

## MHT CET 2025 Biology Answer Key PDF

### 1. Option (C) Helps lipase to act on fat droplets

**Explanation:** Colipase is a protein co-enzyme required for the optimal activity of pancreatic lipase. It binds to the esterase site of the lipase and to the surface of the bile-salt stabilized lipid micelles, allowing the lipase to hydrolyze the triglycerides.

### 2. Option (B) Breaking down detritus and enhancing nutrient recycling

**Explanation:** Earthworms are "ecosystem engineers." They act as detritivores by fragmenting organic matter (detritus), which increases the surface area for microbial action, thereby accelerating decomposition and nutrient cycling in the soil.

### 3. Option (B) a-(ii), b-(i)

**Explanation:** Fructose is a simple sugar and cannot be hydrolyzed further, making it a Monosaccharide (ii). Lactose (milk sugar) is composed of glucose and galactose, making it a Disaccharide (i).

### 4. Option (C) Glomerulus

**Explanation:** The hepatic artery, hepatic vein, and bile duct are all parts of the liver's circulatory and biliary system. The glomerulus is a cluster of capillaries located in the nephrons of the kidney, responsible for blood filtration.

### 5. Option (B) Xylem

**Explanation:** Xylem is the specialized tissue in vascular plants responsible for the conduction of water and dissolved minerals upwards from the roots to the leaves (ascent of sap).

### 6. Option (C) Activates trypsinogen to trypsin

**Explanation:** Enterokinase (also called enteropeptidase) is an enzyme produced by the duodenum. Its specific role is to convert the inactive proenzyme trypsinogen into the active enzyme trypsin, which then activates other pancreatic proteases.

### 7. Option (A) S-type (Smooth, Virulent)

**Explanation:** In Griffith's experiment, the S-type (Smooth) strain has a polysaccharide capsule that protects it from the mouse's immune system, making it virulent and causing pneumonia. The R-type (Rough) lacks this capsule and is non-virulent.

### 8. Option (C) acts as a link between the mRNA codon and the corresponding amino acid.

**Explanation:** tRNA is an "adapter" because one end carries an anticodon that base-pairs with the mRNA codon, while the other end (3' end) carries the specific amino acid corresponding to that codon.

### 9. Option (B) To amplify specific DNA sequences

**Explanation:** The primary purpose of Polymerase Chain Reaction (PCR) is to produce millions of copies of a specific segment of DNA from a very small initial sample.

### 10. Option (A) Graphite is a good conductor of electricity due to its free electrons.

**Explanation:** In graphite, each carbon atom is bonded to three others in a hexagonal plane. The fourth valence electron is delocalized (free to move), allowing graphite to conduct electricity efficiently.

### 11. Option (C) Remains constant.

**Explanation:** For an ideal gas, internal energy ( $U$ ) is a function of temperature only ( $U \propto T$ ). In an isothermal process,  $\Delta T = 0$ , therefore the internal energy remains constant ( $\Delta U = 0$ ).

### 12. Option (B) o-Hydroxybenzaldehyde (Salicylaldehyde)

**Explanation:** The Reimer-Tiemann reaction involves the treatment of phenol with chloroform and aqueous sodium hydroxide, which introduces an aldehyde group at the ortho-position, forming salicylaldehyde.

### 13. Option (B) 1,3,5-Trihydroxybenzene

**Explanation:** Phloroglucinol is a phenolic compound with the chemical formula  $C_6H_3(OH)_3$ , where the hydroxyl groups are located at the 1, 3, and 5 positions of the benzene ring.

### 14. Option (A) $Ti^{4+}$

**Explanation:** Transition metal ions are colored due to  $d-d$  electronic transitions.  $Ti^{4+}$  has a  $[Ar]3d^0$  configuration. With no electrons in the  $d$ -orbital,  $d-d$  transitions are impossible, making the ion colourless.

**15. Option (D)  $\text{CH}_3\text{-CH=CH-CH}_2\text{OH}$** 

**Explanation:** Crotonyl alcohol (also known as (E)-but-2-en-1-ol) contains a four-carbon chain with a double bond at the second carbon and an alcohol group at the first carbon.

**16. Option (A) Aldehydes and (C) Ketones**

**Explanation:** The Wolff-Kishner reduction is used to reduce the carbonyl group ( $>C=O$ ) of aldehydes and ketones to a methylene group ( $-CH_2-$ ), resulting in the formation of an alkane.

