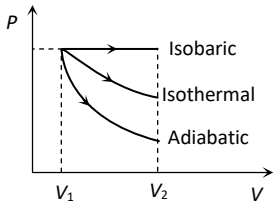
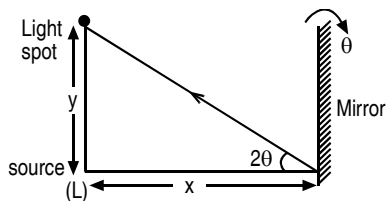


PHYSICS

- 1.(a) We know, $\text{Energy} = \frac{1}{2} LI^2 \Rightarrow L = \frac{\text{Energy}}{I^2} = [ML^2T^{-2}A^{-2}]$
- 2.(d) $\vec{A} \times \vec{B} = \vec{A} \cdot \vec{B} \Rightarrow AB \sin\theta = AB \cos\theta \Rightarrow \tan\theta = 1 \therefore \theta = 45^\circ$
- 3.(b) Let's assume the body fall for t sec.
 Distance travelled in last sec [t^{th} sec] = S_t
 $S_t = u + \frac{1}{2} a(2t - 1) = 0 + \frac{1}{2} \times g(2t - 1) = \frac{g}{2} [2t - 1]$
 Distance traveled in the first three seconds = $\frac{1}{2} g \times 3^2 = \frac{9}{2} \times g = \frac{9}{2} g \therefore \frac{9}{2} g = \frac{g}{2} (2t - 1) \Rightarrow 2t - 1 = 9 \Rightarrow t = 5$ seconds.
- 4.(b) $R_H = 800$ [$\theta = 45^\circ \rightarrow \text{max}^m \text{horizontal range}$]
 From relation, $4H = R \tan\theta$
 $4H = 800 \times 1 \quad H = 200\text{m}$
- 5.(a) Acceleration of the system.
 $a = \left(\frac{m_1 - m_2}{m_1 + m_2} \right) g = \frac{6 - 4}{6 + 4} \times 10 = 2\text{m/s}^2$
- 6.(b)
- 7.(c) For rotational motion, there is no translatory motion. $\therefore \text{Rotational KE} = \frac{1}{2} I \omega^2 = \frac{1}{2} \times \frac{1}{2} m r^2 \times \frac{v^2}{r^2} = \frac{1}{4} m v^2$
- 8.(d) Extreme position $\rightarrow$ velocity minimum, acceleration maximum
 Mean position $\rightarrow$ velocity maximum, acceleration minimum
- 9.(c) PE in the string = $\frac{1}{2} K x^2 \propto x^2$. $\frac{U^1}{U} = \left(\frac{10}{2} \right)^2 = 5^2 = 25, \therefore U^1 = 25U$
- 10.(c) Angle of contact (θ)
 (i) θ is acute ($\theta < 90^\circ$) for a liquid that wets the solid surface (i.e., level of liquid increase for $\theta < 90^\circ$) E.g.: glass and water.
 (ii) $\theta = 90^\circ$ (level of liquid neither increases nor decreases) E.g.: silver and water.
 (iii) θ is obtuse ($\theta > 90^\circ$) for a liquid that does not wet a solid surface (i.e., the level of liquid decreases for $\theta > 90^\circ$) E.g.: mercury and glass capillary.
- 11.(c)
- 12.(d) According to Wein's displacement law, the product of wavelength belonging to maximum intensity and temperature is constant. i.e. $\lambda_m T = \text{Constant}$
- 13.(c) For an isothermal process, $P_1 V_1 = P_2 V_2 \Rightarrow PV = P_2(2V) \Rightarrow P_2 = \frac{P}{2}$
 For an adiabatic process, $P_2 V_2^\gamma = P_3 V_3^\gamma \Rightarrow \left(\frac{P}{2} \right) (2V)^\gamma = P_3 (16V)^\gamma \Rightarrow P_3 = \frac{P}{2} \left(\frac{1}{8} \right)^{5/3} = \frac{P}{64}$
- 14.(b) In a refrigerator, the heat dissipated in the atmosphere is more than that taken from the cooling chamber, therefore the room is heated if the door of a refrigerator is kept open.
- 15.(c) $W = P \Delta V = nR \Delta T = 0.1 \times 2 \times 300 = 60 \text{ cal}$
- 16.(d) We know $v_s = \sqrt{\frac{\gamma P}{\rho}}$ and $v_{rms} = \sqrt{\frac{3P}{\rho}}; \therefore \frac{v}{c} = \sqrt{\frac{\gamma}{3}}$
- 17.(b) $W_{\text{adiabatic}} < W_{\text{isothermal}} < W_{\text{isobaric}}$
- 
- 18.(d) When the mirror is rotated by angle θ , the reflected ray will be rotated by 2θ .
 According to the condition, $\frac{y}{x} = 2\theta \Rightarrow \theta = \frac{y}{2x}$



- 19.(d) Total thickness = t ; Refractive index = μ

Speed of light in a glass plate = $\frac{c}{\mu}$, Time taken = $\frac{t}{(\frac{c}{\mu})} = \frac{\mu t}{c}$

Where, t = thickness of glass plate

- 20.(d) For red light, the focal length of the lens is maximum because $f \propto \lambda$ and λ is maximum for red light.

