

UPPCS Prelims 2025 Test 5 (Solution) – Science Full Length (SSW - 8077834630)

**UPPCS Prelims
2025
Current Affairs**

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By Team Self Study Wala
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Question 1. Who is known as the "Father of Biology"?

- (a) Theophrastus
- (b) Hippocrates
- (c) Aristotle
- (d) Linnaeus

Answer: (c)

Explanation: Aristotle (384–322 BC) is regarded as the Father of Biology due to his extensive study and documentation of plant and animal life.

Question 2. Which of the following branches is correctly matched with its father?

- (a) Genetics – Edward Jenner
- (b) Cell Biology – Robert Hooke
- (c) Taxonomy – Gregor Mendel
- (d) Paleontology – Aristotle

Answer: (b)

Explanation:

- (a) Genetics – Edward Jenner

Incorrect. Edward Jenner is known as the father of immunology for his work on the smallpox vaccine. The father of genetics is Gregor Mendel.

- (b) Cell Biology – Robert Hooke

Correct. Robert Hooke is considered the father of cell biology because he discovered and named

the "cell" in 1665 after observing cork under a microscope.

- (c) Taxonomy – Gregor Mendel

Incorrect. Mendel is the father of genetics, not taxonomy. The father of taxonomy is Carl Linnaeus.

- (d) Paleontology – Aristotle

Incorrect. Aristotle is a pioneer in biology and zoology, but the father of paleontology is often considered to be Georges Cuvier.

Question 3. Choose the incorrect statement:

- (a) Bionomics is the study of life modes and adaptations
- (b) Agrostology is the study of flowers
- (c) Palynology involves the study of pollen grains
- (d) Pedology deals with soil formation and classification

Answer: (b)

Explanation:

- (a) Bionomics is the study of life modes and adaptations

Correct. Bionomics is essentially ecology—the study of the interaction of organisms with their environment, including modes of life and adaptations.

- (b) Agrostology is the study of flowers

Incorrect. Agrostology is the study of grasses, not flowers. The correct term for the study of flowers is Anthology or more broadly, Floriculture or Botany.

- (c) Palynology involves the study of pollen grains

Correct. Palynology is the scientific study of pollen, spores, and microscopic plant structures.

- (d) Pedology deals with soil formation and classification

Correct. Pedology is the branch of soil science that focuses on the origin, classification, and distribution of soils.

Question 4. Which of the following is correctly matched?

- (a) Lamarck – Natural Selection

- (b) Hugo de Vries – Mutation Theory
- (c) Darwin – Inheritance of Acquired Characters
- (d) Pasteur – Cosmozoic Theory

Answer: (b)

Explanation:

- (a) Lamarck – Natural Selection

Incorrect. Lamarck proposed the Theory of Inheritance of Acquired Characters, not Natural Selection. Natural Selection was proposed by Charles Darwin.

- (b) Hugo de Vries – Mutation Theory

Correct. Hugo de Vries is known for proposing the Mutation Theory of evolution based on his experiments with the evening primrose (*Oenothera lamarckiana*).

- (c) Darwin – Inheritance of Acquired Characters

Incorrect. That was Lamarck's theory. Darwin proposed the Theory of Natural Selection.

- (d) Pasteur – Cosmozoic Theory

Incorrect. Cosmozoic Theory (life came from space) was proposed by scientists like Arrhenius. Louis Pasteur is known for disproving spontaneous generation and for his work in germ theory and pasteurization.

Question 5. Assertion (A): The early atmosphere of Earth lacked free oxygen.

Reason (R): Oxygen was toxic to the formation of organic molecules in primitive Earth.

Code:

- (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, R is false
- (d) A is false, R is true

Answer: (a)

Explanation:

Assertion (A): The early atmosphere of Earth lacked free oxygen

True. The primitive Earth's atmosphere was reducing in nature (rich in methane, ammonia, water vapor, hydrogen), but lacked free oxygen (O_2).

Reason (R): Oxygen was toxic to the formation of organic molecules in primitive Earth

True. Free oxygen is highly reactive and would have oxidized and broken down the complex organic molecules essential for life. Hence, a reducing environment was necessary for the origin of life.

Since the presence of free oxygen would have hindered the synthesis of organic compounds, the reason correctly explains the assertion.

Question 6. Choose the incorrect statement:

- (a) The first living cells were heterotrophic.
- (b) Eukaryotic cells appeared before prokaryotic cells.
- (c) Oxygen revolution led to the ozone layer formation.
- (d) The first biomolecules formed in the "primordial soup."

Answer: (b)

Explanation:

- (a) The first living cells were heterotrophic

Correct. The earliest cells are believed to have been heterotrophs, relying on organic molecules present in the environment ("primordial soup") for energy.

- (b) Eukaryotic cells appeared before prokaryotic cells

Incorrect. Prokaryotic cells (like bacteria) appeared first — they are simpler and more ancient. Eukaryotic cells evolved later through processes like endosymbiosis.

- (c) Oxygen revolution led to the ozone layer formation

Correct. The Great Oxygenation Event (around 2.5 billion years ago) increased oxygen levels in the atmosphere, which eventually led to the formation of the ozone (O_3) layer that protects life from harmful UV rays.

- (d) The first biomolecules formed in the "primordial soup"

Correct. The term "primordial soup" refers to the early oceans rich in organic compounds where the first biomolecules (like amino acids) formed under prebiotic conditions.

Question 7. Choose the true statement:

- (a) Hibernation occurs in summer
- (b) Aestivation occurs in cold climates
- (c) Hibernation lowers metabolic rate to conserve energy
- (d) Aestivation increases heart rate to avoid heat

Answer: (c)

Explanation:

- (a) Hibernation occurs in summer

Incorrect. Hibernation occurs in winter, allowing animals to survive cold temperatures and food scarcity.

- (b) Aestivation occurs in cold climates

Incorrect. Aestivation is a summer dormancy seen in animals in hot and dry climates (e.g., lungfish, frogs), not cold climates.

- (c) Hibernation lowers metabolic rate to conserve energy

True. During hibernation, the metabolic rate, body temperature, and heart rate drop significantly to save energy when resources are scarce.

- (d) Aestivation increases heart rate to avoid heat

Incorrect. Aestivation actually involves reducing metabolic activity, not increasing it, to conserve water and energy in extreme heat.

Question 8. Which of the following is not a cold-blooded animal?

- (a) Crocodile
- (b) Salamander
- (c) Sparrow
- (d) Frog

Answer: (c)

Explanation:

Cold-blooded animals (ectotherms) cannot regulate their body temperature internally and rely on external sources (sunlight, environment) for heat. Examples: reptiles, amphibians, fish.

Warm-blooded animals (endotherms) maintain a constant internal body temperature regardless of the environment. Examples: birds, mammals.

Option-wise:

- (a) Crocodile – Cold-blooded (Reptile)
- (b) Salamander – Cold-blooded (Amphibian)

- (c) Sparrow – Warm-blooded (Bird)
- (d) Frog – Cold-blooded (Amphibian)

Question 9. Which of the following fish is not a true fish?

- (a) Seahorse
- (b) Jellyfish
- (c) Shark
- (d) Goldfish

Answer: (b)

Explanation:

- (a) Seahorse

A true fish. It belongs to the class Actinopterygii (bony fishes).

- (b) Jellyfish

Not a true fish. It is a cnidarian, not a vertebrate. It lacks a backbone, gills, and fins—essential features of true fish.

- (c) Shark

A true fish. Belongs to class Chondrichthyes (cartilaginous fishes).

- (d) Goldfish

A true fish. Also belongs to class Actinopterygii.

Question 10. In binomial nomenclature, which of the following is true?

- (a) Both names are written in capital
- (b) Genus in lowercase, species in uppercase
- (c) Genus is capitalized, species is lowercase
- (d) Both in lowercase

Answer: (c)

Explanation:

The rules of Binomial Nomenclature were formalized by **Carl Linnaeus**, the father of modern taxonomy.

