|---|---|---|---|
| (A) | Storage roots | (i) | Banyan |
| (B) | Pneumatophores | (ii) | *Rhizophora* |
| (C) | Stilt roots | (iii) | Turnip |
| (D) | Prop roots | (iv) | Maize |

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

**112.** **Statement I:** Increase in mass and increase in number of individuals are twin characteristics of growth.
**Statement II:** Metabolic reactions can be demonstrated outside the body in isolated cell-free systems.
In the light of the above statements, choose the correct answer from the options given below:
(a) Both Statement I and Statement II are incorrect
(b) Statement I is correct but Statement II is incorrect
(c) Statement I is incorrect but Statement II is correct
(d) Both Statement I and Statement II are correct

**113.** **Assertion (A):** A network of food chains existing together in an ecosystem is known as food web.
**Reason (R):** An animal like kite cannot be a part of a food web.
In the light of the above statements, choose the correct answer from the options given below:
(a) Both (A) and (R) are correct but (R) is not the correct explanation of (A)
(b) (A) is correct but (R) is not correct
(c) (A) is not correct but (R) is correct
(d) Both (A) and (R) are correct and (R) is the correct explanation of (A)

**114.** Female gametophyte of angiosperms is represented by
(a) Ovule (b) Megaspore mother cell
(c) Embryo sac (d) Nucellus

**115.** Chasmogamy refers to the condition where
(a) Flowers remains closed
(b) Flowers absent
(c) Flowers open
(d) Flowers gamopetalous

**116.** Match the columns and choose the appropriate option.

| | Column-I | | Column-II |
|---|---|---|---|
| (A) | Parenchyma | (i) | Isodiametric cells |
| (B) | Collenchyma | (ii) | Lignified cell walls |
| (C) | Sclerenchyma | (iii) | Living mechanical tissue |
| (D) | Xylem | (iv) | Conducting tissue for water |

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

**117.** Cross between AaBB and aaBB will form
(a) 1 AaBB : 1aaBB (b) All AaBB
(c) 3 AaBB : 1 aaBB (d) 1 AaBB : 3 aaBB

**118.** Match the columns and find out the correct combination:

| | Column-I | | Column-II |
|---|---|---|---|
| (A) | *Omnis cellula-e cellula* | (i) | Botanist |
| (B) | Schleiden | (ii) | Rudolf Virchow |
| (C) | Schwann | (iii) | Cell wall |
| (D) | Plant cell | (iv) | Zoologist |

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

**119.** Parthenocarpic tomato fruits can be produced by
(a) treating the plants with low concentrations of gibberellic acid and auxins

(b) raising the plants from vernalized seeds
(c) treating the plants with ethylene
(d) removing androecium of flowers before pollen grains are released

**120.** Which of the following is incorrect regarding ZW-ZZ type of sex determination?
(a) It occcurs in birds and some reptiles
(b) Females are homogametic and males are heterogametic
(c) 1 : 1 sex ratio is produced in the offsprings
(d) All of these

**121.** Match the columns and find out the correct combination:

| | Column-I | | Column-II |
|---|---|---|---|
| (A) | Mitosis | (i) | Liquid endosperm in coconut |
| (B) | Syncytium | (ii) | Responsible for the growth of multicellular organism. |
| (C) | Metaphase plate | (iii) | Inactive stage |
| (D) | $G_0$ stage | (iv) | Plane of alignment of Chromosomes. |

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

**122.** The rate at which light energy is converted to chemical energy of organic molecules in the ecosystem is
(a) net primary productivity
(b) gross primary productivity
(c) net secondary productivity
(d) gross secondary productivity

**123.** Consider the following statements concerning food chains :
(i) Removal of 80% tigers from an area resulted in greatly increased growth of vegetation
(ii) Removal of most of the carnivores resulted in an increased population of deers
(iii) The length of food chains is generally limited to 3-4 trophic levels due to energy loss
(iv) The length of food chains may vary from 2 to 8 trophic levels
Which two of the above statements are correct?
(a) (ii) and (iii) only (b) (iii) and (iv) only
(c) (i) and (iv) only (d) (i) and (ii) only

**124.** Match Column-I with Column-II and select the correct answer from the codes given below.

| | Column-I | | Column-II |
|---|---|---|---|
| A. | *Trichoderma* | (i) | Nitrification |
| B. | *Streptomyces* | (ii) | Biocontrol agent |
| C. | *Nitrosomonas* | (iii) | Lactic acid |
| D. | *Lactobacillus* | (iv) | Source of antibiotic |

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

**125.** Binomial nomenclature was introduced by
(a) Carolus Linnaeus
(b) Charles Darwin
(c) Bentham and Hooker
(d) Aristotle

**126.** Pteridophytes differ from mosses/bryophytes in possessing
(a) independent gametophyte
(b) well developed vascular system
(c) archegonia structure
(d) flagellate spermatozoids

**127.** Match the columns and find out the correct combination:

| | Column-I | | Column-II |
|---|---|---|---|
| (A) | Light reactions | (i) | Photochemical reactions |
| (B) | Dark reactions | (ii) | Carbon reactions |
| (C) | Van Neil | (iii) | Purple and green bacteria |
| (D) | PS II | (iv) | 680 nm. |

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

**128.** Mycorrhiza is
(a) a symbiotic association of plant roots and certain fungi.
(b) an association of algae with fungi.
(c) a fungus parasitising root system of higher plants.
(d) an association of *Rhizobium* with the roots of leguminous plants.

**129.** *Laminaria* (kelp) and *Fucus* (rock weed) are the examples of
(a) red algae (b) brown algae
(c) green algae (d) golden brown algae

**130.** The outer layer of vacuole is called
(a) cell wall (b) tonoplast
(c) plasmalayer (d) leucoplast

**131.** Match the column with the correct number of ATP produced in different relations.

| | Column-I | | Column-II |
|---|---|---|---|
| (A) | ATP through SLP | (i) | 6 |
| (B) | Total ATP in glycolysis | (ii) | 38 |

(C) Total ATP in respiration (iii) 4
(D) $C_6H_{12}O_6$ (iv) Glucose
(a) (A)-(iii) (B)-(iv) (C)-(ii) (D)-(i)
(b) (A)-(i) (B)-(iii) (C)-(ii) (D)-(iv)
(c) (A)-(iv) (B)-(ii) (C)-(iii) (D)-(i)
(d) (A)-(ii) (B)-(iii) (C)-(i) (D)-(iv)

**132.** Which of the following statements is true?
(a) Vessel is long cylindrical tube-like structure.
(b) Tracheids are dead with protoplasm.
(c) Both (a) and (b)
(d) Xylem fibres have thin walls and obliterated central lumen.

**133.** The linking of antibiotic resistance gene with the plasmid vector became possible with
(a) DNA ligase (b) Endonucleases
(c) DNA polymerase (d) Exonucleases

**134.** Which one of the following is not included under *in-situ* conservation ?
(a) Botanical garden (b) Biosphere reserve
(c) National park (d) Sanctuary

**135.** *Monascus purpureus* is a yeast used commercially in the production of :
(a) ethanol
(b) streptokinase for removing clots from the blood vessels.
(c) Citric acid
(d) blood cholesterol lowering statins

## Section-B

**136.** Match the following.

| | Column-I | | Column-II |
|---|---|---|---|
| (A) | Meristem | (i) | Increase in girth |
| (B) | Apical meristem | (ii) | Increase in protoplasm |
| (C) | Lateral meristem | (iii) | Elongation of plants |
| (D) | Cellular growth | (iv) | Capacity to divide |

(a) (A) – (iv); (B) – (iii); (C) – (i); (D) – (ii)
(b) (A) – (i); (B) – (iii); (C) – (iv); (D) – (ii)
(c) (A) – (ii); (B) – (i); (C) – (iv); (D) – (iii)
(d) (A) – (iv); (B) – (iii); (C) – (ii); (D) – (i)

**137.** DNA or RNA segment tagged with a radioactive molecule is called
(a) Vector (b) Probe
(c) Clone (d) Plasmid

**138.** Which of the following is considered a hot-spot of biodiversity in India ?
(a) Indo-Gangetic Plain (b) Eastern Ghats
(c) Aravalli Hills (d) Western Ghats

**139.** Match the items given in column-I with those given in column-II and choose the correct option given below.

| | Column-I | | Column-II |
|---|---|---|---|
| (A) | Tapetum | (i) | Irregular in shape with abundant food reserve |
| (B) | Exine | (ii) | Acts as nutritive layer |
| (C) | Pollenkit | (iii) | Thick, rigid protective layer |
| (D) | Vegetative cell | (iv) | Oily and sticky layer, tissue help in pollination. |

(a) (A) – (ii); (B) – (iii); (C) – (iv); (D) – (i)
(b) (A) – (i); (B) – (iii); (C) – (ii); (D) – (iv)
(c) (A) – (ii); (B) – (iii); (C) – (i); (D) – (iv)
(d) (A) – (ii); (B) – (iv); (C) – (iii); (D) – (i)

**140.** Match the Column I with Column II and choose the correct option.

| | Column I | | Column II |
|---|---|---|---|
| (A) | ABO blood groups | (i) | Dihybrid cross |
| (B) | Law of segregation | (ii) | Monohybrid cross |
| (C) | Law of Independent assortment | (iii) | Base pairs substitution |
| (D) | Genetic mutation | (iv) | Multiple allelism |

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

**141.** **Statement I:** Nitrogen base is linked to pentose sugar through N-glycosidic linkage.
**Statement II:** Phosphate group is linked to 5'–OH of a nucleoside through phosphoester linkage.
In the light of the above statements, choose the correct answer from the options given below:
(a) Both Statement I and Statement II are incorrect
(b) Statement I is correct but Statement II is incorrect
(c) Statement I is incorrect but Statement II is correct
(d) Both Statement I and Statement II are correct

**142.** **Statement I:** Yeast is used in preparation of ethyl alcohol.
**Statement II:** In cheese microorganisms are required for souring and ripening.
In the light of the above statements, choose the correct answer from the options given below:
(a) Both Statement I and Statement II are incorrect
(b) Statement I is correct but Statement II is incorrect
(c) Statement I is incorrect but Statement II is correct
(d) Both Statement I and Statement II are correct

**143.** Which of the following statements is true?
(i) Many secondary compounds are produced by plants for the purpose of discouraging herbivores (Grazers and Browsers).
(ii) Predators keep prey population under control.
(iii) Predators in nature are prudent because they do not exploit their prey.
(iv) Parasites have evolved to be host-specific.
(v) Parasites that feed on the external surface of the host organism are called ectoparasites.
(a) Statements (i) and (iv) only
(b) Statements (i) and (ii) only
(c) Statements (i) and (iii) only
(d) All statements are correct

