### MHT CET 2025 Apr 12 Shift 1 Question Paper

Time Allowed :3 HourMaximum Marks :200Total Questions :200

#### **General Instructions**

#### Read the following instructions very carefully and strictly follow them:

- 1. The test is of 3 hours duration.
- 2. The question paper consists of 200 questions. The maximum marks are 200.
- There are three parts in the question paper consisting of Physics, Chemistry and Biology (Botany and Zoology) having 50 questions in each part of equal weightage.

#### 1. What is the function of colipase in the human digestive system?

- (A) Stimulates insulin secretion
- (B) Activates pepsinogen
- (C) Helps lipase to act on fat droplets
- (D) Converts bile salts into bile pigments

#### 2. Earthworms contribute to decomposition by:

- (A) Fixing atmospheric nitrogen
- (B) Breaking down detritus and enhancing nutrient recycling
- (C) Pollinating flowers
- (D) Producing humic acid

#### 3. Match the following pairs:

- a. Fructose (i) Disaccharide
- b. Lactose (ii) Monosaccharide

#### Which is the correct match?

- (A) a-(i), b-(ii)
- (B) a-(ii), b-(i)

#### 4. Which of the following is NOT a part usually labeled in a liver diagram?

- (A) Hepatic artery
- (B) Hepatic vein
- (C) Glomerulus
- (D) Bile duct

## 5. Which of the following tissues is primarily responsible for upward water transport in plants?

- (A) Phloem
- (B) Xylem
- (C) Parenchyma
- (D) Collenchyma

#### 6. What is the role of enterokinase in digestion?

- (A) Converts pepsinogen to pepsin
- (B) Emulsifies fats
- (C) Activates trypsinogen to trypsin
- (D) Breaks down carbohydrates

#### 7. Which of the following causes pneumonia in mice in Griffith's experiment?

- (A) S-type (Smooth, Virulent)
- (B) R-type (Rough, Non-virulent)
- (C) Both A and B
- (D) Heat-killed S-type only

#### 8. tRNA is referred to as an "adapter molecule" primarily because it:

- (A) carries genetic information from the nucleus to the ribosome.
- (B) catalyzes the formation of peptide bonds between amino acids.
- (C) acts as a link between the mRNA codon and the corresponding amino acid.

(D) provides the structural framework for the ribosome.

#### 9. What is the main purpose of Polymerase Chain Reaction (PCR)?

- (A) To sequence DNA
- (B) To amplify specific DNA sequences
- (C) To cut DNA into fragments
- (D) To identify mutations in genes

#### 10. Which of the following statements about graphite is correct?

- (A) Graphite is a good conductor of electricity due to its free electrons.
- (B) Graphite is a poor conductor of electricity because it lacks free electrons.
- (C) Graphite does not conduct electricity as it is an insulator.
- (D) Graphite conducts electricity only when heated above 100°C.

#### 11. In an isothermal expansion of an ideal gas, the internal energy of the gas:

- (A) Increases as the temperature increases.
- (B) Decreases because the temperature decreases.
- (C) Remains constant.
- (D) Increases and then decreases during the expansion.

#### 12. What is the major organic product obtained when phenol undergoes the

#### **Reimer-Tiemann reaction?**

- (A) Benzaldehyde
- (B) o-Hydroxybenzaldehyde (Salicylaldehyde)
- (C) p-Hydroxybenzoic acid
- (D) o-Nitrophenol

#### 13. What is the IUPAC name of phloroglucinol?

- (A) 1,2,3-Trihydroxybenzene
- (B) 1,3,5-Trihydroxybenzene
- (C) 2,4,6-Trihydroxybenzene
- (D) 1,2,4-Trihydroxybenzene

#### 14. Which of the following elements is colourless?

(A) Ti<sup>4+</sup>

(B)  $Fe^{2+}$ 

(C)  $Fe^{3+}$ 

(D) None of these

#### 15. Which of the following represents the correct structure of crotonyl alcohol?

- (A)  $CH_2$ =CH-COOH
- (B) CH<sub>3</sub>-CH=CH-CHOH
- (C) CH<sub>3</sub>-CH=CH-COH
- (D)  $CH_2$ =CH-CH<sub>2</sub>-OH

# 16. The Wolff-Löffler-Kishner reduction is used to convert which of the following compounds into the corresponding alkane?

