MHT CET 2026 April 21 Shift 2

Question Paper with Solutions (Memory Based)

Conducted by CET Cell, Maharashtra

General Instructions

(i) **Duration:** The total duration of the examination is 3 hours (180 minutes).

(ii) **Total Marks:** The complete paper carries a maximum of 200 marks.

(iii) **Structure:** The paper has 3 Sections:

- **Section A:** 50 Multiple Choice Questions (Physics)
- **Section B:** 50 Multiple Choice Questions (Chemistry)
- **Section C:** 100 Multiple Choice Questions (Biology)

(iv) **Compulsory Questions:** All 200 questions are compulsory.

(v) Each question has four options. Only **one** option is correct.

(vi) **Right Answer:** Physics (+1 marks), Chemistry (+1 marks) and Biology(+1 marks).

(vii) **Incorrect Answer:** (No Negative marking).

(viii) **Unanswered/Marked for Review:** 0 marks.

1. Which animal possesses the most primitive nervous system?

(A) Earthworm

(B) Hydra

(C) Frog

(D) Human

Correct Answer: (B) Hydra

Solution:

Concept: The nervous system is responsible for coordination and response to stimuli. In the animal kingdom, the complexity of the nervous system increases progressively during evolution. The simplest type of nervous system is a **nerve net**, where nerve cells are loosely connected without forming a centralized brain or spinal cord.

Primitive multicellular organisms show this basic organization. As animals evolved, the nervous system became more complex, forming ganglia and eventually a well-developed brain and spinal cord in higher animals.

Step 1: Understanding the nervous system of Hydra.

Hydra, a member of the phylum **Cnidaria**, possesses the most primitive type of nervous system known as a **nerve net**. In this system:

- Nerve cells are distributed throughout the body.
- There is **no central brain**.
- Impulses can travel in multiple directions across the body.

Step 2: Comparison with other animals.

- **Earthworm** – possesses a well-developed nervous system with a nerve cord and ganglia.
- **Frog** – has a centralized nervous system with brain and spinal cord.
- **Human** – has a highly developed nervous system.

Thus, among the given options, the organism with the most primitive nervous system is **Hydra**.

Quick Tip: The simplest nervous system in animals is the **nerve net**, found in **Cnidarians** such as Hydra and jellyfish. It lacks a central brain and allows impulses to move in different directions.

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2. What is the oxidation state of Chlorine in Cl_2O_7?

(A) +1

(B) +3

(C) +5

(D) +7

Correct Answer: (D) +7

Solution:

Concept: The oxidation state (oxidation number) of an element represents the hypothetical charge it would have if all bonds were completely ionic. Some important rules used to determine oxidation states are:

- Oxygen usually has an oxidation state of −2.
- The sum of oxidation states of all atoms in a neutral molecule is 0.

Step 1: Assign oxidation states to known elements.

In the compound Cl_2O_7, oxygen has an oxidation state of −2.

There are 7 oxygen atoms:

$$7 \times (-2) = -14$$

Step 2: Let the oxidation state of chlorine be x.

Since there are 2 chlorine atoms:

$$2x + (-14) = 0$$

$$2x = 14$$

$$x = +7$$

Step 3: Interpretation.

Thus, the oxidation state of chlorine in Cl_2O_7 is +7.

Quick Tip: To find oxidation states quickly:

- Oxygen generally has oxidation state −2.
- Multiply oxidation states by the number of atoms.
- The total for a neutral molecule must equal 0.

3. Which plant hormone is primarily responsible for apical dominance?

(A) Cytokinin

(B) Auxin

(C) Gibberellin

(D) Ethylene

Correct Answer: (B) Auxin

Solution:

Concept: Plant hormones (phytohormones) are chemical substances that regulate growth and development in plants. One important growth phenomenon is **apical dominance**, where the growth of lateral buds is suppressed by the terminal (apical) bud.
This occurs due to the action of certain plant hormones that regulate cell elongation and bud growth.

Step 1: Understanding apical dominance.

Apical dominance is the phenomenon in which the main growing point of the plant (apical bud) inhibits the growth of lateral or side buds. This ensures that the plant grows vertically and the main stem dominates over side branches.

Step 2: Role of Auxin.

The plant hormone **Auxin** is produced in the **apical meristem** (tip of the plant). It moves downward through the stem and suppresses the growth of lateral buds.
As a result:

- The apical bud grows actively.
- The lateral buds remain dormant.

If the apical bud is removed, the level of auxin decreases and the lateral buds start growing, leading to branching.

Step 3: Conclusion.