Binomial Nomenclature Rules:

- Two parts: Scientific name = Genus + species
- Example: *Homo sapiens*
- Genus name is always Capitalized.
- Species name is always lowercase.

The full name is:

- Italicized when typed (e.g., *Canis lupus*)

- Underlined separately when handwritten (e.g., *Canis lupus*)

Option-wise:

- (a) Both names are written in capital - Incorrect.
- (b) Genus in lowercase, species in uppercase - Incorrect.
- (c) Genus is capitalized, species is lowercase - Correct.
- (d) Both in lowercase - Incorrect.

Question 11. Match List-I with List-II:

List-I (Organelle) — List-II (Discoverer)

- A. Ribosome — 1. Robert Brown
- B. Nucleus — 2. George Palade
- C. Golgi body — 3. Camillo Golgi
- D. Mitochondria — 4. Callicer

Code:

A B C D

- (a) 1 2 4 3
- (b) 2 1 3 4
- (c) 2 3 1 4
- (d) 3 2 1 4

Answer: (b)

Explanation:

List-I (Organelle) List-II (Discoverer)

- A. Ribosome 2. George Palade
- B. Nucleus 1. Robert Brown
- C. Golgi body 3. Camillo Golgi
- D. Mitochondria 4. Callicer (Albert von Kölliker)

Question 12. Assertion (A): DNA has self-replicating ability.

Reason (R): DNA is a double-helical molecule located only in the nucleus.

Code:

- (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, R is false
- (d) A is false, R is true

Answer: (c)

Explanation: DNA does have self-replication ability. However, DNA is also found in mitochondria and chloroplasts—not only in the nucleus.

Question 13. What is the primary structural difference between plant and animal cells?

- (a) Mitochondria
- (b) Plasma membrane
- (c) Presence of centrosome
- (d) Presence of chloroplast and cell wall

Answer: (d)

Explanation: Plant cells have a cell wall and chloroplasts, which are absent in animal cells.

Question 14. Which is the largest human cell?

- (a) Neuron
- (b) Ovum
- (c) RBC
- (d) Hepatic cell

Answer: (b)

Explanation: Human ovum is the largest human cell.

Question 15. Which organelle is known as the “suicidal bag” of the cell?

- (a) Golgi apparatus
- (b) Lysosome
- (c) Mitochondria
- (d) Peroxisome

Answer: (b)

Explanation: Lysosomes contain hydrolytic enzymes that digest cell waste and can self-destruct cells.

Question 16. Cell wall in fungi is made of:

- (a) Cellulose
- (b) Chitin
- (c) Pectin
- (d) Lignin

Answer: (b)

Explanation: Fungal cell walls contain chitin, unlike plant cells that contain cellulose.

Question 17. The term “Central Dogma” in molecular biology refers to:

- (a) DNA → RNA → Protein

- (b) RNA → DNA → Protein
- (c) Protein → RNA → DNA
- (d) DNA → Protein → RNA

Answer: (a)

Explanation: Central Dogma describes the unidirectional flow of genetic information: DNA to RNA to Protein.

Question 18. Which of the following organelles is responsible for cellular respiration?

- (a) Ribosome
- (b) Nucleus
- (c) Mitochondria
- (d) Lysosome

Answer: (c)

Explanation: Mitochondria produce ATP via cellular respiration.

Question 19. Which is the longest human cell?

- (a) Sperm
- (b) Neuron
- (c) Hepatic cell
- (d) RBC

Answer: (b)

Explanation: Neurons are the longest cells in the human body.

Question 20. Which of the following is the correct sequence of stages in human nutrition?

- (a) Ingestion → Absorption → Digestion → Assimilation → Egestion
- (b) Ingestion → Digestion → Assimilation → Absorption → Egestion
- (c) Ingestion → Digestion → Absorption → Assimilation → Egestion
- (d) Ingestion → Assimilation → Digestion → Absorption → Egestion

Answer: (c)

Explanation:

Correct Sequence of Human Nutrition:

1. Ingestion – Taking in food through the mouth.
2. Digestion – Breaking down food into simpler, absorbable forms (mechanical + chemical).

3. Absorption – Nutrients absorbed into the bloodstream through the intestinal walls.
4. Assimilation – Utilization of absorbed nutrients by body cells for energy, growth, and repair.
5. Egestion – Removal of undigested waste materials from the body.

Question 21. Match the following enzymes with their respective functions:

- A. Pepsin – 1. Digests starch
- B. Amylase – 2. Digests proteins
- C. Lipase – 3. Breaks down fats

Code:

A B C

- (a) 2 3 1
- (b) 1 2 3
- (c) 2 1 3
- (d) 3 2 1

Answer: (c)

Explanation:

Enzyme - Function

- A. Pepsin - 2. Digests proteins
- B. Amylase - 1. Digests starch
- C. Lipase - 3. Breaks down fats

Question 22. Choose the correct statement regarding bile:

- (a) Bile is produced in the pancreas and stored in the liver
- (b) Bile is produced in the liver and contains digestive enzymes
- (c) Bile is produced in the gallbladder and digests proteins
- (d) Bile is produced in the liver, stored in the gallbladder, and emulsifies fats

Answer: (d)

Explanation: Bile is produced by the liver, stored in the gallbladder, and emulsifies fats. It does not contain enzymes.

Question 23. Assertion (A): Enamel is the hardest substance in the human body.

Reason (R): Enamel is composed primarily of calcium carbonate.

Code:

- (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

Answer: (c)

Explanation: Enamel is the hardest body substance but is mainly made of calcium phosphate, not calcium carbonate.

Question 24. Which part of the digestive system has villi for absorption?

- (a) Stomach
 (b) Esophagus
 (c) Small intestine
 (d) Large intestine

Answer: (c)

Explanation: Villi are finger-like projections in the small intestine that increase the surface area for absorption of nutrients.

Question 25. Arrange the following sections of the small intestine in increasing order of length:

1. Duodenum
2. Ileum
3. Jejunum

Code:

- (a) 2, 3, 1
 (b) 3, 2, 1
 (c) 1, 3, 2
 (d) 2, 1, 3

Answer: (c)

Explanation:

Correct Order by Increasing Length:

1. Duodenum – Shortest section (~25 cm)
2. Jejunum – Middle section (~2.5 meters)
3. Ileum – Longest section (~3.5 meters)

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Question 26. Choose the true statement:

- (a) Gastrin is secreted in the pancreas
 (b) Secretin inhibits pancreatic juice secretion
 (c) Ghrelin suppresses appetite
 (d) Cholecystokinin stimulates bile and enzyme secretion

Answer: (d)

Explanation:

- (a) Gastrin is secreted in the pancreas

Incorrect. Gastrin is secreted by G-cells in the stomach, not the pancreas. It stimulates gastric acid secretion.

- (b) Secretin inhibits pancreatic juice secretion

Incorrect. Secretin actually stimulates the pancreas to release bicarbonate-rich pancreatic juice to neutralize stomach acid.

- (c) Ghrelin suppresses appetite

Incorrect. Ghrelin increases appetite. It is known as the "hunger hormone."

- (d) Cholecystokinin (CCK) stimulates bile and enzyme secretion

Correct. CCK is secreted by the small intestine and stimulates:

- The gallbladder to release bile
- The pancreas to release digestive enzymes

Question 27. Match the following parts with their function:

- A. Duodenum – 1. Water absorption

B. Stomach – 2. Digestion of proteins

C. Large Intestine – 3. Emulsification of fats

Code:

A B C

(a) 3 2 1

(b) 2 1 3

(c) 1 2 3

(d) 3 1 2

Answer: (a)

Explanation: Duodenum – fat digestion, Stomach – protein digestion, Large intestine – water absorption.

Question 28. Which component of saliva is responsible for killing bacteria?

(a) Diastase

(b) Mucins

(c) Lysozyme

(d) Ptyalin

Answer: (c)

Explanation:

(a) Diastase

Incorrect. Diastase is a general term for enzymes (like amylase) that break down starch, not bacteria.