21.(a) $\delta_m = (\mu - 1)(2r) = (1.5 - 1)2r = 0.5 \times 2r = r$

22.(d) The ratio of slits width $\frac{1}{25}$ (given) $\therefore \frac{I_1}{I_2} = \frac{1}{25}$ or, $\frac{A_1}{A_2} = \sqrt{\frac{I_1}{I_2}} = \frac{1}{5} \Rightarrow A_2 = 5A_1$ As we know

$$\frac{A_{\max}}{A_{\min}} = \frac{A_1 + A_2}{A_1 - A_2} = \frac{5 + 1}{5 - 1} = \frac{6}{4} = \frac{3}{2}$$

$$\therefore \frac{I_{\max}}{I_{\min}} = \frac{A_{\max}^2}{A_{\min}^2} = \left(\frac{3}{2}\right)^2 = \frac{9}{4}$$

- 23.(c) It is caused due to turning of light around corners.

24.(a)

- 25.(d) Since, there is no relative velocity between the source and observer, the apparent frequency 'f' is equal to 200Hz.

- 26.(b) The body does not lose any charge during induction.

- 27.(a) When a high energy X-ray beam falls on the metal sphere, the photoelectric effect takes place and electrons are emitted from the sphere. This makes the sphere positively charged and hence it is deflected in the direction of the electric field.

28.(a) $W = qV = CV \cdot V = CV^2$

29.(b) $\Delta E = E_{\text{Final}} - E_{\text{Initial}} = \frac{1}{2} C (V_{\text{Final}}^2 - V_{\text{Initial}}^2)$

$$= \frac{1}{2} \times 6 \times (20^2 - 10^2) \times 10^{-6} = 3 \times (400 - 100) \times 10^{-6} = 3 \times 300 \times 10^{-6} = 9 \times 10^{-4} \text{J.}$$

- 30.(c) Conductors: Temperature $\uparrow$, Resistivity $\uparrow$, Semiconductors: Temperature $\uparrow$, Resistivity $\downarrow$

31.(c) $\frac{1}{R} = \frac{1}{1} + \frac{1}{1} + \frac{1}{1} = \frac{3}{1} \Rightarrow R = \frac{1}{3} \text{ ohm.}$ Now, such three resistances are joined in series, hence total $R = \frac{1}{3} + \frac{1}{3} + \frac{1}{3} = 1 \text{ ohm.}$

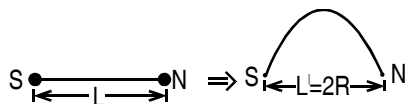
- 32.(b) All appliances are connected in parallel in the house. When a high-power heater is used, a very high current passes through it, so the potential across the main switchboard of the house decreases ($V = E - ir$, here r is the resistance of the main line), which results in a decrease in the intensity of bulbs.

33.(a) $B = \frac{\mu_0 i}{2\pi r}$ i.e. $B \propto \frac{1}{r}$ i.e. when r is doubled, B is halved.

34.(b)

- 35.(b) On bending a rod its pole strength remains unchanged, whereas its magnetic moment changes.

New magnetic moment $M' = m(2R) = m\left(\frac{2L}{\pi}\right) = \frac{2M}{\pi}$.



- 36.(c) Using the tangent law, $\theta = \tan^{-1}\left(\frac{i}{K}\right)$, where K is the constant called the reduction factor. So, Deflection is independent of the number of turns.

37.(b) Energy stored $E = \frac{1}{2} LI^2 = \frac{1}{2} \times 50 \times 10^{-3} \times 4 = 0.1 \text{J}$

- 38.(c) Hot wire ammeter reads rms value of current. Hence its peak value = $i_{\text{rms}} \times \sqrt{2} = 14.14 \text{ amp}$

39.(d)

- 40.(b) Hubble's law states that the speed of a star is directly proportional to distance from the star i.e.

$V \propto r \Rightarrow v = Hr$ Where H is Hubble's constant.

- 41.(c) N-type semiconductors are neutral because neutral atoms are added during doping.

42.(a) On increasing temperature, n_e increases but v_d decreases as per the equation, $v_d = \frac{i}{(n_e) eA}$.

43.(b) Since the diode is in forward bias, $i = \frac{\Delta V}{R} = \frac{4 - (-6)}{10^3} = \frac{10}{10^3} = 10^{-2} \text{ A}$.

44.(c) For NOT gate, $X = \bar{A}$

45.(c) For the Paschen series, $f = \frac{1}{\lambda} = R \left(\frac{1}{3^2} - \frac{1}{n^2} \right)$;

$n = 4, 5, 6, 7, \dots$ For the first member of the Paschen series, $n = 4$

$$\text{So, } \frac{1}{\lambda_1} = R \left(\frac{1}{3^2} - \frac{1}{4^2} \right) = \frac{7R}{144} \Rightarrow R = \frac{144}{7 \lambda_1}$$

For the shortest wavelength, $n = \infty$

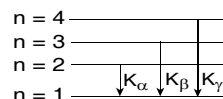
$$\text{So, } \frac{1}{\lambda} = R \left(\frac{1}{3^2} - \frac{1}{\infty^2} \right) = \frac{R}{9} \Rightarrow \lambda = \frac{9}{R} = \frac{9 \times 7 \lambda_1}{144} = \frac{9 \times 7 \times 18,800 \times 10^{-10}}{144} = 8225 \times 10^{-10} = 8225 \text{ \AA}$$

46.(c) $\frac{C^{14}}{C^{12}} = \frac{1}{4} = \left(\frac{1}{2} \right)^{t/5700} \Rightarrow \frac{t}{5700} = 2 \Rightarrow t = 11,400 \text{ years}$

47.(c) Speed of cathode ray is $10^7 \text{ m/sec} = 3 \times 10^7 \text{ m/sec}$.

