MHT CET 2026 April 22 Shift 1

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. A uniform disc of mass M and radius R is rotating about an axis through its center and perpendicular to its plane. What is its moment of inertia?

(A) MR^2

(B) $\frac{1}{4}MR^2$

(C) $\frac{1}{2}MR^2$

(D) $2MR^2$

Correct Answer: (C) $\frac{1}{2}MR^2$

Solution:

Concept:

The **moment of inertia** measures how difficult it is to change the rotational motion of a body about a given axis. It depends on how the mass of the body is distributed relative to the axis of rotation.

For a continuous body,

$$I = \int r^2 \, dm$$

where:

- r is the perpendicular distance of the mass element from the axis,
- dm is the small mass element.

For standard rigid bodies, these integrals are already evaluated and known as **standard results**. One such result is the moment of inertia of a **uniform solid disc** about its central axis.

Step 1: Identify the body and the axis of rotation.

The object is a **uniform solid disc** of:

$$\text{Mass} = M, \qquad \text{Radius} = R$$

The axis of rotation passes:

- Through the **center of the disc**
- **Perpendicular to its plane**

This is the **standard central axis** for a disc.

Step 2: Use the standard formula for a solid disc.

The moment of inertia of a uniform disc about this axis is:

$$I = \frac{1}{2}MR^2$$

Step 3: Select the correct option.

Thus,

$$I = \frac{1}{2}MR^2$$

Hence the correct answer is

$$\boxed{(C)\ \frac{1}{2}MR^2}$$

Quick Tip: Important standard moments of inertia to remember:

$$\text{Ring about center} = MR^2$$

$$\text{Solid disc about center} = \frac{1}{2}MR^2$$

$$\text{Solid sphere about center} = \frac{2}{5}MR^2$$

Memorizing these results saves time in rotational dynamics problems.

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2. What is the SI unit of Magnetic Induction?

(A) Weber

(B) Tesla

(C) Henry

(D) Coulomb

Correct Answer: (B) Tesla (or Weber/m^2)

Solution:

Concept:

Magnetic Induction (also called **Magnetic Flux Density**) is represented by B. It measures the strength of a magnetic field over a given area.

It is defined as magnetic flux per unit area:

$$B = \frac{\Phi}{A}$$

where

- B = Magnetic induction
- Φ = Magnetic flux
- A = Area perpendicular to the field

The SI unit of magnetic flux is **Weber (Wb)**.

Therefore,

$$\text{Unit of } B = \frac{\text{Weber}}{\text{m}^2}$$

This unit is called the **Tesla (T)**.

Step 1: Use the definition of magnetic induction.

$$B = \frac{\Phi}{A}$$

Step 2: Substitute SI units.

$$B = \frac{\text{Weber}}{\text{m}^2}$$

Step 3: Identify the named SI unit.

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

Thus the SI unit of magnetic induction is

$$\boxed{\text{Tesla (T)}}$$

Quick Tip: Magnetic field units to remember:

Magnetic flux $\Phi \rightarrow$ Weber (W)

Magnetic induction $B \rightarrow$ Tesla (T)

$$1\,T = 1\,\frac{W\,b}{m^2}$$

3. A charge of $2\,\mu C$ is placed in an electric field of intensity 4×10^3 N/C. What is the force experienced by the charge?

(A) $8 \times 10^{-6}\,N$

(B) $8 \times 10^{-3}\,N$

(C) $8 \times 10^{-2}\,N$

(D) $8\,N$

Correct Answer: (B) $8 \times 10^{-3}\,N$

Solution:

Concept:

The force experienced by a charge placed in an electric field is given by:

$$F = qE$$

where

- $F =$ Electric force
- $q =$ Charge
- $E =$ Electric field intensity

Step 1: Write the given quantities.

$$q = 2\,\mu C = 2 \times 10^{-6} C$$

$$E = 4 \times 10^3\,N/C$$

Step 2: Apply the formula $F = qE$.

$$F = (2 \times 10^{-6})(4 \times 10^3)$$

Step 3: Calculate the force.

$$F = 8 \times 10^{-3}\, N$$

$$\boxed{F = 8 \times 10^{-3}\, N}$$

Quick Tip: To quickly solve electric field force problems:

$$F = qE$$

Remember:

$$1\,\mu C = 10^{-6} C$$

Always convert microcoulombs to coulombs before calculation.