(b) Mucins

Incorrect. Mucins are glycoproteins that help in lubrication and protecting mucous membranes, but not in bacterial killing.

(c) Lysozyme

Correct. Lysozyme is an antibacterial enzyme in saliva that breaks down the cell walls of bacteria, helping to kill them.

(d) Ptyalin

Incorrect. Ptyalin is another name for salivary amylase, which digests starch, not bacteria.

Question 29. What is the dental formula for adult humans?

(a) 2122/2122

(b) 2123/2123

(c) 1112/1112

(d) 3131/3131

Answer: (b)

Explanation: Adult humans have the dental formula 2 incisors, 1 canine, 2 premolars, 3 molars per half jaw.

Question 30. Which of the following statements correctly defines double circulation in humans?

(a) Blood circulates through two different blood vessels

(b) Blood circulates through two different hearts

(c) Blood passes through the heart twice in one complete cycle

(d) Oxygenated and deoxygenated blood are mixed in the heart

Answer: (c)

Explanation: In double circulation, blood passes twice through the heart—first for oxygenation (pulmonary) and second for supply to body tissues (systemic).

Question 31. Choose the correct function of the spleen:

(a) Produces insulin and glucagon

(b) Acts as a blood filter and removes old RBCs

(c) Regulates heart rhythm

(d) Stimulates digestive enzyme production

Answer: (b)

Explanation:

(a) Produces insulin and glucagon

Incorrect. This is the function of the pancreas, not the spleen.

(b) Acts as a blood filter and removes old RBCs

Correct. The spleen:

- Filters blood
- Removes old or damaged red blood cells
- Stores platelets and white blood cells
- Plays a role in immune response

(c) Regulates heart rhythm

Incorrect. This is controlled by the cardiac conduction system, not the spleen.

(d) Stimulates digestive enzyme production

Incorrect. This function is carried out by the stomach, pancreas, and small intestine, not the spleen.

Question 32. Assertion (A): Arteries have thick and elastic walls.

Reason (R): Arteries carry blood at low pressure.

Code:

(a) Both A and R are true, and R is the correct Explanation

(b) Both A and R are true, but R is not the correct Explanation

(c) A is true, R is false

(d) A is false, R is true

Answer: (c)

Explanation: Arteries carry blood at high pressure; hence they have thick walls.

Question 33. Which of the following is the universal blood recipient?

(a) O–

(b) AB+

(c) AB–

(d) B+

Answer: (b)

Explanation: AB+ has no antibodies and can accept blood from all groups including Rh+ and Rh–.

Question 34. Which part of the human heart is known as the natural pacemaker?

(a) AV Node

(b) SA Node

(c) Purkinje fibers

(d) Bundle of His

Answer: (b)

Explanation: The sinoatrial (SA) node initiates and regulates the heartbeat.

Question 35. Choose the incorrect match:

(a) Bradycardia – Abnormally slow heart rate

(b) Tachycardia – Abnormally fast heart rate

(c) Jarvik-7 – First artificial pacemaker

(d) ECG – Records electrical activity of heart

Answer: (c)

Explanation: Jarvik-7 was the first artificial heart, not a pacemaker.

Question 36. Match the following:

A. Hemophilia – 1. High RBC count

B. Leukemia – 2. Defective clotting

C. Polycythemia – 3. Blood cancer

Code:

A B C

(a) 2 3 1

(b) 1 2 3

(c) 3 2 1

(d) 2 1 3

Answer: (a)

Explanation: Hemophilia – clotting disorder, Leukemia – cancer of WBCs, Polycythemia – excess RBCs.

Question 37. Which blood component lacks nucleus?

(a) WBC

(b) Lymphocyte

(c) RBC

(d) Monocyte

Answer: (c)

Explanation: Human RBCs are anucleated to allow more space for hemoglobin.

Question 38. Which of the following tissues connects muscle to bone?

(a) Ligament

(b) Cartilage

(c) Tendon

(d) Periosteum

Answer: (c)

Explanation:

Tendons connect muscle to bone.

Ligaments connect bone to bone.

Cartilage is a flexible connective tissue found in joints, ear, nose, etc.

Periosteum is a dense layer of vascular connective tissue enveloping the bones except at the surfaces of the joints.

Question 39. Which of the following bones is known to be the most commonly fractured bone?

(a) Ulna

(b) Femur

(c) Clavicle

(d) Radius

Answer: (c)

Explanation: The clavicle or collarbone is the weakest and most commonly fractured bone in the body.

Question 40. Arrange the following vertebral regions from top to bottom:

1. Cervical
2. Lumbar
3. Thoracic

Code:

- (a) 1, 2, 3
- (b) 1, 3, 2
- (c) 3, 1, 2
- (d) 2, 3, 1

Answer: (b)

Explanation: The correct anatomical order is cervical (7), thoracic (12), and lumbar (5).

Question 41. Match the following joint types with their examples:

- A. Ball and Socket – 1. Knee
- B. Hinge – 2. Shoulder
- C. Pivot – 3. Neck

Code:

- A B C
- (a) 2 1 3
- (b) 3 2 1
- (c) 1 3 2
- (d) 2 3 1

Answer: (a)

Explanation:

- A. Ball and Socket – 2. Shoulder

(Also found in the hip; allows movement in all directions)

- B. Hinge – 1. Knee

(Also found in the elbow; allows movement in one plane like a door hinge)

- C. Pivot – 3. Neck

(Specifically between the atlas and axis vertebrae; allows rotation of the head)

Question 42. Which of the following bones is a part of the axial skeleton?

- (a) Humerus

- (b) Femur

- (c) Scapula

- (d) Sternum

Answer: (d)

Explanation:

The axial skeleton consists of the central core of the body and includes:

- Skull
- Vertebral column (spine)
- Ribs
- Sternum (breastbone)

Other options:

- Humerus – part of the appendicular skeleton (upper limb)
- Femur – part of the appendicular skeleton (lower limb)
- Scapula – part of the appendicular skeleton (shoulder blade)

Question 43. How many ribs are there in the human thoracic cage?

- (a) 10
- (b) 24
- (c) 26
- (d) 12

Answer: (b)

Explanation: There are 12 pairs of ribs, totaling 24 bones.

Question 44. Match the following nitrogenous wastes with the type of animals:

- A. Ammonia – 1. Birds
- B. Urea – 2. Mammals
- C. Uric acid – 3. Bony fishes

Code:

- A B C
- (a) 3 1 2
- (b) 1 2 3
- (c) 2 1 3
- (d) 3 2 1

Answer: (d)

Explanation: Ammonotelic – fishes (ammonia), Ureotelic – mammals (urea), Uricotelic – birds and reptiles (uric acid).

Question 45. Match the following diseases with their causative agents:

- A. Cholera – 1. Bacteria
B. Ringworm – 2. Fungus
C. AIDS – 3. Virus

Code:

A B C

- (a) 3 2 1
(b) 1 3 2
(c) 2 1 3
(d) 1 2 3

Answer: (d)

Explanation: Cholera – *Vibrio cholerae* (bacterium), Ringworm – fungal infection, AIDS – caused by HIV (virus).

Question 46. Choose the correct statement:

- (a) All infectious diseases are communicable.
(b) All communicable diseases are non-infectious.
(c) All communicable diseases are infectious.
(d) Non-communicable diseases can be transmitted.

Answer: (c)

Explanation: All communicable diseases are infectious, but not all infectious diseases (e.g., tetanus) are communicable.

Question 47. Which of the following is a genetic disorder?

- (a) Tuberculosis
(b) Scurvy
(c) Sickle cell anemia
(d) Hepatitis

Answer: (c)

Explanation: Sickle cell anemia is a hereditary disorder caused by a gene mutation affecting hemoglobin.

Question 48. Assertion (A): Hemophilia is also called "Royal disease."

Reason (R): It was common in European royal families.