48.(b) The stopping potential depends only on the frequency of incident light.

49.(c)



50.(d) B.E. of $\text{Li}^7 = 39.20 \text{ MeV}$ and $\text{He}^4 = 28.24 \text{ MeV}$
Hence, the binding energy of $2 {}_2\text{He}^4 = 56.48 \text{ MeV}$,
Energy of reaction = $56.48 - 39.20 = 17.28 \text{ MeV}$

CHEMISTRY

51.(c) 12.5 mL:

$$N = \frac{\text{molecular weight}}{\text{equivalent weight}} \times M$$

$$N_{2(\text{KMnO}_4)} = \frac{158}{31.6} \times 0.025 = 0.125$$

$$N_{1(\text{O.A})} = \frac{126}{63} \times 0.1 = 0.2$$

$$\therefore N_1 V_1 = N_2 V_2$$

$$\therefore 0.2 \times V_1 = 0.125 \times 20$$

$$V_1 = \frac{0.125 \times 20}{0.2} = 12.5 \text{ mL}$$

52.(c) 1ml of water = 1gm of water, 1gm of water $\rightarrow$ 20 drops

$$18 \text{ gm of water contains } 6.023 \times 10^{23} \text{ molecules. } 1 \text{ gm of water contains } \frac{6.023 \times 10^{23}}{18} \text{ molecules}$$

$$20 \text{ drops of water contains } \frac{6.023 \times 10^{23}}{18} \text{ molecules} \quad 1 \text{ drop of water contains } \frac{6.023 \times 10^{23}}{18 \times 20} \text{ molecules}$$

$$= 1.667 \times 10^{21} \text{ molecules}$$

53.(c) Numerical value of m cannot be greater than 1.

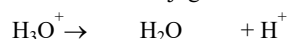
54.(a) In redox reactions, oxidation number of Fe is changed from +2 to +3. Hence, eq. mass of Mohr's salt = $\frac{\text{Mol. mass}}{3 - 2} = \text{Mol. mass}$.

55.(d) The higher the lattice energy, the less the solubility.

56.(c) 3 equatorial bonds and 2 axial bonds.

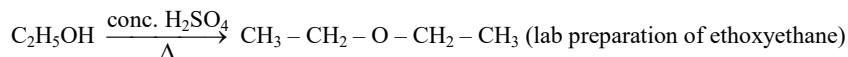
57.(a) $\text{H}_2\text{O} + \text{H}^+ \longrightarrow \text{H}_3\text{O}^+$

