TS EAMCET 2026 May 4 Shift 2

Question Paper with Solutions (Memory-Based)

Conducted by JNTU, Hyderabad

General Instructions

(i) The test is of 3 hours duration.

(ii) This test paper consists of 160 questions. The maximum marks are 720.

(iii) Physics and Chemistry contains 40 questions each and Biology (Botany and Zoology) contains 80 questions.

(iv) Each question carries +1 marks for correct answer and there is no negative marking for wrong answer.

1. Which of the following correctly defines apomixis?

(A) It involves fertilisation

(B) It requires meiosis

(C) Seeds develop without fertilisation

(D) It increases genetic variation

Correct Answer: (C) Seeds develop without fertilisation

Solution:

Step 1: Concept

Apomixis is a form of asexual reproduction in plants that mimics sexual reproduction by producing seeds.

Step 2: Meaning

The term is derived from Greek words meaning "away from mixing," referring to the absence of the union of male and female gametes.

Step 3: Analysis

In sexual reproduction, seeds are the result of fertilisation. However, in apomictic plants, the embryo develops directly from diploid cells of the ovule or an unfertilised egg. This bypasses both meiosis and syngamy (fertilisation).

Step 4: Conclusion

Since the process results in seed formation without the fusion of gametes, option (C) is the correct definition.

Final Answer: (C)

Quick Tip: Apomixis = "A" (without) + "mixis" (mixing/fertilisation). It creates clones of the mother plant in seed form.

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2. Casparian strips in the root endodermis are made of:

(A) Cellulose

(B) Pectin

(C) Suberin

(D) Lignin

Correct Answer: (C) Suberin

Solution:

Step 1: Concept

The endodermis is the innermost layer of the root cortex, acting as a biological checkpoint for water and minerals entering the vascular cylinder.

Step 2: Meaning

Casparian strips are specialized hydrophobic wall bands found in the radial and transverse walls of endodermal cells.

Step 3: Analysis

These strips are primarily composed of suberin, a waxy, water-impermeable substance. This prevents water from moving through the apoplastic pathway (cell walls) and forces it to enter

the symplast (cell cytoplasm) to reach the xylem.

Step 4: Conclusion

Based on the chemical composition of these waterproof barriers, suberin is the primary constituent.

Final Answer: (C)

Quick Tip: Suberin acts like "waterproof wax" in roots to ensure the plant can filter what enters its "veins."

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3. Which alkaloid is derived from Cinchona bark?

(A) Morphine

(B) Quinine

(C) Cocaine

(D) Reserpine

Correct Answer: (B) Quinine

Solution:

Step 1: Concept

Alkaloids are naturally occurring organic nitrogen-containing compounds found in plants that often have potent pharmacological effects.

Step 2: Meaning

Cinchona refers to a genus of flowering plants in the family Rubiaceae, native to the Andes forests of western South America.

Step 3: Analysis

Morphine is derived from the poppy plant; Cocaine comes from coca leaves; Reserpine is extracted from Rauwolfia serpentina. Quinine is the famous alkaloid extracted from the bark of the Cinchona tree.

Step 4: Conclusion

Quinine has been historically used as a primary treatment for malaria, making it the correct alkaloid associated with Cinchona bark.

Final Answer: (B)

Quick Tip: Cinchona and Quinine: Both have "n" and "i" sounds—remember them as the classic duo for fighting malaria.

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4. The first step in glycolysis is:

(A) Phosphorylation of glucose

(B) Formation of fructose-6-phosphate

(C) Formation of PGAL

(D) Pyruvate formation

Correct Answer: (A) Phosphorylation of glucose

Solution:

Step 1: Concept

Glycolysis is the metabolic pathway that breaks down glucose into pyruvate to produce energy in the form of ATP.

Step 2: Meaning

Phosphorylation refers to the addition of a phosphate group to a molecule, typically utilizing ATP.

Step 3: Analysis

To begin the process and trap the glucose molecule inside the cell, an enzyme called hexokinase adds a phosphate group to the sixth carbon of glucose. This converts glucose into glucose-6-phosphate.