**144.** **Assertion (A):** Glycolysis occurs in cytoplasm.
**Reason (R):** Enzymes for glycolysis are found in cytoplasm. It is common in aerobic/anaerobic respiration.
In the light of the above statements, choose the correct answer from the options given below:
(a) Both (A) and (R) are correct but (R) is not the correct explanation of (A)
(b) (A) is correct but (R) is not correct
(c) (A) is not correct but (R) is correct
(d) Both (A) and (R) are correct and (R) is the correct explanation of (A)

**145.** Chemiosmotic hypothesis proposes the mechanism of
(a) synthesis of ATP
(b) synthesis of $FADH_2$
(c) synthesis of NADH
(d) synthesis of NADPH

**146.** **Statement I:** In numerical taxonomy observable characters are not given equal importance.
**Statement II:** More than 20 characters can't be studied at a time in numerical taxonomy.
In the light of the above statements, choose the correct answer from the options given below:
(a) Both Statement I and Statement II are incorrect
(b) Statement I is correct but Statement II is incorrect
(c) Statement I is incorrect but Statement II is correct
(d) Both Statement I and Statement II are correct

**147.** Which of the following statement confirm the law of dominance
(a) 3:1 ratio in $F_2$ generation
(b) It is the conclusion of a dihybrid cross
(c) Alleles do not show any blending and both characters recovered as such in $F_2$ generation
(d) Alleles of a pair segregate from each other such that gamete receives only one of the two factors

**148.** Go through the statements.
(i) In terrestrial ecosystem, maximum energy is present in $T_1$.
(ii) In grasslands ecosystem, the pyramid of biomass is upright.
(iii) In pyramid of food, the producers occupy the base / bottom.
(iv) Energy flow in an ecosystem is bidirectional
(v) If all green plants of earth are destroyed, all animals shall die ultimately.
How many of the above statement(s) is wrong?
(a) (iv) only (b) (i) and (ii) only
(c) (iii) and (iv) only (d) All of these

**149.** Read the following statement about post-fertilization events in angiospermic plants
(i) Ovary develop into fruit
(ii) Ovules develop into embryo sac
(iii) Embryo develop at the micropylar end of embryo sac
(iv) Endosperm will never be completely consumed by developing embryo
(v) Zygote develop into embryo
Choose the correct answer from the options below:
(a) (i), (ii) and (v) only
(b) (i), (iii) and (v) only
(c) (ii), (iii) and (iv) only
(d) (ii), (iv) and (v) only

**150.** Which of the following is true?
(i) The biological wealth of our plant has been declining rapidly and the accusing finger is clearly pointing to human activities.
(ii) The colonisation of tropical pacific island by humans is said to have led to the extinction of more than 2,000 species of native bird
(iii) The IUCN Red list (2004) documents the extinction of 784 species in last 500 years
(iv) Insects have less diversity than reptiles.
(v) India has more than 20,000 genetically different strains of rice.
(a) Only (i), (ii) and (iii) is correct
(b) Only (i) and (ii) is correct
(c) Only (ii) and (v) is correct
(d) Only (i) and (iv) is correct

# PART-IV : ZOOLOGY

## Section-A

**151.** Which ion is essential for muscle contraction?
(a) $Na^+$ (b) $K^+$
(c) $Ca^{2+}$ (d) $Cl^-$

**152.** Match the following columns and choose the correct answer from the options given below:-

| | Column - I | | Column - II |
|---|---|---|---|
| (A) | Coelomate | (i) | Aschelminthes |
| (B) | Acoelomate | (ii) | Platyhelminthes |
| (C) | Pseudocoelomate | (iii) | Molluscs |
| (D) | Radially Symmetrical | (iv) | Cnidaria |

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

**153.** Elbow joint is an example of
(a) hinge joint
(b) gliding joint
(c) ball and socket joint
(d) pivot joint

**154.** Match the columns and choose the correct answer from the options given below:

| | Column-I | | Column-II |
|---|---|---|---|
| (A) | squamous epithelium | (i) | intestine |
| (B) | columnar epithelium | (ii) | nephrons |
| (C) | cuboidal epithelium | (iii) | blood vessels |
| (D) | ciliated epithelium | (iv) | bronchioles |

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

**155.** Gel electrophoresis is used for
(a) cutting of DNA into fragments
(b) separation of DNA fragments according to their size
(c) construction of recombinant DNA by joining with cloning vectors
(d) isolation of DNA molecule

**156.** The neuro transmitter, produced at the synapse and neuromuscular junction, is
(a) GTP (b) ATP
(c) acetylcholine (d) phosphokinase

**157.** Match the following and choose the correct combination from the options given.

| | Column I | | Column II |
|---|---|---|---|
| A. | Pigment | (i) | Lemon grass oil |
| B. | Lectins | (ii) | Curcumin |
| C. | Drug | (iii) | Concanavalin A |
| D. | Essential oils | (iv) | Anthocyanins |

(a) A – (i); B – (ii); C – (iii), D – (iv)
(b) A – (iv); B – (iii); C – (ii), D – (i)
(c) A – (ii); B – (iii); C – (iv), D – (i)
(d) A – (iii); B – (iv); C – (i), D – (ii)

**158.** Match the items given in Column I with those in Column II and select the correct option given below:

| | Column I | | Column II |
|---|---|---|---|
| A. | Proliferative Phase | I. | Breakdown of endometrial lining |
| B. | Secretory Phase | II. | Follicular Phase |
| C. | Menstruation | III. | Luteal Phase |
| D. | Menarche | IV | At puberty |

(a) A – III; B – II; C – I, D – IV
(b) A – I; B – III; C – II, D – IV
(c) A – III; B – I; C – II, D – IV
(d) A – II; B – III; C – I, D – IV

**159.** Egg is liberated from ovary in
(a) secondary oocyte stage
(b) primary oocyte stage
(c) oogonial stage
(d) mature ovum stage

**160.** Match the columns and find out the correct combination:

| | Column-I | | Column-II |
|---|---|---|---|
| (A) | Tracheal tubes | (i) | Birds |
| (B) | Branchial respiration | (ii) | Insects |
| (C) | Pulmonary respiration | (iii) | Aquatic arthropods |
| (D) | Cutaneous respiration | (iv) | Frog |

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

**161.** The most important component of the oral contraceptive pills is
(a) Progesterone
(b) Growth hormone

(c) Thyroxine
(d) Luteinizing hormone

**162.** **Statement I:** Exonucleases are restriction enzymes, which cut DNA internally.
**Statement II:** Endonuclease can destroy both DNA and RNA.
In the light of the above statements, choose the correct answer from the options given below:
(a) Both Statement I and Statement II are incorrect
(b) Statement I is correct but Statement II is incorrect
(c) Statement I is incorrect but Statement II is correct
(d) Both Statement I and Statement II are correct

**163.** Reproductive health in society can be improved by –
(i) Introduction of sex education in schools.
(ii) Increased medical assistance.
(iii) Awareness about contraception and STDs.
(iv) Equal opportunities to male and female child.
(v) Ban on aminocentesis.
(a) (ii) and (iv) only
(b) (i), (ii) and (iv) only
(c) (i), (ii), (iii), (iv) and (v) only
(d) (ii) and (v) only

**164.** Foetal ejection reflex in human female is induced by
(a) release of oxytocin from pituitary
(b) fully developed foetus and placenta
(c) differentiation of mammary glands
(d) pressure exerted by amniotic fluid

**165.** Natality is the characteristic of a population which means
(a) the total number of individuals present per unit area at a given time
(b) the increase in number of individuals in a population under given environmental conditions
(c) loss of individuals due to death in a population under given environmental conditions
(d) the movement of individuals into and out of population

**166.** Match the columns and find out the correct combination:

| | Column-I | | Column-II |
|---|---|---|---|
| (A) | Valves | (i) | Closure of semilunar valves |
| (B) | AV node | (ii) | Generate maximum number of action potential per minute |
| (C) | Second heart sound | (iii) | Atrio-ventricular septum |
| (D) | SA node | (iv) | Prevent back flow of blood |

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

**167.** Given below are two statements: one is labelled as **Assertion (A)** and the other is labelled as **Reason (R)**.
**Assertion (A):** Osteoporosis is characterised by decreased bone mass and increased chances of fractures.
**Reason (R):** Common cause of osteoporosis is increased levels of estrogen.
In the light of the above statements, choose the **most appropriate** answer from the options given below:
(a) Both (A) and (R) are correct but (R) is not the correct explanation of (A)
(b) (A) is correct but (R) is not correct
(c) (A) is not correct but (R) is correct
(d) Both (A) and (R) are correct and (R) is the correct explanation of (A)

**168.** Variations caused by mutation, as proposed by Hugo de Vries, are:
(a) random and directional
(b) random and directionless
(c) small and directional
(d) small and directionless

**169.** Match the lists and find the correct match.

| | Column-I | | Column-II |
|---|---|---|---|
| (A) | Platyhelminthes | (i) | Insects |
| (B) | Annelida | (ii) | Crustaceans |
| (C) | Malpighian tubules | (iii) | Nephridia |
| (D) | Antennal gland | (iv) | Flame cells |

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

**170.** Adaptive radiation refers to
(a) evolution of different species from a common ancestor
(b) migration of members of a species to different geographical areas
(c) power of adaptation in an individual to a variety of environments
(d) adaptations due to geographical isolation.