Therefore, the plant hormone primarily responsible for **apical dominance** is **Auxin**.

Quick Tip: **Auxin** is produced in the shoot apex and controls **apical dominance**. Removing the apical bud reduces auxin concentration, allowing lateral buds to grow and form branches.

4. What is the hybridization of the carbon atom in CO_2?

(A) sp^3

(B) sp^2

(C) sp

(D) sp^3d

Correct Answer: (C) sp

Solution:

Concept: Hybridization is the mixing of atomic orbitals of similar energy to form new equivalent hybrid orbitals. The type of hybridization depends on the number of regions of electron density (sigma bonds or lone pairs) around the central atom.

Step 1: Determine the bonding in CO_2.

The structure of carbon dioxide is:

$$O = C = O$$

Carbon forms two double bonds with two oxygen atoms.

Step 2: Count regions of electron density.

Each double bond contains one sigma bond. Therefore, carbon has:

- 2 sigma bonds
- 0 lone pairs

Total regions of electron density $= 2$.

Step 3: Determine hybridization.

Two regions of electron density correspond to sp hybridization and a linear molecular geometry with bond angle 180°.

Thus, the hybridization of carbon in CO_2 is sp.

Quick Tip: If the central atom has:

- 2 regions of electron density $\rightarrow sp$
- 3 regions $\rightarrow sp^2$
- 4 regions $\rightarrow sp^3$

Carbon in CO_2 has two regions, hence sp hybridization.

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5. If the distance between two charges is doubled, what happens to the Coulomb force?

(A) It becomes double

(B) It becomes four times

(C) It becomes half

(D) It becomes one-fourth

Correct Answer: (D) It becomes one-fourth

Solution:

Concept: Coulomb's law states that the electrostatic force between two charges is directly proportional to the product of the charges and inversely proportional to the square of the distance between them.

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Step 1: Initial force.

Let the initial distance between two charges be r.

Then the force is:

$$F = k\frac{q_1 q_2}{r^2}$$

Step 2: When distance is doubled.

If the distance becomes $2r$:

$$F' = k\frac{q_1 q_2}{(2r)^2}$$

$$F' = k\frac{q_1 q_2}{4r^2}$$

$$F' = \frac{F}{4}$$

Step 3: Conclusion.

Thus, when the distance between two charges is doubled, the Coulomb force becomes $\frac{1}{4}$ of its original value.

Quick Tip: According to Coulomb's law, electrostatic force varies inversely with the square of distance. If distance becomes $2r$, force becomes $\frac{1}{4}$. If distance becomes $3r$, force becomes $\frac{1}{9}$.

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6. Which antibody is most abundant in human colostrum?

(A) IgG

(B) IgA

(C) IgM

(D) IgE

Correct Answer: (B) IgA

Solution:

Concept: Colostrum is the first milk produced by the mother immediately after childbirth. It is rich in proteins, vitamins, minerals, and especially antibodies that provide passive immunity to the newborn.

Immunoglobulins (antibodies) are proteins produced by the immune system to fight against pathogens such as bacteria and viruses.

Step 1: Understanding antibodies present in colostrum.

Among different types of antibodies (IgG, IgA, IgM, IgE, IgD), **Immunoglobulin A (IgA)** is the most abundant in human colostrum.

Step 2: Role of IgA in newborn immunity.

- IgA protects mucosal surfaces such as the gastrointestinal and respiratory tracts.
- It prevents pathogens from attaching to the mucous membranes.
- It provides **passive immunity** to the newborn during the early stages of life.

Step 3: Conclusion.

Therefore, the antibody most abundant in human colostrum is **IgA**.

Quick Tip: **IgA** is the major antibody found in secretions such as saliva, tears, mucus, and **colostrum**. It plays a crucial role in protecting mucosal surfaces and providing passive immunity to infants.

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7. What is the interaction where one species is harmed and the other is unaffected?

(A) Mutualism

(B) Commensalism

(C) Amensalism

(D) Parasitism

Correct Answer: (C) Amensalism

Solution:

Concept: In ecology, different species interact with each other in various ways. These interactions may benefit, harm, or have no effect on the participating species.

Step 1: Understanding amensalism.

Amensalism is a type of ecological interaction in which:

- One species is **harmed**.
- The other species is **neither benefited nor harmed**.

Step 2: Example of amensalism.

A common example is the fungus *Penicillium*, which produces antibiotics that inhibit the growth of bacteria. The bacteria are harmed, while the fungus remains unaffected.

Step 3: Comparison with other interactions.