Step 4: Conclusion

Since the very first reaction involves the addition of a phosphate to glucose, the correct answer is phosphorylation of glucose.

Final Answer: (A)

Quick Tip: Step 1 "invests" energy—think of adding a phosphate as "locking the door" so the sugar can't leave the cell.

5. Which of the following is an example of vivipary?

(A) Rhizophora

(B) Opuntia

(C) Bryophyllum

(D) Agave

Correct Answer: (A) Rhizophora

Solution:

Step 1: Concept

Vivipary in plants refers to the germination of seeds while they are still attached to the parent plant, before being dispersed.

Step 2: Meaning

This is an adaptation often found in mangrove plants to survive in saline, anaerobic (oxygen-poor), and waterlogged marshy soils where normal germination is difficult.

Step 3: Analysis

Opuntia (cactus) and Agave do not show this trait. Bryophyllum shows vegetative propagation through leaf buds, which is different from seed vivipary. Rhizophora, a common mangrove tree, allows the seedling to grow a long hypocotyl while attached to the parent.

Step 4: Conclusion

Once the seedling is heavy enough, it falls and anchors itself in the mud, making Rhizophora the classic example of vivipary.

Final Answer: (A)

Quick Tip: Vivipary = "Live birth." In plants, think of mangroves like Rhizophora that grow their "babies" before letting them go.

6. Which enzyme converts RNA into DNA in retroviruses?

(A) DNA polymerase

(B) RNA polymerase

(C) Reverse transcriptase

(D) Helicase

Correct Answer: (C) Reverse transcriptase

Solution:

Step 1: Concept

In the standard central dogma of biology, information flows from DNA to RNA (transcription). Retroviruses reverse this process using a specific enzyme.

Step 2: Meaning

The term "reverse transcriptase" refers to an RNA-dependent DNA polymerase that synthesizes a complementary DNA (cDNA) strand from an RNA template.

Step 3: Analysis

DNA polymerase synthesizes DNA from DNA, and RNA polymerase synthesizes RNA from DNA. Helicase is involved in unwinding DNA strands. Only reverse transcriptase has the capability to utilize the viral RNA genome to produce a DNA copy.

Step 4: Conclusion

Therefore, reverse transcriptase is the essential enzyme for retroviral replication inside a host cell.

Final Answer: (C)

Quick Tip: Think of "Reverse" as going backward from RNA to DNA, unlike the normal "Transcription" process.

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7. Oogenesis in humans begins:

(A) At birth

(B) At puberty

(C) During foetal development

(D) After menarche

Correct Answer: (C) During foetal development

Solution:

Step 1: Concept

Oogenesis is the biological process of formation of a mature female gamete (ovum).

Step 2: Meaning

Unlike spermatogenesis in males, which starts at puberty, the timeline for oogenesis is unique in human females.

Step 3: Analysis

Oogenesis is initiated during the embryonic development stage when a few million gamete mother cells (oogonia) are formed within each fetal ovary. No more oogonia are formed or added after birth.

Step 4: Conclusion

These cells start division and enter prophase-I of meiotic division and get temporarily arrested at that stage. Thus, the process begins long before birth.

Final Answer: (C)

Quick Tip: Females are born with all the potential eggs they will ever have; the process "starts" in the womb!

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8. ABO blood group system is controlled by:

(A) Incomplete dominance

(B) Codominance with multiple alleles

(C) Simple dominance

(D) Sex-linked inheritance

Correct Answer: (B) Codominance with multiple alleles

Solution:

Step 1: Concept

The ABO blood group is determined by the I gene, which has three different forms known as alleles: I^A, I^B, and i.

Step 2: Meaning

Multiple allelism occurs when more than two alleles govern the same character. Codominance occurs when two alleles are both expressed in the phenotype.

Step 3: Analysis

Alleles I^A and I^B are both completely dominant over i. However, when I^A and I^B are present together, they both express their own types of sugars; this is codominance. Because there are three alleles (I^A, I^B, i) involved, it is also an example of multiple alleles.

Step 4: Conclusion

Thus, the ABO system represents a combination of both multiple alleles and codominance.

Final Answer: (B)

Quick Tip: Blood Type AB is the "Co" in codominance because A and B work together as equals.