**171.** Match the columns and find out the correct combination:

| | Column-I | | Column-II |
|---|---|---|---|
| (A) | Myosin | (i) | Binds with Ca++ and starts the contraction cycle |
| (B) | Actin | (ii) | Move away from active sites |
| (C) | Tropomyosin | (iii) | Slides towards 'M' line during contraction. |
| (D) | Troponin | (iv) | ATP-binding site |

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

**172.** During muscular contraction which of the following events occur?
(i) 'H' zone disappears
(ii) 'A' band widens
(iii) 'I' band reduces in width
(iv) Myosine hydrolyzes ATP, releasing the ADP and Pi.
(v) Z-lines attached to actins are pulled inwards.
Choose the correct answer from the options given below:
(a) (ii), (iv), (v), (i) only
(b) (i), (iii), (iv), (v) only
(c) (i), (ii), (iii), (iv) only
(d) (ii), (iii), (iv), (v) only

**173.** Match the columns and choose the appropriate option.

| | Column-I | | Column-II |
|---|---|---|---|
| (A) | Cerebrum | (i) | Controls urge for eating |
| (B) | Cerebellum | (ii) | Corpora quadrigemina |
| (C) | Hypothalamus | (iii) | has very convoluted surface in order to provide the additional space for may more neurons |
| (D) | Mid brain | (iv) | Cerebral hemispheres |

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

**174.** **Statement I:** Crop is used for storing of food in cockroach
**Statement II:** Hepatic caeca of cockroach produce digestive enzyme.
In the light of the above statements, choose the correct answer from the options given below:
(a) Both Statement I and Statement II are incorrect
(b) Statement I is correct but Statement II is incorrect
(c) Statement I is incorrect but Statement II is correct
(d) Both Statement I and Statement II are correct

**175.** The kind of epithelium which forms the inner walls of blood vessels is
(a) cuboidal epithelium
(b) columnar epithelium
(c) ciliated columnar epithelium
(d) squamous epithelium

**176.** Myoglobin is present in
(a) all muscle fibres
(b) white muscle fibres only
(c) red muscle fibres only
(d) both white and red muscle fibres

**177.** Mast cells are associated with
(a) exocrine glands
(b) endocrine glands
(c) areolar connective tissue
(d) neural tissue

**178.** **Assertion (A):** Insect-resistant transgenic cotton has been produced by inserting Bt gene.
**Reason (R):** The Bt gene is derived from a bacterium.
In the light of the above statements, choose the correct answer from the options given below:
(a) Both (A) and (R) are correct but (R) is not the correct explanation of (A)
(b) (A) is correct but (R) is not correct
(c) (A) is not correct but (R) is correct
(d) Both (A) and (R) are correct and (R) is the correct explanation of (A)

**179.** Man, in the life cycle of *Plasmodium*, is
(a) primary host (b) secondary host
(c) intermediate host (d) None of these

**180.** The most active phagocytic white blood cells are
(a) neutrophils and monocytes
(b) neutrophils and eosinophils
(c) lymphocytes and macrophages
(d) eosinophils and lymphocytes

**181.** Human insulin is being commercially produced from a transgenic species of
(a) *Escherichia* (b) *Mycobacterium*
(c) *Rhizobium* (d) *Saccharomyces*

**182.** Match the columns and find out the correct combination:

| | Column-I | | Column-II |
|---|---|---|---|
| (A) | Pineal gland | (i) | 24 hour rhythm of body |
| (B) | Pituitary gland | (ii) | Humoral immunity |
| (C) | Thyroid gland | (iii) | Regulate spermatogenesis |
| (D) | Thymus | (iv) | Tetraiodothyronine |

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

**183.** Match the column-I with column-II and choose the correct option.

| | Column I | | Column II |
|---|---|---|---|
| A. | Semen | (i) | Clitoris |
| B. | Birth canal | (ii) | Testicular lobules |
| C. | Penis | (iii) | Vagina |
| D. | Seminiferous tubule | (iv) | Seminal plasma |

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

**184.** Match column -I with column -II and select the correct option.

| | Column-I | | Column-II |
|---|---|---|---|
| A. | Mesozoic | I. | Paleozoic |
| B. | Devonian | II. | Lycopods |
| C. | Cenozoic | III. | Jurassic |
| D. | Permian | IV. | Bryophytes |

(a) A – I; B – IV; C – III; D – II
(b) A – III; B – I; C – IV; D – II
(c) A – IV; B – I; C – II; D – III
(d) A – II; B – I; C – IV; D – III

**185.** Human immuno deficiency virus (HIV) has a protein coat and a genetic material which is
(a) single stranded DNA
(b) double stranded DNA
(c) single stranded RNA
(d) double stranded RNA

## Section-B

**186.** Reproductive health in society can be improved by–
(i) Introduction of sex education in schools.
(ii) Increased medical assistance
(iii) Awareness about contraception and STDs
(iv) Equal opportunities to male and female child.
(v) Ban on amniocentesis for sex determination.
(a) All
(b) (i), (ii) and (iv) only
(c) (i), (ii), (iii) and (iv) only
(d) (ii) and (v) only

**187.** Which of the following forms the basis of DNA finger printing?
(a) The relative proportions of purines and pyrimidines in DNA.
(b) Satellite DNA occurring as highly repeated short DNA segments.
(c) The relative difference in the DNA occurrence in blood, skin and saliva.
(d) The relative amount of DNA in the ridges and grooves of the fingerprints.

**188.** Which of the following features are correct for *Homo erectus*?
(i) Had a large brain.
(ii) Probably ate meat.
(iii) Appeared about 1.5 mya year ago.
(iv) Evolved from *H. habilis*.
(v) Brain size was 900 cc.
(a) (i) and (ii) only
(b) (iii), (iv) and (v) only
(c) None of these
(d) All of these

**189.** **Statement I:** Virus infected cells secrete proteins called interferons.
**Statements II:** Interferons protect infected cells from further viral infection.
In the light of the above statements, choose the correct answer from the options given below:
(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.

**190.** The function of rennin is
(a) vasoconstriction
(b) temperature regulation
(c) degradation of angiotensinogen
(d) regulation of blood pressure

**191.** Heart is covered by
(a) Peritoneum
(b) Pleural membrane
(c) Pericardium
(d) Visceral membrane

**192.** Which of the following is incorrect?
(a) Iodine is needed for thyroxine formation.
(b) Calcium regulates the excitibility of nerve fibres.
(c) Potassium plays an important role in the regulation of acid base balance in cell.
(d) Phosphorus helps to maintain the osmotic pressure of the body fluids.

**193.** An adult healthy human with average blood pressure has systolic and diastolic pressures as
(a) 80mm Hg and 80 mm Hg
(b) 70 mm Hg and 120 mm Hg
(c) 120 mm Hg and 80 mm Hg
(d) 50 mm Hg and 80 mm Hg

**194.** Reabsorption of water in distal parts of kidney tubules/urine formation is controlled by
(a) relaxin (b) calcitonin
(c) oxytocin (d) vasopressin

**195.** **Statement I:** Restriction endonuclease recognise specific sequence to cut DNA known s palindromic nucleotide sequence.
**Statement II:** Restriction endonuclease cut the DNA strand a little away from the centre of the palindromic site.
In the light of the above statements, choose the correct answer from the options given below:
(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.

**196.** Select the correct events that occur during inspiration.
(i) Contraction of diaphragm
(ii) Contraction of external inter-costal muscles
(iii) Pulmonary volume decreases
(iv) Intra pulmonary pressure increases
(a) (iii) and (iv) only
(b) (i), (ii) and (iv) only
(c) Only (iv) only
(d) (i) and (ii) only

**197.** **Statement I:** Genetic modifications has decreased efficiency of mineral uses by plants.
**Statement II:** GMO plants prevent early exhaustion of fertility of soil.
In the light of the above statements, choose the correct answer from the options given below:
(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.

**198.** Read the following statements on lipids and find out correct set of statements:
(i) Lecithin found in the plasma membrane is a glycolipid
(ii) Saturated fatty acids possess one or more c = c bonds
(iii) Lipids are not strictly macromolucules
(iv) Lipids are generally insoluble in water but soluble in some organic solvents
(v) When fatty acid is esterified with glycerol, monoglycerides are formed
Choose the correct answer from the options given below:
(a) (i), (iv) and (v) only
(b) (iii), (iv) and (v) only
(c) (i), (ii) and (iv) only
(d) (i), (ii) and (iii) only

**199.** Select the option including all sexually transmitted diseases.
(a) Gonorrhoea, Malaria, Genital herpes
(b) AIDS, Malaria, Filaria
(c) Cancer, AIDS, Syphilis
(d) Gonorrhoea, Syphilis, Genital herpes

**200.** **Statement I:** The digestive system in platyhelminthes has only a single opening and serves as both mouth and anus.
**Statement II:** Organ level of organisation is exhibited by members of platyhelminthes.
In the light of the above statements, choose the correct answer from the options given below:
(a) Both Statement I and Statement II are incorrect
(b) Statement I is correct but Statement II is incorrect
(c) Statement I is incorrect but Statement II is correct
(d) Both Statement I and Statement II are correct

# ANSWER KEY & SOLUTIONS

## MOCK TEST - 1

| ANSWER KEY | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **1** | (b) | **21** | (b) | **41** | (a) | **61** | (b) | **81** | (b) | **101** | (d) | **121** | (d) | **141** | (a) | **161** | (a) | **181** | (a) |
| **2** | (c) | **22** | (d) | **42** | (a) | **62** | (b) | **82** | (b) | **102** | (b) | **122** | (b) | **142** | (a) | **162** | (c) | **182** | (a) |
| **3** | (c) | **23** | (a) | **43** | (d) | **63** | (d) | **83** | (b) | **103** | (c) | **123** | (a) | **143** | (d) | **163** | (c) | **183** | (d) |
| **4** | (c) | **24** | (b) | **44** | (c) | **64** | (c) | **84** | (c) | **104** | (a) | **124** | (b) | **144** | (d) | **164** | (b) | **184** | (b) |
| **5** | (a) | **25** | (d) | **45** | (c) | **65** | (c) | **85** | (b) | **105** | (d) | **125** | (a) | **145** | (a) | **165** | (b) | **185** | (c) |
| **6** | (c) | **26** | (c) | **46** | (b) | **66** | (a) | **86** | (b) | **106** | (a) | **126** | (b) | **146** | (a) | **166** | (b) | **186** | (a) |
| **7** | (a) | **27** | (d) | **47** | (a) | **67** | (a) | **87** | (a) | **107** | (c) | **127** | (d) | **147** | (a) | **167** | (b) | **187** | (b) |
| **8** | (a) | **28** | (d) | **48** | (d) | **68** | (b) | **88** | (a) | **108** | (a) | **128** | (a) | **148** | (a) | **168** | (b) | **188** | (d) |
| **9** | (d) | **29** | (b) | **49** | (a) | **69** | (c) | **89** | (c) | **109** | (a) | **129** | (b) | **149** | (b) | **169** | (d) | **189** | (c) |
| **10** | (c) | **30** | (a) | **50** | (a) | **70** | (a) | **90** | (c) | **110** | (a) | **130** | (b) | **150** | (a) | **170** | (a) | **190** | (d) |
| **11** | (b) | **31** | (c) | **51** | (a) | **71** | (d) | **91** | (c) | **111** | (a) | **131** | (b) | **151** | (c) | **171** | (a) | **191** | (c) |
| **12** | (a) | **32** | (c) | **52** | (d) | **72** | (d) | **92** | (a) | **112** | (d) | **132** | (a) | **152** | (d) | **172** | (b) | **192** | (d) |
| **13** | (c) | **33** | (c) | **53** | (b) | **73** | (d) | **93** | (d) | **113** | (b) | **133** | (a) | **153** | (a) | **173** | (d) | **193** | (c) |
| **14** | (a) | **34** | (c) | **54** | (b) | **74** | (a) | **94** | (b) | **114** | (c) | **134** | (a) | **154** | (c) | **174** | (d) | **194** | (d) |
| **15** | (b) | **35** | (b) | **55** | (c) | **75** | (a) | **95** | (c) | **115** | (c) | **135** | (d) | **155** | (b) | **175** | (d) | **195** | (a) |
| **16** | (None) | **36** | (d) | **56** | (a) | **76** | (b) | **96** | (c) | **116** | (b) | **136** | (a) | **156** | (c) | **176** | (d) | **196** | (d) |
| **17** | (a) | **37** | (a) | **57** | (d) | **77** | (c) | **97** | (b) | **117** | (a) | **137** | (b) | **157** | (b) | **177** | (c) | **197** | (d) |
| **18** | (b) | **38** | (c) | **58** | (a) | **78** | (c) | **98** | (b) | **118** | (a) | **138** | (d) | **158** | (d) | **178** | (a) | **198** | (b) |
| **19** | (c) | **39** | (a) | **59** | (c) | **79** | (d) | **99** | (d) | **119** | (a) | **139** | (a) | **159** | (a) | **179** | (b) | **199** | (d) |
| **20** | (a) | **40** | (d) | **60** | (a) | **80** | (a) | **100** | (a) | **120** | (b) | **140** | (c) | **160** | (b) | **180** | (a) | **200** | (d) |