Base Acid conjugate acid

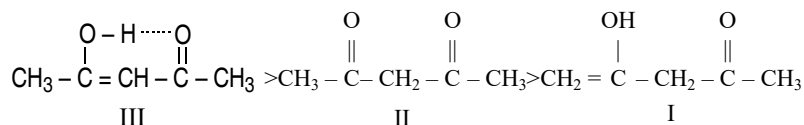


acid Conjugate base

- 58.(c) During the reaction, oxalic acid ($C_2H_2O_4$) acts as a reducing agent, providing electrons that reduce the manganese in $KMnO_4$ from +7 to +2.
- 59.(d) From relation $N_1V_1 = N_2V_2$.
 $N_1 = 10N$, $V_1 = ?$
 $N_2 = 1N$, $V_2 = 1000cc$
 Here, $10N \times V_1 = 1N \times 1000cc$ $V_1 = 100cc$.
- 60.(b) The relationship is given by $K_p = K_c(RT)^{\Delta n}$. Here, $\Delta n = 2 - (1 + 3) = -2$.
 So, $K_p = K_c(RT)^{-2}$
- 61.(c) In acidic medium, the reduction half-reaction is:
 $MnO_4^- + 8H^+ + 5e^- \rightarrow Mn^{2+} + 4H_2O$. Since, 5 electrons (5F) are required to reduce 1 mole of MnO_4^- to Mn^{2+} .
- 62.(c) At the anode (+), oxidation occurs. In aqueous $CuSO_4$ with an inert platinum electrode, **water is oxidized to oxygen gas**: $2H_2O \rightarrow O_2 + 4H^+ + 4e^-$. Thus, O_2 is liberated at the anode.
- 63.(c) The general unit for a rate constant is $(mol L^{-1})^{1-n} s^{-1}$. Therefore, the given unit corresponds to a second-order reaction.
- 64.(a) In endothermic reaction, the reaction has less energy than product. i.e., $\Delta H = -ve$.
- 65.(b) $16 \text{ min} : t_{75\%} = 2 \times t_{50\%}$
 $32 = 2 \times t_{50\%}$
 $\frac{32}{2} = t_{50\%} \therefore t_{50\%} = 16 \text{ minutes}$
- 66.(c) The average Kinetic energy of gas molecules is given by $KE = \frac{2}{3}kT$, proving that it depends strictly on the absolute temperature.
- 67.(b) Hess's Law states that the total enthalpy change of a reaction is independent of the pathway and equals the sum of the enthalpy changes of the individual steps
 i.e., $\Delta H_{\text{total}} = \Delta H_1 + \Delta H_2 + \Delta H_3$
- 68.(c) This structure shows a hydroxyl group on the fourth carbon, a methyl group on the second and third and an aldehyde group at the terminal carbon.
- $$\begin{array}{c} O \\ || \\ CH_3 - C - Cl \end{array}$$
- 69.(a) $CH_3 - C - Cl$: Phosphorus trichloride is a chlorinating agent which converts acid to its corresponding acid chloride.
 $CH_3COOH + PCl_3 \rightarrow CH_3COCl + POCl_3$
- 70.(b)
- 71.(d)
- 72.(a) $C_2H_5OC_2H_5 + 2HI \xrightarrow{\text{red P + HI}} 2CH_3 - CH_2 - I + H_2O$
Iodoethane
- 73.(c) Free radicals are formed as intermediates.
- 74.(a) $C_6H_{14} \xrightarrow{\Delta} C_4H_{10} + C_2H_4$
 Hexane liquid Butane Ethene gas
- 75.(c) The transformation from an alkyne to a diketone suggests that the reaction involves ozonolysis. Ozonolysis is a reaction where ozone reacts with alkenes or alkynes to form carbonyl compounds.
- 76.(c) Chloroform when heated with conc. HNO_3 then single hydrogen atom of chloroform get replaced by a nitro group forming chloropicrin.
- $$\begin{array}{ccc} \begin{array}{c} Cl \\ | \\ Cl - C - H + HO - NO_2 \\ | \\ Cl \end{array} & \xrightarrow{\Delta} & \begin{array}{c} Cl \\ | \\ Cl - C - NO_2 + H_2O \\ | \\ Cl \end{array} \end{array}$$
- 77.(a) For alkyl radical, the ease of formation of a Grignard reagent is:
 $C_2H_5 - I > C_2H_5 - Br > C_2H_5 - Cl$
 However, in case of tertiary alkyl halides, ter-alkyl chlorides are preferred to ter-iodides because the latter tend to eliminate a molecule of HI easily to form alkene.
- 78.(a) $A \xrightarrow{Na} B$, $A \xrightarrow[\Delta]{\text{conc. } H_2SO_4} \text{diethylether}$
 $C_2H_5OH \xrightarrow{Na} C_2H_5ONa$,
(A) (B)



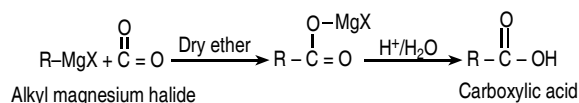
- 79.(d) III > II > I: Most stable due to H-bond.



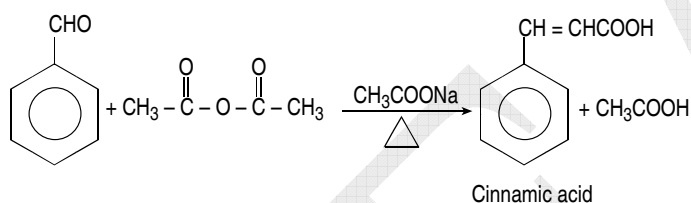
- 80.(b) Koch reaction is: $\text{CH}_3 - \text{CH} = \text{CH}_2 \xrightarrow[\text{H}^+]{\text{CO} + \text{H}_2\text{O}} \text{CH}_3 - \underset{\text{COOH}}{\text{CH}} - \text{CH}_3$

- 81.(a) The primary amine is formed in this reaction has one fewer carbon atom than the original amide. The carbonyl carbon (C = O) is removed as CO₂.

- 82.(b) Organometallic compounds like Grignard reagent (RMgX) or organolithium compounds react with CO₂ to form carboxylate salts, which can further undergo hydrolysis to produce carboxylic acid.



- 83.(b)

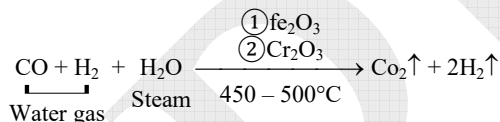


Benzaldehyde

- 84.(b) R-group due to +I effect intensify the electron density on nitrogen. Therefore, highly basic in nature.

- 85.(d) Mg²⁺ has smaller size and has higher charge as compared to other cations, so it has largest hydration energy.

- 86.(c) Bosch's process:



- Merck's process: $\text{Na}_2\text{O}_3 + \text{H}_2\text{SO}_4 \rightarrow \text{Na}_2\text{SO}_4 + \text{H}_2\text{O}_2$

- 87.(a) $\text{Na}_2\text{CO}_3 \rightarrow$ Soda Ash

Aqu. KOH $\rightarrow$ Potash lye

Aqu. NaOH $\rightarrow$ Soda lye

- 88.(a) Barium gives green color in its chloride form

The emission spectra of barium contain the wavelength corresponding to the green colour.