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9. Which part of the nephron is impermeable to water?

(A) Proximal convoluted tubule

(B) Loop of Henle (ascending limb)

(C) Collecting duct

(D) Bowman's capsule

Correct Answer: (B) Loop of Henle (ascending limb)

Solution:

Step 1: Concept

The nephron uses differential permeability in its various segments to concentrate urine and maintain osmotic balance.

Step 2: Meaning

Impermeability to water means that water molecules cannot pass through the cell membranes of that specific segment, regardless of the osmotic gradient.

Step 3: Analysis

The proximal tubule and descending limb of the loop of Henle are highly permeable to water. In contrast, the ascending limb is impermeable to water but allows the active or passive transport of electrolytes (like Na^+ and Cl^-).

Step 4: Conclusion

This segment ensures that solutes are removed without water following them, which is crucial for creating a concentrated medullary interstitium.

Final Answer: (B)

Quick Tip: Descending = "Down for Water" (Permeable); Ascending = "Against Water" (Impermeable).

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10. Which respiratory pigment is found in cockroaches?

(A) Haemoglobin

(B) Haemerythrin

(C) Haemocycanin

(D) None – no respiratory pigment

Correct Answer: (D) None – no respiratory pigment

Solution:

Step 1: Concept

Respiratory pigments like haemoglobin are typically used to transport oxygen through the blood (circulatory system) to tissues.

Step 2: Meaning

Cockroaches have an open circulatory system where the "blood" (haemolymph) does not play a major role in oxygen transport.

Step 3: Analysis

Cockroaches use a tracheal system—a network of tubes that delivers air directly to the tissues.

Because oxygen reaches cells directly via these tubes, there is no need for a chemical pigment in the fluid to carry it.

Step 4: Conclusion

Consequently, their haemolymph is colorless and lacks any respiratory pigments like haemoglobin or haemocyanin.

Final Answer: (D)

Quick Tip: No pigment = Clear "blood." Cockroaches breathe through holes in their sides, not their blood!

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11. Ohm's law is valid when:

(A) Resistance varies with temperature

(B) Temperature and physical conditions remain constant

(C) Conductor is non-ohmic

(D) Frequency of AC is changed

Correct Answer: (B) Temperature and physical conditions remain constant

Solution:

Step 1: Concept

Ohm's Law states that the current (I) flowing through a conductor is directly proportional to the potential difference (V) applied across its ends, provided physical conditions are unchanged.

Step 2: Meaning

The mathematical expression is $V = IR$, where R (resistance) is a constant. For R to remain constant, the properties of the material must not change.

Step 3: Analysis

Resistance is highly dependent on temperature and mechanical strain. If the temperature increases, the internal resistance of most metallic conductors also increases, leading to a non-linear relationship between voltage and current.

Step 4: Conclusion

Therefore, the linear proportionality defined by Ohm's law only holds true when external factors like temperature and pressure are kept constant.

Final Answer: (B)

Quick Tip: Ohm's Law is not a universal law; it is a specific property of "Ohmic" materials under stable conditions.

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12. The SI unit of magnetic flux density (B) is:

(A) Weber

(B) Tesla

(C) Henry/metre

(D) Gauss

Correct Answer: (B) Tesla

Solution:

Step 1: Concept

Magnetic flux density (B) represents the amount of magnetic flux through a unit area taken perpendicular to the direction of the magnetic field.

Step 2: Meaning

It is also known as magnetic induction or simply the magnetic field strength. It is calculated as $\frac{\Phi}{A}$, where Φ is magnetic flux.

Step 3: Analysis

Weber (Wb) is the unit of magnetic flux, not density. Gauss is a CGS unit of magnetic flux density (1 Tesla $= 10^4$ Gauss). Henry/metre is the unit for permeability. Tesla (T) is the standard SI unit.

Step 4: Conclusion

Thus, the international standard (SI) unit for B is the Tesla.

Final Answer: (B)

Quick Tip: Remember: Weber is the "Total Flux," while Tesla is the "Density" (Flux per square meter).