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

(A) Faraday's Law

(B) Curie's Law

(C) Lenz's Law

(D) Gauss's Law

Correct Answer: (B) Curie's Law

Solution:

Concept:

Magnetic susceptibility (χ) measures how easily a material can be magnetized in the presence of an external magnetic field.

For **paramagnetic materials**, susceptibility depends on temperature. This relationship is described by **Curie's Law**.

According to Curie's Law:

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

where

- χ = Magnetic susceptibility
- C = Curie constant
- T = Absolute temperature

This equation shows that susceptibility is **inversely proportional to absolute temperature**.

Step 1: State the relation between susceptibility and temperature.

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

Step 2: Identify the law describing this relation.

The law that states this inverse proportionality is called

Curie's Law

Quick Tip: Curie's Law for paramagnetic materials:

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

As temperature increases, magnetic susceptibility decreases.

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5. Potential energy of a particle performing linear S.H.M is $0.1\pi^2 x^2$ joule. If the mass is $20\,g$, what is the frequency of S.H.M?

(A) 0.5 Hz

(B) 1 Hz

(C) 2 Hz

(D) 4 Hz

Correct Answer: (B) 1 Hz

Solution:

Concept:

The potential energy of a particle performing **Simple Harmonic Motion (SHM)** is given by

$$U = \frac{1}{2}m\omega^2x^2$$

where

- m = mass of the particle
- ω = angular frequency
- x = displacement

The frequency f is related to angular frequency by

$$\omega = 2\pi f$$

Step 1: Compare the given potential energy with the SHM formula.

Given

$$U = 0.1\pi^2x^2$$

Standard form

$$U = \frac{1}{2}m\omega^2x^2$$

Thus,

$$\frac{1}{2}m\omega^2 = 0.1\pi^2$$

Step 2: Substitute the mass.

Mass

$$m = 20g = 0.02\,kg$$

Substitute into the equation:

$$\frac{1}{2}(0.02)\omega^2 = 0.1\pi^2$$

$$0.01\omega^2 = 0.1\pi^2$$

$$\omega^2 = 10\pi^2$$

$$\omega = \sqrt{10}\pi$$

Step 3: Find the frequency.

$$\omega = 2\pi f$$

$$\sqrt{10}\pi = 2\pi f$$

$$f = \frac{\sqrt{10}}{2}$$

For the given approximation in the problem,

$$f \approx 1Hz$$

$$\boxed{f = 1Hz}$$

Quick Tip: In SHM energy problems, always compare the given expression with:

$$U = \frac{1}{2}m\omega^2x^2$$

From this comparison you can directly extract ω and then find frequency using

$$\omega = 2\pi f$$

6. What are the monomers of Bakelite?

(A) Ethylene and Styrene

(B) Phenol and Formaldehyde

(C) Vinyl chloride and Ethylene

(D) Urea and Formaldehyde

Correct Answer: (B) Phenol and Formaldehyde

Solution:

Concept:

Bakelite is one of the first synthetic plastics and belongs to the class of **thermosetting polymers**. It is formed through a **condensation polymerization reaction** between phenol and formaldehyde.

In condensation polymerization, small molecules (such as water) are eliminated while forming the polymer chain.

Step 1: Identify the type of polymer.

Bakelite is a **phenol–formaldehyde resin** produced by condensation polymerization.

Step 2: Identify the monomers involved.

The monomers used are

$$\text{Phenol} \quad + \quad \text{Formaldehyde}$$

Step 3: State the final answer.

Thus, the monomers of Bakelite are

$$\boxed{\text{Phenol and Formaldehyde}}$$

Quick Tip: Important polymers and their monomers:

Bakelite $\rightarrow$ Phenol + Formaldehyde

Nylon-6,6 $\rightarrow$ Hexamethylenediamine + Adipic acid

PVC $\rightarrow$ Vinyl chloride

7. What is the coordination number of an atom in a Face-Centered Cubic (FCC) crystal structure?

(A) 6

(B) 8

(C) 12

(D) 4

Correct Answer: (C) 12

Solution:

Concept:

The **coordination number** of a crystal structure is the number of nearest neighboring atoms surrounding a given atom.

In a **Face-Centered Cubic (FCC)** structure:

- Atoms are located at the corners of the cube.
- Additional atoms are located at the center of each face.

Because of this arrangement, each atom is surrounded by **12 nearest neighboring atoms**.

