BEd Science 27th March 2024 Shift 2

Time Allowed:3 Hours	**Maximum Marks:**300	**Total Questions:**75

General Instructions

Read the following instructions very carefully and strictly follow them:

1. This question paper comprises 75 questions. All questions are compulsory.
2. Each question carries 04 (four) marks.
3. For each correct response, the candidate will get 04 (four) marks.
4. For each incorrect response, 01 (one) mark will be deducted from the total score.
5. Un-answered/un-attempted responses will be given no marks.
6. To answer a question, the candidate needs to choose one option as the correct option.
7. However, after the process of Challenges of the Answer Key, in case there are multiple correct options or a change in the key, only those candidates who have attempted it correctly as per the revised Final Answer Key will be awarded marks.
8. In case a question is dropped due to some technical error, full marks shall be given to all the candidates irrespective of whether they have attempted it or not.

1. Lecithin is an example of which type of biomolecule?

1. Nucleotides
2. Phospholipids
3. Proteins
4. Polysaccharides

Correct Answer: 2. Phospholipids

Solution:

Lecithin is a type of phospholipid commonly found in biological membranes. Phospholipids consist of a hydrophilic (water-attracting) ”head” and two hydrophobic (water-repelling) ”tails,” forming the lipid bilayer of cell membranes. Lecithin, specifically, contains glycerophospholipids, which are essential for maintaining the structure and fluidity of the membrane. It also plays a role in emulsification, making it crucial in biological and industrial processes.

Quick Tip

Phospholipids like lecithin are key components of cell membranes and help maintain their structure and function.

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2. Which of the following is NOT part of Forebrain?

1. Cerebrum
2. Hypothalamus
3. Cerebellum
4. Thalamus

Correct Answer: 3. Cerebellum

Solution:

The forebrain consists of the cerebrum, hypothalamus, and thalamus. The cerebellum, on the other hand, is part of the hindbrain. The forebrain is responsible for higher cognitive functions, sensory processing, and voluntary motor activities, whereas the cerebellum plays a key role in motor control and coordination.

Quick Tip

The forebrain is primarily associated with higher cognitive and sensory functions, while the cerebellum manages balance and coordination.

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3. Match List-I with List-II:

List-I (Cell/Tissue/Organs):

1. Mesorchium
2. Uriniferous tubules
3. Endocrine glands
4. Sinus venosus

List-II (System):

1. Reproductive system
2. Excretory system
3. Chemical coordination
4. Vascular system

Choose the correct answer from the options given below:

1. (A) - (I), (B) - (IV), (C) - (III), (D) - (II)
2. (A) - (III), (B) - (II), (C) - (I), (D) - (IV)
3. (A) - (III), (B) - (I), (C) - (II), (D) - (IV)
4. (A) - (III), (B) - (IV), (C) - (I), (D) - (II)

Correct Answer: 1. (A) - (I), (B) - (IV), (C) - (III), (D) - (II)

Solution:

Mesorchium is associated with the reproductive system as it supports testes in the male reproductive system. Uriniferous tubules are part of the excretory system, functioning in the kidney for filtration. Endocrine glands are associated with chemical coordination, releasing hormones to regulate bodily functions. Sinus venosus is part of the vascular system, functioning in the heart to collect deoxygenated blood.

Quick Tip

Understand the functional role of each organ or system to make accurate matches in such questions.

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4. Cranial meninges include:

(A). Dura mater

(B). Arachnoid

(C). Neurotransmitters

(D). Pia mater

Options:

1. (A), (B) and (D) only.
2. (A) and (D) only.
3. (A), (B), (C) and (D).
4. (A), (C) and (D) only.

Correct Answer: 1. (A), (B) and (D) only.

Solution:

The cranial meninges are protective layers that surround the brain and spinal cord. These include: - Dura mater: The tough outer layer that protects the brain. - Arachnoid: The middle

layer, which is web-like and helps in cushioning the brain. - Pia mater: The delicate inner layer that closely adheres to the brain's surface. Neurotransmitters, however, are not part of the meninges; they are chemical messengers used in the nervous system for communication.

Quick Tip

Remember the sequence of meninges: dura mater (outermost), arachnoid (middle), and pia mater (innermost).

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5. Sequence of regions of the vertebral column, starting from the skull is:

(A). Thoracic

(B). Cervical

(C). Sacral

(D). Lumbar

Options:

1. (A), (B), (C), (D).
2. (B), (A), (D), (C).
3. (B), (A), (C), (D).
4. (C), (B), (D), (A).

Correct Answer: 2. (B), (A), (D), (C).

Solution:

The vertebral column is divided into the following regions in sequence from the skull: Cervical (B): The first seven vertebrae starting from the skull, labeled C1 to C7, support the neck. Thoracic (A): The next twelve vertebrae, labeled T1 to T12, are located in the upper back and connect to the ribs. Lumbar (D): The five larger vertebrae, labeled L1 to L5, are in the lower back and bear the body's weight. Sacral (C): A group of fused vertebrae located at the base of the spine. Hence, the correct sequence is Cervical, Thoracic, Lumbar, and Sacral.

Quick Tip

Remember the sequence ”CTLS” for the vertebral column: Cervical, Thoracic, Lumbar, Sacral.

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6. Colostrum is an example of:

1. Active immunity
2. Antigen
3. Passive immunity
4. Cancer

Correct Answer: 3. Passive immunity

Solution:

Colostrum is the first milk produced by the mammary glands immediately after childbirth. It contains antibodies, primarily Immunoglobulin A (IgA), which are transferred to the newborn. This transfer of ready-made antibodies provides passive immunity to the infant, protecting them against infections during the initial days of life.

Quick Tip

Passive immunity involves the direct transfer of antibodies from one individual to another, such as through colostrum or antibody injections.

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7. What is the role of Sertoli cells in the reproductive system?

1. Synthesis of androgens
2. Secretion of androgens
3. To provide nutrition to germ cells
4. Release antibodies

Correct Answer: 3. To provide nutrition to germ cells

Solution:

Sertoli cells are specialized cells found in the seminiferous tubules of the testes. They play a crucial role in spermatogenesis by providing structural support, nourishment, and an optimal environment for developing germ cells. Additionally, Sertoli cells secrete factors that regulate the development of sperm and form the blood-testis barrier to protect germ cells from harmful substances.

Quick Tip

Sertoli cells are also known as "nurse cells" because they nurture and support the development of sperm cells during spermatogenesis.

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8. Match List-I with List-II:

List-I (Structure):

(A) Fimbriae

(B) Seminiferous tubules

(C) Acrosome

(D) Graafian follicle

List-II (Associated with organ):

(I) Spermatozoa

(II) Testes

(III) Ovary

(IV) Oviduct

Choose the correct answer from the options given below:

1. (A) - (IV), (B) - (II), (C) - (I), (D) - (III)

2. (A) - (IV), (B) - (III), (C) - (II), (D) - (I)

3. (A) - (I), (B) - (II), (C) - (III), (D) - (IV)

4. (A) - (III), (B) - (IV), (C) - (I), (D) - (II)

Correct Answer: 1. (A) - (IV), (B) - (II), (C) - (I), (D) - (III)

Solution:

Fimbriae (A) are associated with the **oviduct (IV)** and help in capturing the ovum released from the ovary. **Seminiferous tubules (B)** are present in the **testes (II)** and are the site of sperm production. **Acrosome (C)** is a cap-like structure on **spermatozoa (I)** that contains enzymes to penetrate the egg during fertilization. **Graafian follicle (D)** is found in the **ovary (III)** and represents the mature ovarian follicle before ovulation.

Quick Tip

Remember, fimbriae and Graafian follicles are associated with the female reproductive system, while seminiferous tubules and acrosomes are part of the male reproductive system.

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9. ESTs stands for:

1. Extra Sequence Tags

2. External Sequence Tags

3. Expressed Sequence Transcripts

4. Expressed Sequence Tags

Correct Answer: 4. Expressed Sequence Tags

Solution:

Expressed Sequence Tags (ESTs) are short sub-sequences of cDNA (complementary DNA) sequences. They are used to identify gene transcripts and are important in gene discovery and mapping. ESTs provide insights into the expressed portions of the genome and help in understanding the functions of genes.

Quick Tip

Expressed Sequence Tags (ESTs) are crucial for annotating genes and studying gene expression in different organisms.

