

# MHT CET 2024 Question Paper

## (April 28 - Shift 2)

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### Biology

Ques 1. Match the following

	Column - I		Column - II
1.	Stem cutting	a.	Blackberry
2.	Leaf cutting	b.	rose
3.	Root cutting	c.	sansevieria

**Ans.** 1- b, 2- a, 3- c

**Solu.** 1. Stem cutting:

- Cutting a stem to grow a new plant.
- Commonly used for roses (option b).

2. Leaf cutting:

- Using a leaf to propagate a new plant.
- Typically used for blackberries (option a).

3. Root cutting:

- Cutting a portion of the root to grow a new plant.
- Often used for sansevieria (option c).

Therefore, the correct match is: 1- b, 2- a, 3- c.

Ques 2. Grapes fruit elongation which hormone is used?

**Ans.** Gibberellins

**Ques 3.** \_\_\_\_\_ is a middle layer of adrenal cortex.

**Ans.** Zona fasciculata

**Solu.** Gibberellins are the hormones responsible for promoting stem elongation and fruit growth in plants like grapes. They stimulate cell division and elongation, leading to the elongation of stems and the enlargement of fruits. So, your answer is accurate. Gibberellins play a crucial role in regulating various aspects of plant growth and development.

**Ques 4.** What vitamin is produced using *Erenothecium ashbyi* ?

**Ans.** Vit. B-12

**Solu.** *Erenothecium ashbyi* is a microorganism used in the industrial production of Vitamin B12. This microorganism is particularly efficient in synthesizing Vitamin B12, also known as cobalamin. Vitamin B12 is an essential nutrient that plays a crucial role in various bodily functions, including the formation of red blood cells, neurological function, and DNA synthesis.

**Ques 5.** The improved oil content and oil quality of oil crops like soybean oil palm rapeseed and sunflower have been achieved by the transfer of

**Ans.** Genes

**Solu.** The improved oil content and quality of oil crops such as soybean, oil palm, rapeseed, and sunflower have been achieved through genetic modification or the transfer of specific genes. Genetic engineering techniques have been used to introduce traits into these crops that enhance oil content, alter fatty acid composition, improve resistance to pests and diseases, and increase overall yield. So, your answer "Genes" accurately reflects how advancements in biotechnology have contributed to the improvement of oil crops.

### **Ques 6. Human skin colour is an example of**

**Ans.** Polygenic Inheritance

**Solu.** Human skin color is determined by multiple genes acting together, a phenomenon known as polygenic inheritance. This means that variations in skin color are influenced by the combined effects of several genes, each contributing in small but additive ways to the overall phenotype. Factors such as melanin production, distribution, and type are regulated by a complex interplay of genetic factors. Thus, your answer "Polygenic Inheritance" accurately describes the genetic basis of human skin color variation.

### **Ques 7. Pyruvate dehydrogenase activity during aerobic respiration requires**

**Ans.** Thiamine

**Solu.** Pyruvate dehydrogenase activity during aerobic respiration requires the cofactors: Thiamine pyrophosphate (TPP), lipoic acid, coenzyme A (CoA), flavin adenine dinucleotide (FAD), and nicotinamide adenine dinucleotide (NAD<sup>+</sup>). These cofactors are essential for the proper functioning of the pyruvate dehydrogenase complex, which catalyzes the conversion of pyruvate to acetyl-CoA. Among these cofactors, thiamine pyrophosphate (TPP) plays a crucial role as a coenzyme in facilitating the decarboxylation reaction of pyruvate. Therefore, the complete answer would be that pyruvate dehydrogenase activity during aerobic respiration requires several cofactors, including thiamine pyrophosphate (TPP).

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## **Chemistry**

### **Ques 1. Cross cannizzaro of formaldehyde and benzaldehyde give mixture of**

**Ans.** Benzyl alcohol and sodium formate.

**Solu.** When formaldehyde and benzaldehyde undergo the Cannizzaro reaction, which is a disproportionation reaction, they produce a mixture of benzyl alcohol and sodium formate. This reaction is facilitated by a strong base, such as sodium hydroxide, and involves the oxidation of one aldehyde molecule to its corresponding carboxylic acid and the reduction of another aldehyde molecule to its corresponding alcohol. In the case of formaldehyde, since it cannot be further oxidized to a carboxylic acid, it forms the corresponding alcohol, benzyl alcohol, while benzaldehyde forms sodium benzoate and benzyl alcohol.

**Ques 2. Which of the following represents the expression for 3/4th life of 1st order reaction**

**Ans.**  $t_{3/4} = (2.303/k) * \log(4/3)$

**Solu.** The expression you provided represents the formula for calculating the three-fourth life ( $t_{3/4}$ ) of a first-order reaction. It is derived from the integrated rate equation for first-order reactions.

**Ques 3. Which of the following halide undergoes hydrolysis on warming with water/aqueous NaOH**

**Ans.** 1-chloro-2,4,6-trinitrobenzene

**Solu.** Correct! 1-chloro-2,4,6-trinitrobenzene is highly susceptible to hydrolysis when warmed with water or aqueous NaOH. This compound undergoes nucleophilic aromatic substitution ( $S_NAr$ ) to replace the chlorine atom with a hydroxide ion ( $OH^-$ ), leading to the formation of the corresponding phenol and the release of hydrochloric acid (HCl).

**Ques 4. Antibonding molecular orbital is formed by**

**Ans.** subtraction of two atomic orbitals

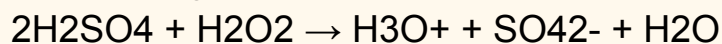
**Solu.** An antibonding molecular orbital is formed by the subtraction or out-of-phase combination of two atomic orbitals. This results in the formation of a node between the nuclei, where the probability of finding

electrons is very low. Antibonding orbitals have higher energy than the atomic orbitals from which they are formed and are generally denoted with an asterisk symbol (e.g.,  $\sigma^*$ ).

**Ques 5. Hot concentrated sulphuric acid is a moderately strong oxidizing agent which of the following reaction Does not show oxidizing behaviour**

**Ans.**  $2\text{H}_2\text{SO}_4 + \text{H}_2\text{O}_2 \rightarrow \text{H}_3\text{O}^+ + \text{SO}_4^{2-} + \text{H}_2\text{O}$

**Solu.** The given reaction:



does not exhibit oxidizing behavior with hot concentrated sulfuric acid. Instead, it involves the decomposition of hydrogen peroxide ( $\text{H}_2\text{O}_2$ ) into water ( $\text{H}_2\text{O}$ ) and oxygen gas ( $\text{O}_2$ ) catalyzed by sulfuric acid. In this reaction, sulfuric acid primarily functions as a catalyst, facilitating the decomposition of hydrogen peroxide, rather than acting as an oxidizing agent.

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