Enhanced MCQ Paper

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Multi-Format Question Paper

Name: _____

Class: _____ Section: _____

Roll no.: _____

Instructions:

- Fill OMR sheet with blue/black pen.
- Fill circles completely.
- No stray marks.
- Enter Name, Class, Section.

SET A

Questions: **40**
Duration: **45min**

Physics

This section covers fundamental concepts in Physics including electricity, optics, and mechanics.

1. *According to Ohm's law, if a potential difference of 6V across a resistor results in a current of 2A, what is the resistance?*

A. 12 Ω **B.** 3 Ω
C. 0.33 Ω **D.** 8 Ω

2. *A ray of light is incident on a plane mirror, making an angle of 30° with the mirror's surface.*

What is the angle of reflection?

A. 30° **B.** 60°
C. 90° **D.** 120°

3. *Consider the following statement regarding Earth's gravity:*

Statement:

The value of acceleration due to gravity (g) is constant everywhere on the Earth's surface.

Evaluate the accuracy of this statement.

A. Completely true **B.** Completely false
C. True only at the equator
D. True only at the poles

4. *Consider the following optical components:*

i. Convex lens
ii. Concave lens
iii. Plane mirror
iv. Convex mirror

Which of these can form a real, inverted image of an object?

A. i only **B.** ii and iv only
C. i and iii only **D.** All of the above

5. *Match the physical quantities in the left column with their correct SI units in the right column.*

A. Electric Current	-	Ampere
B. Power	-	Watt
C. Resistance	-	Ohm
D. Force	-	Newton

How many pairs are correctly matched?

A. 1 match is correct
B. 2 matches are correct
C. 3 matches are correct
D. All 4 matches are correct

6. *Evaluate the following statements about magnetic fields.*

Assertion:

Magnetic field lines never intersect each other.

Reason:

If they were to intersect, there would be two directions for the magnetic field at a single point, which is impossible.

A. Both correct, reason explains assertion
B. Both correct, reason doesn't explain assertion
C. Assertion correct, reason incorrect
D. Both incorrect

7. *To calculate the total resistance of resistors connected in a series circuit, one must follow a specific sequence of steps.*

A. Sum the individual resistance values.

B. Identify all resistors in the series path.

C. The result is the equivalent resistance.

What is the correct sequence of operations?

A. A → B → C **B.** B → C → A

C. B → A → C **D.** C → A → B

8. *Read the passage about renewable energy sources.*

Renewable energy sources, such as solar and wind power, are crucial for combating climate change. They harness natural processes to generate electricity with minimal greenhouse gas emissions. Solar panels convert sunlight directly into electricity, while wind turbines use wind to spin a generator. Unlike fossil fuels, they are inexhaustible. However, their primary drawback is intermittency; solar power is only available during the day and wind power depends on variable weather conditions, making energy storage solutions essential for a reliable supply.

According to the text, what is a major challenge associated with solar and wind power?

A. High greenhouse gas emissions

B. They are exhaustible resources

C. Their inconsistent and variable availability

D. The complexity of converting energy

9. *The refractive index of a medium is defined as the ratio of the speed of light in a vacuum to the speed of light in that medium.*

What is the SI unit of refractive index?

A. m/s **B.** Dioptre

C. No unit **D.** Metre

10. **Assertion (A):**

The power of a convex lens is considered positive.

Reason (R):

A convex lens has a positive focal length according to sign conventions.

A. Both A and R are true and R is the correct explanation of A.

B. Both A and R are true but R is not the correct explanation of A.

C. A is true but R is false.

D. A is false but R is true.

Chemistry

This section tests knowledge of chemical reactions, acids and bases, metals, and the periodic table.

11. *What is the pH value of a completely neutral solution, such as pure water, at 25°C?*

A. 0 **B.** 7

C. 14 **D.** 1

12. *The chemical reaction $CaCO_3(s) \rightarrow CaO(s) + CO_2(g)$ is an example of which type of reaction?*

A. Combination reaction

B. Decomposition reaction

C. Displacement reaction

D. Double displacement reaction

13. *Evaluate the following statement about the physical properties of metals:*

Statement:

All metals are solid at standard room temperature.

A. True **B.** False

C. True for all metals except gold

D. True for all metals except iron

14. *Consider the general properties of chemical substances.*

i. They have a sour taste.

ii. They turn blue litmus paper red.

iii. They feel slippery to the touch.

iv. They react with active metals to produce hydrogen gas.

Which of the following are characteristic properties of acids?

A. i, ii, and iii only **B.** i, ii, and iv only

C. ii and iii only **D.** All of the above

15. *Match the common chemical names with their correct chemical formulas.*

1. Water - H_2SO_4
2. Table Salt - NaCl
3. Methane - CH_4
4. Sulfuric Acid - H_2O

A. 1-H_2O, 2-NaCl, 3-CH_4, 4-H_2SO_4

B. 1-NaCl, 2-H_2O, 3-CH_4, 4-H_2SO_4

C. 1-H_2O, 2-CH_4, 3-NaCl, 4-H_2SO_4

D. 1-H_2SO_4, 2-NaCl, 3-H_2O, 4-CH_4

16. **Assertion:**

In a redox reaction, both oxidation and reduction take place simultaneously.