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10. The correct order of steps in the process of recombinant DNA technology are:

1. Digestion by restriction enzyme
2. Transformation
3. Ligation
4. Isolation of DNA

Options:

1. (D), (C), (B), (A)
2. (A), (C), (B), (D)
3. (D), (A), (C), (B)
4. (A), (D), (C), (B)

Correct Answer: 3. (D), (A), (C), (B)

Solution:

The steps in recombinant DNA technology occur in the following order:

1. **Isolation of DNA (D):** The DNA is isolated from the source organism.
2. **Digestion by restriction enzyme (A):** Specific restriction enzymes are used to cut the DNA at desired sites.
3. **Ligation (C):** The DNA fragments are joined together using DNA ligase.
4. **Transformation (B):** The recombinant DNA is introduced into a host organism for replication and expression.

This sequence ensures that the recombinant DNA is properly prepared and successfully introduced into the host.

Quick Tip

Recombinant DNA technology requires precise execution of steps in the correct order to achieve the desired genetic modification.

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11. Large holes in ”Swiss Cheese” are due to the production of large amounts of carbon dioxide gas by bacterium:

1. Lactobacillus bulgaricus
2. Propionibacterium sharmanii
3. Staphylococcus aureus
4. Bifidobacterium jejuni

Correct Answer: 2. Propionibacterium sharmanii

Solution:

The characteristic large holes in Swiss cheese are formed due to the metabolic activity of the bacterium **Propionibacterium sharmanii**. During the fermentation process, this bacterium ferments lactate to produce carbon dioxide gas, which forms bubbles trapped in the cheese matrix. These bubbles create the iconic ”holes” or ”eyes” in Swiss cheese. The production of propionic acid also imparts the distinct nutty flavor of the cheese.

Quick Tip

Propionibacterium sharmanii plays a dual role in Swiss cheese production by creating its unique texture and flavor.

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12. Identify which one is NOT a Sexually Transmitted Infection (STI):

1. Leishmaniasis

2. Syphilis
3. Chlamydiasis
4. Gonorrhoea

Correct Answer: 1. Leishmaniasis

Solution:

Leishmaniasis is a parasitic disease caused by the *Leishmania* species and transmitted through the bite of infected sandflies. It primarily affects the skin, mucous membranes, and internal organs, depending on the type of infection. It is not related to sexual transmission. In contrast, **Syphilis, Chlamydiasis, and Gonorrhoea** are sexually transmitted infections (STIs) caused by specific bacterial pathogens: *Treponema pallidum* (Syphilis), *Chlamydia trachomatis* (Chlamydiasis), and *Neisseria gonorrhoeae* (Gonorrhoea), respectively.

Quick Tip

Sexually Transmitted Infections (STIs) are primarily transmitted through sexual contact, while Leishmaniasis is spread by sandfly bites.

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13. Carolus Linnaeus is credited for:

1. Oxidative Phosphorylation
2. Binomial Nomenclature
3. Photoperiodism
4. Cryopreservation

Correct Answer: 2. Binomial Nomenclature

Solution:

Carolus Linnaeus, a Swedish botanist, is credited with developing the system of **Binomial Nomenclature**, which is a formal system of naming species of organisms using two Latin names: the genus and the species. This system is the foundation of modern taxonomy and allows for the universal identification and classification of organisms.

Quick Tip

The binomial nomenclature system uses two parts: the genus name (capitalized) and the species name (lowercase), both italicized or underlined.

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14. Which of the following are NOT examples of brown algae?

1. (A). Laminaria
2. (B). Ectocarpus
3. (C). Volvox
4. (D). Porphyra

Choose the correct answer from the options given below:

1. (C) and (D) only.
2. (A) only.
3. (B), (C) and (D) only.
4. (B) and (C) only.

Correct Answer: 1. (C) and (D) only.

Solution:

Brown algae are a group of multicellular algae belonging to the class *Phaeophyceae*. Examples of brown algae include **Laminaria** and **Ectocarpus**. However, **Volvox** is a green alga (class *Chlorophyceae*), and **Porphyra** is a red alga (class *Rhodophyceae*), making them NOT examples of brown algae.

Quick Tip

Brown algae are characterized by the presence of fucoxanthin pigment, which gives them their distinctive color. Examples include Laminaria, Ectocarpus, Fucus, and Sargassum.

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15. Which of the following is an example of Sporozoan Protozoa?

1. Entamoeba
2. Trypanosoma
3. Paramaecium
4. Plasmodium

Correct Answer: 4. Plasmodium

Solution:

Sporozoan protozoa belong to the class *Sporozoa*, which is characterized by the presence of spore-forming stages in their life cycle. **Plasmodium** is a well-known example of sporozoan protozoa, and it is the causative agent of malaria in humans. It exhibits a complex life cycle involving both a vertebrate host (human) and an invertebrate vector (mosquito). Other options:

- **Entamoeba:** A type of amoeboid protozoa causing amoebiasis.
- **Trypanosoma:** A flagellate protozoan causing diseases like sleeping sickness.
- **Paramaecium:** A ciliate protozoan found in freshwater.

Thus, only **Plasmodium** qualifies as a sporozoan protozoa.

Quick Tip

Sporozoans, such as Plasmodium, are parasitic and lack locomotory structures in their mature stages. They reproduce via spores and often have complex life cycles.

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16. Choose the correct order of taxonomical categories in descending order:

1. (A). Genus
2. (B). Order
3. (C). Phylum

4. (D). Class

Options:

1. (A), (C), (B), (D).
2. (C), (B), (D), (A).
3. (B), (D), (C), (A).
4. (C), (D), (B), (A).

Correct Answer: 4. (C), (D), (B), (A)

Solution:

In the hierarchical classification system, taxonomical categories are arranged in a specific order from the most inclusive to the least inclusive. The correct descending order is:

- **Phylum (C):** A high-level category grouping related classes.
- **Class (D):** Includes related orders within a phylum.
- **Order (B):** Contains families sharing common characteristics.
- **Genus (A):** A group of related species.

Thus, the correct order is (C) $\rightarrow$ (D) $\rightarrow$ (B) $\rightarrow$ (A).

Quick Tip

Remember the taxonomical hierarchy: Kingdom $\rightarrow$ Phylum $\rightarrow$ Class $\rightarrow$ Order $\rightarrow$ Family $\rightarrow$ Genus $\rightarrow$ Species. It's like zooming in from a broad group to a specific entity.

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17. Identify the non-endospermous seeds:

1. (A). Castor
2. (B). Pea
3. (C). Gram

4. (D). Bean

Options:

1. (A), (B) and (D) only.
2. (A), (B) and (C) only.
3. (B), (C) and (D) only.
4. (A), (B), (C) and (D).

Correct Answer: 3. (B), (C) and (D) only.

Solution:

Non-endospermous (exalbuminous) seeds do not retain their endosperm at maturity as it is fully utilized during seed development. The cotyledons act as the storage organs. Among the given options:

- **Pea (B):** Non-endospermous seed as cotyledons store food.
- **Gram (C):** Non-endospermous seed.
- **Bean (D):** Non-endospermous seed.
- **Castor (A):** Endospermous seed, as it retains endosperm for storage.

Thus, the correct answer is (B), (C), and (D).

Quick Tip

Endospermous seeds retain their endosperm as a food source (e.g., castor), whereas non-endospermous seeds store nutrients in their cotyledons (e.g., pea, gram, bean).

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18. Conjoint, open vascular bundles are found in:

1. Monocot stem
2. Dicot stem
3. Monocot root

4. Dicot root

Correct Answer: 2. Dicot stem

Solution:

Vascular bundles are classified based on their arrangement and nature:

- **Conjoint Vascular Bundles:** Xylem and phloem are arranged together on the same radius.
- **Open Vascular Bundles:** Cambium is present between xylem and phloem, which allows secondary growth.
- In the **dicot stem**, the vascular bundles are conjoint, collateral, and open, facilitating secondary growth.
- In contrast, monocot stems and roots usually have closed vascular bundles (without cambium), and roots of both monocots and dicots show radial arrangement, not conjoint bundles.

Thus, conjoint, open vascular bundles are characteristic of the dicot stem.

Quick Tip

Dicot stems have conjoint, open vascular bundles, which allow for secondary growth due to the presence of cambium.