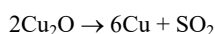
- 89.(a) Thermite $\Rightarrow$ Iron oxide + Al powder (1 : 3)

used in welding

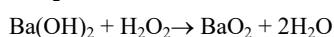
- 90.(d) $\text{FeSO}_4 \cdot \text{NO}$ i.e. brown ring complex

- 91.(a) Bleaching mechanical pulp is called brightening to distinguish it from bleaching of chemical pulps.

- 92.(b) $2\text{Cu}_2\text{S} + 3\text{O}_2 \rightarrow 2\text{Cu}_2\text{O} + 2\text{SO}_2$



- 93.(c) BaO₂ = Barium oxide



- 94.(a) Bessemer converter $\rightarrow$ steel from pig iron

Blast furnace $\rightarrow$ pig iron from iron ore

Muffle furnace $\rightarrow$ to heat material to extremely high temperature

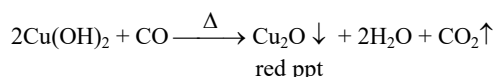
- 95.(d) Iron oxide (Fe₂O₃) acts as flux in cement production

It also imparts colour to cement and inhibits corrosion

- 96.(d) Lysine is amino acid. Hence, it forms zwitter ion.

- 97.(c) Ingrain or developed dyes are those which are synthesized directly on the fabric eg: azo dyes.

98.(c) **Cu₂O:** CO reduces Fehling to red ppt. of Cu₂O.



99.(a) Fats provide highest energy, followed by carbohydrate and proteins.

100.(b) Cyclohexanone being a liquid cannot be purified either by sublimation or crystallization. IR is a technique to identify a compound. In infrared spectroscopy, each functional group appears at a certain peak. So, cyclohexanone can be identified by carbonyl peak.

ZOOLOGY

101.(b) Merozoites are released from infected liver cells and invade red blood cells, where they undergo erythrocytic schizogony. Sporozoites initially infect liver cells, while ookinete and oocyst occur in the mosquito.

102.(d) It lacks blood sucking mouthparts. Male Anopheles sips nectar from flowers using their proboscis. So, they do not transmit malaria.

103.(b)

104.(c) In *Pheretima posthuma*, the female genital pore is a single median opening on the ventral side of the 14th segment. The male genital pores are located on the 18th segment.

105.(c) The frog's heart is enclosed within a pericardial membrane/cavity and lies in the anterior region of the body.

106.(c) Frog lungs are not like mammalian lungs. They contain faveoli, which are internal partitions that increase respiratory surface.

107.(b) Sarcodina includes amoeba-like protozoans that move and capture food using pseudopodia ("false feet"). Pseudopodia extend from the cell, help the organism move, and surround food particles for phagocytosis.

108.(a) Mayfly nymphs (naiads) are aquatic and may live underwater for years before emerging as short-lived flying adults.

109.(a) Echinoderms such as starfish and sea urchins show:

- Adult: Pentaradial (radial) symmetry
- Larva: Bilateral symmetry
- Body cavity: True coelom
- Segmentation: Absent

110.(b) A mature proglottid of *Taenia* contains both male reproductive organs (testes) and female reproductive organs (ovaries). Therefore, each proglottid is bisexual/hermaphroditic.

111.(a) Olfactory receptor cells are specialized bipolar neurons located in the olfactory epithelium of the upper part of the nasal cavity.

A bipolar neuron has two processes:

One dendritic process → receives chemical stimuli (odor molecules).

One axon → carries nerve impulses toward the olfactory bulb.

112.(c) Both skeletal muscles and visceral (smooth) muscles are composed of contractile proteins, mainly actin and myosin. These proteins interact to produce muscle contraction.

113.(a) Macula adherens is another name for a desmosome, a specialized cell junction that provides strong adhesion between adjacent cells.

114.(b) The urinary bladder is lined by transitional epithelium (urothelium). Its multiple layers and specialized superficial cells allow the lining to stretch during filling and return to its original form during emptying while maintaining its barrier function.

115.(b) Arteriosclerosis is the general thickening and hardening of arterial walls. Atherosclerosis is a specific form involving fatty/cholesterol plaque formation in the arterial wall.

116.(b) *Vibrio cholerae* causes cholera, characterized by profuse watery ("rice-water") diarrhea and severe dehydration. It is commonly transmitted through contaminated food or water.

117.(c) Histamine is released mainly by mast cells and basophils during inflammation. It causes vasodilation and increases vascular permeability, helping immune cells and plasma move into the injured tissue.

118.(c) Tuberculosis is called Koch's disease because Robert Koch discovered *Mycobacterium tuberculosis*, the bacterium that causes TB, in 1882. He did not develop the TB vaccine, discover a vector, or treat the first patient.

119.(b) During inhalation, air passes from the trachea into the right and left primary bronchi. Each primary bronchus carries air into its respective lung and then divides into smaller secondary bronchi, followed by tertiary bronchi and bronchioles.