- **Mutualism** – both species benefit.
- **Commensalism** – one benefits and the other is unaffected.
- **Parasitism** – one benefits while the other is harmed.

Thus, the interaction where one species is harmed and the other is unaffected is called **Amensalism**.

Quick Tip: Ecological interaction symbols: +/+ Mutualism, +/0 Commensalism, +/− Parasitism, −/0 Amensalism.

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8. What is the volume of air remaining in the lungs after forceful expiration called?

(A) Tidal Volume

(B) Vital Capacity

(C) Residual Volume (RV)

(D) Inspiratory Capacity

Correct Answer: (C) Residual Volume (RV)

Solution:

Concept: Lung volumes refer to different quantities of air associated with the respiratory cycle. These volumes help in understanding respiratory physiology and the functioning of the lungs.

Step 1: Understanding Residual Volume.

Residual Volume (RV) is the volume of air that remains in the lungs even after a forceful expiration. This air cannot be expelled from the lungs.

Step 2: Importance of Residual Volume.

- It prevents the lungs from collapsing.
- It allows continuous gas exchange between breaths.
- It maintains the structure and function of alveoli.

Step 3: Conclusion.

Therefore, the air remaining in the lungs after forceful expiration is called **Residual Volume (RV)**.

Quick Tip: Important lung volumes: Tidal Volume (TV) – air inhaled or exhaled during normal breathing. Vital Capacity (VC) – maximum air expelled after maximum inhalation. Residual Volume (RV) – air remaining in lungs after forceful expiration.

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9. What is the stability order of carbocations?

(A) Primary > Secondary > Tertiary

(B) Secondary > Primary > Tertiary

(C) Tertiary > Secondary > Primary

(D) Primary > Tertiary > Secondary

Correct Answer: (C) Tertiary > Secondary > Primary

Solution:

Concept: Carbocations are positively charged carbon species formed during many organic reactions. Their stability depends mainly on the **inductive effect** and **hyperconjugation** provided by surrounding alkyl groups.

Step 1: Understanding stabilization by alkyl groups.

Alkyl groups donate electron density through the $+I$ (inductive) effect and hyperconjugation, which helps stabilize the positive charge on carbon.

Step 2: Comparison of carbocations.

- **Tertiary carbocation** – attached to three alkyl groups (most stable).
- **Secondary carbocation** – attached to two alkyl groups.
- **Primary carbocation** – attached to one alkyl group (least stable).

Step 3: Conclusion.

Hence, the stability order of carbocations is:

Tertiary > Secondary > Primary

Quick Tip: More alkyl groups attached to a carbocation increase its stability due to **hyperconjugation** and the **+I inductive effect**.

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10. What is the formula for centripetal acceleration?

(A) $a = \frac{v}{r}$

(B) $a = \frac{v^2}{r}$

(C) $a = vr$

(D) $a = \frac{r}{v^2}$

Correct Answer: (B) $a = \frac{v^2}{r}$

Solution:

Concept: Centripetal acceleration is the acceleration experienced by an object moving in a circular path. It always acts towards the center of the circular path and keeps the object moving along the curved trajectory.

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Step 1: Understanding circular motion.

When an object moves in a circle with constant speed v, its direction continuously changes. This change in direction produces an acceleration directed towards the center of the circle.

Step 2: Expression for centripetal acceleration.

If v is the velocity of the object and r is the radius of the circular path, the centripetal acceleration is given by:

$$a = \frac{v^2}{r}$$

Step 3: Conclusion.

Thus, the formula for centripetal acceleration is $a = \frac{v^2}{r}$.

Quick Tip: In uniform circular motion, centripetal acceleration always points toward the center of the circle and depends on the square of velocity.

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11. Which law states that magnetic susceptibility is inversely proportional to absolute temperature?

(A) Ohm's Law

(B) Curie's Law

(C) Faraday's Law

(D) Gauss's Law

Correct Answer: (B) Curie's Law

Solution:

Concept: Magnetic susceptibility (χ) is a measure of how much a material becomes magnetized in the presence of an external magnetic field. For paramagnetic materials, the susceptibility depends on temperature.

Step 1: Statement of Curie's Law.

Curie's Law states that the magnetic susceptibility of a paramagnetic substance is inversely proportional to its absolute temperature.

$$\chi \propto \frac{1}{T}$$

or

$$\chi = \frac{C}{T}$$

where C is Curie's constant and T is the absolute temperature.

Step 2: Interpretation of the law.

- As temperature increases, thermal agitation increases.
- This reduces the alignment of magnetic dipoles.
- Hence, magnetic susceptibility decreases.