Reason:

Oxidation is the loss of electrons, while reduction is the gain of electrons, and electrons cannot be created or destroyed in a reaction.

A. Both correct, reason explains assertion
B. Both correct, reason doesn't explain assertion
C. Assertion correct, reason incorrect
D. Assertion incorrect, reason correct

17. A. Balance the Hydrogen atoms by placing a coefficient before H_2.

B. Balance the Iron atoms by placing a coefficient before Fe.

C. Balance the Oxygen atoms by placing a coefficient before H_2O.

Arrange the following steps in the correct order to balance the chemical equation: $\_\_Fe + \_\_H_2O \rightarrow \_\_Fe_3O_4 + \_\_H_2$

A. A → C → B **B.** B → A → C
C. B → C → A **D.** C → B → A

18. *Read the following passage about the periodic table.*

Dmitri Mendeleev's periodic table of 1869 was a monumental achievement in chemistry. He arranged the elements based on increasing atomic mass and grouped them by similar properties, even leaving gaps for undiscovered elements. However, his table had limitations. The primary issue was the placement of certain elements, like tellurium and iodine, where a heavier element had to be placed before a lighter one to maintain property alignment. Furthermore, the table could not explain the position of isotopes, which are atoms of the same element with different masses.

What was a primary limitation of Mendeleev's periodic table, according to the passage?

A. It did not include the noble gases.
B. It was unable to account for the position of isotopes.
C. It was arranged by atomic number.
D. It did not leave gaps for new elements.

19. *How are covalent bonds formed between atoms?*

A. By transferring electrons from a metal to a non-metal
B. By sharing electrons between two non-metal atoms
C. By the attraction between positive and negative ions
D. By the movement of free electrons in a metallic lattice

20. *Analyze the following statements about corrosion.*

Assertion (A):

Iron articles, when exposed to moist air, get coated with a reddish-brown substance called rust.

Reason (R):

The process of rusting is a redox reaction where iron is oxidized.

A. Both A and R are true and R is the correct explanation of A.
B. Both A and R are true but R is not the correct explanation of A.
C. A is true but R is false.
D. A is false but R is true.

Biology

This section assesses understanding of life processes, heredity, and the human body.

21. *Which of the following are the final products of photosynthesis in plants?*

A. Carbon dioxide, water, and energy
B. Glucose, oxygen, and water
C. Oxygen and carbon dioxide
D. Glucose and carbon dioxide

22. *Which chamber of the human heart is responsible for pumping oxygenated blood to the rest of the body?*

A. Right Atrium **B.** Right Ventricle
C. Left Atrium **D.** Left Ventricle

23. **Statement:**

Traits acquired during an individual's lifetime, such as learned skills or muscle development from exercise, can be inherited by their offspring.

Evaluate the scientific validity of this statement related to genetics.

A. True **B.** False
C. True only for simple organisms
D. False, but only for humans

24. *The nervous system is composed of specialized cells called neurons.*

i. Dendrite
ii. Axon
iii. Cell Body (Soma)
iv. Myelin

Which of the following are the three main parts of a typical neuron?

A. i, ii, and iv **B.** i, iii, and iv
C. ii, iii, and iv **D.** i, ii, and iii

25. *Match the endocrine gland with the primary hormone it produces.*

A. Pancreas - Thyroxine
B. Thyroid - Adrenaline
C. Adrenal - Growth Hormone
D. Pituitary - Insulin

A. A-Insulin, B-Thyroxine, C-Adrenaline, D-Growth Hormone
B. A-Thyroxine, B-Insulin, C-Growth Hormone, D-Adrenaline
C. A-Adrenaline, B-Growth Hormone, C-Insulin, D-Thyroxine
D. A-Insulin, B-Adrenaline, C-Thyroxine, D-Growth Hormone

26. **Assertion:**

Aerobic respiration yields significantly more ATP than anaerobic respiration.

Reason:

Aerobic respiration involves the complete oxidation of glucose in the presence of oxygen, unlocking its full energy potential.

A. Both correct, reason explains assertion
B. Both correct, reason doesn't explain assertion
C. Assertion correct, reason incorrect
D. Both incorrect

27. *A food chain shows the flow of energy in an ecosystem.*

A. Lion
B. Grass
C. Deer

Arrange the following organisms into a logical food chain sequence.

A. A → C → B **B.** B → C → A
C. C → A → B **D.** B → A → C

28. Deoxyribonucleic acid, or DNA, is the molecule that carries the genetic instructions for all known living organisms. Its structure is a double helix, resembling a twisted ladder. The 'rungs' of this ladder are made of pairs of nitrogenous bases. There are four bases: Adenine (A), Guanine (G), Cytosine (C), and Thymine (T). A crucial feature of DNA's structure is the specific base-pairing rule: Adenine always pairs with Thymine, and Guanine always pairs with Cytosine. This complementarity is key to DNA replication and function.