120.(d) The liver converts toxic nitrogenous waste, especially ammonia, into the less toxic compound urea through the urea cycle (ornithine cycle). Urea is then transported by the blood to the kidneys, where it is eliminated in urine.

121.(b) The LH (luteinizing hormone) surge occurs around the middle of the menstrual cycle and triggers ovulation, usually within about 24–36 hours after the surge begins.

122.(c)

123.(b) The heart has four chambers. The two upper chambers are called atria, which receive blood returning to the heart.

- Ventricles → Lower chambers that pump blood out of the heart.
- Atria → Upper chambers that receive blood.

- Valves → Prevent backflow of blood.
 - Arteries → Blood vessels that carry blood away from the heart.
- 124.(b)** Mature human red blood cells (RBCs) are anucleate and have a biconcave disc shape.
Absence of nucleus provides more space for hemoglobin, increasing oxygen-carrying capacity.
Biconcave shape provides a large surface area for efficient O₂ and CO₂ exchange and makes RBCs flexible enough to pass through narrow capillaries.
- 125.(d)** Vital capacity is the maximum volume of air that a person can forcibly exhale after taking the deepest possible inspiration. It is an important measure of lung function and respiratory efficiency.
- 126.(b)** In herbivorous mammals like rabbits, a toothless space called diastema is present between the incisors and premolars. This gap allows manipulation of food by the tongue and helps in chewing plant material efficiently.
- 127.(c)** Vitamin D (Calciferol) deficiency leads to rickets in children and osteomalacia in adults, affecting bone mineralization.
- 128.(b)** The glomerulus is a network of capillaries present inside the cup-shaped Bowman's capsule. Together, they form the renal corpuscle (also called Malpighian body), which is the filtration unit of the nephron.
Glomerulus → filters blood
Bowman's capsule → collects the filtrate
- 129.(a)** In long sightedness, the image is formed behind the retina and it can be corrected by using convex lens of suitable focal length
- 130.(c)** Meibomian glands are modified sebaceous glands that are found in eyelids that opens in the corner of the eye
- 131.(a)**
 - Thymus → Helps in immunity by maturation of T-lymphocytes.
 - Thyroid → Controls metabolism and growth.
 - Adrenal → Secretes adrenaline and corticosteroids.
 - Tonsil → Lymphoid tissue, not an endocrine gland
- 132.(b)**
 - Constriction of pupil → Controlled by oculomotor nerve (cranial nerve III).
 - Contraction of urinary bladder → Controlled by sacral spinal nerves, not cranial nerves.
 - Increase of salivation → Controlled by facial and glossopharyngeal nerves.
 - Gall bladder activity → Controlled by vagus nerve (cranial nerve X).
- 133.(b)**
 - Corpus albicans → Small mamillary body structure; not hemispheric connection.
 - Corpus callosum → Thick nerve band connecting two cerebral hemispheres.
 - Corpus striatum → Part of basal ganglia involved in motor control.
 - Corpus spongiosum → Erectile tissue of male reproductive organ.
- 134.(d)** Louis Pasteur's experiment showed that after boiling and sealing the nutrient medium, microorganisms did not appear because contamination from existing microorganisms was prevented. This disproved spontaneous generation and supported the idea that living organisms arise from pre-existing life (biogenesis).
- 135.(d)** A. I. Oparin and J. B. S. Haldane independently proposed the chemical evolution hypothesis in the 1920s. They suggested that simple inorganic molecules in the primitive atmosphere, in the presence of energy sources such as lightning and UV radiation, could form simple organic molecules (monomers).
- 136.(b)** In the Miller-Urey experiment (1953), the gases methane (CH₄), ammonia (NH₃), hydrogen (H₂), and water vapour (H₂O) were used to simulate the reducing atmosphere proposed for early Earth. Electric sparks acted as an energy source, leading to the formation of organic compounds, including amino acids.
- 137.(c)** Arboreal animals are animals adapted for living on trees. They possess special adaptations for climbing and maintaining balance
 - Desert animals → adapted to conserve water and tolerate heat.
 - Aerial animals → adapted for flying.
 - Cursorial animals → adapted for running fast (e.g., horse, deer).
- 138.(b)** Negative chemotaxis occurs when an organism moves directionally away from a noxious or harmful chemical stimulus.
- 139.(d)** Bone marrow transplantation is used to treat blood-related disorders like leukemia, as it introduces healthy stem cells that can regenerate normal blood cells.
- 140.(c)** In IVF, egg and sperm are fertilized in a laboratory dish outside the body, and the resulting zygote/early embryo (up to 8-celled stage) is transferred into the fallopian tube (ZIFT) or later stage embryo into the uterus (IUT/ET).

BOTANY

- 141.(d)**
 - **Apoenzyme** → protein part of a conjugated enzyme
 - **Holoenzyme** → complete, active enzyme
 - **Isoenzyme** → different molecular forms of the same enzyme
 - **Allosteric enzyme** → undergoes conformational changes in response to effectors
- 142.(a)** Methionine is an amino acid and not a carbohydrate. Glycogen, starch, and chitin are all carbohydrates.