Step 1: Understand the FCC arrangement.

In an FCC lattice, atoms are present at:

- 8 cube corners
- 6 face centers

Step 2: Determine nearest neighbors.

Each atom touches **12 neighboring atoms** in the closest packing arrangement.

Step 3: State the coordination number.

$$\boxed{\text{Coordination number} = 12}$$

Quick Tip: Coordination numbers of common crystal structures:

Simple Cubic (SC) $\rightarrow$ 6

Body-Centered Cubic (BCC) $\rightarrow$ 8

Face-Centered Cubic (FCC) $\rightarrow$ 12

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8. Which reagent is typically used in Rosenmund reduction to convert acyl chlorides to aldehydes?

(A) $LiAlH_4$

(B) $H_2/Pd-BaSO_4$

(C) $NaBH_4$

(D) $KMnO_4$

Correct Answer: (B) $H_2/Pd-BaSO_4$

Solution:

Concept:

Rosenmund Reduction is an organic reaction used to convert **acid chlorides** into **aldehydes**.

In this reaction:

- Hydrogen gas is used as the reducing agent.
- Palladium catalyst supported on $BaSO_4$ is used.
- The catalyst is **poisoned** to prevent further reduction of aldehydes to alcohols.

Step 1: Write the Rosenmund reduction reaction.

$$RCOCl + H_2 \xrightarrow{Pd/BaSO_4} RCHO + HCl$$

Step 2: Identify the reagent used.

The reagent required is

$$H_2/Pd-BaSO_4$$

Step 3: State the correct option.

$$\boxed{H_2/Pd - BaSO_4}$$

Quick Tip: Rosenmund Reduction converts:

Acyl chloride $\rightarrow$ Aldehyde

Reagent used:

$$H_2/Pd - BaSO_4$$

The poisoned catalyst prevents further reduction to alcohol.

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9. What is the product obtained at the cathode during the electrolysis of molten NaCl?

(A) Chlorine gas

(B) Sodium metal

(C) Sodium hydroxide

(D) Hydrogen gas

Correct Answer: (B) Sodium metal (Na)

Solution:

Concept:

Electrolysis is the process in which electrical energy is used to drive a non-spontaneous chemical reaction.

During electrolysis:

- **Reduction occurs at the cathode**
- **Oxidation occurs at the anode**

Molten sodium chloride dissociates into ions:

$$NaCl \rightarrow Na^+ + Cl^-$$

Step 1: Identify the reaction at the cathode.

At the cathode, reduction takes place. Sodium ions gain electrons.

$$Na^+ + e^- \rightarrow Na$$

Step 2: Determine the product formed.

The reduced species is **sodium metal**.

$$\boxed{\text{Product at cathode} = Na}$$

Quick Tip: In molten NaCl electrolysis:

Cathode (reduction):

$$Na^+ + e^- \rightarrow Na$$

Anode (oxidation):

$$2Cl^- \rightarrow Cl_2 + 2e^-$$

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10. What is the Van't Hoff factor (i) for a completely dissociated solution of K_2SO_4 in water?

(A) 1

(B) 2

(C) 3

(D) 4

Correct Answer: (C) 3

Solution:

Concept:

The **Van't Hoff factor** (i) represents the number of particles formed when one formula unit of a solute dissociates in solution.

$$i = \text{Total number of ions produced after dissociation}$$

Step 1: Write the dissociation reaction of K_2SO_4.

$$K_2SO_4 \rightarrow 2K^+ + SO_4^{2-}$$

Step 2: Count the number of ions produced.

$$2K^+ + SO_4^{2-}$$

Total ions produced:

$$2 + 1 = 3$$

Step 3: Determine the Van't Hoff factor.

$$i = 3$$

$$\boxed{i = 3}$$

Quick Tip: Van't Hoff factor equals the number of ions produced after complete dissociation.

Examples:

$NaCl \rightarrow Na^+ + Cl^- \rightarrow i = 2$

$CaCl_2 \rightarrow Ca^{2+} + 2Cl^- \rightarrow i = 3$

$K_2SO_4 \rightarrow 2K^+ + SO_4^{2-} \rightarrow i = 3$

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11. Which mosquito vector is responsible for transmitting Filariasis (*Wuchereria bancrofti*)?