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13. Lenz's law is a consequence of conservation of:

(A) Mass

(B) Charge

(C) Energy

(D) Momentum

Correct Answer: (C) Energy

Solution:

Step 1: Concept

Lenz's Law states that the direction of an induced electromotive force (emf) is such that it always opposes the change in magnetic flux that produced it.

Step 2: Meaning

This law provides the negative sign in Faraday's Law of Induction: $\epsilon = -\frac{d\Phi}{dt}$.

Step 3: Analysis

If the induced current did not oppose the change, it would create a positive feedback loop, generating energy out of nothing, which violates the First Law of Thermodynamics. The mechanical work done to move a magnet against the opposing force is converted into electrical energy.

Step 4: Conclusion

Because the electrical energy produced comes at the cost of external mechanical work, the law is a direct manifestation of the Law of Conservation of Energy.

Final Answer: (C)

Quick Tip: Lenz = Opposition. Without this opposition, we would have a "perpetual motion machine," which is impossible in physics.

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14. Which hydrogen atom transition emits light in the Balmer series (visible)?

(A) n=2 → n=1

(B) n=3 → n=2

(C) n=4 → n=1

(D) n=3 → n=1

Correct Answer: (B) n=3 → n=2

Solution:

Step 1: Concept

The spectral series of hydrogen are categorized based on the lower energy level (n_{final}) to which an electron falls.

Step 2: Meaning

For the Lyman series, $n_{final} = 1$ (Ultraviolet). For the Balmer series, $n_{final} = 2$ (Visible). For the Paschen series, $n_{final} = 3$ (Infrared).

Step 3: Analysis

Options (A), (C), and (D) all involve transitions to $n = 1$, which places them in the Lyman series. Only option (B) shows a transition from $n = 3$ to $n = 2$, which fits the criteria for the Balmer series.

Step 4: Conclusion

Transitions ending at the second energy level ($n = 2$) produce photons with wavelengths in the visible spectrum.

Final Answer: (B)

Quick Tip: Remember the order: Lyman (1), Balmer (2), Paschen (3). If it lands on 2, you can see it!

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15. Energy band gap of an insulator is approximately:

(A) 0 eV

(B) 0.1 eV

(C) Less than 3 eV

(D) Greater than 3 eV

Correct Answer: (D) Greater than 3 eV

Solution:

Step 1: Concept

The energy band gap (E_g) is the forbidden energy range between the valence band (filled with electrons) and the conduction band (empty).

Step 2: Meaning

This gap determines how easily electrons can move to the conduction band to allow electrical current.

Step 3: Analysis

In conductors, the gap is 0 eV (bands overlap). In semiconductors, the gap is small (usually < 3 eV). In insulators, the gap is very large, making it nearly impossible for electrons to jump to the conduction band at room temperature.

Step 4: Conclusion

Generally, materials with a band gap significantly greater than 3 eV are classified as insulators.

Final Answer: (D)

Quick Tip: Insulator = Huge Gap. Think of it as a jump too wide for electrons to cross, so no current flows.

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16. The half-life of a first-order reaction is:

(A) 0.693/k

(B) k/0.693

(C) 1/k

(D) k × 0.693

Correct Answer: (A) 0.693/k

Solution:

Step 1: Concept

The half-life ($t_{1/2}$) of a chemical reaction is the time required for the concentration of a reactant

to decrease to half of its initial value.

Step 2: Meaning

For a first-order reaction, the rate of reaction depends linearly on only one reactant concentration. The integrated rate law is $\ln([A]_0/[A]) = kt$.

Step 3: Analysis

By substituting $[A] = [A]_0/2$ into the integrated rate law, we get $\ln(2) = k \cdot t_{1/2}$. Since $\ln(2)$ is approximately 0.693, the expression becomes $t_{1/2} = 0.693/k$.

Step 4: Conclusion

This mathematical derivation shows that the half-life is a constant value determined solely by the rate constant k, remaining independent of the starting concentration.

Final Answer: (A)

Quick Tip: For 1st order: Half-life is "constant." It doesn't matter if you start with 10g or 100g; the time to lose half is the same.