Code:

- (a) Both A and R are true and R is the correct Explanation

(b) Both A and R are true, but R is not the correct Explanation

(c) A is true, R is false

(d) A is false, R is true

Answer: (a)

Explanation: Hemophilia was prevalent among European royalty, hence the term "Royal disease."

Question 49. Which of the following diseases is transmitted by *Culex* mosquito?

- (a) Dengue
(b) Malaria
(c) Elephantiasis
(d) Yellow fever

Answer: (c)

Explanation:

Culex mosquitoes are known vectors of *Wuchereria bancrofti*, the parasitic worm that causes Lymphatic Filariasis, commonly known as Elephantiasis.

Here's a quick breakdown:

- Dengue – Transmitted by *Aedes aegypti*
- Malaria – Transmitted by *Anopheles* mosquitoes
- Elephantiasis – Transmitted by *Culex* mosquitoes
- Yellow fever – Also transmitted by *Aedes aegypti*

Question 50. Which of the following is a zoonotic disease?

- (a) Typhoid
(b) Cholera
(c) Rabies
(d) Polio

Answer: (c)

Explanation: Rabies is a zoonotic disease transmitted from animals to humans, mainly via dog bites.

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Question 51. Which of the following viral diseases has been eradicated globally?

- (a) Polio
- (b) Measles
- (c) Smallpox
- (d) Chickenpox

Answer: (c)

Explanation: Smallpox was declared eradicated by WHO in 1980.

Question 52. Which test is used for diagnosing Typhoid?

- (a) ELISA
- (b) Widal Test
- (c) Mantoux Test
- (d) RT-PCR

Answer: (b)

Explanation:

- **Widal Test** is a serological test used to diagnose Typhoid fever by detecting antibodies (agglutinins) against Salmonella typhi (O and H antigens) in the patient's serum.
- ELISA – used for various viral/bacterial infections like HIV etc.
- Mantoux Test – used for Tuberculosis diagnosis.
- RT-PCR – used for detecting viral RNA, commonly in COVID-19 etc.

Question 53. Choose the incorrect statement:

- (a) Dengue virus affects platelet count
- (b) Rabies is a bacterial disease
- (c) Pneumonia affects lungs
- (d) AIDS attacks immune system

Answer: (b)

Explanation: Rabies is a viral disease, not bacterial.

Question 54. The term “Itai-Itai” disease is associated with:

- (a) Mercury
- (b) Lead
- (c) Cadmium
- (d) Arsenic

Answer: (c)

Explanation: Itai-Itai disease results from cadmium poisoning, named in Japan.

Question 55. According to WHO, the leading cause of global deaths (2025) is:

- (a) Diabetes
- (b) Lower respiratory infections
- (c) Cancer
- (d) Ischemic Heart Disease

Answer: (d)

Explanation: WHO states Ischemic Heart Disease is the leading global cause of death.

Ischemic heart disease (IHD), also known as coronary artery disease (CAD) or coronary heart disease (CHD), is a condition where the heart muscle doesn't get enough blood and oxygen due to narrowed or blocked arteries.

This reduced blood flow is usually caused by a buildup of plaque (atherosclerosis) in the coronary arteries. Ischemic heart disease can lead to various problems, including angina (chest pain), heart attack, and heart failure.

Question 56. Which of the following is a water-soluble vitamin?

- (a) Vitamin A
- (b) Vitamin D
- (c) Vitamin C
- (d) Vitamin K

Answer: (c) Vitamin C

Explanation:

Vitamin C is a water-soluble vitamin that dissolves in water and is not stored in the body. It must be consumed regularly.

(a) Vitamin A – Fat-soluble; stored in the liver; essential for vision.

(b) Vitamin D – Fat-soluble; synthesized by the skin in sunlight; helps in calcium absorption.

(d) Vitamin K – Fat-soluble; important for blood clotting.

Trick – water-soluble vitamin (K-E-D-A)

Question 57. Pellagra is caused due to the deficiency of which vitamin?

(a) Vitamin B2

(b) Vitamin B3

(c) Vitamin B5

(d) Vitamin B7

Answer: (b) Vitamin B3

Explanation:

Vitamin B3 (Niacin) deficiency causes Pellagra, which is characterized by the 3 D's: Dermatitis, Diarrhea, and Dementia.

(a) Vitamin B2 (Riboflavin) – Deficiency causes ariboflavinosis, leading to sore throat and cracks at the corner of the mouth.

(c) Vitamin B5 (Pantothenic acid) – Deficiency is very rare; may cause fatigue and numbness.

(d) Vitamin B7 (Biotin) – Deficiency causes hair thinning, skin rash.

Question 58. Which vitamin helps in the clotting of blood?

(a) Vitamin C

(b) Vitamin D

(c) Vitamin E

(d) Vitamin K

Answer: (d) Vitamin K

Explanation:

Vitamin K is essential for the synthesis of prothrombin, a protein necessary for blood clotting.

(a) Vitamin C – Helps in collagen formation and immune function, not clotting.

(b) Vitamin D – Regulates calcium and phosphate metabolism.

(c) Vitamin E – Functions as an antioxidant, not involved in clotting.

Question 59. Beriberi is caused by the deficiency of:

(a) Vitamin B1

(b) Vitamin B6

(c) Vitamin B12

(d) Vitamin C

Answer: (a) Vitamin B1

Explanation:

Vitamin B1 (Thiamine) is required for carbohydrate metabolism. Its deficiency leads to Beriberi – affecting nerves (dry type) and the heart (wet type).

(b) Vitamin B6 (Pyridoxine) – Deficiency causes irritability, depression, and confusion.

(c) Vitamin B12 (Cobalamin) – Deficiency causes pernicious anemia, not beriberi.

(d) Vitamin C – Deficiency causes scurvy.

Question 60. Which of the following is known as anti-sterility vitamin?

(a) Vitamin A

(b) Vitamin D

(c) Vitamin E

(d) Vitamin K

Answer: (c) Vitamin E

Explanation:

Vitamin E (Tocopherol) is called the anti-sterility vitamin because it is essential for reproduction, especially in animals.

(a) Vitamin A – Important for vision and immunity, not reproduction directly.

(b) Vitamin D – Involved in bone health.

(d) Vitamin K – Involved in clotting, not fertility.

Question 61. Match List-I (Vitamin) with List-II (Other Name):

List-I:

A. Vitamin B1

B. Vitamin B2

C. Vitamin B3

D. Vitamin B6

List-II:

1. Niacin
2. Riboflavin
3. Thiamine
4. Pyridoxine

Code:

A B C D

- (a) 1 3 2 4
 (b) 3 2 1 4
 (c) 4 2 3 1
 (d) 2 3 1 4

Answer: (b) 3 2 1 4**Explanation:**

Vitamin B1 → Thiamine

Vitamin B2 → Riboflavin

Vitamin B3 → Niacin

Vitamin B6 → Pyridoxine

Question 62. Match the following terms with their definitions:

- A. Gene – 1. Thread-like structure carrying genetic info
 B. Chromosome – 2. Variant form of a gene
 C. Allele – 3. Segment of DNA determining traits

Code:

A B C

- (a) 3 1 2
 (b) 1 2 3
 (c) 2 3 1
 (d) 3 2 1

Answer: (a)**Explanation:**

A. Gene – 3. Segment of DNA determining traits

→ A gene is a specific segment of DNA that codes for a protein or determines a particular trait (e.g., eye color, blood type).

B. Chromosome – 1. Thread-like structure carrying genetic info

→ A chromosome is a long, thread-like structure composed of DNA and proteins, present in the nucleus, and carries genes. Humans have 46 chromosomes.

C. Allele – 2. Variant form of a gene

→ An allele is a different version of the same gene, e.g., the gene for blood type has A, B, and O alleles.

Question 63. Which of the following provides the highest energy per gram?

- (a) Carbohydrate
 (b) Protein
 (c) Vitamin
 (d) Fat

Answer: (d)

Explanation: Fats provide the highest energy per gram among all nutrients — approximately 9 kilocalories (kcal) per gram.

Carbohydrates and proteins each provide about 4 kcal per gram.