### PART-I : PHYSICS

**1.** **(b)** $\text{Torque} = F(N) \times r_{\perp}(m) \rightarrow \text{Nm}$

$$\text{Stress} = \frac{\text{Force (N)}}{\text{Area}(m^2)} \rightarrow \text{N/m}^2$$

$$\text{Latent heat} = \frac{\text{Energy (J)}}{\text{Mass (kg)}} \rightarrow \text{J kg}^{-1}$$

$$\text{Power} = \frac{\text{Work (Nm)}}{\text{Time (s)}} \rightarrow \text{N ms}^{-1}$$

**2.** **(c)** In '$t$' sec, $S = 10$ m

So, $10 = \frac{1}{2}at^2$ ...(i)

In next '$t$' sec, suppose body travel $S'$ distance

Then, $10 + S' = \frac{1}{2}a(2t)^2$ ...(ii)

Dividing (ii) by (i), we get

$$\Rightarrow \frac{10 + S'}{10} = 4 \quad \Rightarrow 10 + S' = 40 \quad \Rightarrow S' = 30m$$

**3.** **(c)** Time to complete 1/4th oscillation is $\frac{T}{4}$ s.

Time to complete $\frac{1}{8}$ th vibration from extreme position is obtained from

$$y = \frac{a}{2} = a\cos\omega t = a\cos\frac{2\pi}{T}t \text{ or } t = \frac{T}{6}s$$

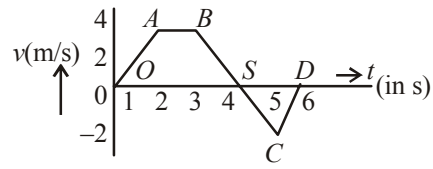
So time to complete 3/8th oscillation

$$= \frac{T}{4} + \frac{T}{6} = \frac{5T}{12}$$

**4.** **(c)** $I_1 \omega_1 : I_2 \omega_2$ or $M K_1^2 \omega_1 : M K_2^2 \omega_2$

$$\frac{K_1}{K_2} = \sqrt{\left(\frac{\omega_2}{\omega_1}\right)}$$

**5.** **(a)**




$$OS = 4 + \frac{1}{3} = \frac{13}{3};\ SD = 2 - \frac{1}{3} = \frac{5}{3}$$

Distance covered by the body = area of *v*-*t* graph = ar (*OABS*) + ar (*SCD*)

$$= \frac{1}{2}\left(\frac{13}{3} + 1\right) \times 4 + \frac{1}{2} \times \frac{5}{3} \times 2 = \frac{32}{3} + \frac{5}{3} = \frac{37}{3}\ \text{m}$$

**6.** **(c)** Work function of aluminium is 4.2 eV. The energy of two photons can not be added at the moment photons collide with electron all its energy will be dissipated or wasted as this energy is not sufficient to knock it out. Hence emmission of electron is not possible.

**7.** **(a)** $C_1 = C$, $V_1 = V_0$, $C_2 = KC$, $V_2 = 0$ and $V_{common} = V$

We know that

$$V_{common} = \frac{C_1 V_1 + C_2 V_2}{C_1 + C_2}$$

$$\therefore \quad V_{common} = \frac{CV_0 + KC \times O}{C + KC} \text{ or } K = \frac{V_0}{V} - 1$$

**8.** **(a)** Current flowing through the conductor, I = n e v A. Hence

$$\frac{4}{1} = \frac{n e v_{d_1} \pi (1)^2}{n e v_{d_2} \pi (2)^2} \text{ or } \frac{v_{d_1}}{v_{d_2}} = \frac{4 \times 4}{1} = \frac{16}{1}.$$

**9.** **(d)** As range and maximum height are equal, R = H

$$\Rightarrow \frac{2v_x - v_y}{g} = \frac{v_y^2}{2g}$$

$$\Rightarrow v_x = \frac{v_y}{4} \Rightarrow u \cos\theta = \frac{u \sin\theta}{4} \Rightarrow \tan\theta = 4$$

**10.** **(c)** For monatomic gas, f = 3,

$$C_v = \frac{3R}{2}, C_p = \frac{5R}{2};\ \frac{C_v}{C_p} = \frac{3}{5}$$

For diatomic gas, f = 5

$$C_v = \frac{5R}{2}, C_p = \frac{7R}{2};\ \frac{C_v}{C_p} = \frac{5}{7}$$

**11.** **(b)** From law of conservation of charge $q_i = q_f$

$$\Rightarrow 64q = Q \Rightarrow \frac{Q}{q} = 64$$

and, $\frac{4}{3}\pi R^3 = 64 \times \frac{4}{3}\pi r^3$

$$\Rightarrow R = 4r \Rightarrow \frac{r}{R} = \frac{1}{4}$$

So, $\frac{\sigma_{bigger}}{\sigma_{smaller}} = \frac{\frac{Q}{4\pi R^2}}{\frac{q}{4\pi r^2}}$

$$= \frac{Q}{q} \times \left(\frac{r}{R}\right)^2 = 64 \times \frac{1}{16} = \frac{4}{1}$$

**12.** **(a)** The photoelectric current from a given photocell depends upon the number of photons striking per second. As the photocurrent is directly proportional to number of photoelectrons which, in turn, are proportional to the number of photons of light striking per second. Only the kinetic energy of the ejected photoelectrons depends on the frequency of radiation.

**13.** **(c)** Since moment of inertia $I = mr^2$, where m is the mass of body & r is distance of it from the fixed axis.

mass = density × volume $\{\because \rho = \text{density}\}$

$M_A = \rho\pi r^2 t$; $I_A = \frac{\rho\pi r^2 t}{2}$

$M_B = \rho\pi r^2\, 16 \times t/4 = 4\rho\pi r^2 t$

$$I_B = \frac{M_B (4r)^2}{2} = \frac{4\rho\pi r^2 t.16t^2}{2}$$

$$= \frac{64\rho\pi r^2 4t}{2}$$

$\therefore I_B > I_A$

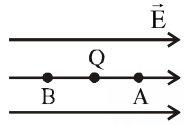
**14.** **(a)** Einstein's photoelectric effect & compton effect established particle nature of light. These effects can be explained only, when we assume that the light has particle nature (To explain, Interference & Diffraction the light must have wave nature. It means that light has both particle and wave nature, so it is called dual nature of light)

**15.** **(b)** $\frac{\Delta\ell}{\ell} = \alpha \Delta T = 10^{-5} \times 100 = 10^{3}$

$\frac{\Delta\ell}{\ell} \times 100\% = 10^{-3} \times 100$

$= 10^{-1} = 0.1\%$

**16.** **(None)**




At point '*A*' electric field will increase
At point '*B*' electric field will decrease.
In non uniform field, when dipole is placed at a point where electric field is maximum, then force experienced by it is zero.

**17.** **(a)** We known that

$$\mu = \frac{\sin\left(\frac{A+\delta m}{2}\right)}{\sin\left(\frac{A}{2}\right)} \Rightarrow \cot\frac{A}{2} = \frac{\sin\left(\frac{A+\delta m}{1}\right)}{\sin\left(\frac{A}{2}\right)}$$

$$\Rightarrow \cos\left(\frac{A}{2}\right) = \sin\left(\frac{A+\delta m}{2}\right)$$

$$\Rightarrow \sin\left(\frac{\pi}{2} - \frac{A}{2}\right) = \sin\left(\frac{A}{2} + \frac{\delta m}{2}\right)$$

$$\Rightarrow \frac{\pi}{2} - \frac{A}{2} = \frac{A}{2} + \frac{\delta m}{2} \Rightarrow \frac{\pi}{2} - A = \frac{\delta m}{2}$$

$\therefore \delta m = \pi - 2A$

**18.** **(b)** $a = \frac{M_2 g - M_1 g}{M_1 + M_2}$

When, $M_2 = 2\, m_1$

$$\Rightarrow a_1 = \frac{2M_1 g - M_1 g}{3M_1} = \frac{g}{3}$$

When $M_2 = 3M_1 \Rightarrow a_2 = \frac{3M_1 g - M_1 g}{4M_1} = \frac{g}{2}$

The ratio $\frac{a_1}{a_2} = \frac{\frac{g}{3}}{\frac{g}{2}} = \frac{2}{3}$

**19.** **(c)** Ohm's law is not obeyed by vacuum tubes. Semiconductors, transistors or diodes do not follow Ohm's law. They are also called non-ohmic devices.

**20.** **(a)** $\frac{140-32}{9} = \frac{C}{5}$ or $\frac{700-160}{9} = C$

or $C = 60°C$

**21.** **(b)** The bullets are fired at the same initial speed

$$\frac{H}{H'} = \frac{u^2 \sin^2 60°}{2g} \times \frac{2g}{u^2 \sin^2 30°} = \frac{\sin^2 60°}{\sin^2 30°}$$

$$= \frac{(\sqrt{3}/2)^2}{(1/2)^3} = \frac{3}{1}$$

**22.** **(d)** Total resistance of the circuit
$= 4000 + 400 = 4400\,\Omega$

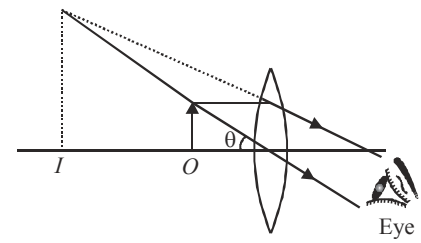
Current flowing $i = \frac{V}{R} = \frac{440}{4400} = 0.1\ amp.$

Voltage across load = R i
$= 4000 \times 0.1 = 400$ volt.

**23.** **(a)** $E = \frac{V}{\ell} = \frac{10}{10} = 1\ Vm^{-1}$

**24.** **(b)**

**25.** **(d)** Image size is bigger than object size, the angular size of the image is equal to the angular size of object.