- (A) Aldehydes
- (B) Alcohols
- (C) Ketones
- (D) Carboxylic acids

#### 17. Which of the following is a non-reducing sugar?

- (A) Glucose
- (B) Sucrose
- (C) Fructose
- (D) Maltose

#### 18. Which of the following correctly represents the bond angle and bond length in the

#### crown-shaped S<sub>8</sub> molecule?

- (A) Bond angle  $\approx 120^{\circ}$ , Bond length  $\approx 154 \text{ pm}$
- (B) Bond angle  $\approx 109.5^{\circ}$ , Bond length  $\approx 140 \text{ pm}$
- (C) Bond angle  $\approx 108^{\circ}$ , Bond length  $\approx 204 \text{ pm}$

### **19.** What is the major product formed when 2-methyl-3-chloropentane undergoes alcoholic KOH elimination (E2 reaction)?

- (A) 2-methyl-1-pentene
- (B) 2-methyl-2-pentene
- (C) 3-methyl-1-pentene
- (D) 3-methyl-2-pentene

### **20.** What is the major product when toluene reacts with concentrated sulfuric acid (H<sub>2</sub>SO<sub>4</sub>) under heating conditions?

- (A) Benzene sulfonic acid
- (B) p-Toluenesulfonic acid
- (C) o-Toluenesulfonic acid
- (D) A mixture of o- and p-toluenesulfonic acids

#### 21. Which of the following elements is classified as an alkali metal?

- (A) Sodium (Na)
- (B) Calcium (Ca)
- (C) Magnesium (Mg)
- (D) Aluminum (Al)

#### 22. Which of the following statements is true about a chiral carbon?

- (A) A chiral carbon is attached to two identical groups.
- (B) A chiral carbon must be attached to four different groups.
- (C) A chiral carbon cannot exist in molecules with symmetry.
- (D) A chiral carbon is always part of an alkene.

## **23.** A system absorbs 50 J of heat and does 10 J of work. What is the change in internal energy ( $\Delta U$ ) of the system?

- (A)  $\Delta U = 60 \,\mathrm{J}$
- $(\mathbf{B})\,\Delta U = 40\,\mathbf{J}$

#### 24. Which of the following compounds is a cyclic allyl?

- (A) Cyclohexene
- (B) Cyclopropene
- (C) 1,3-Cyclohexadiene
- (D) Cycloheptatriene

## **25.** What is the IUPAC name of the compound with the following structure: benzene attached to COOH, OH, and an ethyl group?

- (A) 2-Ethylbenzoic acid
- (B) 3-Ethylsalicylic acid
- (C) 4-Ethylphenol
- (D) 2-Ethyl-4-hydroxybenzoic acid

#### 26. What is the IUPAC name of phenylmethane?

- (A) Benzyl alcohol
- (B) Toluene
- (C) Benzene methane
- (D) Methylbenzene

### 27. To double the pressure of an ideal gas, keeping volume and number of moles constant, the temperature should be:

- (A) 2T
- (B) 4T
- (C) T/2
- (D) T/4

### 28. An AC circuit has a resistance of 150 $\Omega$ , inductive reactance of 250 $\Omega$ , and capacitive reactance of 100 $\Omega$ . What is the phase difference between current and voltage? (A) $\tan^{-1}\left(\frac{250-100}{150}\right)$

(B)  $\tan^{-1} \left(\frac{100-250}{150}\right)$ (C)  $\tan^{-1} \left(\frac{150}{250-100}\right)$ (D)  $\tan^{-1} \left(\frac{150}{250+100}\right)$ 

**29.** What is the energy required to increase the radius of a soap bubble from R to 2R considering the surface tension T?

(A)  $8\pi TR^2$ 

(B)  $4\pi TR^2$ 

(C)  $2\pi T R^2$ 

(D)  $16\pi TR^2$ 

**30.** Two coherent waves are represented by  $y_1 = a_1 \cos \omega t$  and  $y_2 = a_2 \sin \omega t$ , and they are superimposed on each other. The resulting intensity is proportional to:

(A)  $(a_1 + a_2)^2$ (B)  $(a_1 - a_2)^2$ (C)  $a_1^2 + a_2^2$ (D)  $\sqrt{a_1^2 + a_2^2}$