Vitamins do not provide energy directly. Instead, they help in various metabolic processes but contain no calories.

Question 64. Choose the correct statement about essential nutrients:

- (a) Body can synthesize all essential nutrients.
 (b) They must be obtained from diet.
 (c) They provide no functional value.
 (d) They are only required during infancy.

Answer: (b)**Explanation:**

Essential nutrients are those that the human body cannot synthesize (or cannot synthesize in sufficient quantities), so they must be obtained through the diet. These include certain amino acids, fatty acids, vitamins, and minerals.

Why other options are incorrect:

- (a) Incorrect – The body cannot synthesize all essential nutrients. That's what makes them "essential."
 (c) Incorrect – Essential nutrients are vital for growth, metabolism, and body function. They have high functional value.
 (d) Incorrect – These nutrients are required throughout life, not just in infancy.

Question 65. Which food is richest in plant-based protein?

- (a) Rice

(b) DHRUVA — Natural uranium based Correct

→ DHRUVA, commissioned in 1985 at BARC (Mumbai), is a natural uranium-fueled, heavy water-moderated reactor used for producing radioisotopes and plutonium.

(c) CIRUS — Built with UK support Incorrect

→ CIRUS stands for Canada-India Reactor, U.S. — it was built with Canadian assistance (design and construction) and heavy water was supplied by the USA, not the UK.

(d) AHWR — Thorium-based design Correct

→ AHWR (Advanced Heavy Water Reactor) is a next-generation reactor designed by India to run primarily on thorium and a small amount of uranium or plutonium.

Question 70. Which of the following nuclear fuels is used in the second stage of India's nuclear programme?

- (a) Uranium-233
- (b) Plutonium-239
- (c) Uranium-238
- (d) Thorium-232

Answer: (b) Plutonium-239

Explanation:

India's nuclear programme, developed by Dr. Homi Bhabha, follows a three-stage strategy to efficiently utilize its limited uranium and abundant thorium resources:

Stage 1: Pressurized Heavy Water Reactors (PHWRs)

- Fuel: Natural uranium (mostly U-238, with ~0.7% U-235)
- Outcome: Generates power and produces Plutonium-239 as a by-product through neutron capture by U-238.

Stage 2: Fast Breeder Reactors (FBRs)

- Fuel: Plutonium-239, obtained from stage 1
- Blanket: Surrounded by Thorium-232, which converts to Uranium-233
- Role: This stage breeds more fuel than it consumes, preparing for stage 3.
- Hence, Plutonium-239 is the fuel used in the second stage.

Stage 3: Advanced Heavy Water Reactors (AHWRs)

- Fuel: Uranium-233 (bred from Thorium-232)
- Goal: To use India's vast thorium reserves.

Why other options are incorrect:

(a) Uranium-233 – Used in third stage, not second.

(c) Uranium-238 – Not fissile, used to breed Plutonium-239 in stage 1.

(d) Thorium-232 – Used in blanket during stage 2, but not the main fuel.

Question 71. Which of the following is not a fundamental unit in the SI system?

- (a) Kelvin
- (b) Candela
- (c) Newton
- (d) Mole

Answer: (c)

Explanation: Newton is a derived unit ($\text{kg}\cdot\text{m}/\text{s}^2$) used to measure force; not a fundamental unit.

Question 72. Consider the following:

1. Velocity = m/s
2. Acceleration = m/s^2
3. Force = $\text{kg}\cdot\text{m}/\text{s}$

Which are correctly matched with their units?

- (a) 1 and 2 only
- (b) 2 and 3 only
- (c) 1 and 3 only
- (d) 1, 2 and 3

Answer: (a)

Explanation: Force = $\text{kg}\cdot\text{m}/\text{s}^2$, not $\text{kg}\cdot\text{m}/\text{s}$. So only 1 and 2 are correct.

Question 73. Match the measurement devices with their quantities:

- A. Barometer – 1. Temperature
- B. Hygrometer – 2. Humidity
- C. Altimeter – 3. Altitude
- D. Thermometer – 4. Pressure

Code:

- (a) A-1, B-3, C-4, D-2
- (b) A-2, B-4, C-1, D-3

(c) A-4, B-1, C-2, D-3

(d) A-4, B-2, C-3, D-1

Answer: (d)

Explanation: Barometer = pressure; Hygrometer = humidity; Altimeter = altitude; Thermometer = temperature.

Question 74. Which one of the following has no unit?

(a) Velocity

(b) Density

(c) Strain

(d) Power

Answer: (c)

Explanation:

(a) Velocity

→ Velocity is the rate of change of displacement.

→ SI unit: metres per second (m/s)

Has units.

(b) Density

→ Density = Mass/Volume

→ SI unit: kilogram per cubic metre (kg/m³)

Has units.

(c) Strain

→ Strain = Change in dimension / Original dimension

→ It is a ratio of two lengths or dimensions.

→ Therefore, it is a dimensionless quantity and has no unit.

(d) Power

→ Power = Work done / Time

→ SI unit: watt (W)

Has units.

Question 75. Which law is also known as the "Law of Inertia"?

(a) Newton's First Law

(b) Newton's Second Law

(c) Newton's Third Law

(d) Law of Conservation of Momentum

Answer: (a)

Explanation: Newton's First Law states that a body at rest or in uniform motion will remain so unless acted upon by an external force.

Question 76. Consider the following:

1. Force is a vector quantity.
2. Force = mass × acceleration.

Which of the above are correct?

(a) Only 1

(b) Only 2

(c) Both 1 and 2

(d) Neither 1 nor 2

Answer: (c)

Explanation:

Statement 1: Force is a vector quantity

→ True.

→ Force has both magnitude and direction, which is the defining property of a vector quantity.

→ For example, a push to the right is different from a push to the left with the same strength.

Statement 2: Force = mass × acceleration

→ True.

→ This is Newton's Second Law of Motion, often written as:

$$F = m \times a$$

→ Where:

- F = Force (in newtons, N)

- m = mass (in kg)

- a = acceleration (in m/s^2)

Question 77. Consider the following:

1. Retardation is negative acceleration.
2. Acceleration is the rate of change of velocity.
3. Velocity is a scalar quantity.

Which are correct?

- (a) 1 and 2 only
- (b) 2 and 3 only
- (c) 1 and 3 only
- (d) 1, 2 and 3

Answer: (a)

Explanation: Velocity is a vector quantity; the other two statements are correct.

Question 78. Which of the following examples demonstrate Newton's Third Law of Motion?

1. Recoil of a gun
2. Jumping off a boat
3. A car moving due to engine force
4. Walking on the ground

Code:

- (a) 1 and 2 only
- (b) 1, 2 and 4 only
- (c) 3 and 4 only
- (d) All of the above

Answer: (b)

Explanation:

Newton's Third Law of Motion states:

"For every action, there is an equal and opposite reaction."

Let's analyze each statement:

1. Recoil of a gun – correct

→ When a bullet is fired forward, the gun recoils backward with equal momentum.

✓ Demonstrates action-reaction pair.

2. Jumping off a boat – correct

→ When you jump forward, you exert force backward on the boat, and the boat moves backward.

✓ Classic third law example.

3. A car moving due to engine force – incorrect

→ This primarily involves Newton's Second Law ($F = ma$), not the third.

→ Engine exerts force, and acceleration occurs. No equal and opposite reaction pair is evident in this basic description unless more detail is added about road friction.

4. Walking on the ground – correct

→ When you push backward on the ground, the ground pushes you forward.

✓ Clear action-reaction pair.

Final Answer: (b) 1, 2 and 4 only

Question 79. Match the following physical quantities with their dimensions:

- A. Velocity – 1. $[\text{MLT}^{-2}]$
- B. Force – 2. $[\text{MLT}^{-1}]$
- C. Momentum – 3. $[\text{M}^0\text{LT}^{-1}]$
- D. Acceleration – 4. $[\text{LT}^{-2}]$

Code:

- (a) A-3, B-1, C-2, D-4
- (b) A-4, B-1, C-2, D-3
- (c) A-4, B-1, C-2, D-4
- (d) A-3, B-2, C-1, D-4

Answer: (c)

Explanation: Velocity – $[\text{LT}^{-1}]$, Force – $[\text{MLT}^{-2}]$, Momentum – $[\text{MLT}^{-1}]$, Acceleration – $[\text{LT}^{-2}]$.