**26.** **(c)** A corresponds to transition from $n = \infty$ to $n = 1$.
It is a series limit of Lymen series.
B corresponds to transition from $n = 5$ to $n = 2$.
It is a third member of Balmer series.
C corresponds to transition from $n = 5$ to $n = 3$, thus, it is second member of Paschen series.

**27.** **(d)** $\lambda_{micro} > \lambda_{infrared} > \lambda_{ultraviolet} > \lambda_{gamma}$

**28.** **(d)** Velocity after the collision

$$= \frac{10\times10+5\times0}{15} = \frac{100}{15} = \frac{20}{3}\,\text{m/sec}.$$

**29.** **(b)**

**30.** **(a)** For adiabatic process, $V \propto T^{\frac{1}{1-\gamma}}$

And for isothermal process, temperature is constant.

Let $\gamma = 1.5$

then, $V \propto \frac{1}{T^2}$

Hence, (c) is the correct *V-T* graph.

Also for adiabatic process, $P \propto T^{\frac{r}{\gamma-1}}$

Let $\gamma = 1.5$

Then, $P \propto T^3$

Hence, (d) is the correct *P-T* graph.

**31.** **(c)** $v_{oxg.} = \sqrt{\frac{3R\times289}{32}}$

$\left(v_{rms} = \sqrt{\frac{3RT}{M}}\right)$

$v_H = \sqrt{\frac{3R\times400}{2}}$ so $v_H = 2230.59$ m/sec

**32.** **(c)** For the observation of interference phenomenon, the two source must be coherent & must have same frequency.

**33.** **(c)** The direction of oscillations of *E* and *B* fields are perpendicular to each other as well as to the direction of propagation. So, electromagnetic waves are transverse in nature. The electric and magnetic fields oscillate in same phase.

**34.** **(c)** Electric field due to infinite sheet is given by $E=\frac{\bar{0}}{2\epsilon_0}$, clearly $|\vec{E}|$ is independent of distance

So, $E_1 = E_2 = \frac{\bar{0}}{2\,\epsilon_0}$

**35.** **(b)** $v_e = \sqrt{2}v_o$ where $v_e$ and $v_o$ are the escape velocity and orbital velocity respectively.

**36.** **(d)**

(I) **Adiabatic process:** No exchange of heat takes place with surroundings. $\therefore \Delta Q = 0$

(II) **Isothermal process:** Temperature remains constant.

$$\therefore \Delta T = 0 \Rightarrow \Delta U = \frac{f}{2}nR\Delta T \Rightarrow \Delta U = 0$$

No change in internal energy [$\Delta U = 0$].

(III) **Isochoric process:** Volume remains constant

$$\Delta V = 0 \Rightarrow W = \int P\cdot dV = 0$$

Hence work done is zero.

(IV) **In isobaric process:** Pressure remains constant.

$$W = P\cdot\Delta V \neq 0$$

$$\Delta U = \frac{f}{2}nR\Delta T = \frac{f}{2}[P\Delta V] \neq 0$$

$$\therefore \Delta Q = nC_p\Delta T \neq 0$$

**37.** **(a)** $G = 15\Omega$, $i_g = 4$ mA, $i = 6$ A

Required shunt,

$$S = \left(\frac{i_g}{i-i_g}\right)G = \left(\frac{4\times10^{-3}}{6-4\times10^{-3}}\right)\times15$$

$$= \frac{4\times10^{-3}}{5.996}\times15 = 0.01\Omega$$

$= 10\text{m}\Omega$ (in parallel)

**38.** **(c)** $Y = \frac{F\ell}{A\Delta\ell} \Rightarrow \Delta\ell = \frac{F\ell}{YA} = \frac{mg\ell}{YA}$

**39.** **(a)** We have $PV = nRT \Rightarrow V = \frac{nR}{P}T$

$V = mT$, where $m$ = slope of $v - T_{curve} = \frac{nR}{P}$

Now, as $m_2 > m_1 \Rightarrow \frac{nR}{P_2} > \frac{nR}{P_1} \Rightarrow P_2 < P_1$

**40.** **(d)** For streamline flow, all are correct.

**41.** **(a)** Given : T/2 = 0.5 s

$\therefore$ T = 1s

Frequency, $f = \frac{1}{T} = \frac{1}{1} = 1\text{Hz}$

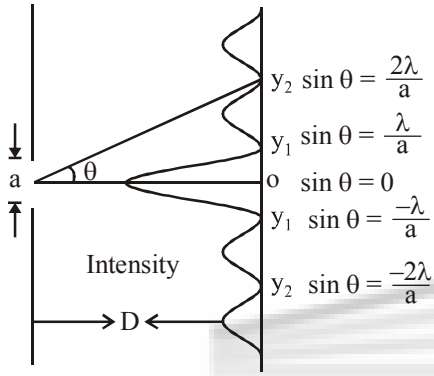
If A is the amplitude, then

$2A = 50\,cm \Rightarrow \quad A = 25\,cm.$

**42.** **(a)** Width of central maximum

$$= \frac{2\lambda D}{a} = \frac{2\times 6250\times 10^{-10}\times 0.5}{2\times 10^{-4}}$$

$$= 3125\times 10^{-6}\,m = 312.5\times 10^{-3}\,cm.$$




Screen position of various minima for Fraunhoffer diffraction pattern of a single slit of width a.

**43.** **(d)** In a p-type semic-onductor germanium is doped with trivalent element. All the elements, like aluminium, boron & gallium are trivalent. So, the correct alternative is (d).

**44.** **(c)** For different values of A & B input, obtain output Z.

| *A* | *B* | *X* | *Y* | *Z* |
|---|---|---|---|---|
| 1 | 1 | 0 | 0 | 0 |
| 1 | 0 | 0 | 1 | 0 |
| 0 | 1 | 1 | 0 | 0 |
| 0 | 0 | 1 | 1 | 1 |

Therefore the given circuit represents NOR gate.

**45.** **(c)** $i = \frac{V}{R} = \frac{20}{2\times 10^3} = 10\ mA.$

**46.** **(b)** In forward bi as it will conduct whereas in reverse bias it will not conduct.
So, it will conduct in one direction only.

**47.** **(a)** The chemical reaction of process is

$$2_1^2H \rightarrow {}_2^4He$$

Energy released $= 4\times(7) - 4(1.1) = 23.6\,eV$

**48.** **(d)** Kinetic energy gained by a charged particle accelerated by a potential V is qV

$KE = qV$

$$\Rightarrow \frac{p^2}{2m} = qV \quad \Rightarrow p = \sqrt{2mqV}$$

$$p = \frac{h}{\lambda} \Rightarrow \lambda = \frac{h}{\sqrt{2mqV}}$$

$$\text{now } \frac{\lambda_p}{\lambda_d} = \sqrt{\frac{m_d V_d}{m_p V_p}} \Rightarrow \frac{1}{\sqrt{2}} = \sqrt{\frac{2V_d}{V_p}} \Rightarrow \frac{V_p}{V_d} = 4$$

**49.** **(a)** As $E_y = 540 \sin\pi\times 10^4 (x - ct)\ Vm^{-1}$

So, $E_0 = 540\ Vm^{-1}$

$$B_0 = \frac{E_0}{C} = \frac{540}{3\times 10^8} = 18\times 10^{-7}\,T$$

**50.** **(a)** $A = \sqrt{A_1^2 + A_2^2 + 2A_1A_2\cos\phi}$

where $\phi$ = phase difference

$= [(x - vt + 1.5) - (x - vt)]\times 2\pi$

$= 2\pi\times 1.5 = 3\pi$

So, $A = \sqrt{5^2 + 3^2 + 2.5.3\cos\pi} = \sqrt{4} = 2\,cm.$

## PART-II : CHEMISTRY

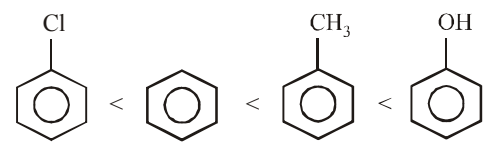
**51.** **(a)** Statement I is correct but statement II is incorrect.
In alkaline medium.

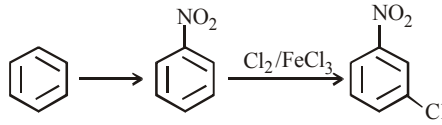
$$S_8 + 12\ OH^{\ominus} \longrightarrow 4S^{2-} + 2S_2O_3 + 6H_2O$$

$$S_8^0 \longrightarrow S^{-2} + S_2^{+3}O_3$$

Hence $S_8$ undergo disproportionation reaction.
In $ClO_4^-$ molecule. The oxidation state of Cl is +7 hence it's in its maximum oxidation state and cannot undergo disproportionation reaction.

**52.** **(d)** Order of increasing reactivity towards electrophilic substitution reaction is:



**53.** **(b)** 


**54.** **(b)** $\text{Molarity(M)} = \frac{n_{NaCl}}{V_{sol}\,(\text{in L})}$

$\Rightarrow \quad M = \frac{\frac{5.85}{58.5}}{0.5} = 0.2\,M$

**55.** **(c)** Chlorination of methane proceeds via free radical mechanism. Conversion of methyl chloride to methyl alcohol proceeds via nucleophilic substitution. Formation of ethylene from ethyl alcohol proceeds via dehydration reaction. Nitration of benzene is electrophilic substitution reaction.

**56.** **(a)** Vapour pressure of solvent is greater than vapour pressure of solution.

Only solvent molecules is solidify at the freezing point.

**57.** **(d)** Rate of formation of B is

$$\frac{d[B]}{dt} = K_1[A] - K_2[B] = 0$$

$$K_1[A] = K_2[B] \Rightarrow [B] = \frac{K_1[A]}{K_2}$$

**58.** **(a)** In a period on moving from left to right ionic radii decreases.

(a) Order of cationic radii is

$Cr^{2+} > Mn^{2+} > Fe^{2+} > Ni^{2+}$ and

(b) $Sc > Ti > Cr > Mn$

(correct order of atomic radii)

(c) For unpaired electrons

$$Mn^{2+}(\text{Five}) > Ni^{2+}(\text{Two})$$

$$< Co^{2+}(\text{Three}) < Fe^{2+}(\text{Four})$$

(d) For unpaired electrons

$$Fe^{2+}(\text{Four}) > Co^{2+}(\text{Three})$$

$$> Ni^{2+}(\text{Two}) > Cu^{2+}(\text{One})$$

**59.** **(c)** For $S_N2$ reaction polar aprotic solvent is needed.

**60.** **(a)** According to the (n + l) rule the higher the value of (n + l), the higher is the energy. When (n + l) value is the same see value of n.

| | i | ii | iii | iv |
|---|---|---|---|---|
| (n + l) | (4 + 1) | (4 + 0) | (3 + 2) | (3 + 1) |
| | 5 | 4 | 5 | 4 |

$\therefore$ iv < ii < iii < i

**61.** **(b)** For adiabatic process, q = 0

**62.** **(b)** $Mn^{2+}$ ($3d^5$) is more stable than $Mn^{3+}$ ($3d^4$).

**63.** **(d)** $KMnO_4$ on heating dissociates as

$$\underset{\text{Permanganate}}{2K\overset{+7}{M}nO_4} \xrightarrow{\Delta} \underset{\text{Manganate}}{K_2\overset{+6}{M}nO_4} + MnO_2 + O_2$$

$Mn^{+7} \Rightarrow 3d^0 4s^0$ (Diamagnetic)

$Mn^{+6} \Rightarrow 3d^1 4s^0$ (Paramagnetic)

Both permanganate and manganate are tetrahedral but only manganate is paramagnetic.