- 143.(d) Microsomes are **not true cell organelles**. They are artificial vesicular structures formed from fragments of the endoplasmic reticulum during cell homogenization.
- 144.(c)
- 145.(b) Because of presence of hydrolytic enzyme, they can digest cell organelles and their parts.
- 146.(a) In higher organisms, DNA combines with proteins to form **nucleoproteins**. These nucleoproteins are highly organized and condensed to form **chromosomes**, which carry genetic information.
- 147.(a) Disulfide bond formation occurs mainly in the **oxidizing environment of the endoplasmic reticulum (ER)**, especially for proteins destined for secretion or membranes.
- 148.(d)
- 149.(b) Viruses are extremely small infectious particles that can pass through fine porcelain filters designed to trap and retain bacteria, which led early scientists to describe them as "filterable agents"
- 150.(c) In yeast, sexual reproduction involves conjugation. After fusion, the **diploid zygotic nucleus undergoes meiosis** to produce haploid spores. These spores are enclosed within a sac-like structure called an **ascus**.
- 151.(a) Fruticose or filamentous lichens are branched and shrubby but with small base, e.g., *Cladonia*, *Usnea*.
- 152.(c) In **Rhodophyceae (red algae)**, sexual reproduction occurs, but **motile cells are completely absent** because their reproductive cells lack flagella.
- 153.(d) Pyrenoids are the rounded bodies found in the chloroplast of green algae and are the centres of conversion of glucose to starch and also collection of starch.
- 154.(c) Mosses lack a true vascular system and specialized tissues to handle high salinity, making marine or coastal sea-spray environments harsh for them.
- 155.(d) **Apogamy** is the development of a **sporophyte directly from the gametophyte (prothallus) without fertilisation**. It is a type of asexual reproduction seen in ferns.
- 156.(c) Chilgoza is seed of *Pinus*.
- 157.(d) Niche is specific part of habitat occupied by individuals of a species which is circumscribed by its range of tolerance, range of movement microclimate, type of food and its availability.
- 158.(c) Halophytes are specifically adapted to grow in saline environments.
- 159.(a) The concept of biomass refers to organismal mass or the living material.
- 160.(c) Caves are typically dark and lack sunlight, making them unsuitable for primary productivity.
- 161.(b) Lateral meristems, such as **cambium and cork cambium**, produce new cells in mature plant regions and contribute to **secondary growth and repair/regeneration of damaged tissues**.
- 162.(d) Branching of root is endogenous. During the branching, pericycle of root becomes meristematic and protrudes to outside.
- 163.(c) In monocot like sugarcane, maize, etc. due to absence of cambium, secondary growth is not found. So, removal of bark (phloem) and ringing experiment is not possible.
- 164.(c) In case exosmosis continues, the protoplasm shrinks from the cell wall. The phenomenon is called plasmolysis (flaccid in appearance) which is followed by wilting.
- 165.(d) In a fully turgid cell, D.P.D. = 0 As, T.P. = O.P.
- 166.(d) **Transpiration** is the loss of water vapour from plants, mainly through stomata. It influences the **temperature and moisture conditions** of the surrounding terrestrial environment.
- 167.(d) ATP synthesis during photosynthesis and respiration is associated with **redox reactions involving the transfer of electrons**. As electrons move through an electron transport chain, the released energy is used to generate ATP.
- 168.(c) In **cyclic photophosphorylation**, only **ATP** is produced. **NADPH and O₂ are not produced** because only **Photosystem I (P700)** participates.
- 169.(d) When radioactive C₁₄ is incorporated into a C₃ plant, the first compound where it is found is PGA.
- 170.(a) The number of different gametes formed from a genotype can be calculated using the formula 2ⁿ, where n is the number of heterozygous pairs.
 So, n = (from Aa, Bb, and Dd).
 Using the formula: 2³ = 8
- 171.(d) Yellow coloured pod and wrinkled seed is recessive character according to Mendel.
- 172.(c) **tRNA (transfer RNA)** contains a large number of **modified or unusual nucleotides**. These modifications help tRNA maintain its proper structure and function during protein synthesis.
- 173.(a) Enzyme involved in transcription is RNA polymerase –II which consist five polypeptides $\alpha, \beta, \beta', \omega$ and σ .

- 174.(c) Alleles for blood group B (of child) are absent in father (blood group A), therefore they should come from mother and they are present in persons having blood group B or AB.
- 175.(c) There is a large-scale possibility of autosomal aneuploidy in human beings.
- 176.(a) In anther culture, the androgenic haploid plants are obtained from young pollen grains. These cells can be induced to form haploid plants under specific culture conditions.
- 177.(b) Embryo sac is made up of 8 nuclei which are formed by 3 simple divisions.
- 178.(b) The basis of green revolution is plant breeding because it has been achieved through introduction of high yielding varieties, increased irrigation facilities, fertilizer application, weed pest and pathogen control and better agriculture management.
- 179.(d)
- 180.(b) PCR is a method for amplifying a specific piece of DNA molecule without the requirement for time-consuming cloning procedures.

MAT

- 181.(b) Girl's father's only son – Girl's brother; Grandmother of girl's brother – Girl's grandmother; Daughter-in-law of girl's grandmother – Girl's mother.