Question 80. What happens to recoil velocity if the mass of gun is increased?

- (a) Increases
- (b) Remains unchanged
- (c) Decreases
- (d) Becomes infinite

Answer: (c)

Explanation: $V_{\text{gun}} = -(M_{\text{bullet}} \times V_{\text{bullet}}) / M_{\text{gun}}$; thus, more mass → less recoil velocity.

Question 81. Which type of friction is the least in magnitude?

- (a) Static Friction
- (b) Sliding Friction
- (c) Rolling Friction
- (d) Fluid Friction

Answer: (c)

Explanation:

(a) Static Friction

→ Acts when an object is at rest and prevents it from moving.

→ It is usually the highest among all types because it resists the initial motion.

✓ Highest in magnitude.

(b) Sliding Friction

→ Acts when an object is sliding over a surface.

→ Less than static friction, but more than rolling friction.

✓ Intermediate in magnitude.

(c) Rolling Friction

→ Acts when an object rolls over a surface (e.g., a ball or wheel).

→ It is much less than sliding or static friction because the contact area is smaller.

✓ Least in magnitude.

(d) Fluid Friction

→ Occurs when objects move through a fluid (liquid or gas).

→ Depends on shape, speed, and viscosity. Can be high or low, but typically higher than rolling friction.

Summary (in descending order of magnitude):

Static > Sliding > Fluid (variable) > Rolling

Question 82. Consider the following statements:

1. Work done against friction is always zero.
2. Work is scalar in nature.
3. 1 Joule = 10^7 erg.

Which of the statements is/are correct?

- (a) 1 and 2 only
- (b) 2 and 3 only
- (c) 1 and 3 only
- (d) 1, 2 and 3

Answer: (b)

Explanation: Work against friction is not zero; it is negative.

Question 83. Which of the following examples demonstrate centrifugal force?

1. Clothes pushed outward in washing machine

2. Passenger pushed outward in a turning car
3. Moon revolving around Earth
4. Cream separation from milk

Code:

- (a) 1, 2 and 4 only
- (b) 1 and 2 only
- (c) 3 and 4 only
- (d) All of the above

Answer: (a)

Explanation: Moon around Earth is due to centripetal (gravitational) force, not centrifugal.

Question 84. Why are roads banked on curves?

- (a) To beautify highways
- (b) To reduce vehicle speed
- (c) To provide centripetal force for safe turning
- (d) To reduce tire pressure

Answer: (c)

Explanation: When a vehicle takes a turn, it needs a centripetal force to keep it moving in a circular path. This force is usually provided by friction between the tires and the road. But:

On sharp curves, especially at high speeds or in slippery conditions, friction alone may not be sufficient.

So, roads are banked (i.e. tilted inward) to ensure that a component of the normal force from the road surface provides the required centripetal force.

Question 85. A stone is tied to a string and whirled in a circle. If the string breaks, the stone will:

- (a) Move toward the center
- (b) Move in a spiral path
- (c) Move tangentially to the circle
- (d) Stop immediately

Answer: (c)

Explanation:

When a stone is whirled in a circle, it experiences centripetal force directed toward the center of the circle. This force is provided by the tension in the string and is responsible for keeping the stone in circular motion.

- The moment the string breaks, the centripetal force vanishes, and no force acts toward the center.
- The stone continues to move in the direction of its velocity at that instant, which is along the tangent to the circle.

This behavior is governed by Newton's First Law (law of inertia):

An object in motion continues in a straight line unless acted upon by a net external force.

Question 86. Consider the following statements:

1. Potential energy depends on height.
2. KE increases with velocity.

Choose the correct option:

- (a) Only 1
- (b) Only 2
- (c) Both 1 and 2
- (d) Neither 1 nor 2

Answer: (c)

Explanation: $PE = mgh$ (height), $KE = \frac{1}{2} mv^2$ (velocity).

Question 87. Why does the Moon not have an atmosphere?

- (a) It has no water
- (b) It rotates slowly
- (c) It has low escape velocity
- (d) It is farther from the Sun

Answer: (c)

Explanation: Escape velocity on the Moon is only 2.4 km/s, so gases easily escape into space.

Question 88. The instrument used to measure atmospheric pressure is:

- (a) Manometer
- (b) Barometer
- (c) Hydrometer
- (d) Thermometer

Answer: (b) Barometer

Explanation:

Barometer measures atmospheric pressure.

Manometer – pressure in a gas tube

Hydrometer – relative density of liquids

Thermometer – temperature

Question 89. Which phenomenon is responsible for the formation of a rainbow?

- (a) Dispersion
- (b) Refraction
- (c) Both (a) and (b)
- (d) Reflection

Answer: (c) Both (a) and (b)

Explanation:

The formation of a rainbow is primarily due to the combined effect of three optical phenomena:

- Refraction – When sunlight enters a raindrop, it bends due to the change in medium (from air to water).
- Internal Reflection – Inside the raindrop, the light reflects off the inner surface.
- Dispersion – As the light exits the drop, it splits into its component colors due to varying wavelengths (each color bends differently).

Correct Answer: Dispersion of light (along with refraction and internal reflection)

Question 90. Which mirror is used in vehicles to see the traffic behind?

- (a) Concave mirror
- (b) Convex mirror
- (c) Plane mirror
- (d) Parabolic mirror

Answer: (b) Convex mirror

Explanation:

Convex mirrors provide a wider field of view and form virtual, erect, and diminished images, ideal for rearview.

Question 91. Which of the following is measured by a voltmeter?

- (a) Resistance
- (b) Electric current
- (c) Potential difference
- (d) Power

Answer: (c) Potential difference

Explanation:

Voltmeter measures potential difference across two points.

Ammeter – current

Ohmmeter – resistance

Wattmeter – power

Question 92. The resistance of a wire depends on:

1. Length
2. Area of cross-section
3. Material

Which are correct?

- (a) 1 and 2 only
- (b) 2 and 3 only
- (c) 1 and 3 only
- (d) 1, 2 and 3

Answer: (d) 1, 2 and 3

Explanation:

Resistance $R = \rho L/A$

Increases with length (L)

Decreases with area (A)

Depends on material via resistivity (ρ)

Question 93. Which law states: “Current through a conductor is directly proportional to the potential difference across it”?

- (a) Newton’s Law
- (b) Hooke’s Law
- (c) Faraday’s Law
- (d) Ohm’s Law

Answer: (d) Ohm’s Law

Explanation:

Ohm’s Law: $V = IR$

→ Current (I) $\propto$ Voltage (V), when resistance (R) is constant.

Question 94. When does an object in a lift experience weightlessness?

- (a) When lift accelerates upward
- (b) When lift is at rest
- (c) During free fall
- (d) During deceleration

Answer: (c)

Explanation:

Weightlessness is the condition in which no normal reaction force acts on a body — i.e., the body does not experience its apparent weight.

Let’s analyze:

When a lift is in free fall, it accelerates downward with acceleration equal to gravity (g).

Both the object and the lift fall with the same acceleration, so the object does not exert any force on the floor, and the floor does not exert any normal force.

Hence, apparent weight becomes zero, and weightlessness is felt.

Question 95. Why does a hammer fall faster than a feather on Earth?

- (a) Hammer is heavier
- (b) Feather is lighter
- (c) Air resistance affects feather more
- (d) Gravity is stronger for hammer

Answer: (c)

Explanation: In presence of air, drag slows down the feather. In vacuum, both fall equally.

Question 96. Why does a sharp needle penetrate better than a blunt one?