Step 3: Conclusion.

Therefore, the law stating that magnetic susceptibility is inversely proportional to absolute temperature is **Curie's Law**.

Quick Tip: For paramagnetic substances:

$$\chi = \frac{C}{T}$$

This means susceptibility decreases as temperature increases.

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12. What is the product of the reaction between Phenol and concentrated HNO_3?

(A) Nitrobenzene

(B) Picric Acid (2,4,6-trinitrophenol)

(C) Aniline

(D) Benzaldehyde

Correct Answer: (B) Picric Acid (2,4,6-trinitrophenol)

Solution:

Concept: Phenol undergoes electrophilic substitution reactions easily because the hydroxyl group ($-OH$) strongly activates the benzene ring and directs incoming electrophiles to the **ortho** and **para** positions.

Step 1: Reaction with concentrated nitric acid.

When phenol reacts with **concentrated nitric acid**, strong nitration occurs due to the highly activated aromatic ring.

Step 2: Formation of trinitro compound.

Three nitro groups ($-NO_2$) are introduced at the **2, 4, and 6 positions** of the benzene ring.

The product formed is:

2,4,6-trinitrophenol

This compound is commonly known as **Picric Acid**.

Step 3: Conclusion.

Hence, the reaction of phenol with concentrated HNO_3 produces **Picric Acid (2,4,6-trinitrophenol)**.

Quick Tip: Phenol is highly activated due to the $-OH$ group, so strong nitration with concentrated HNO_3 produces **picric acid (2,4,6-trinitrophenol)**.

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13. What is the Van't Hoff factor (i) for a non-electrolyte?

(A) 0

(B) 1

(C) 2

(D) 3

Correct Answer: (B) $i = 1$

Solution:

Concept: The **Van't Hoff factor (i)** represents the number of particles into which a substance dissociates in solution. It is used in colligative properties such as boiling point elevation, freezing point depression, and osmotic pressure.

Step 1: Understanding non-electrolytes.

A **non-electrolyte** is a substance that does not dissociate into ions when dissolved in water. It remains as whole molecules in solution.

Step 2: Value of Van't Hoff factor.

Since a non-electrolyte does not dissociate, the number of particles in solution remains the same as the number of molecules dissolved.

Thus,

$$i = 1$$

Step 3: Conclusion.

Therefore, the Van't Hoff factor for a non-electrolyte is $\mathbf{i = 1}$.

Quick Tip: For non-electrolytes (like glucose or urea), there is no ionization in solution, so the Van't Hoff factor $i = 1$.

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14. What is the SI unit of Magnetic Induction?

(A) Weber

(B) Tesla (T)

(C) Henry

(D) Ampere

Correct Answer: (B) Tesla (T)

Solution:

Concept: Magnetic induction, also known as **magnetic flux density**, represents the strength of a magnetic field at a particular point. It is denoted by B.

Step 1: Definition of magnetic induction.

Magnetic induction describes the number of magnetic field lines passing through a unit area perpendicular to the magnetic field.

Step 2: SI unit.

The SI unit of magnetic induction is **Tesla (T)**.

$$1\,\text{Tesla} = 1\,\frac{\text{Weber}}{\text{m}^2}$$

Step 3: Conclusion.

Thus, the SI unit of magnetic induction is **Tesla (T)**.

Quick Tip: Magnetic field strength B is measured in **Tesla (T)**. $1\,T = 1\,\text{Weber}/m^2$.

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15. Which part of the brain is responsible for maintaining posture and equilibrium?

(A) Cerebrum

(B) Cerebellum

(C) Medulla Oblongata

(D) Hypothalamus

Correct Answer: (B) Cerebellum

Solution:

Concept: The human brain is divided into different regions, each responsible for specific functions such as thinking, coordination, and regulation of body activities.

Step 1: Role of the cerebellum.

The **cerebellum** is located at the back of the brain, below the cerebrum. It plays an essential role in:

- Maintaining body posture
- Controlling balance and equilibrium
- Coordinating voluntary muscle movements

Step 2: Comparison with other brain parts.

- **Cerebrum** – responsible for thinking, memory, and voluntary actions.

- **Medulla oblongata** – controls involuntary actions like heartbeat and breathing.
- **Hypothalamus** – regulates body temperature, hunger, and hormonal control.

Step 3: Conclusion.

Therefore, the part of the brain responsible for maintaining posture and equilibrium is the **Cerebellum**.

Quick Tip: **Cerebellum** = balance, posture, and coordination of muscles.