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19. In which type of chromosome, the centromere is located slightly away from the middle?

1. Metacentric chromosome
2. Sub-metacentric chromosome
3. Acrocentric chromosome
4. Telocentric chromosome

Correct Answer: 2. Sub-metacentric chromosome

Solution:

Chromosomes are classified based on the position of the centromere:

- **Metacentric Chromosome:** The centromere is located at the center, dividing the chromosome into two equal arms.
- **Sub-metacentric Chromosome:** The centromere is slightly away from the middle, resulting in one arm being slightly longer than the other.
- **Acrocentric Chromosome:** The centromere is located close to one end, producing a very short arm and a long arm.
- **Telocentric Chromosome:** The centromere is at the very end, forming a single arm.

In sub-metacentric chromosomes, the arms are unequal due to the centromere being slightly off-center.

Quick Tip

Sub-metacentric chromosomes have a centromere slightly off-center, leading to arms of unequal length.

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20. What is the percentage of Photosynthetically Active Radiation (PAR) captured by plants?

1. 100%
2. 70-80%
3. 40-50%
4. 2-10%

Correct Answer: 4. 2-10%

Solution:

Photosynthetically Active Radiation (PAR) refers to the portion of the sunlight spectrum (400-700 nm) that is used by plants for photosynthesis. Although sunlight is abundant, plants

are able to capture only a small fraction of PAR effectively. Studies indicate that only about 2-10% of the PAR available to plants is converted into chemical energy through photosynthesis. The rest of the energy is either reflected, transmitted, or dissipated as heat.

Quick Tip

Plants utilize only a small fraction (2-10%) of Photosynthetically Active Radiation (PAR) for photosynthesis. Most of the sunlight energy is not converted into chemical energy.

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21. Which of the following is NOT a type of ex-situ conservation method?

1. Cryopreservation
2. Botanical gardens
3. In-vitro fertilization
4. National parks

Correct Answer: 4. National parks

Solution:

Ex-situ conservation involves protecting and conserving biological diversity outside their natural habitats. Methods like cryopreservation, botanical gardens, and in-vitro fertilization are all ex-situ strategies. However, national parks are an example of in-situ conservation, where species are conserved within their natural environment.

Quick Tip

Ex-situ conservation takes species out of their natural habitats for protection (e.g., seed banks, botanical gardens), while in-situ conservation maintains species within their natural ecosystems (e.g., national parks).

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22. The World Summit on Sustainable Development held in 2002 was organised at:

1. Rio de Janeiro
2. Johannesburg
3. Montreal
4. Los Angeles

Correct Answer: 2. Johannesburg

Solution:

The World Summit on Sustainable Development (WSSD), also known as Rio+10, was held in Johannesburg, South Africa, in 2002. This summit aimed to build upon the principles established at the 1992 Earth Summit in Rio de Janeiro and to address global challenges related to sustainable development, poverty eradication, and environmental protection.

Quick Tip

The 2002 Johannesburg Summit emphasized the integration of environmental, social, and economic aspects of sustainable development, marking a decade of progress since the Earth Summit in Rio.

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23. Match List-I with List-II:

List-I (Plant growth regulator):

- (A) Auxins
- (B) Gibberellins
- (C) Cytokinins
- (D) Abscisic acid

List-II (Function):

- (I) Stress hormone
- (II) Parthenocarpy in tomatoes

- (III) 'Bolting' in a rosette plant
- (IV) Delay leaf senescence

Choose the correct answer from the options given below:

1. (A) (II), (B) - (I), (C) - (III), (D) - (IV)
2. (A) (II), (B) - (III), (C) - (IV), (D) - (I)
3. (A) (I), (B) - (III), (C) - (IV), (D) - (II)
4. (A) - (IV), (B) - (III), (C) - (I), (D) - (II)

Correct Answer: 2. (A) (II), (B) - (III), (C) - (IV), (D) - (I)

Solution:

Plant growth regulators are chemicals that influence plant growth and development. The correct matches are:

- **Auxins (A):** Promote parthenocarpy (e.g., seedless fruit development) in tomatoes.
- **Gibberellins (B):** Responsible for 'bolting,' a rapid elongation of the internodes in rosette plants.
- **Cytokinins (C):** Delay leaf senescence, thereby prolonging the life of leaves.
- **Abscisic acid (D):** Known as the stress hormone, it helps plants cope with stress by inducing stomatal closure.

Quick Tip

Plant growth regulators such as auxins, gibberellins, cytokinins, and abscisic acid play specific roles in plant growth, development, and stress management.

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24. The path of transfer of electrons involves the following order in Z scheme:

(A) PS-I

(B) PS-II

(C) ETS

(D) NADP

Options:

1. (A), (B), (C), (D)
2. (A), (C), (B), (D)
3. (B), (C), (A), (D)
4. (B), (A), (D), (C)

Correct Answer: 3. (B), (C), (A), (D)

Solution:

In the Z-scheme of photosynthesis, electrons follow a specific pathway during the light-dependent reactions:

- **PS-II (B):** Electrons are excited by light energy in Photosystem II.
- **ETS (C):** These high-energy electrons are transferred through an Electron Transport System (ETS), where ATP is generated.
- **PS-I (A):** The electrons reach Photosystem I and are again excited by light energy.
- **NADP (D):** Finally, the electrons are transferred to NADP, reducing it to NADPH, which is used in the Calvin cycle.

This sequential flow of electrons ensures the generation of energy carriers ATP and NADPH for photosynthesis.

Quick Tip

The Z-scheme depicts the flow of electrons from PS-II to NADP, creating a 'Z' pattern when plotted based on energy levels.

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25. Henri Bacqueral discovered this phenomenon...

1. Radioactivity
2. Fluorescence

3. Photoelectric effect
4. Spectroscopy

Correct Answer: 1. Radioactivity

Solution:

Henri Becquerel discovered radioactivity in 1896 while working with phosphorescent materials. He observed that uranium salts emitted rays that could fog photographic plates, even without exposure to sunlight. This phenomenon was termed ”radioactivity,” marking a significant milestone in physics and chemistry.

Quick Tip

Radioactivity is a process in which unstable atomic nuclei release energy in the form of radiation. This discovery laid the foundation for nuclear science.

26.Arrange the following according to their increasing size:

1. (A). Mg
2. (B). Al
3. (C). Mg^{2+}
4. (D). Al^{3+}

Choose the correct answer from the options given below:

1. (D), (B), (C), (A)
2. (A), (C), (B), (D)
3. (D), (B), (A), (C)
4. (D), (C), (B), (A)

Correct Answer: 4. (D), (C), (B), (A)

Solution:

The size of an atom or ion depends on the effective nuclear charge and electron configuration:

- Al^{3+}: Smallest in size due to the high positive charge, causing greater nuclear attraction and reduced radius.
- Mg^{2+}: Slightly larger than Al^{3+} as it has a lower positive charge and less nuclear attraction.
- Al: Larger than Mg^{2+} because it is a neutral atom with more electron repulsion in its outer shell.
- Mg: Largest due to its neutral charge and fewer protons compared to Al, leading to less nuclear attraction.

Hence, the correct increasing size order is: Al^{3+} (D) ¡ Mg^{2+} (C) ¡ Al (B) ¡ Mg (A).

Quick Tip

Cations (positive ions) are smaller than their parent atoms due to the loss of electrons and increased nuclear attraction. Higher positive charge results in a smaller size.

27.VSEPR theory stands for:

1. Vacant Shell Electron Pair Repulsion Theory
2. Valence Shell Electron Pair Retention Theory
3. Valence Shell Electron Pair Repulsion Theory
4. Vacant Shell Electron Pair Resonance Theory

Correct Answer: 3. Valence Shell Electron Pair Repulsion Theory

Solution:

The VSEPR (Valence Shell Electron Pair Repulsion) theory explains the geometry of molecules based on the repulsion between electron pairs in the valence shell of the central atom. According to this theory:

- Electron pairs (bonding and non-bonding) arrange themselves around the central atom to minimize repulsion.
- The shape of the molecule is determined by the number of bonding and non-bonding electron pairs.
- For example, in a tetrahedral geometry like CH_4, the electron pairs are evenly spaced to reduce repulsion.

This theory is widely used to predict molecular shapes in chemistry.