- (a) Less weight
- (b) More volume
- (c) More surface area
- (d) Greater pressure due to small area

Answer: (d)

Explanation: Pressure = Force/Area. Smaller area $\Rightarrow$ more pressure $\Rightarrow$ easier penetration.

Question 97. Pressure inside a fluid depends on:

1. Depth
2. Density
3. Acceleration due to gravity

Code:

- (a) 1 and 2 only
- (b) 1 and 3 only
- (c) All of the above
- (d) None of the above

Answer: (c)

Explanation: $P = h\rho g \Rightarrow$ depends on depth, density and gravity.

Question 98. Match the phenomenon with principle:

A. Gyroscope – 1. Conservation of angular momentum

B. Hydraulic brakes – 2. Pascal's law

C. Pendulum swing – 3. Energy conservation

Code:

(a) A-1, B-2, C-3

(b) A-2, B-1, C-3

(c) A-3, B-1, C-2

(d) A-2, B-3, C-1

Answer: (a)

Explanation:

A. Gyroscope → Conservation of Angular Momentum

→ Gyroscopes maintain their orientation due to the principle of angular momentum conservation.

B. Hydraulic Brakes → Pascal's Law

→ Hydraulic systems work by transmitting pressure equally in all directions in a fluid — as per Pascal's Law.

C. Pendulum Swing → Energy Conservation

→ A pendulum converts potential energy to kinetic energy and back, demonstrating conservation of mechanical energy.

Question 99. Match the phenomenon with the cause:

A. Capillary rise in plants – 1. Cohesive force

B. Needle floating on water – 2. Surface tension

C. Water forming droplets – 3. Adhesive force

Code:

(a) A-1, B-2, C-3

(b) A-2, B-1, C-3

(c) A-3, B-2, C-1

(d) A-1, B-3, C-2

Answer: (c)

Explanation:

A. Capillary rise in plants → Adhesive force (3)

→ Adhesive forces between water molecules and walls of xylem tubes cause water to rise against gravity (capillarity).

→ Adhesion to surface > Cohesion within liquid
= Capillary rise.

B. Needle floating on water → Surface tension (2)

→ Even though the needle is denser than water, surface tension forms a thin "film" that supports light objects.

C. Water forming droplets → Cohesive force (1)

→ Water molecules stick to each other (cohesion), minimizing surface area, hence forming spherical droplets.

Question 100. Assertion (A): A soap bubble expands and floats in air.

Reason (R): Soap decreases water's surface tension, allowing expansion.

Code:

(a) Both A and R are true, and R is the correct Explanation

(b) Both A and R are true, but R is not the correct Explanation

(c) A is true, R is false

(d) A is false, R is true

Answer: (a)

Explanation: A soap bubble forms and expands because soap reduces the surface tension of water, making it easier for a thin film to stretch and enclose air. Pure water has very high surface tension, which resists expansion into a film. Soap molecules reduce this tension, stabilizing the film and allowing it to expand and trap air, thus forming a bubble.

Moreover, a soap bubble floats in air mainly because the air inside it is slightly warmer and less dense (due to breath or formation process), and the bubble's thin wall adds very little weight.

So both the Assertion and Reason are correct, and the Reason accurately explains the Assertion.

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Question 101. A towel soaks up water due to:

- (a) Surface tension
- (b) Adhesive force only
- (c) Capillary action
- (d) Gravity

Answer: (c)

Explanation:

A towel soaks up water mainly because of capillary action, which is the ability of a liquid to flow through narrow spaces without the assistance of external forces (like gravity).

Capillary action results from the combination of cohesive forces (between water molecules) and adhesive forces (between water and the towel's fibers). The narrow spaces between the threads of the towel act like capillaries, drawing the water upward or inward.

- Surface tension plays a role but only in maintaining the shape of water droplets.
- Adhesive force is one component of capillary action but not the only reason.
- Gravity actually works against the upward movement of water in this context.

Hence, capillary action is the most accurate and complete Explanation.

Question 102. A fluid is flowing through a horizontal pipe. According to Bernoulli's theorem, when velocity increases:

- (a) Pressure increases
- (b) Pressure decreases
- (c) Density increases

(d) Flow stops

Answer: (b)

Explanation:

Bernoulli's theorem states that for an incompressible, non-viscous fluid in a steady flow, the total mechanical energy (pressure energy + kinetic energy + potential energy) remains constant along a streamline:

$$P + \frac{1}{2}\rho v^2 + \rho gh = \text{constant}$$

- In a horizontal pipe, the height h is constant, so the equation simplifies to:

$$P + \frac{1}{2}\rho v^2 = \text{constant}$$

- This means that as velocity v increases, the pressure P must decrease to keep the sum constant.

Thus, when fluid flows faster through a narrower section of pipe, its pressure decreases — a key concept in aerodynamics and hydraulics.

Question 103. Which physical quantity increases when a solid is heated?

- (a) Mass
- (b) Density
- (c) Length
- (d) Weight

Answer - (c)

Explanation – Heating causes thermal expansion, increasing the length ($\Delta L = \alpha L \Delta T$).

Question 104. A substance with high specific heat capacity will:

- (a) Heat up quickly
- (b) Require less heat to change temperature
- (c) Remain unaffected by heat
- (d) Show slow temperature change

Answer - (d)

Explanation – Specific heat capacity is the amount of heat required to raise the temperature of 1 kg of a substance by 1°C (or 1 K).

A substance with high specific heat capacity requires more heat energy to produce the same rise in temperature compared to a substance with low specific heat capacity.

This means it will heat up slowly and also cool down slowly, making it ideal for thermal buffering (e.g., water, which has high specific heat and moderates Earth's climate).

Question 105. Which of the following factors causes a depression in the melting point of ice?

- (a) Increasing temperature
- (b) Increasing atmospheric pressure
- (c) Presence of impurities
- (d) Decreasing volume

Answer - (c)

Explanation – Impurities like salt lower the melting point of ice (called melting point depression).

Question 106. Choose the true statement from the following:

- (a) Boiling point of water is always 100°C.
- (b) Freezing occurs only at temperatures below 0°C.
- (c) Melting and freezing points of pure water are the same under standard pressure.
- (d) Boiling does not depend on atmospheric pressure.

Answer - (c)

Explanation – For pure substances under standard pressure, melting and freezing points are the same (e.g., water at 0°C).

Question 107. Assertion (A): Wet clothes dry faster on a hot windy day.

Reason (R): Wind increases rate of evaporation.

Code:

- (a) Both A and R are true and R is the correct Explanation
- (b) Both A and R are true but R is not the correct Explanation
- (c) A is true, R is false
- (d) A is false, R is true

Answer - (a)

Explanation – Wind helps remove evaporated molecules, increasing the evaporation rate.

Question 108. Triple point of water corresponds to:

- (a) 100°C
- (b) 0°C
- (c) 0.01°C
- (d) -273.15°C

Answer - (c)

Explanation –

The triple point of water is the unique temperature and pressure at which the solid (ice), liquid (water), and gas (vapor) phases of water coexist in equilibrium.

The temperature at the triple point is 0.01°C

The pressure is 611.657 pascals (approx.)

Question 109. Which mirror always forms a virtual, erect, and diminished image irrespective of the object's position?

- (a) Plane mirror
- (b) Concave mirror
- (c) Convex mirror
- (d) Cylindrical mirror

Answer - (c)

Explanation – Convex mirrors always form virtual, upright, and diminished images.

Question 110. Which of the following uses concave mirrors?

- A. Solar cooker
- B. Rear-view mirror
- C. Shaving mirror

Select the correct Answer using the code:

- (a) Only A
- (b) A and C
- (c) A and B
- (d) All of the above

Answer - (b)

Explanation – Concave mirrors converge light and are used in solar cookers and shaving mirrors. Rear-view mirrors use convex mirrors.

Question 111. The speed of light is maximum in:

- (a) Water
- (b) Air
- (c) Diamond
- (d) Vacuum

Answer - (d)

Explanation – The speed of light is maximum in vacuum, where it travels at approximately:

When light enters any medium other than vacuum (like air, water, or diamond), it slows

down due to interaction with the medium's particles.

