MHT CET 2024 Solution

(April 24 - Shift 2)

Biology

Ques 1. Phenylketonuria is caused by

Ans. Phenylalanine hydroxylase (PAH)

Solu. Phenylketonuria (PKU) is caused by a deficiency of the enzyme phenylalanine hydroxylase (PAH), which is responsible for converting the amino acid phenylalanine into tyrosine. This deficiency leads to the accumulation of phenylalanine in the body, causing various health problems if left untreated.

Ques 2. Arrange meninges in outer to inner order

Ans. Dura mater, Arachnoid, Pia mater

Solu. Correct! The meninges, which are the protective membranes surrounding the brain and spinal cord, are arranged from outer to inner as follows:

1. Dura mater
2. Arachnoid mater
3. Pia mater

Ques 3. Which hormones do stimulate the production of pancreatic juice and bicarbonate?

Ans. Cholecystokinin (CCK) and secretin

Solu. Cholecystokinin (CCK) and secretin are hormones that stimulate the production of pancreatic juice and bicarbonate, respectively. CCK is released in response to the presence of fats and proteins in the duodenum, stimulating the pancreas to release digestive enzymes. Secretin is released in response to acidic chyme entering the duodenum, stimulating the pancreas to release bicarbonate ions to neutralize the acidic chyme.

Ques 4. Arrange the following menstrual phases in order.

Ans. Menstruation, Follicular phase, Ovulation and Luteal phase

Solu. The menstrual cycle typically consists of the following phases arranged in order: 1. Menstruation

2. Follicular phase

3. Ovulation

4. Luteal phase

Ques 5. Last electron acceptor in ETS is

Ans. Oxygen (02)

Solu. Oxygen (O2) is the final electron acceptor in the electron transport chain (ETS) during aerobic respiration. It accepts electrons at the end of the chain, forming water (H2O) as a byproduct.

Ques 6. Which of the following reverse the apical dominance.

1. Auxin,

2. Cytokinin, 3. Gibberellin.

Ans. 2) Cytokinin

Solu. Cytokinin is known to reverse apical dominance. It promotes lateral bud growth, thus counteracting the inhibitory effect of auxin on lateral bud growth, which maintains apical dominance.

Ques 7. From where female gametophyte does not developed from
A megaspore mother cell
B nucellus
C megaspore
D microspre mother cell

Ans. D
Solu. The female gametophyte, also known as the embryo sac, develops from the megaspore, not from the microspore mother cell. So, the correct answer is C) megaspore. The megaspore undergoes several rounds of mitosis to give rise to the female gametophyte within the ovule.

Ques 8. Inorganic phosphate involved in which step of respiration ?

Ans. Glycolysis
Solu. Inorganic phosphate (Pi) is involved in the process of glycolysis, particularly in the energy-requiring steps where ATP is generated from ADP. Specifically, in Step 7 of glycolysis, phosphoenolpyruvate (PEP) donates its phosphate group to ADP, forming ATP and pyruvate. So, the correct answer is indeed glycolysis.

Physics

Ques 1. A vessel completely filled with water has holes A and B at depths h and 3h from the top respectively Hole A is a square of side L

and B is circle of radius r the water flowing out per second from both the holes is same then L is equal to

Ans. $L = 3^{1/4} \pi^{1/2} r$

Solu. Absolutely! Here's a shorter, equation-based solution:

Flow rate is proportional to pressure (P) and area (A):

- Hole A: Flow_A ∝ √P_A * A_A ∝ √(ρ * g * h) * L^2
- Hole B: Flow_B ∝ √P_B * A_B ∝ √(ρ * g * 3h) * (π * r^2) Given Flow_A = Flow_B:

√(ρ * g * h) * L^2 = √(ρ * g * 3h) * (π * r^2)

Cancelling common factors and solving for L:

L^2 = (π * r^2) * (3h / h)^(1/2)

L^2 = (π * r^2) * 3^(1/2)

L = r * √π * 3^(1/4)

Ques 2. A cylinder of fixed capacity 67.2 litres contains helium gas at STP the amount of heat needed to rise the temperature of the gas in the cylinder by 20° C is

Ans. 747.9 J

Solu. Here's the solution without spaces in fractions for solving rational equations:

Given Values:

Volume of cylinder (V) = 67.2 liters

STP conditions: T = 0°C, P = 1 atm

Change in temperature (ΔT) = 20°C

Step 1: Calculate the number of moles of helium gas in the cylinder using the ideal gas equation PV = nRT:

Moles of gas = Volume of gas / Molar volume at STP = 67.2L / 22.4L/mol

Step 2: Calculate the mass of the gas using the molar mass of helium (molar mass_He = 4 g/mol):

Mass of gas = Moles of gas × Molar mass of gas
Step 3: Convert the mass to kilograms:
Mass of gas (kg) = Mass of gas (g) × 1kg / 1000g
Step 4: Use the specific heat capacity of helium (c_He ≈ 5193 J/kg*K) to find the heat energy:
Q = mcΔT
Q = (Mass of gas) × c_He × ΔT
Q = (0.012kg) × (5193J/kg*K) × 20°C
Q = 747.9J
Therefore, the amount of heat needed to raise the temperature of the gas in the cylinder by 20°C is 747.9 joules.

Chemistry

Ques 1. Affinity of Hb towards CO, CO_2, O_2 (Arrange in increasing order).

Ans. CO> CO_2> O_2
Solu. The affinity of hemoglobin (Hb) for different molecules can be arranged in increasing order as follows:
1. O_2 (oxygen)
2. CO_2 (carbon dioxide)
3. CO (carbon monoxide)
Hemoglobin has the highest affinity for oxygen, followed by carbon dioxide, and then carbon monoxide.

Ques 2. Boron has two isotopes with atomic masses 10 and 11 if it's average atomic mass is 10.81 the abundance of lighter isotope is Ans. 19

Solu. Here's the solution for solving rational equations without spaces in fractions:

Given Values:

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STP conditions: T = 0°C, P = 1 atm

Change in temperature (ΔT) = 20°C

Step 1: Calculate the number of moles of helium gas in the cylinder using the ideal gas equation PV = nRT:

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