Quick Tip

VSEPR theory is a simple yet powerful model to predict molecular shapes by considering the repulsion between electron pairs in the valence shell.

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28. Select the disaccharide molecule from the following:

1. Ribose
2. Fructose
3. Lactose
4. Galactose

Correct Answer: 3. Lactose

Solution:

Disaccharides are carbohydrates composed of two monosaccharide units joined by a glycosidic bond. Among the given options:

- **Ribose** and **Fructose** are monosaccharides.
- **Lactose** is a disaccharide made of glucose and galactose units.
- **Galactose** is a monosaccharide.

Hence, the correct answer is Lactose, as it is the only disaccharide listed.

Quick Tip

Disaccharides, like Lactose, are formed by the combination of two monosaccharides through a condensation reaction.

29.The element that does not belong to actinoids is:

1. (A) Mg
2. (B) Th
3. (C) U
4. (D) Ba

1. (A) Mg, (B) and (D) only.
2. (A), (C) and (D) only.
3. (A) and (D) only.
4. (B) and (C) only.

Correct Answer: 3. (A) and (D) only.

Solution:

Actinoids are a series of elements in the periodic table ranging from atomic numbers 89 (Actinium) to 103 (Lawrencium). These elements are characterized by their actinide series properties. Among the given options:

- **Mg (Magnesium)**: A Group 2 element, not part of the actinoids.
- **Th (Thorium)**: An actinoid element.
- **U (Uranium)**: An actinoid element.
- **Ba (Barium)**: A Group 2 element, not part of the actinoids.

Hence, the correct answer is **(A) Mg and (D) Ba**, as they do not belong to the actinoid series.

Quick Tip

Actinoids are elements from atomic numbers 89 to 103, and they are typically radioactive. Elements like Mg and Ba belong to Groups 2 and do not exhibit actinoid properties.

30.Match List-I with List-II:

List-I:

1. (A) Halogens
2. (B) Noble gases
3. (C) Chalcogens
4. (D) Lanthanoids

List-II:

1. (I) Ne
2. (II) Ce
3. (III) S
4. (IV) Br

Choose the correct answer from the options given below:

1. (A) - (IV), (B) - (III), (C) - (II), (D) - (I)
2. (A) - (IV), (B) - (I), (C) - (III), (D) - (II)
3. (A) - (IV), (B) - (I), (C) - (II), (D) - (III)
4. (A) - (II), (B) - (IV), (C) - (III), (D) - (I)

Correct Answer: 2.(A) - (IV), (B) - (I), (C) - (III), (D) - (II)

Solution:

- (A) Halogens are represented by (IV) Bromine (**Br**).

- (B) Noble gases are represented by (I) Neon (**Ne**).
- (C) Chalcogens are represented by (III) Sulfur (**S**).
- (D) Lanthanoids are represented by (II) Cerium (**Ce**).

Thus, the correct matches are:

(A) - (IV), (B) - (I), (C) - (III), (D) - (II)

Quick Tip

Halogens include elements like **F, Cl, Br, I**, while noble gases include **He, Ne, Ar, Kr**. Chalcogens consist of **O, S, Se**, and lanthanoids are rare earth elements such as **Ce, Pr, Nd**.

31.Which of the following is an intensive property?

1. Volume
2. Mass
3. Enthalpy
4. Molar volume

Correct Answer: 4. Molar volume

Solution:

An intensive property is independent of the amount of substance present. Molar volume is defined as the volume occupied by one mole of a substance and is therefore independent of the quantity of the substance, making it an intensive property. On the other hand, properties like volume, mass, and enthalpy depend on the size or quantity of the substance, making them extensive properties.

Quick Tip

Intensive vs Extensive Properties: Intensive properties, such as density and molar volume, do not depend on the quantity of the substance. In contrast, extensive properties, like mass and volume, depend on the system's size or amount.

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Quick Tip

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32. What is the oxidation number of O in OF_2?

1. +2
2. +1
3. -2
4. -1

Correct Answer: 1. +2

Solution:

In oxygen difluoride (OF_2), fluorine is the most electronegative element, and it always has an oxidation number of -1. Since the compound is neutral, the sum of oxidation numbers must equal 0. Let the oxidation number of oxygen be x:

$$x + 2(-1) = 0$$

$$x - 2 = 0$$

$$x = +2$$

Thus, the oxidation number of oxygen in OF_2 is +2.

Quick Tip

Fluorine always has an oxidation number of -1. In compounds like OF_2, oxygen adopts an unusual positive oxidation state due to fluorine's higher electronegativity.

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33. Protium, Deuterium, and Tritium are:

1. Isobars
2. Isotopes
3. Isomers
4. Enantiomers

Correct Answer: 2. Isotopes

Solution:

Protium, Deuterium, and Tritium are isotopes of hydrogen. They have the same atomic number (1) but different mass numbers:

- **Protium:** Mass number = 1 (1 proton, 0 neutrons)
- **Deuterium:** Mass number = 2 (1 proton, 1 neutron)

- **Tritium:** Mass number = 3 (1 proton, 2 neutrons)

Isotopes are atoms of the same element with identical numbers of protons but different numbers of neutrons, resulting in different mass numbers.

Quick Tip

Key Fact: Isotopes have the same chemical properties but may differ in physical properties, such as mass and stability.

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34. Match List-I with List-II:

List I:

- (A) Solvay process
- (B) Kjeldahl's method
- (C) Castner-Kellner process
- (D) Carius method

List II:

- (I) Halogens
- (II) Nitrogen
- (III) Sodium carbonate
- (IV) Sodium hydroxide

Choose the correct answer from the options given below:

1. (A) - (I), (B) - (II), (C) - (III), (D) - (IV)
2. (A) - (III), (B) - (I), (C) - (II), (D) - (IV)
3. (A) - (III), (B) - (II), (C) - (IV), (D) - (I)
4. (A) - (III), (B) - (II), (C) - (I), (D) - (IV)

Correct Answer: 3. (A) - (III), (B) - (II), (C) - (IV), (D) - (I)

Solution:

- **(A) Solvay process:** Used for the production of **sodium carbonate** (Na_2CO_3).
- **(B) Kjeldahl's method:** Analytical technique used for estimating **nitrogen** content in organic compounds.
- **(C) Castner-Kellner process:** Industrial method for the production of **sodium hydroxide** (NaOH).
- **(D) Carius method:** Used for the determination of **halogens** in organic compounds.

Quick Tip

Key Fact: Each process or method is designed for a specific industrial or analytical application. For example, the Solvay process is vital in the chemical industry for producing sodium carbonate.

35.Caustic soda is:

1. Sodium carbonate
2. Sodium hydroxide
3. Sodium chloride
4. Sodium hydrogencarbonate

Correct Answer: 2. Sodium hydroxide

Solution:

Caustic soda is the common name for **sodium hydroxide** (NaOH). It is a strong base commonly used in the production of soaps, detergents, and paper. It is also used in water treatment and chemical manufacturing processes.

Quick Tip

Key Fact: Caustic soda (NaOH) is highly corrosive and should be handled with care in industrial and laboratory settings.

36.Arrange the following as per the increase in atomic number:

1. Carbon
2. Tin
3. Lead
4. Silicon

Options:

1. (A), (B), (C), (D)
2. (A), (D), (C), (B)
3. (A), (D), (B), (C)
4. (C), (B), (A), (D)

Correct Answer: 3. (A), (D), (B), (C)

Solution:

To arrange elements based on increasing atomic number, we use their positions in the periodic table:

- **Carbon (C)**: Atomic number 6.
- **Silicon (Si)**: Atomic number 14.
- **Tin (Sn)**: Atomic number 50.
- **Lead (Pb)**: Atomic number 82.

The correct order of increasing atomic number is: **Carbon (A), Silicon (D), Tin (B), Lead (C)**.

Quick Tip

Key Fact: Elements in the same group of the periodic table (e.g., carbon group) are arranged in order of increasing atomic number down the group.