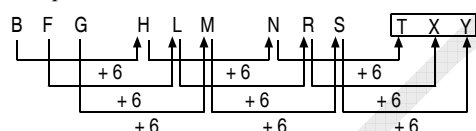
- 182.(a) Lack of second results in the first

183.(c) $9^2 - 10 = 71$

$6^2 - 10 = 26$

$7^2 - 10 = \boxed{39}$

- 184.(d) The pattern is as follows



- 185.(d) Total minute space = 1 hour + 30 minutes = 60 minutes + 30 minutes = 90 minutes space.

60 minutes space = 360°

90 minutes space = $\frac{360^\circ}{60} \times 90 = 540^\circ$

- 186.(d) The sequence of the boys in a queue is



So, E is in the middle.

- 187.(d) Next but will leave at 9 : 35 am.

So, last but left at $(9 : 35 - 0 : 30) = 9 : 05$ am

So, enquiry clerk gave the information to the passenger = $(9 : 05 + 0 : 10) = 9 : 15$ am.

- 188.(d) According to the statement, 80% of the total runs were made by spinners. So, I does not follow. Nothing about the opening batsmen is mentioned in the statement. So, II also does not follow.

- 189.(a) Population in the beginning of the first year

$$= \frac{9975}{\left(1 + \frac{5}{100}\right) \left(1 - \frac{5}{100}\right)} = \left(9975 \times \frac{20}{21} \times \frac{20}{19}\right) = 10000.$$

- 190.(d) Let cost price = Rs. 100. Then, $\frac{2}{5}$ of Marked price = 75

$$\Rightarrow \text{Marked price} = \text{Rs.} \left(\frac{75 \times 5}{2} \right) = \text{Rs.} \left(\frac{375}{2} \right)$$

$$\therefore \text{Required ratio} = \frac{375}{2} : 100 = 375 : 200 = 15 : 8$$

- 191.(a) Average expenditure of a man for the first five months = Rs. 1200

Average expenditure of a man for the next seven months = Rs. 1300

Total annual expenditure of man = Rs. $(5 \times 1200 + 7 \times 1300) = \text{Rs.} (6000 + 9100) = \text{Rs.} 15100$

Man saves = Rs. 2900

His total annual income = Rs. $(15100 + 2900) = \text{Rs.} 18000$

$$\therefore \text{Average monthly income} = \frac{18000}{12} = \text{Rs.} 1500$$

192.(a) 4 days: Ratio of rates of working of A and B = 2 : 1.

So, ratio of time taken = 1 : 2

$$\therefore \text{A's 1 day's work} = \frac{1}{6}; \quad \text{B's 1 day's work} = \frac{1}{12}.$$

$$(\text{A} + \text{B})\text{'s 1 day's work} = \left(\frac{1}{6} + \frac{1}{12}\right) = \frac{3}{12} = \frac{1}{4}.$$

193.(a) Let the Missu age be $6x$ and Mahima age be $5x$ respectively.

According to the question,

$$\frac{6x+9}{5x+9} = \frac{9}{8} \Rightarrow 8(6x+9) = 9(5x+9)$$

$$\Rightarrow 48x - 45x = 81 - 72$$

$$\Rightarrow 3x = 9 \Rightarrow x = 3$$

Difference in their ages = $(6x - 5x) = x$ years = 3 years

194.(a) 30 km/hr: Let the total distance be x km. Then, Distance covered at 20 km/hr = $\frac{x}{3}$ km;

$$\text{Distance covered at 30 km/hr} = \frac{5x}{12} \text{ km.}$$

$$\text{Distance covered at 50 km/hr} = \left[x - \left(\frac{x}{3} + \frac{5x}{12}\right)\right] \text{ km} = \frac{5x}{12} \text{ km.}$$

$$\text{Total time taken} = \left[\frac{(x/3)}{20} + \frac{(x/4)}{30} + \frac{(5x/12)}{50}\right] \text{ hrs} = \left(\frac{x}{60} + \frac{x}{120} + \frac{x}{120}\right) \text{ hrs} = \frac{4x}{120} \text{ hrs} = \frac{x}{30} \text{ hrs.}$$

$$\therefore \text{Average speed for the whole journey} = \left(x \times \frac{30}{x}\right) \text{ km/hr} = 30 \text{ km/hr.}$$

195.(c) 5040: LOGARITHMS contains ten different letters

Required number of words = Number of arrangements of 10 letters, taking 4 at a time = ${}^{10}P_4 = (10 \times 9 \times 8 \times 7) = 5040$

196.(d) D: In each step, the clockwise end element moves to the anticlockwise end position.

197.(d) 27:



The simplest triangles are GLK, DLJ, DJM, HMN, QRE, IRA, IPA and FPO i.e., 8 in number.

The triangles having two components each are BDO, CDQ, DLM, PRA, KFI, NEI, HJI, GJI, DKI and DNI, i.e., 10 in number.

The triangles having four components each are DIE, DFI, DOA, DQA and GHI, i.e., 5 in number.

The triangles having six components each are DCA and DBA, i.e., 2 in number.

DEF is the only triangle having eight components.

ABC is the only triangle having twelve components.

Thus, there are $8 + 10 + 5 + 2 + 1 + 1 = 27$ triangles in the figure.

198.(c) 3:



199.(c) 245:



200.(b)

...The End...