**64.** **(c)** In case of unsymmetrical ethers, the site of cleavage depends on the nature of alkyl group e.g.,

$$CH_3O - CH(CH_3)_2 + HI \xrightarrow{373K}$$

$$\underset{\text{Methyl iodide}}{CH_3I} + \underset{\text{Isopropyl alcohol}}{(CH_3)_2CHOH}$$

The alkyl halide is always formed from the smaller alkyl group.

**65.** **(c)** $(NH_4)_2Cr_2O_7 \xrightarrow{\Delta} N_2 + Cr_2O_3 + 4H_2O$

$KMnO_4 + HCl \longrightarrow MnCl_2 + KCl + Cl_2 + H_2O$

$Al + NaOH + H_2O \longrightarrow H_2 + Na\,[Al(OH)_4]$

$NaNO_3 \longrightarrow NaNO_2 + O_2$

**66.** **(a)** Molality of solution does not depend on the temperature as it depends on the moles of solute and mass of solvent.

Hence, both assertion and reason are true.

**67.** **(a)** $\Delta x.\Delta v = \frac{h}{4\pi m}$

$\Delta v^2 = \frac{h}{4\pi m}$ [Since $\Delta x = \Delta v$]

$\therefore \quad \Delta v = \sqrt{\frac{h}{4\pi m}}$

$\therefore \quad \Delta p = m.\Delta v = m\sqrt{\frac{h}{4\pi m}} = \frac{1}{2}\sqrt{\frac{hm}{\pi}}$

**68.** **(b)** $[NiBr_2Cl_2]^{2-} \rightarrow$ This complex species is tetrahedral as $Br^-$ & $Cl^-$ are weak field ligands.

$[PtBr_2Cl_2]^{2-}$ → As Pt belongs to 5d series. This complex species is square planar.

Both the complex species are optically inactive.

$[NiBr_2Cl_2]^{2-}$, being tetrahedral does not show Geometrical Isomerism.

$[PtBr_2Cl_2]^{2-}$ shows two geometrical isomers.

$Ni^{2+}$ and $Pt^{2+}$ have different configurations. So different magnetic properties.

**69.** **(c)** Hybridisation can be calculated by calculating the no of valence electron and dividing it by 8.

In $SO_4^{2-}$, Total no. of $e^-$

$$= 6 + (6 \times 4) + 2 = 32$$

So, no. of hybrid orbitals $= \frac{32}{8} = 4$

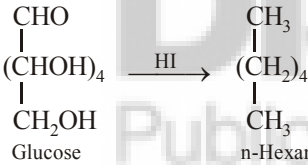
$\therefore$ $sp^3$ hybridization.

Similarly, for $PO_4^{3-}$ ; no. of hybrid orbitals

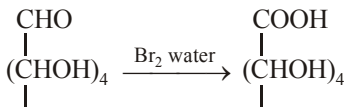
$$= \frac{5+24+3}{8} = \frac{32}{8} = 4$$

Hybridisation = $sp^3$

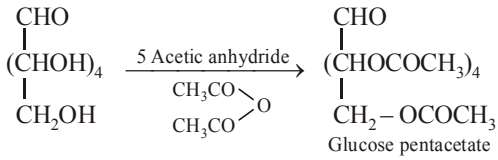
Similarly, for $BF_4^-$ , it is $sp^3$.

**70.** **(a)** (A) 

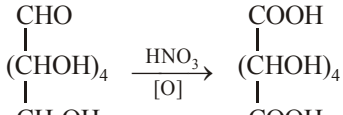
Glucose n-Hexane

(B) 

Gluconic acid

(C) 

Glucose pentacetate

(D) 

Saccharic acid

**71.** **(d)**

**72.** **(d)** HVZ reactions = $Br_2$ / red P

Iodoform reaction = $NaOH + I_2$

Etard reaction = (i) $CrO_2Cl_2$, $CS_2$(ii) $H_2O$

Gattermann–Koch Reaction = CO, HCl, Anhydrous, $AlCl_3$

**73.** **(d)** This reaction shows the formation of $H_2O$, and the $X_2$ represents the enthalpy of formation of $H_2O$ because as the definition suggests that the enthalpy of formation is the heat evolved or absorbed when one mole of substance is formed from its constituent atoms.

**74.** **(a)** Both the statements are correct.

**75.** **(a)** E > C > D > A > B [E is resonance stabilized with an EWG]

**76.** **(b)** Ni in zero oxidation state with any ligand always form tetrahedral complex with $sp^3$ hybridization.

$Ni^{2+}$ ion with strong field ligand (SFL) form square planar complex with $dsp^2$ hybridisation.

$Ni^{2+}$ ion with weak field ligand (WFL) such as $Cl^-$ form tetrahedral complex.

$[Ni(CN)_4]^{2-}$: $d^8$ configuration, SFL, sq. planar splitting ($dsp^2$), diamagnetic.

$[Ni(CO)_4]$: $d^{10}$ configuration (after excitation), SFL, tetrahedral splitting ($sp^3$), diamagnetic.

$[NiCl_4]^{2-}$: $d^8$ configuration, WFL, tetrahedral splitting ($sp^3$), paramagnetic (2 unpaired $e^-$).

**77.** **(c)** $AB \rightleftharpoons A^+B^-$ ; $K_{sp} = \frac{[A^+][B^-]}{[AB]}$

Salt will precipitate if ionic conc. > $K_{sp}$

$[A^+][B^-] > 1 \times 10^{-8}$

$(1 \times 10^{-3})[B^-] > 1 \times 10^{-8}$

$$[B^-] > \frac{1 \times 10^{-8}}{1 \times 10^{-3}} \text{ or } 1 \times 10^{-5}$$

**78.** **(c)** The hydrolysis of sucrose by boiling with mineral acid or by enzyme invertase or sucrase produces a mixture of equal molecules of D(+) glucose and D(–) Fructose.

$$\underset{\substack{\text{sucrose}\\ [\alpha_D]=+66.5^\circ}}{C_{12}H_{22}O_{11}} + H_2O \xrightarrow{HCl} \underbrace{\underset{\substack{\text{D-glucose}\\ [\alpha_D]=+52.5^\circ}}{C_6H_{12}O_6} + \underset{\substack{\text{D-Fructose}\\ [\alpha_D]=-92^\circ}}{C_6H_{12}O_6}}_{\text{Invert sugar, } [\alpha_D]=-20^\circ}$$

**79.** **(d)** In $CO_2$ we have 22 (6 + 8 + 8 = 22) electrons. In $(CN_2^{2-})$, we have 22 (6 + 7 + 7 + 2 =22) electrons. Both $CO_2$ and $(CN_2^{2-})$ have linear

structures. Thus, statement (a) is correct.

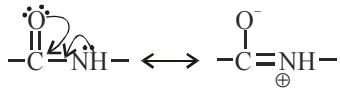
$$Mg_2C_3 + 4H_2O \longrightarrow \underset{\text{Propyne}}{2Mg(OH)_2 + CH_3C \equiv CH}$$

i.e., statement (b) is also correct .

The structure of $CaC_2$ is of NaCl type

i.e., statement (c) is also correct.

**80.** **(a)** Due to resonance C — N bond in protein acquires double bond character and is smaller than usual C — N bond.



**81.** **(b)** $NH_4OH \rightleftharpoons NH_4^+ + OH^-$

$NH_4Cl \rightarrow NH_4^+ + Cl^-$

Due to common ion effect of $NH_4^+$, $[OH^-]$ decreases in such extent that only group-III cations can be precipitated, due to their very low $K_{sp}$ in the range of $10^{-38}$.

**82.** **(b)** With the decrease in the electronegativity of central atom the bond angle decreases

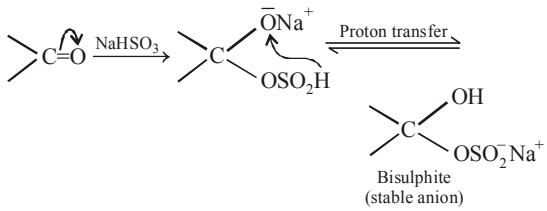
**83.** **(b)** When the concentration of reactant is reduced to half its initial value, the rate is reduced by $\frac{2.4}{0.6} = 4$ times

It means, rate $\propto$ [ reactant]$^2$

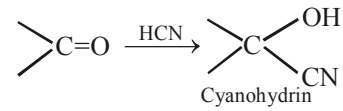
So, order of reaction = 2

**84.** **(c)** Catalyst changes the reaction rate. A reaction cannot happen without the involvement of the molecule $t_{1/2}$ for 1st order reaction is independent of concentration of the reactant. Proper orientation during collision leads to the effective collision resulting into product.

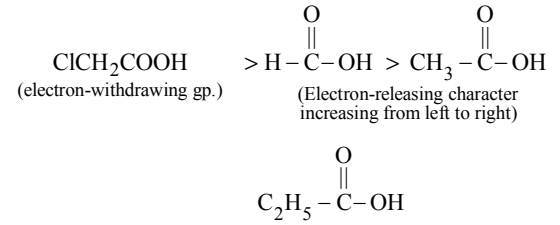
**85.** **(b)** **Statement I :** Correct




**Statement II :** Wrong




**86.** **(b)** Recall that presence of electron-withdrawing group increases, while presence of electron-releasing group decreases the acidity of carboxylic acids.




**87.** **(a)** Butan–l–ol ($CH_3CH_2CH_2CH_2OH$) can undergo hydrogen bonding. Ethoxyethane ($CH_3CH_2–O–CH_2CH_3$) has no hydrogen (attached with F, O, N) which can undergo hydrogen bonding. More is the extent of intermolecular H–bonding, more will be association of molecules. Thus leading to higher boiling point.

Hence both Assertion (A) and Reason(R) are true and (R) is the correct explanation of (A).

