MHT CET 2024 Question Paper (April 28 - Shift 1)

Biology Questions

Ques 1. Which codon has dual function?

A. AUG
B. UAG
C. UAA
D. UGA

Ans. A
Solu. The codon with a dual function is:
AUG
It codes for the amino acid methionine (Met) and also acts as the initiation codon, signifying the start of protein translation on mRNA.

Ques 2. An angiotensinogen is secreted by _____?

Ans. Liver
Solu. Angiotensinogen is secreted by the liver. It's a plasma protein produced and released into the circulation by the liver cells.

Ques 3. Body Fluids and Circulation: the inner surface of the ventricle is thrown into a series of irregular muscular ridges called _____?

Ans. Columnae cornae

Solu. The series of irregular muscular ridges lining the inner surface of the ventricles of the heart are called columnae carneae. These ridges also have another name, trabeculae carneae.
These muscular ridges play a crucial role in optimizing heart function:

- Increased Surface Area: They significantly increase the inner surface area of the ventricles, allowing for more forceful contractions and efficient blood pumping.
- Preventing Blood Pooling: The ridges help prevent blood from pooling within the ventricles during relaxation phases of the heart cycle.

Ques 4. What is the site of perception of photoperiod necessary for induction of flowering in plants?

Ans. Leaves
Solu. In plants, the site of perception for photoperiod necessary for induction of flowering is indeed the leaves.
Here's why:

- Light Detection: Leaves contain photoreceptors like phytochrome and cryptochrome, which are sensitive to specific wavelengths of light. These photoreceptors detect the duration of light and dark periods (photoperiod).
- Flowering Signal: Based on the perceived photoperiod, the leaves produce a floral hormone called florigen.
- Signal Transport: Florigen is then transported from the leaves to the shoot apical meristem (growing tip), where it triggers the development of flowers.

Therefore, leaves play a crucial role in detecting the photoperiod and initiating the flowering process in plants.

Ques 5. Most widely accepted explanation for the ascent of sap in tree is_____?

Ans. Transpiration cohesion theory

Solu. Most agree sap ascends in trees due to the transpiration cohesion theory. Transpiration pulls water up, while water molecule attraction (cohesion) helps it defy gravity.

Ques 6. Which animal conserves water through the excretion process?

Solu. Animals like birds, reptiles, and insects save water by excreting waste as uric acid, needing less water than other waste forms. This adaptation is key in dry environments.

Ques 7. Grapes fruit elongation which hormone is used?

Solu. "Gibberellins" are a group of plant hormones that regulate various developmental processes, including stem elongation, germination, flowering, and fruit development. In the context of grapes, gibberellins play a significant role in promoting fruit elongation. These hormones stimulate cell division and elongation in the fruit tissues, leading to the enlargement of the fruit. This elongation process is crucial for the proper development and maturation of the fruit, ensuring that it reaches its desired size and shape.

Ques 8. Question related to ICSH Stimulates.

Ques 9. Question related to Human Physiology.

Ques 10. Question related to Replication of cell.

Ques 11. Question related to Excretion: Animal Kingdom.

Ques 12. Question related to Plant Growth.

Chemistry Questions

Ques 13. A hydrocarbon containing one double bond gave on reductive ozonolysis, ethanal and propanone. What is the name of hydrocarbon?

Solu. The hydrocarbon described is likely an alkene. When an alkene undergoes reductive ozonolysis, the double bond is cleaved, resulting in the formation of aldehydes or ketones. In this case, the formation of ethanal (acetaldehyde) and propanone (acetone) suggests that the original alkene had three carbon atoms.
The hydrocarbon in question is **propene** ($CH_3CH=CH_2$).

Ques 14. pH of a saturated solution of Ca $(OH)_2$ is 9 the solubility product (Ksp) of Ca $(OH)_2$ is

Solu. Saturated Ca(OH)2 solution has pH 9, indicating high $[OH^-]$.
Assuming a dilute solution: pOH = 14 - pH = 5 $[OH^-]$ = 10^(-pOH) = 10^-5 M
Since Ca(OH)2 dissociates 1:2, $[Ca^{2+}]$ = $[OH^-]$ / 2 = 5.0 x 10^-6 M
Estimated Ksp = $[Ca^{2+}][OH^-]$^2 ≈ 2.5 x 10^-16 (rough estimate due to dilution assumption)
Note: Actual Ksp of Ca(OH)2 at 25°C is around 5.0 x 10^-7 due to limitations of using pH for strong bases.

Ques 15. 0.1 molal aqueous solution of glucose boils at 100.16 °C the boiling point of 0.5 molal aqueous solution of glucose will be

Solu. We can calculate the boiling point of the 0.5 molal glucose solution using the information provided:

- Boiling point elevation constant (Kb) for water: 0.51 °C kg/mol (assumed)
- Molality (m) of solution 1 (glucose): 0.1 mol/kg
- Boiling point of solution 1: 100.16 °C
- Molality (m) of solution 2 (glucose): 0.5 mol/kg (desired to find boiling point)

Formula:

- ΔTb = m * Kb (where ΔTb is the boiling point elevation, m is molality, and Kb is the boiling point elevation constant)

Calculation:

1. Boiling Point Elevation for Solution 1: We don't need to calculate ΔTb for solution 1 as the question directly provides its boiling point (100.16 °C), which inherently includes the elevation from the 0.1 mol/kg concentration.
2. Boiling Point Elevation for Solution 2: ΔTb_2 = m_2 * Kb = 0.5 mol/kg * 0.51 °C kg/mol = 0.255 °C
3. Boiling Point of Solution 2: Since boiling point elevation represents the increase in boiling point compared to pure water, we can find the boiling point of solution 2 (with 0.5 mol/kg glucose) by adding the ΔTb to the boiling point of pure water (assumed to be 100 °C in this case).
   Boiling point of solution 2 = 100 °C + ΔTb_2 = 100 °C + 0.255 °C = 100.255 °C

Therefore, boiling point of the 0.5 molal aqueous solution of glucose will be approximately 100.255 °C.

Ques 16. Electronic configuration of cu

Solu. The electronic configuration of copper (Cu) is:
$1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 4s^1\ 3d^{10}$