37.Match List-I with List-II:

List I (Drugs):

- (A) Ranitidine
- (B) Norethindrone
- (C) Aspirin
- (D) Ofloxacin

List II (Purpose):

- (I) Antibiotic
- (II) Analgesic
- (III) Antacid
- (IV) Antifertility

Options:

1. (A) (III), (B) - (IV), (C) - (II), (D) - (I)
2. (A) (III), (B) (I), (C) - (II), (D) - (IV)
3. (A) (I), (B) - (II), (C) - (IV), (D) - (III)
4. (A) - (III), (B) - (IV), (C) - (I), (D) - (II)

Correct Answer: 1. (A) (III), (B) - (IV), (C) - (II), (D) - (I)

Solution:

- **Ranitidine:** It is an antacid used to reduce stomach acid. (**III**)

- **Norethindrone:** It is an antifertility drug used in contraceptive pills. (**IV**)
- **Aspirin:** It is an analgesic and anti-inflammatory drug. (**II**)
- **Ofloxacin:** It is an antibiotic used to treat bacterial infections. (**I**)

Thus, the correct matching is: (A) (III), (B) (IV), (C) (II), (D) (I).

Quick Tip

Key Fact: Drugs are classified based on their therapeutic purpose, such as antacids for acidity, antibiotics for infections, and antifertility drugs for birth control.

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38. HTTP stands for:

1. High Text Transfer Problem
2. Hyper Technology Transfer Process
3. Hyper Text Transfer Protocol
4. Hyper Technology Transfer Protocol

Correct Answer: 3. Hyper Text Transfer Protocol

Solution:

HTTP (Hyper Text Transfer Protocol) is the foundation of any data exchange on the web and is a protocol used to transfer hypertext documents. It is the primary protocol used by browsers to fetch web pages and is an integral part of the World Wide Web.

Quick Tip

HTTP operates as a request-response protocol in the client-server model. For secure communication, HTTPS (Hyper Text Transfer Protocol Secure) is used.

39.Which of the following statement(s) is/are TRUE for database?

1. Database is a collection of logically related data.

2. DBMS is a specialised software that is responsible for the creation, maintenance and use of a database.
3. RDBMS stores the data centrally in the form of a collection of tables known as relations.
4. SQL is a database that stores the data in tabular form.

Choose the correct answer from the options given below:

1. (A), (B) and (D) only.
2. (A), (B) and (C) only.
3. (A), (B), (C) and (D).
4. (B), (C) and (D) only.

Correct Answer: 2. (A), (B) and (C) only.

Solution:

- (A) is correct because a database is a structured collection of logically related data. - (B) is correct because a Database Management System (DBMS) is specialised software used for managing databases. - (C) is correct because a Relational Database Management System (RDBMS) organises data in the form of tables or relations. - (D) is incorrect because SQL (Structured Query Language) is a language used to manage and query databases, not a database itself.

Quick Tip

SQL is used to interact with RDBMS, which stores data in tables, ensuring easy retrieval and management.

40.Which of the following is an example of Application Software?

1. Android
2. Unix
3. Disk Defragmenter

4. MS-Office

Correct Answer: 4. MS-Office

Solution:

- Android is an operating system designed for mobile devices and is not an application software. - Unix is also an operating system used for servers and workstations. - Disk Defragmenter is a utility software used to optimize disk performance. - MS-Office is a suite of application software including Word, Excel, and PowerPoint, designed for productivity tasks.

Quick Tip

Application software like MS-Office is designed for end-users to perform specific tasks, while system and utility software manage or optimize the system.

41.In MS-Word, Portrait and Landscape are:

1. Page Orientation
2. Page Scale
3. Paper Size
4. Page Margin

Correct Answer: 1. Page Orientation

Solution:

In MS-Word, Page Orientation refers to the direction in which a document is displayed or printed. The two primary orientations are: - Portrait: The document is taller than it is wide. - Landscape: The document is wider than it is tall. These options allow users to format their documents based on content requirements.

Quick Tip

In MS-Word, you can change the page orientation by navigating to the ”Page Layout” tab and selecting ”Orientation” under the ”Page Setup” group.

42.C Programming language was developed by:

1. Marcian ”Ted” Hoff
2. Douglas Engelbart
3. Dennis Ritchie
4. Charles Babbage

Correct Answer: 3. Dennis Ritchie

Solution:

The C programming language was developed in the early 1970s by Dennis Ritchie at Bell Labs. It was initially designed for system programming, especially for writing the Unix operating system. C became one of the most widely used programming languages due to its simplicity, efficiency, and flexibility.

Quick Tip

Dennis Ritchie is often referred to as the father of modern programming for his contribution to developing the C language, which laid the foundation for many modern programming languages like C++, Java, and Python.

43.Words that a programming language has set aside for its own use and have a special meaning are called:

1. Control words
2. Saved words
3. Important words
4. Reserved words

Correct Answer: 4. Reserved words

Solution:

In programming, reserved words are predefined words that a language sets aside for its own use. These words have special meanings and cannot be used as identifiers (e.g., variable names). Examples of reserved words include ‘if‘, ‘while‘, ‘for‘, ‘int‘, and ‘return‘ in languages like C, Java, and Python.

Quick Tip

Reserved words are an integral part of the syntax of programming languages. They ensure that code is structured and interpreted correctly by the compiler or interpreter.

44.Match List-I with List-II:

List I (Terms):

A. FTP

B. Hub

C. QWERTY

D. Trojan

List II (Types):

I. Malware

II. Network Protocol

III. Networking Device

IV. Keyboard Layout

Correct Answer: 1. (A) - (II), (B) - (III), (C) - (IV), (D) - (I)

Solution:

The correct matches are as follows:

- FTP (File Transfer Protocol) is a **network protocol** used for transferring files over a network. Hence, (A) matches (II).

- Hub is a **networking device** that connects multiple computers in a network. Hence, (B) matches (III).
- QWERTY is a **keyboard layout** commonly used in typewriters and computer keyboards. Hence, (C) matches (IV).
- Trojan is a type of **malware** designed to deceive users by appearing as legitimate software. Hence, (D) matches (I).

Quick Tip

Understanding the types of terms in networking and computing helps in identifying their functions and roles in technology.

45.Which one of the following is NOT a type of hacker?

1. Black Hat hackers
2. Orange Hat hackers
3. Grey Hat hackers
4. White Hat hackers

Correct Answer: 2. Orange Hat hackers

Solution:

The types of hackers are classified based on their intentions and actions:

- **Black Hat hackers:** These hackers engage in illegal activities, such as stealing data or causing harm to systems.
- **White Hat hackers:** Also known as ethical hackers, they help secure systems by identifying and fixing vulnerabilities.
- **Grey Hat hackers:** These hackers fall between Black and White Hat hackers, sometimes acting without malicious intent but still violating laws.

- **Orange Hat hackers:** This is not a recognized category of hackers and is therefore the correct answer to the question.

Quick Tip

Hackers are typically categorized by their intent: malicious (Black Hat), ethical (White Hat), or a mix of both (Grey Hat).

46.Which of the following is NOT a malware?

1. Virus
2. Spyware
3. Worm
4. Cookies

Correct Answer: 4. Cookies

Solution:

Malware refers to malicious software designed to disrupt, damage, or gain unauthorized access to systems. The given options include:

- **Virus:** A type of malware that replicates itself and spreads across devices, causing harm.
- **Spyware:** A type of malware designed to secretly gather user information.
- **Worm:** A type of malware that spreads across networks and systems without needing a host file.
- **Cookies:** These are small files stored by web browsers to remember user preferences and are not considered malware.

Cookies are benign and used for improving user experience, making them the correct answer.

Quick Tip

Malware includes malicious software like viruses, spyware, and worms, but cookies are non-malicious files used for storing user preferences.

47.Arrange the following binary numbers in increasing order.

(A) 0111

(B) 1110

(C) 1010

(D) 0010

Choose the correct answer from the following:

1. (A) (B) (C) ¡ (D)
2. (A) ¡ (D) ¡ (C) ¡ (B)
3. (D) ¡ (A) ¡ (C) ¡ (B)
4. (D) ¡ (B) ¡ (A) ¡ (C)

Correct Answer: 3. (D) ¡ (A) ¡ (C) ¡ (B)

Solution:

To arrange the binary numbers in increasing order, we first convert them to decimal:

- **(A)** 0111 in binary = 7 in decimal.
- **(B)** 1110 in binary = 14 in decimal.
- **(C)** 1010 in binary = 10 in decimal.
- **(D)** 0010 in binary = 2 in decimal.

The order in increasing decimal values is:

$$(D) < (A) < (C) < (B)$$

Thus, the correct option is 3.