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17. Catalyst used in the Haber process for ammonia synthesis:

(A) Platinum

(B) V_2O_5

(C) Iron (with K_2O, Al_2O_3 promoters)

(D) Nickel

Correct Answer: (C) Iron (with K_2O, Al_2O_3 promoters)

Solution:

Step 1: Concept

The Haber process is the industrial method used to produce ammonia (NH_3) from nitrogen and hydrogen gases.

Step 2: Meaning

Catalysts are substances that increase the reaction rate without being consumed, while promoters are added to enhance the efficiency of the catalyst.

Step 3: Analysis

Finely divided iron serves as the primary catalyst to break the strong triple bond of nitrogen. Potassium oxide (K_2O) and Alumina (Al_2O_3) are added as promoters to increase the surface area and activity of the iron.

Step 4: Conclusion

While other metals can catalyze the reaction, the specific combination of iron with these promoters is the standard industrial choice for optimal yield.

Final Answer: (C)

Quick Tip: Haber = Ammonia = Iron. Remember "Fe-K-Al" as the trio that powers industrial fertilizer production.

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18. Highest boiling point among these isomers (C_5H_{12}):

(A) n-pentane

(B) neopentane

(C) isopentane

(D) 2-methylbutane

Correct Answer: (A) n-pentane

Solution:

Step 1: Concept

Boiling points in alkanes are primarily determined by the strength of London dispersion forces (intermolecular forces).

Step 2: Meaning

These forces are proportional to the molecular surface area; a larger surface area allows for more points of contact between molecules.

Step 3: Analysis

n-pentane is a straight-chain molecule with the maximum surface area. Branching (as seen in isopentane and neopentane) makes the molecule more spherical/compact, significantly reducing the surface area and weakening the intermolecular attractions.

Step 4: Conclusion

Because n-pentane has the most extensive surface contact among its isomers, it requires the most energy (highest temperature) to overcome these forces and boil.

Final Answer: (A)

Quick Tip: Straight chain = High Surface Area = High Boiling Point. Branching always lowers the boiling point in isomers.

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19. Ethanol + Water shows:

(A) Negative deviation from Raoult's law

(B) Zero deviation (ideal)

(C) Positive deviation from Raoult's law

(D) Azeotrope from start

Correct Answer: (C) Positive deviation from Raoult's law

Solution:

Step 1: Concept

Raoult's Law describes ideal solutions where interactions between different molecules ($A-B$) are identical to interactions between similar molecules ($A-A$ or $B-B$).

Step 2: Meaning

Positive deviation occurs when the $A-B$ attractive forces are weaker than the original $A-A$ and $B-B$ forces, causing more molecules to escape into the vapor phase.

Step 3: Analysis

In a mixture of ethanol and water, the molecules interfere with each other's hydrogen bonding networks. The resulting total vapor pressure of the solution is higher than predicted by Raoult's law.

Step 4: Conclusion

Since the unlike-molecule interactions are weaker than the like-molecule interactions, the system exhibits positive deviation.

Final Answer: (C)

Quick Tip: Weak interactions = Happy to leave (Vaporize) = Positive Pressure Deviation.

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20. The shape of XeF_4 is:

(A) Tetrahedral

(B) Square planar

(C) See-saw

(D) Trigonal bipyramidal

Correct Answer: (B) Square planar

Solution:

Step 1: Concept

The shape of a molecule is determined by the Valence Shell Electron Pair Repulsion (VSEPR) theory, considering both bonding and lone pairs of electrons.

Step 2: Meaning

Xenon (Xe) has 8 valence electrons. In XeF_4, it forms 4 bonds with Fluorine, leaving 4 electrons (2 lone pairs).

Step 3: Analysis

With 4 bonding pairs and 2 lone pairs, the steric number is 6, corresponding to an octahedral electron geometry. To minimize repulsion, the two lone pairs occupy opposite axial positions.

Step 4: Conclusion

The remaining 4 Fluorine atoms are arranged in a single plane around the central Xenon atom, resulting in a square planar molecular geometry.

Final Answer: (B)

Quick Tip: XeF4: 4 bonds + 2 lone pairs. Lone pairs "sandwich" the square of Fluorines to keep it flat.