Based on the passage, what is the fundamental pairing rule in a DNA molecule?

A. Adenine pairs with Guanine; Cytosine pairs with Thymine.
B. Adenine pairs with Cytosine; Guanine pairs with Thymine.
C. Adenine pairs with Thymine; Guanine pairs with Cytosine.
D. Any base can pair with any other base.

29. *The organism Hydra reproduces by developing small outgrowths on its body that detach and grow into new individuals.*

What is this mode of reproduction called?

A. Fission **B.** Fragmentation
C. Budding **D.** Spore formation

30. **Assertion (A):**

The primary role of the kidneys in the human body is to filter metabolic wastes from the blood to form urine.

Reason (R):

Each kidney contains millions of microscopic filtering units called nephrons.

A. Both A and R are true and R is the correct explanation of A.
B. Both A and R are true but R is not the correct explanation of A.
C. A is true but R is false.
D. A is false but R is true.

Mathematics

This section covers topics in algebra, geometry, trigonometry, and statistics.

31. *For a quadratic equation of the form $ax^2 + bx + c = 0$, what is the formula for the discriminant?*

A. $b^2 + 4ac$ **B.** $b^2 - 4ac$
C. $4ac - b^2$ **D.** $-b \pm \sqrt{(b^2 - 4ac)}$

32. *What is the common difference of the Arithmetic Progression (AP): 4, 1, -2, -5, ... ?*

A. 3 **B.** 4
C. -3 **D.** 5

33. *Read the following statement about trigonometric functions.*

Statement:

For any angle θ, the value of sin(θ) can be 2.

Is this statement mathematically correct?

A. Correct **B.** Incorrect
C. Correct only if θ is greater than 90°
D. Correct only for right-angled triangles

34.

i. A tangent to a circle is perpendicular to the radius at the point of tangency.

ii. The lengths of tangents drawn from an external point to a circle are equal.

iii. A chord that passes through the center is called the diameter.

iv. A circle can have multiple diameters.

Which of the following statements about circles are true?

A. i and ii only **B.** i, ii, and iii only
C. ii and iv only **D.** All are true

35. *Match the geometric shapes with their correct area or volume formulas.*

1. Area of a Circle	-	s^3
2. Volume of a Cube	-	s^2
3. Area of a Square	-	$2\pi r$
4. Circumference of a Circle	-	πr^2

A. 1-πr^2, 2-s^3, 3-s^2, 4-$2\pi r$
B. 1-s^2, 2-s^3, 3-$2\pi r$, 4-πr^2
C. 1-πr^2, 2-s^2, 3-s^3, 4-$2\pi r$
D. 1-$2\pi r$, 2-s^3, 3-s^2, 4-πr^2

36.

Assertion:

The probability of a sure event is 1.

Reason:

Probability of an event E is defined as P(E) = (Number of favorable outcomes) / (Total number of outcomes).

A. Both correct, reason explains assertion
B. Both correct, reason doesn't explain assertion
C. Assertion correct, reason incorrect
D. Assertion incorrect, reason correct

37.

A. Add or subtract the equations to eliminate one variable.

B. Solve the resulting equation for the remaining variable.

C. Multiply one or both equations by suitable numbers to make the coefficients of one variable numerically equal.

D. Substitute the value found in step B back into one of the original equations to find the other variable.

Arrange the steps in the correct order for solving a pair of linear equations using the elimination method.

A. C → A → B → D **B.** A → C → B → D
C. C → B → A → D **D.** B → D → C → A

38. *Read the following passage about measures of central tendency.*

In statistics, measures of central tendency provide a summary of a dataset. The three most common measures are the mean, median, and mode. The mean is the arithmetic average, calculated by summing all values and dividing by the count of values. The mode is the value that appears most frequently in the dataset. The median is the value that separates the higher half from the lower half of a data sample; to find it, the data must first be arranged in ascending or descending order.

Which measure of central tendency is described as the 'middle value' in an ordered dataset?

A. Mean **B.** Median
C. Mode **D.** Range

39. *What is the formula for the total surface area of a sphere with radius 'r'?*

A. $(4/3)\pi r^3$ **B.** $2\pi r^2$
C. $4\pi r^2$ **D.** $\pi r^2 h$

40. **Assertion (A):**

If two triangles are similar, then the ratio of their areas is equal to the square of the ratio of their corresponding sides.

Reason (R):

Two triangles are similar if their corresponding angles are equal and their corresponding sides are in the same ratio.

A. Both A and R are true and R is the correct explanation of A.

B. Both A and R are true but R is not the correct explanation of A.

C. A is true but R is false.

D. A is false but R is true.

* * * * **END** * * * *