Quick Tip

To compare binary numbers, convert them to decimal by summing powers of 2 corresponding to the positions of 1s in the binary representation.

48.Bandwidth is measured in:

1. Hertz
2. Bits
3. Kbps
4. Metre

Correct Answer: 1. Hertz

Solution:

Bandwidth refers to the range of frequencies within a given band that a network or communication channel can transmit. It is measured in **Hertz (Hz)**, which represents the number of cycles per second of the signal. Bandwidth is an important parameter in determining the capacity of a system to transmit data.

Quick Tip

Bandwidth is often confused with data rate. While bandwidth is measured in Hertz (frequency range), data rate is measured in bits per second (bps).

49.Which of the following key is used to establish a relationship between tables in a relational database?

1. Primary Key
2. Foreign Key
3. Candidate Key

4. Alternate Key

Correct Answer: 2. Foreign Key

Solution:

In relational databases, a **Foreign Key** is used to establish a relationship between two tables. It is a field (or collection of fields) in one table that uniquely identifies a row in another table. The table containing the foreign key is called the child table, and the table containing the primary key is called the parent table. This key enforces referential integrity in the database.

Quick Tip

A Foreign Key ensures that the values in one table correspond to valid values in another table, creating a link between the two.

50.The particle nature of light can be explained by the:

1. Doppler Effect
2. Photoelectric Effect
3. Young's double slit experiment
4. Piezo Effect

Correct Answer: 2. Photoelectric Effect

Solution:

The **Photoelectric Effect** provides evidence for the particle nature of light. It occurs when light of a certain frequency strikes the surface of a metal, causing the emission of electrons. This phenomenon cannot be explained by wave theory alone, as the energy of emitted electrons depends on the frequency of the incident light, not its intensity. Albert Einstein explained this effect using the concept of photons, which are discrete packets of energy, demonstrating the particle nature of light.

Quick Tip

The Photoelectric Effect was crucial in establishing the quantum theory and earned Albert Einstein the Nobel Prize in Physics in 1921.

51.Match List-I with List-II:

List I:

- I. CdS
- II. Si doped with B
- III. Si doped with As
- IV. Si

List II:

- A. Intrinsic Semiconductor
- B. n-type Semiconductor
- C. p-type Semiconductor
- D. Compound Inorganic Semiconductor

Options:

1. (A) - (IV), (B) - (III), (C) - (II), (D) - (I)
2. (A) - (IV), (B) - (III), (C) - (I), (D) - (II)
3. (A) - (I), (B) - (II), (C) - (III), (D) - (IV)
4. (A) - (III), (B) - (IV), (C) - (I), (D) - (II)

Correct Answer: 1. (A) - (IV), (B) - (III), (C) - (II), (D) - (I)

Solution:

The matching is based on the properties of semiconductors:

- **CdS (I)**: It is a compound inorganic semiconductor (D).
- **Si doped with B (II)**: Boron (B) is a trivalent impurity, creating a p-type semiconductor (C).
- **Si doped with As (III)**: Arsenic (As) is a pentavalent impurity, creating an n-type semiconductor (B).
- **Si (IV)**: Pure silicon is an intrinsic semiconductor (A).

Thus, the correct matches are:

$$\text{I-D, II-C, III-B, IV-A.}$$

Quick Tip

Doping silicon with trivalent elements like boron produces p-type semiconductors, while pentavalent elements like arsenic produce n-type semiconductors.

52.Two capacitors C_1 and C_2 are connected in parallel. If charge Q is given to the assembly, then the ratio of charge on C_1 to charge on C_2 will be:

1. $\frac{C_1}{C_2}$
2. C_1C_2
3. 1
4. $\frac{C_2}{C_1}$

Correct Answer: 1. $\frac{C_1}{C_2}$

Solution:

When capacitors are connected in parallel, the potential difference (V) across both capacitors is the same. The charge on each capacitor is given by:

$$Q_1 = C_1 \cdot V, \quad Q_2 = C_2 \cdot V$$

The ratio of charges is:

$$\frac{Q_1}{Q_2} = \frac{C_1 \cdot V}{C_2 \cdot V} = \frac{C_1}{C_2}$$

Thus, the ratio of the charge on C_1 to C_2 is $\frac{C_1}{C_2}$.

Quick Tip

For capacitors connected in parallel, the voltage across each capacitor is the same, and the charge on each capacitor is proportional to its capacitance.

53.Out of the following, select the molecules having zero dipole moment:

1. (A). CH_4

2. (B). CO_2

3. (C). H_2O

4. (D). NaCl

Choose the correct answer from the options given below:

1. (A), (B), and (D) only.
2. (A) and (C) only.
3. (A) and (D) only.
4. (A) and (B) only.

Correct Answer: 4. (A) and (B) only.

Solution:

A molecule has a zero dipole moment when its molecular geometry is symmetric, and the bond dipoles cancel out each other.

- **CH_4 (Methane):** It has a tetrahedral geometry with symmetrical distribution of bond dipoles, resulting in a zero dipole moment.
- **CO_2 (Carbon dioxide):** It has a linear geometry with equal and opposite bond dipoles that cancel each other, resulting in a zero dipole moment.

- **H_2O (Water):** It has a bent geometry, and the bond dipoles do not cancel each other, resulting in a net dipole moment.
- **NaCl (Sodium chloride):** It is an ionic compound and has a permanent dipole moment due to its ionic bonds.

Thus, CH_4 and CO_2 are the molecules with zero dipole moment.

Quick Tip

Molecules with symmetric geometry and equal bond dipoles cancel out their dipole moments, resulting in zero net dipole moment.

54.Identify the materials which exhibit weak dependence of resistivity with temperature:

1. (A). Copper
2. (B). Nichrome
3. (C). Constantan
4. (D). Manganin

Choose the correct answer from the options given below:

1. (A), (B), and (D) only.
2. (A), (B), and (C) only.
3. (A), (B), (C), and (D).
4. (B), (C), and (D) only.

Correct Answer: 4. (B), (C), and (D) only.

Solution:

Materials like Nichrome, Constantan, and Manganin exhibit weak dependence of resistivity on temperature due to their specific material properties:

- **Nichrome:** It is commonly used in heating elements because its resistivity changes very little with temperature.
- **Constantan:** An alloy of copper and nickel, Constantan has a very low temperature coefficient of resistivity, making it suitable for precise resistive measurements.
- **Manganin:** This alloy, used in making standard resistors, also exhibits a very small change in resistivity with temperature.
- **Copper:** In contrast, copper exhibits a significant change in resistivity with temperature, so it is not included in the answer.

Thus, Nichrome, Constantan, and Manganin show weak dependence of resistivity with temperature.

Quick Tip

Materials like Nichrome, Constantan, and Manganin are used in precision resistive applications due to their stable resistivity across a wide temperature range.

55.Which of the following statements are related to the limitations of Bohr's model?

1. (A) It is applicable to two-electron atoms such as helium.

2. (B) It is applicable to hydrogenic atoms.

3. (C) It is able to account for the intensity variations.

4. (D) It is unable to account for the intensity variations.

Choose the correct answer from the options given below:

1. (A) and (B) only
2. (C) and (B) only
3. (B) and (D) only
4. (A) and (D) only

Correct Answer: 3. (B) and (D) only.

Solution:

Bohr's model, though revolutionary, has several limitations:

- **Applicability to hydrogenic atoms:** Bohr's model works only for single-electron systems such as hydrogen and hydrogen-like ions (e.g., He^{+}).
- **Intensity variations:** The model is unable to explain the intensity variations in spectral lines observed in atomic spectra. This is because it doesn't account for the distribution of electron transitions.
- **Two-electron or multi-electron atoms:** Bohr's model fails to describe atoms with more than one electron, as it doesn't consider electron-electron interactions.

Therefore, statements (B) and (D) correctly represent the limitations of Bohr's model.

Quick Tip

Bohr's model is effective for hydrogenic atoms but fails for multi-electron systems and does not account for intensity variations in spectral lines.

56.The magnetic susceptibility of a paramagnetic material is:

1. Small and positive
2. Small and negative
3. Large and negative
4. Large and positive

Correct Answer: 1. Small and positive

Solution:

Paramagnetic materials have a small and positive magnetic susceptibility. This means they are weakly attracted to an external magnetic field. The susceptibility is positive because the material enhances the external magnetic field by aligning the magnetic dipoles within it. The alignment of dipoles occurs due to unpaired electrons in the atomic or molecular structure, which contribute to the magnetic moment. However, the effect is small as thermal motion counteracts perfect alignment.