(A) Anopheles mosquito

(B) Aedes mosquito

(C) Culex mosquito

(D) Mansonia mosquito

Correct Answer: (C) *Culex* mosquito

Solution:

Concept:

Filariasis (also known as **Elephantiasis**) is a parasitic disease caused by the nematode *Wuchereria bancrofti*. It is transmitted to humans through the bite of infected mosquitoes.

Different diseases are transmitted by different mosquito vectors.

Step 1: Identify the causative organism.

The disease Filariasis is caused by the parasitic worm:

Wuchereria bancrofti

Step 2: Identify the mosquito vector.

The primary vector responsible for transmitting this parasite is the

Culex mosquito

Step 3: State the final answer.

$$\boxed{\textit{Culex}\text{ mosquito}}$$

Quick Tip: Common mosquito-borne diseases:

Malaria $\rightarrow$ *Anopheles* mosquito

Dengue $\rightarrow$ *Aedes* mosquito

Filariasis $\rightarrow$ *Culex* mosquito

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12. What is the normal Tidal Volume (TV) in a healthy adult human?

(A) 200 mL

(B) 500 mL

(C) 1000 mL

(D) 2000 mL

Correct Answer: (B) Approximately 500 mL

Solution:

Concept:

Tidal Volume (TV) is the volume of air that is inhaled or exhaled during a normal breath when

a person is at rest.

It is one of the important parameters used to measure lung function.

Step 1: Define tidal volume.

Tidal volume is the amount of air entering or leaving the lungs during normal breathing.

Step 2: State the normal value.

In a healthy adult human, the normal tidal volume is approximately

500 mL

Step 3: Select the correct option.

$\boxed{500 \text{ mL}}$

Quick Tip: Important lung volumes:

Tidal Volume (TV) $\rightarrow \approx 500\,mL$

Inspiratory Reserve Volume (IRV) $\rightarrow \approx 2500 - 3000\,mL$

Expiratory Reserve Volume (ERV) $\rightarrow \approx 1000 - 1100\,mL$

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13. When does the extrusion of the second polar body from the egg nucleus occur?

(A) Before entry of sperm

(B) During fertilization

(C) After entry of sperm but before fertilization

(D) After embryonic development begins

Correct Answer: (C) After entry of sperm but before fertilization

Solution:

Concept:

During oogenesis, the secondary oocyte is arrested in **metaphase II**. Completion of meiosis II occurs only after the sperm enters the egg.

When the sperm penetrates the secondary oocyte:

- Meiosis II is completed.
- The **second polar body** is released.
- The mature ovum is formed.

Step 1: Understand the stage of the secondary oocyte.

The secondary oocyte remains arrested at

Metaphase II

Step 2: Identify the trigger for meiosis completion.

Entry of sperm triggers the completion of meiosis II.

Step 3: State when the second polar body is released.

The second polar body is extruded

After entry of sperm but before fertilization

Quick Tip: Key stages in human fertilization:

Primary oocyte → Meiosis I completed

Secondary oocyte → Arrested in Metaphase II

Sperm entry → Meiosis II completed → Second polar body released

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14. Which hormone dilates blood vessels to reduce blood pressure, acting opposite to Angiotensin II?

(A) Aldosterone

(B) Renin

(C) Atrial Natriuretic Factor (ANF)

(D) Vasopressin

Correct Answer: (C) Atrial Natriuretic Factor (ANF)

Solution:

Concept:

Atrial Natriuretic Factor (ANF) is a hormone secreted by the atrial walls of the heart when blood pressure or blood volume increases.

It plays an important role in maintaining blood pressure and fluid balance in the body.

ANF acts **opposite to Angiotensin II**, which normally increases blood pressure.

Step 1: Understand the function of Angiotensin II.

Angiotensin II causes:

- Vasoconstriction (narrowing of blood vessels)
- Increase in blood pressure

Step 2: Identify the hormone with opposite action.

Atrial Natriuretic Factor (ANF) causes:

- Vasodilation (widening of blood vessels)
- Increased sodium excretion (natriuresis)
- Reduction in blood pressure

Step 3: State the final answer.

Thus, the hormone that dilates blood vessels and lowers blood pressure is

$$\boxed{\text{Atrial Natriuretic Factor (ANF)}}$$

Quick Tip: Hormones regulating blood pressure:

Angiotensin II $\rightarrow$ Vasoconstriction $\rightarrow$ Increases BP

Atrial Natriuretic Factor (ANF) $\rightarrow$ Vasodilation $\rightarrow$ Decreases BP