**17. Option (B) Sucrose**

**Explanation:** Sucrose is a non-reducing sugar because the glycosidic bond is formed between the reducing groups of both glucose (C1) and fructose (C2), meaning no free aldehyde or ketone group is available.

**18. Option (C) Bond angle  $\approx 108^\circ$ , Bond length  $\approx 204$  pm**

**Explanation:** The  $S_8$  molecule exists in a puckered "crown" shape. The standard bond parameters for rhombic sulfur are a bond angle of approximately  $107^\circ - 108^\circ$  and a bond length of 204 pm.

**19. Option (B) 2-methyl-2-pentene**

**Explanation:** According to Saytzeff's rule, in an E2 elimination reaction with alcoholic KOH, the more substituted alkene is the major product. Removing a proton from C2 (which has fewer hydrogens) leads to the more stable 2-methyl-2-pentene.

**20. Option (B) p-Toluenesulfonic acid**

**Explanation:** Sulfonation of toluene is an electrophilic aromatic substitution. While a mixture is formed, under heating conditions (high temperature), the para-isomer (p-toluenesulfonic acid) is the major product due to steric hindrance at the ortho position.

**21. Option (A) Sodium (Na)**

**Explanation:** Alkali metals belong to Group 1 of the periodic table. Sodium (Na) is an alkali metal, whereas Calcium and Magnesium are alkaline earth metals (Group 2), and Aluminum is a Group 13 metal.

**22. Option (B) A chiral carbon must be attached to four different groups.**

**Explanation:** By definition, a chiral (asymmetric) carbon atom is a tetrahedral carbon atom bonded to four different atoms or groups of atoms.

**23. Option (B)  $\Delta U = 40$  J**

**Explanation:** According to the First Law of Thermodynamics,  $\Delta U = Q - W$ . Here,  $Q = +50$  J (heat absorbed) and  $W = +10$  J (work done by the system). Therefore,  $\Delta U = 50 - 10 = 40$  J.

**24. Option (A) Cyclohexene**

**Explanation:** An allylic position is the carbon atom adjacent to a double bond. In cyclohexene, the carbons at positions 3 and 6 are allylic carbons, making it a cyclic structure with allylic character.

**25. Option (B) 3-Ethylsalicylic acid**

**Explanation:** Salicylic acid is 2-hydroxybenzoic acid. If an ethyl group is attached to the 3rd position, the IUPAC name becomes 3-ethyl-2-hydroxybenzoic acid, commonly referred to in MCQs as 3-ethylsalicylic acid.

**26. Option (D) Methylbenzene**

**Explanation:** Phenylmethane consists of a methyl group attached to a phenyl ring. The IUPAC systematic name is methylbenzene, and its common name is Toluene.

**27. Option (A)  $2T$** 

**Explanation:** From the ideal gas law  $PV = nRT$ . If  $V$ ,  $n$ , and  $R$  are constant,  $P \propto T$ . To double the pressure ( $2P$ ), the temperature must also be doubled ( $2T$ ).

**28. Option (C)  $\tan^{-1} \left( \frac{250-100}{150} \right)$** 

**Explanation:** The phase difference  $\phi$  is given by  $\tan \phi = \frac{X_L - X_C}{R}$ . Substituting  $X_L = 250\Omega$ ,  $X_C = 100\Omega$ , and  $R = 150\Omega$ , we get  $\tan \phi = \frac{150}{150} = 1$ . Thus,  $\phi = \tan^{-1}(1)$ .

**29. Option (D)  $24\pi TR^2$** 

**Explanation:** A soap bubble has two surfaces. The surface energy  $W = T \times \Delta A \times 2$ . Initial Area  $A_1 = 4\pi R^2$ , Final Area  $A_2 = 4\pi(2R)^2 = 16\pi R^2$ .  $\Delta A = 12\pi R^2$ . Total work  $= 2 \times T \times 12\pi R^2 = 24\pi TR^2$ . Note: If 24 is not an option, check for 16 or 8 based on specific question variations (like expanding a drop vs bubble).

**30. Option (D)**  $a_1^2 + a_2^2$

**Explanation:** The two waves  $y_1 = a_1 \cos \omega t$  and  $y_2 = a_2 \sin \omega t$  are out of phase by  $90^\circ$  ( $\pi/2$ ). The resultant amplitude is  $A = \sqrt{a_1^2 + a_2^2 + 2a_1a_2 \cos(\pi/2)} = \sqrt{a_1^2 + a_2^2}$ . Since Intensity  $I \propto A^2$ ,  $I \propto a_1^2 + a_2^2$ .

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