Quick Tip

Paramagnetic materials are characterized by small and positive susceptibility, meaning they are weakly attracted to magnetic fields due to unpaired electrons.

57.Match List-I with List-II:

LIST I (Physical Quantity):

- (A) Electric Flux
- (B) Magnetic Moment
- (C) Magnetic Field
- (D) Magnetic Flux

LIST II (Units):

- (I) Tesla
- (II) Volt Meter
- (III) Weber
- (IV) Ampere meter

Choose the correct answer from the options given below:

1. (A) - (IV), (B) - (III), (C) - (II), (D) - (I)

2. (A) - (II), (B) - (III), (C) - (I), (D) - (IV)

3. (A) - (II), (B) - (I), (C) - (IV), (D) - (III)

4. (A) - (II), (B) - (IV), (C) - (I), (D) - (III)

Correct Answer: 4. (A) - (II), (B) - (IV), (C) - (I), (D) - (III)

Solution:

- Electric Flux is measured in **Volt Meter** (II) because it is related to the electric field over a surface. - Magnetic Moment is measured in **Ampere meter** (IV), representing the torque experienced by a magnetic dipole in a magnetic field. - Magnetic Field is measured in **Tesla** (I), which quantifies the strength of the magnetic field. - Magnetic Flux is measured in **Weber** (III), representing the total magnetic field passing through a surface.

Quick Tip

Each physical quantity is associated with its specific unit: - Electric Flux: Volt Meter - Magnetic Moment: Ampere meter - Magnetic Field: Tesla - Magnetic Flux: Weber

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58.The mass defect in a nuclear fusion reaction is 0.1%. What amount of energy is liberated in a 1 kg fusion reaction?

Options:

1. 9×10^{16} Joule

2. 9×10^{15} Joule

3. 9×10^{13} Joule

4. 9×10^{19} Joule

Correct Answer: 3. 9×10^{13} Joule

Solution:

The energy liberated in a nuclear reaction can be calculated using Einstein's mass-energy equivalence formula:

$$E = \Delta m c^2$$

Here:

- Δm (mass defect) = 0.1% of 1 kg = 0.001 kg,
- c (speed of light) = 3×10^8 m/s.

Substitute the values:

$$E = 0.001 \times (3 \times 10^8)^2$$

$$E = 0.001 \times 9 \times 10^{16} = 9 \times 10^{13} \text{ Joule}$$

Thus, the energy liberated is 9×10^{13} Joule.

Quick Tip

Use Einstein's formula $E = \Delta mc^2$ to calculate the energy released in nuclear reactions. Always convert percentages to decimal form for accurate calculations.

59.Lenz's law is associated with:

Options:

1. Conservation of mass
2. Conservation of energy
3. Conservation of current
4. Conservation of motion

Correct Answer: 2. Conservation of energy

Solution:

Lenz's law states that the direction of an induced current in a conductor is such that it opposes the change in magnetic flux that caused it. This principle is rooted in the **conservation of energy**, ensuring that the energy in the system remains balanced and no energy is created or destroyed. The opposing induced current prevents any violation of this fundamental principle.

Quick Tip

Lenz's law is a direct consequence of the conservation of energy, ensuring that the induced current always resists the change in magnetic flux.

60.Arrange the following electromagnetic waves in the order of increasing wavelength:

1. (A). Gamma rays
2. (B). Radio waves
3. (C). Microwaves
4. (D). Ultraviolet rays

Options:

1. (B), (D), (C), (A)
2. (A), (B), (D), (C)
3. (A), (D), (C), (B)
4. (B), (C), (D), (A)

Correct Answer: 3. (A), (D), (C), (B)

Solution:

The electromagnetic spectrum is arranged in terms of increasing wavelength as follows: 1. Gamma rays have the shortest wavelength. 2. Ultraviolet rays come next. 3. Microwaves have a longer wavelength. 4. Radio waves have the longest wavelength.

Thus, the correct order is:

Gamma rays (A) ¡ Ultraviolet rays (D) ¡ Microwaves (C) ¡ Radio waves (B)

Quick Tip

In the electromagnetic spectrum, wavelength increases from gamma rays to radio waves, while frequency decreases in the same order.

61.Which phenomenon of light is used in optical fibres?

1. Refraction
2. Diffraction
3. Reflection
4. Total Internal Reflection

Correct Answer: 4. Total Internal Reflection

Solution:

The phenomenon used in optical fibres is **Total Internal Reflection (TIR)**. This occurs when light traveling inside the core of the optical fibre hits the boundary with the cladding at an angle greater than the critical angle. At this point, the light reflects entirely within the core, allowing it to travel long distances without escaping, even around curves in the fibre. This property is crucial for transmitting signals in telecommunications and medical imaging.

Quick Tip

Total Internal Reflection (TIR) ensures efficient signal transmission in optical fibres by preventing the loss of light energy.

62.Trypanosoma belongs to which group of Protozoa?

1. Amoeboids
2. Flagellated
3. Ciliated
4. Sporozoans

Correct Answer: 2. Flagellated

Solution:

Trypanosoma belongs to the group of **Flagellated Protozoa**, also known as Mastigophora. These organisms use whip-like structures called **flagella** for movement. Trypanosoma is a

parasitic protozoan responsible for diseases such as African sleeping sickness (caused by *Trypanosoma brucei*) and Chagas disease (caused by *Trypanosoma cruzi*). Its flagellum is crucial for motility and attachment to host tissues.

Quick Tip

Flagellated protozoa, like *Trypanosoma*, use their flagella for locomotion and host interactions.

63.Which of the following is a biological hazard?

1. Inorganic dust
2. Anthrax
3. Alcoholism
4. Noise

Correct Answer: 2. Anthrax

Solution:

A **biological hazard** is a risk posed by biological agents, such as bacteria, viruses, or toxins, that can cause diseases in humans or animals. **Anthrax**, caused by the bacterium *Bacillus anthracis*, is a prime example of a biological hazard. It is typically transmitted through contact with infected animals or their products and can lead to severe respiratory, gastrointestinal, or cutaneous infections.

Quick Tip

Biological hazards include infectious agents like bacteria and viruses, which can cause diseases such as anthrax, tuberculosis, and influenza.

64.Magnification of concave lens is always:

1. = +1

2. = -1

3. ¿ +1

4. ¡ +1

Correct Answer: 4. ¡ +1

Solution:

The magnification (M) of a concave lens is always less than +1. Concave lenses are diverging lenses, and they produce virtual, upright, and diminished images of the object. This means the size of the image is smaller than the size of the object, leading to a magnification value less than +1. For example, if the object size is larger than the image size, magnification could be $M = \frac{\text{Image Height}}{\text{Object Height}} < 1$.

Quick Tip

Magnification $M = \frac{\text{Image Height}}{\text{Object Height}}$ for concave lenses is always less than +1 because they produce smaller, virtual images.

65.The entry level in Kasturba Gandhi Balika Vidyalaya (KGBV) is:

1. Class I

2. Class VI

3. Class IX

4. Nursery

Correct Answer: 2. Class VI

Solution:

Kasturba Gandhi Balika Vidyalaya (KGBV) is a scheme aimed at providing quality education to girls belonging to disadvantaged groups, particularly those from Scheduled Castes, Scheduled Tribes, Other Backward Classes, and minority communities. The scheme focuses on girls in upper primary levels, with the entry point typically starting at Class VI.

The initiative ensures residential schooling facilities for girls who are out of school or at risk of dropping out.

Quick Tip

KGBV focuses on providing education to underprivileged girls at the upper primary level, starting from Class VI.

66.Which of the following is a communicable disease?

1. Hypertension
2. Hepatitis
3. Diabetes
4. Cancer

Correct Answer: 2. Hepatitis

Solution:

Hepatitis is a communicable disease caused by various viruses, such as Hepatitis A, B, C, D, and E. It can spread through contaminated food, water, blood, or other bodily fluids, depending on the type of hepatitis. On the other hand, hypertension, diabetes, and cancer are non-communicable diseases as they do not spread from person to person.