**88.** **(a)** Slow step is rate determining step

$\therefore$ Rate law = k $[NOBr_2]$ [NO], $[NOBr_2]$ is the intermediate

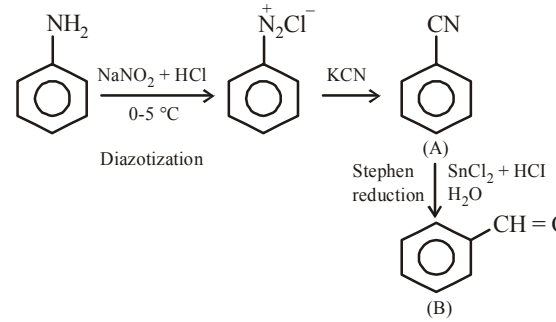
For the fast reaction, $K = \frac{[NOBr_2]}{[NO][Br_2]}$

$\therefore \quad [NOBr_2] = K\,[NO]\,[Br_2]$

$\therefore \quad$ Rate law $= K\,k\,[NO]^2[Br_2]$

$= K'[NO]^2[Br_2]$

**89.** **(c)**



**90.** **(c)** Reaction used in fuel cell is

$$2H_2(g) + O_2(g) \longrightarrow 2H_2O(\ell)$$

At anode : $[H_2 \longrightarrow 2H^+ + 2e] \times 2$

At cathode : $O_2 + 2H_2O + 4e \longrightarrow 4OH^-$

**91.** **(c)** Carbon cannot expand its coordination number beyond four due to the absence of d-orbitals, hence it cannot form $[CCl_6]^{2-}$ ion

**92.** **(a)** Noradrenaline is a neurotransmitter and is released by adrenal medulla. Low level of noradrenaline in the human body causes depression.

| | Solute | y | Complex | y |
|---|---|---|---|---|
| (a) | $PtCl_4$ | 5 | $K_2[PtCl_6]$ | 3 |
| (b) | $ZnCl_2$ | 3 | $Zn[(NH_3)_4]Cl_2$ | 3 |

**93.** **(d)** The equivalent conductivity of a solution,

$$\Lambda_{eq} = \frac{1000}{C} \times \kappa$$

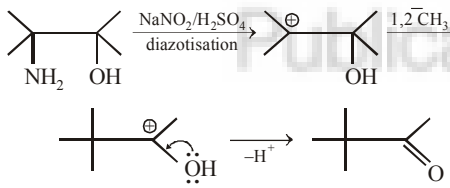
Where,

$\kappa$ = specific conductance = Unit $ohm^{-1}\,cm^{-1}$

C = normality of the solution unit gm eq/$cm^3$

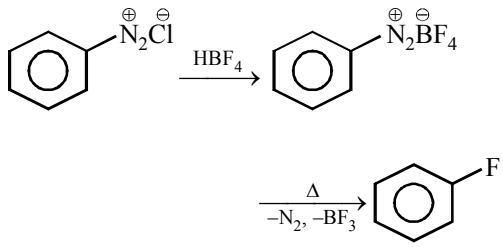
Hence, the unit of $\Lambda_{eq}$ is $Ohm^{-1}.cm^2$ (gm equivalent)$^{-1}$.

**94.** **(b)**




Positive charge better stabilised due to +M effect

**95.** **(c)**




**96.** **(c)** According to Bohr's model

$$v \propto \frac{Z}{n}$$

$Z$ = Atomic no. (corresponds to +ve charge)

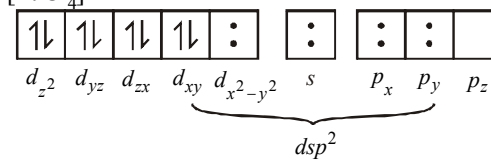
$n$ = Principal quantum no.

This relation suggest that when the $Z$ increases, the velocity will also increase, so statement I is wrong and as '$n$' decreases, velocity will also increase. So statement II is correct.

**97.** **(b)** (A) In case of heavier elements, Pt(5d); $\Delta$(CFSE) > P (Pairing energy)

$\therefore$ Square planar complex with $dsp^2$ is preferable for $[Pt\,Cl_4]^{2-}$

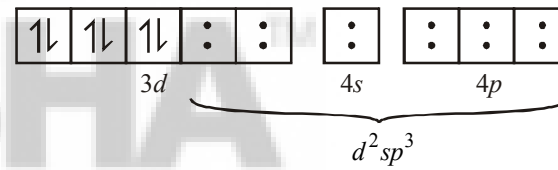
$[Pt\,Cl_4]^{2-}$




(B) $\ddot{B}r\,F_5$ – 5 bond pairs and 1 lone pair of $e^-$.
Hence, $sp^3d^2$ hybridisation.

(C) $PCl_5$ – 5 bond pairs of $e^-$; $sp^3d$ hybridisation.

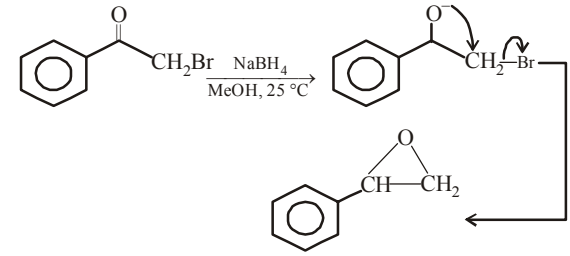
(D) $[Co(NH_3)_6]^{3+}$ : $Co^{3+}(d^6)$
Due to pairing of $e^-$ :




**98.** **(b)** Seliwanoff's test is a differentiating test for ketoses and aldoses. Seliwanoff's reagent is a mixture of conc. HCl and resorcinol. This test relies on the principle that the ketohexoses are more rapidly dehydrated to form 5-hydroxy-methyl furfural when heated in acidic medium which on condensation with resorcinol gives cherry red or brown red coloured complex rapidly indicating a positive test.

Aldose sugars react with the Seliwanoff's reagent to give faint pink colour which intensity with time.

**99.** **(d)**



**100. (a)** $\Delta G^\circ = -nFE^\circ_{cell}$
$= -2 \times (96000) \times 2 = -384000$ J/mol
$= -384$ kJ/mol

## PART-III : BOTANY

**101. (d)** The hormone, which controls cell division and cell differentiation, is cytokinin. Both the auxin and gibberellins cause elongation of cell and plants.

**102. (b)** During aerobic respiration oxygen is consumed and $CO_2$ is released. R.Q. is defined as ratio of volume of $CO_2$ released and $O_2$ consumed by the respiratory substrate.

$$\text{R.Q.} = \frac{\text{Volume of } CO_2}{\text{Volume of } O_2}$$

**103. (c)** Isolated metabolic reaction outside the body performed in a test tube is neither living nor non - living.

**104. (a)**

**105. (d)** The end product of glycolysis is pyruvate. It enters mitochondria and is oxidatively decarboxylated to acetyl CoA before entering into Krebs cycle.

**106. (a)** (A) – (i), (B) – (iv), (C) – (ii), (D) – (iii)

**107. (c)** (A) – (i) (B) – (iii) (C) – (iv) (D) – (ii)

**108. (a)** DNA ligase is the enzyme which helps in joining two fragments of DNA. The enzyme is used in DNA replication as it joints the Okazaki segments (also in proof reading). It also finds its use in genetic engineering as it can join two or more desired nucleotide sequences of DNA.

**109. (a)**

**110. (a)** A-(ii); B-(iv); C-(i); D-(iii)

**111. (a)** (a)-(iii) (B)-(ii) (C)-(iv) (D)-(i)

**112. (d)** Both the statements are correct.

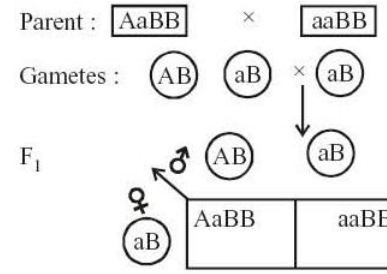
**113. (b)** In the food web, different food chains are interconnected. Each chain is interconnected and consists of different trophic levels i.e. producers, consumers and detrivores. So, kite can also be a part of food web.

**114. (c)** Embryo sac is 7-celled structure. There is a large central cell with two polar nuclei, egg apparatus with egg cell and 2 synergids present at micropylar end and its chalazal end, 3 antipodal cells are present.

**115. (c)**

**116. (b)**

**117. (a)** AaBB × aaBB on crossing gives 50% individuals having genotype AaBB and 50% individuals having genotype aaBB.




**118. (a)** (A)-(ii) (B)-(i) (C)-(iv) (D)-(iii)

**119. (a)** Parthenocarpy is the development of fruits without prior fertilization which results in the formation of seedless fruits. In some plant species, parthenocarpic fruits are produced naturally or they may be induced by treatment of the unpollinated flowers with auxin.
Gibberellins and Auxins are known to induce parthenocarpy in plants. If a tomato plant is treated with a low concentration of auxin and gibberellic acid it'll produce fruits without fertilization i.e. parthenocarpic fruits.

**120. (b)**

**121. (d)** (A)-(ii) (B)-(i) (C)-(iv) (D)-(iii)

**122. (b)** The rate at which organic molecules are formed in a green plant is called gross productivity.

**123. (a)** Food chain is the transfer of energy from green plants (Primary producers), through a sequence of organisms occupies in a food chain is known as its trophic level. Therefore, statements (ii) and (iii) are correct.

**124. (b)**

**125. (a)** Carolus Linnaeus gave the binomial system of nomenclature.

**126. (b)** Well developed vascular system present in the members of pteridophytes but absent in mosses as the plant body is sporophyte which is distinguished into true root, stem and leaves.

**127. (d)** A – (i); B – (ii); C – (iii); D – (iv)

**128. (a)** Association of algae and fungi is referred to as lichen. Symbiotic association of *Rhizobium* with roots of leguminous plants is referred to as symbiosis. Mycorrhiza is symbiotic association between fungi and roots of higher plants. The fungal partner of mycorrhiza obtains food from roots of the higher plant and in return supplies mineral elements to it.

**129. (b)** *Laminaria* (kelp) and *Fucus* (rock weed) are marine algae. They are the members of class-phaeophyceae (brown) algae.

**130. (b)** Vacuoles are present mainly in the plant cells. Each vacuole is surrounded by cytoplasmic membrane called as tonoplast which is similar to plasma membrane.

**131. (b)** (A)-(i) (B)-(iii) (C)-(ii) (D)-(iv)

**132. (a)**

**133. (a)** The linking of antibiotic resistance gene with the plasmid vector became possible with DNA ligase. DNA ligase is an enzyme that is able to join together two portions of DNA and therefore plays an important role in DNA repair. DNA ligase is also used in recombinant DNA technology as it ensures that the foreign DNA is bound to the plasmid into which it is incorporated.

**134. (a)** *In situ* means keeping endangered species of animals or plants into natural environment and not in the environment that looks like natural but man made, like zoological & botanical gardens. *In situ* includes, national parks, sanctuaries and biosphere reserve.