Quick Tip

Communicable diseases are caused by pathogens and can spread from one person to another, unlike non-communicable diseases.

67.The term ”hidden hunger” is associated with

1. Protein deficiency
2. Micronutrient deficiency

3. Fat insufficiency
4. Lack of energy

Correct Answer: 2. Micronutrient deficiency

Solution:

The term ”hidden hunger” refers to a condition where the body lacks essential micronutrients such as vitamins and minerals, even when the person may consume sufficient calories. This deficiency can lead to long-term health issues such as impaired immunity, developmental delays, and chronic diseases. It is often prevalent in populations relying on diets low in diversity.

Quick Tip

”Hidden hunger” highlights the importance of a balanced diet with adequate micronutrients, beyond just meeting caloric needs.

68.Identify the duties of a front office manager.

1. Responsible for managing the front office, lobby, transport activities
2. Organises, supervises and controls all uniformed services
3. Responsible for providing information and communicates with in-house guests and visitors
4. Schedules shifts/staff rotations and duties of the staff in shifts

Choose the correct answer from the options given below:

1. (A) and (D) only
2. (A), (B) and (D) only
3. (A), (B), (C) and (D)
4. (A) and (B) only

Correct Answer: 1. (A) and (D) only

Solution:

The front office manager is primarily responsible for overseeing the management of the front office and its operations, such as the lobby and transport activities (A). Additionally, they handle staff scheduling, including shifts, rotations, and assigning duties (D). Other duties listed, such as managing uniformed services or communication with guests, are typically delegated to other specific roles within the team.

Quick Tip

Front office managers focus on operational efficiency, staff management, and ensuring seamless guest experiences.

69.HACCP stands for which among the following?

1. Hazard Analysis Critical Control Points
2. Highly Analytical Critical Control Process
3. Hazardous Activity Check Control Parameters
4. Hazard Analysis Check Control Process

Correct Answer: 1. Hazard Analysis Critical Control Points

Solution:

HACCP (Hazard Analysis Critical Control Points) is a systematic approach used in food safety to identify, evaluate, and control hazards that could compromise food safety. This method is widely applied in food production and preparation to prevent contamination, ensuring products meet health standards.

Quick Tip

HACCP is essential for maintaining food safety by identifying critical control points in food production and addressing potential hazards proactively.

70.Arrange the steps of media planning process in correct sequence:

1. (A). Deciding and developing media strategies
2. (B). Developing a media schedule for plan of action for execution
3. (C). Identifying group media target
4. (D). Deciding and defining media objectives

Choose the correct answer from the options given below:

1. (D), (A), (C), (B).
2. (C), (D), (A), (B).
3. (B), (A), (D), (C).
4. (C), (B), (D), (A).

Correct Answer: 2. (C), (D), (A), (B).

Solution:

The media planning process involves a structured sequence to achieve effective results:

- **(C)**: Identify the target media group to focus on the intended audience.
- **(D)**: Define the media objectives to ensure alignment with campaign goals.
- **(A)**: Develop media strategies to choose appropriate platforms and methods.
- **(B)**: Create a media schedule to detail execution and timing.

This order ensures a logical progression from audience identification to actionable execution.

Quick Tip

Effective media planning begins with identifying the target audience, followed by clear objectives, strategies, and a detailed schedule.

71.Arrange the organizational chart of a housekeeping department below the level of Executive Housekeeper:

1. (A). Housemen

2. (B). Room attendant
3. (C). Floor supervisor
4. (D). Assistant housekeeper

Choose the correct answer from the options given below:

1. (C), (A), (D), (B).
2. (A), (B), (D), (C).
3. (D), (A), (C), (B).
4. (D), (C), (B), (A).

Correct Answer: 4. (D), (C), (B), (A).

Solution:

The organizational chart of a housekeeping department below the Executive Housekeeper is arranged in a hierarchical manner:

- **(D) Assistant Housekeeper:** Directly assists the Executive Housekeeper and oversees departmental operations.
- **(C) Floor Supervisor:** Supervises activities on designated floors, ensuring cleanliness and order.
- **(B) Room Attendant:** Cleans and maintains guest rooms, ensuring high service standards.
- **(A) Housemen:** Responsible for general cleaning and assisting with guest room maintenance.

This structure ensures efficient delegation and execution of housekeeping tasks.

Quick Tip

A clear hierarchy in the housekeeping department helps streamline responsibilities and maintain service quality.

72.Identify the units/terms which are associated with fabric inspection and testing:

1. (A). Thread count
2. (B). Parts per million
3. (C). Gram per square metre
4. (D). Picks per inch

Choose the correct answer from the options given below:

1. (A), (C) and (D) only.
2. (A), (B) and (D) only.
3. (A), (B), (C) and (D).
4. (B), (C) and (D) only.

Correct Answer: 1. (A), (C) and (D) only.

Solution:

The terms associated with fabric inspection and testing include:

- **Thread count:** Refers to the number of threads per inch in both warp and weft directions, indicating fabric quality.
- **Gram per square metre (GSM):** Measures the weight of fabric and is an important factor for fabric classification.
- **Picks per inch:** Denotes the number of weft yarns (picks) in an inch of fabric, indicating fabric density.
- **Parts per million (B):** This term is not associated with fabric inspection but is used in chemical or environmental measurements.

Thus, (A), (C), and (D) are the correct terms related to fabric inspection.

Quick Tip

Fabric testing often involves measuring thread count, GSM, and picks per inch to assess quality and density.

73.Match List I with List II:

List I (Examples):

- (A). Processed foods
- (B). Food derivatives
- (C). Functional foods
- (D). Medical foods

List II (Characteristics):

- (I). Probiotics
- (II). Conversion of oil to vanaspati
- (III). Pickles, jams, marmalades, squashes
- (IV). Low sodium salt

Choose the correct answer from the options given below:

1. (A) - (II), (B) - (IV), (C) - (III), (D) - (I)
2. (A) - (III), (B) - (I), (C) - (II), (D) - (IV)
3. (A) - (I), (B) - (II), (C) - (III), (D) - (IV)
4. (A) - (III), (B) - (II), (C) - (I), (D) - (IV)

Correct Answer: 4. (A) - (III), (B) - (II), (C) - (I), (D) - (IV)

Solution:

- (A) **Processed foods:** These include pickles, jams, marmalades, and squashes, which are foods that have undergone significant preparation or preservation processes.
- (B) **Food derivatives:** Conversion of oil to vanaspati is an example of a food derivative where raw food materials are chemically transformed.

- (C) **Functional foods:** Probiotics are an example, as they provide health benefits beyond basic nutrition.
- (D) **Medical foods:** Low sodium salt is a type of medical food aimed at meeting specific dietary needs.

Thus, the correct matching is:

(A) - (III), (B) - (II), (C) - (I), (D) - (IV).

Quick Tip

Processed foods undergo preparation and preservation. Functional foods offer additional health benefits, and medical foods address specific dietary needs.

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74. Name the process of problem solving with the purpose of getting a 'zero-defect' product in a garment industry.

1. Quality Assurance
2. Quality Control
3. Quality Management
4. Quality Specifications

Correct Answer: 2. Quality Control

Solution: Quality Control (QC) is a process-oriented approach aimed at ensuring that the product meets specified quality standards and identifies defects in the manufacturing process. It focuses on detecting and eliminating defects to achieve a 'zero-defect' product, especially in industries like garment manufacturing. QC employs systematic procedures such as inspections, testing, and corrective actions to maintain quality throughout production.

Quick Tip

Quality Control ensures that products meet quality standards by detecting and eliminating defects, while Quality Assurance focuses on the overall process.

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75. Red Ribbon Express (RRE) is a nationwide campaign for generating awareness on:

1. Malaria
2. Breast Cancer
3. AIDS
4. Diabetes

Correct Answer: 3. AIDS

Solution: The Red Ribbon Express (RRE) is a unique nationwide campaign launched in India to create awareness about HIV/AIDS. It uses a specially designed train to reach rural and underserved areas, providing information on HIV/AIDS prevention, treatment, and care. The campaign also covers issues related to health, sanitation, and social stigma associated with AIDS, making it a significant initiative for public health education.

Quick Tip

The red ribbon is a universal symbol for awareness and support for people living with HIV/AIDS. The Red Ribbon Express amplifies this message by traveling across the country.