**135. (d)** *Monascus purpureus* is a yeast used in the production of statins which are used in lowering blood cholestrol.

**136. (a)** A – (iv); B – (iii); C – (i); D – (ii)

**137. (b)** DNA or RNA segment tagged with a radioactive molecule is called Probe. They are used to detect the presence of complementary sequences in nucleic acid samples. Probes are used for identification and isolation of DNA and RNA.

**138. (d)** Hot spots are those areas which were rich in biodiversity but now under threat due to direct or indirect interference of human activites. These regions are on the edge to get some of their species extinct due to humans. Western Ghats in India are under threat due to continuous developmental activities and Doon valley is under threat due to continuous mining activities.

**139. (a)** (A) – (ii); (B) – (iii); (C) – (iv); (D) – (i)

**140. (c)** (A) – (iv), (B) – (ii), (C) – (i), (D) – (iii)

**141. (a)** **142. (a)**

**143. (d)** All statements are correct.

**144. (d)** Glycolysis occurs in cytoplasm as all necessary enzymes are found in it. This process is common in aerobic/anaerobic respiration. In this process, one glucose molecule is converted into 2 molecules of pyruvic acid.

**145. (a)**

**146. (a)** In numerical taxonomy numbers and codes are assigned to each observable characteristics and the data is then processed. In this way each character is given equal importance and at the same time hundreds of characters can be considersed.

**147. (a)**

**148. (a)** Energy flow in an ecosystem is unidirectional.

**149. (b)** Ovules develop into seed. Endosperm may be completely consumed by developing embryo.

**150. (a)**

## PART-IV : ZOOLOGY

**151. (c)** Movement of $Ca^{2+}$ out in sarcoplasmic reticulum controls the making and breaking of actin and myosin complex actomyosin due to which muscle contraction and relaxation takes place.

**152. (d)** A-(iii), B-(ii), C-(i), D-(iv)

**153. (a)** Elbow joint is an example of hinge joint. The elbow is a hinge joint; it can open and close like a door. Hinge joint is a form of diarthrosis (freely movable joint) that allows angular movement in one plane only, increasing or decreasing the angle between the bones e.g. elbow joint, knee joint etc.

**154. (c)** (A)-(iii) (B)-(i) (C)-(ii) (D)-(iv)

**155. (b)** Gel electrophoresis is a technique to separation of DNA fragments according to their size. DNA is negatively charged so in gel tank when electric passed, DNA move towards positive electrode.

**156. (c)** The transmission of nerve impulse through synapse requires a chemical neurotransmitter. The most common neurotransmitter is acetylcholine.

**157. (b)** A – (iv); B – (iii); C – (ii), D – (i)

**158. (d)** In proliferative phase, the follicles start developing, called follicular phase. Secretory phase is also called as luteal phase mainly controlled by progesterone secreted by corpus luteum. Menstruation involves breakdown of overgrown endometrial lining.

**159. (a)** Egg is liberated from the ovary (ovulation) at secondary oocyte stage when the meiosis II is arrested in secondary oocyte. It will be induced by the sperm.

**160. (b)** (A)-(ii) (B)-(iii) (C)-(i) (D)-(iv)

**161. (a)**

**162. (c)** Endonuclease are restriction enzymes which cut the DNA internally.

**163. (c)** Reproductive health in society can be improved by creating awareness among people about various reproduction related aspects and providing facilities and support for building up a reproductively healthy society.

**164. (b)** Foetal ejection reflex in human female is induced by fully developed foetus and placenta. When a woman is in a lithotomy or semi-sitting position, the foetal ejection reflex is impaired and the increased pain caused by the sacrum's inability to move as the baby descends can be intolerable.

**165. (b)** **166. (b)**

**167. (b)** Osteoporosis is a age-related disorder characterised by decreased bone mass and increased chances of fractures. Common cause of osteoporosis is due to decreased levels of estrogen.

**168. (b)** According to Hugo de Vries, mutations are random and directionless.

Hugo deVries believed that mutation caused speciation and hence called it saltation (single step large mutation).

**169. (d)** (A)-(iv) (B)-(iii) (C)-(i) (D)-(ii)

**170. (a)** Adaptive radiation refers to evolution of different species from a common ancestor. The mammals are adapted for different mode of life i.e. they show adaptive radiation. They can be aerial (bat), aquatic (whale and dolphins), burrowing or fossorial (rat), cursorial ( horse), scantorial (squirrel) or arboreal (monkey). The adaptive radiation, the term by Osborn, is also known as Divergent evolution.

**171. (a)** (A)-(iv) (B)-(iii) (C)-(ii) (D)-(i)

**172. (b)** Muscle contraction is initiated by the signal that is sent by the central nervous system. In this process certain events occurs such as

(i) The head of the myosin hydrolyses ATP molecule and binds with the active sites of actin and forms the cross bridge.

(ii) The z-line that is connected with actins are pulled inwards and thus causes the shortening of the sarcomeres.

(iii) During the contraction of muscle, 'I' bands reduces and A bands remain the same.

(iv) ADP + Pi are released by myosin and goes back to the relaxed condition.

So option (b) is correct.

**173. (d)** (A)-(iv) (B)-(iii) (C)-(i) (D)-(ii)

**174. (d)**

**175. (d)** Squamous epithelium is formed of thin discoidal and polygonal cells that fit like tiles in a floor, so is also called pavement epithelium. It is found in the walls of blood vessels, in the alveoli of lungs for exchange of gas, and in Bowman's capsule of nephron for ultra filtration.

**176. (d)** Myoglobin is a single-chain globular protein of 153 amino acids, containing a heme (iron-containing porphyrin) prosthetic group in the center around which the remaining apoprotein folds. It has a molecular weight of 16,700 daltons, and is the primary oxygen-carrying pigment of muscle tissues. Unlike the blood-borne

hemoglobin, to which it is structurally related, this protein does not exhibit cooperative binding of oxygen, since positive cooperativity is a property of multimeric/oligomeric proteins only.

**177. (c)**

**178. (a)** Bt-cotton is a transgenic crop. Transgenic plants are those plants, which have foreign gene incorporated in their DNA. This insect-resistant gene is derived from a bacterium, *Bacillus thuringiensis*.

**179. (b)** Malaria is caused by *Plasmodium*. Asexual cycle of *Plasmodium* takes place in man hence, it is secondary host. Sexual cycle of *Plasmodium* occur in mosquito hence, it is called the primary host.

**180. (a)**

**181. (a)** Human insulin is being commercially produced from a transgenic species of *Escherichia coli. E. coli* is a bacterium that is commonly found in the lower intestine of warm blooded animals. The bacteria can also be grown easily and its genetics are comparatively simple and easily manipulated, making it one of the best studied prokaryotic model organisms, and an important species in biotechnology.

**182. (a)** (A)-(i) (B)-(iii) (C)-(iv) (D)-(ii)

**183. (d)** A – (iv), B – (iii), C – (i), D – (ii)

**184. (b)** A-III; B-I; C-IV; D-II

**185. (c)** HIV is a spherical, enveloped virus of about 90-120 nm diameter. Its nucleocapsid is icosahedral and its genome consists of a single-stranded RNA filament segmented into two identical filaments and associated with a "reverse transcriptase enzyme".

**186. (a)** Reproductive health in society can be improved by–

(i) Introduction of sex education in schools.

(ii) Increased medical assistance

(iii) Awareness about contraception and STDs

(iv) Equal opportunities to male and female child.

(v) Ban on amniocentesis for sex determination.

**187. (b)** DNA fingerprinting is a test to identify and evaluate the genetic information-called DNA (deoxyribonucleic acid)-in a person's cells. DNA fingerprinting is a form of identification based on sequencing specific non-coding portions of DNA that are known to have a high degree of variability from person to person. These sections are known as Tandem repeats. The test is used to determine whether a family relationship exists between two people, to identify organisms causing a disease, and to solve crimes.

**188. (d)** ***Homo erectus*** is an extinct species of hominid that lived throughout most of the Pleistocene, with the earliest first fossil evidence dating to around 1.5 million years ago and the most recent to around 70,000 years ago. They had a large brain capacity around 900cc and probably ate meat.

**189. (c)** **190. (d)** **191. (c)**

**192. (d)** Osmotic pressure of body fluids is mainly maintained by the plasma proteins (albumins, globulins) and electrolyte ions ($Na^+$, $K^+$ etc). Phosphorus has nothing to do with the osmotic pressure of body fluids.

**193. (c)** An adult healthy human has average systolic and diastolic blood pressure as given below :

$$\text{B.P.} = \frac{\text{Systolic}}{\text{Diastolic}} = \frac{120 \text{ mm Hg}}{80 \text{ mm Hg}}$$

**194. (d)**

**195. (a)** Both statements are true.

**196. (d)** Inspiration is initiated by the contraction of diaphragm, which increases the volume of thoracic chamber in the anterio-posterior axis. The contraction of external inter-coastal muscles lifts up the ribs and the sternum causing an increase in the volume of the thoracic chamber in the dorso-ventral axis. Mechanism of inspiration is shown in the given diagram.

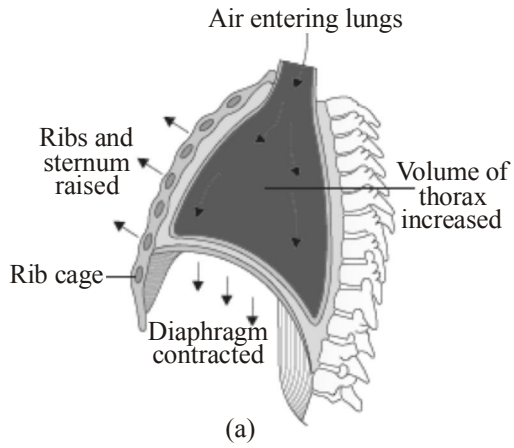



Fig.: Mechanism of breathing showing inspiration

**Note:** Inspiratory Reserve Volume (IRV): Additional volume of air, a person can inspire by a forcible inspiration. This averages 2500 mL to 3000 mL.

**197. (d)**

**198. (b)** Lecithins are mixtures of glycerophospholipids including phosphatidylcholine, phosphatidylethanolamine, phosphatidylinositol, phosphatidylserine, and phosphatidic acid. So, option a is not correct. Saturated fatty acids (SFAs) are made up of a carbon chain with no double bonds. So, option b is not correct.

**199. (d)** Gonorrhoea, Syphilis, Genital herpes are sexually transmitted diseases. Gonorrhoea is caused by a bacterium *Neisseria gonorrhoeae*. Syphilis is caused by a bacterium *Treponema pallidum*. Genital herpes is caused by a virus Type-II-Herpes simplex virus.

**200. (d)** Both statements are correct.