Question 112. The phenomenon of light splitting into its component colors is called:

- (a) Diffraction
- (b) Dispersion
- (c) Interference
- (d) Polarization

Answer - (b)

Explanation – Dispersion causes white light to split into VIBGYOR due to different refractive indices.

Question 113. When a ray travels from glass to air, it:

- (a) Slows down and bends towards normal
- (b) Speeds up and bends away from normal
- (c) Slows down and bends away
- (d) Remains undeviated

Answer - (b)

Explanation – Light bends away from normal while moving from denser to rarer medium.

Question 114. Why is red used in danger signals?

- (a) It has maximum speed
- (b) It scatters the most
- (c) It has longest wavelength and least scattering
- (d) It is most intense

Answer - (c)

Explanation – Red light scatters the least and travels longest distance in atmosphere.

Question 115. Which of the following waves are electromagnetic in nature?

- 1. X-rays
- 2. Gamma rays
- 3. Sound waves
- 4. Microwaves

Select the correct code:

- (a) 1 and 2 only
- (b) 1, 2 and 4 only
- (c) 2, 3 and 4 only
- (d) All of the above

Answer - (b)

Explanation – Sound waves are mechanical; the rest are electromagnetic waves.

Question 116. Assertion (A): Resistance of a conductor increases with temperature.

Reason (R): Increase in temperature increases collisions among free electrons.

Code:

(a) Both A and R are true, and R is the correct Explanation

(b) A is true, R is false

(c) A is false, R is true

(d) Both A and R are false

Answer - (a)

Explanation – More heat causes more random motion and collisions, increasing resistance.

Question 117. Which of the following devices uses electromagnetic induction?

- 1. Generator
- 2. Transformer
- 3. LED Bulb
- 4. Electric Motor

Code:

(a) 1 and 2 only

(b) 1, 2, and 4 only

(c) 1 and 4 only

(d) 2 and 3 only

Answer - (b)

Explanation –

Electromagnetic induction is the process by which a changing magnetic field induces an electric current in a conductor.

Generator 

- Works on the principle of electromagnetic induction: motion of a conductor in a magnetic field induces a current.

Transformer 

- Uses mutual induction: alternating current in the primary coil produces a changing magnetic field, which induces voltage in the secondary coil.

LED Bulb 

- Works on electroluminescence, not electromagnetic induction. It emits light

when current flows through a semiconductor.

Electric Motor 

- Although motors primarily convert electrical energy into mechanical energy, electromagnetic induction plays a role, especially in braking systems and back EMF generation.

Question 118. Choose the true statement from the following:

- (a) Electrons revolve randomly in the atom.
- (b) Electrons are present only inside the nucleus.
- (c) Neutrons carry a negative charge.
- (d) Protons and neutrons are located inside the nucleus.

Answer – (d)

Explanation – Protons and neutrons reside in the nucleus, whereas electrons revolve around it.

Question 119. Which of the following acids is used in car batteries?

- (a) Hydrochloric acid
- (b) Sulphuric acid
- (c) Acetic acid
- (d) Nitric acid

Answer – (b) Sulphuric acid

Explanation – Lead-acid batteries in cars use dilute sulphuric acid as an electrolyte.

Question 120. Which of the following gas is used in soft drinks to make them fizzy?

- (a) Oxygen
- (b) Hydrogen
- (c) Nitrogen
- (d) Carbon dioxide

Answer – (d) Carbon dioxide

Explanation – CO₂ dissolves in the liquid under pressure and forms bubbles when released.

Question 121. Which one of the following chemicals is used to ripen fruits artificially?

- (a) Calcium carbide
- (b) Sodium bicarbonate
- (c) Potassium iodide
- (d) Magnesium sulfate

Answer – (a) Calcium carbide

Explanation – It releases acetylene gas, which acts like ethylene, the natural ripening hormone.

Question 122. Which of the following metal is liquid at room temperature?

- (a) Mercury
- (b) Lead
- (c) Gallium
- (d) Both (a) and (c)

Answer – (d) Both (a) and (c)

Explanation – Mercury is liquid at room temperature. Gallium also melts just above room temperature (~29.7°C), and may appear liquid in warm climates.

Question 123. Match the following:

List-I (Subatomic Particles) – List-II (Discoverer)

- A. Electron – 1. Chadwick
- B. Proton – 2. Thomson
- C. Neutron – 3. Rutherford

Code:

- | | A | B | C |
|-----|---|---|---|
| (a) | 2 | 1 | 3 |
| (b) | 2 | 3 | 1 |
| (c) | 3 | 2 | 1 |
| (d) | 1 | 2 | 3 |

Answer – (b)

Explanation – Electron: Thomson; Proton: Rutherford; Neutron: Chadwick.

Question 124. Choose the true statement from the following:

- (a) Mendeleev's periodic law is based on atomic number.
- (b) Modern periodic table is based on atomic mass.
- (c) Mendeleev predicted undiscovered elements.
- (d) Newlands grouped all elements perfectly.

Answer – (c)

Explanation –

(a) Mendeleev's periodic law is based on atomic number

→ Incorrect. Mendeleev arranged elements by atomic mass, not atomic number.

(b) Modern periodic table is based on atomic mass

→ Incorrect. The modern periodic law is based on atomic number (proton count), not mass.

(c) Mendeleev predicted undiscovered elements

→ Correct. Mendeleev left gaps in his table for elements yet to be discovered (like eka-silicon → germanium), and predicted their properties.

(d) Newlands grouped all elements perfectly

→ Incorrect. Newlands' Law of Octaves worked only for lighter elements, and failed with heavier ones.

Question 125. Who discovered radioactivity?

(a) Marie Curie

(b) Pierre Curie

(c) Henri Becquerel

(d) Rutherford

Answer – (c)

Explanation – Henri Becquerel discovered natural radioactivity in 1896 while working with uranium salts.

Question 126. Consider the following statements:

1. Beta decay increases the atomic number by one.
2. Alpha decay decreases atomic number by two.

Which of the statements is/are correct?

(a) Only 1

(b) Only 2

(c) Both 1 and 2

(d) Neither 1 nor 2

Answer – (c)

Explanation – Beta decay turns a neutron into a proton (+1 to Z); Alpha decay emits He-4 (Z-2).

Question 127. Which of the following is not an organic acid?

(a) Citric acid

(b) Acetic acid

(c) Sulfuric acid

(d) Lactic acid

Answer – (c)

Explanation – Sulfuric acid is an inorganic (mineral) acid, whereas citric, acetic, and lactic acids are organic acids derived from natural sources like fruits or milk.

Question 128. Choose the true statement:

(a) All alkalis are bases but not all bases are alkalis

(b) All bases are alkalis

(c) Bases are always water-soluble

(d) Alkalis are always insoluble

Answer – (a)

Explanation –

A base is any substance that can accept H^+ ions or donate OH^- ions.

An alkali is a water-soluble base — usually a metal hydroxide (like NaOH, KOH).

So:

All alkalis are bases — true

But not all bases are alkalis, because some (like copper(II) hydroxide, zinc hydroxide) are insoluble in water — false

Let's evaluate the options:

(a) True — Matches correct chemical understanding.

(b) Not true — Some bases are not alkalis (they're insoluble).

(c) Not true — Some bases are insoluble in water.

(d) Contradictory — Alkalis are, by definition, soluble.

Question 129. Match List-I with List-II and choose the correct code.

List-I (Acid) – List-II (Use)

- A. Sulfuric acid – 1. Soft drinks
B. Phosphoric acid – 2. Battery
C. Nitric acid – 3. Explosives
D. Acetic acid – 4. Vinegar

Code:

A B C D

- (a) 1 2 4 3
(b) 3 2 1 4
(c) 2 4 3 1
(d) 2 1 3 4

Answer - (d)

Explanation – Sulfuric acid (battery), phosphoric (colas), nitric acid (TNT, rocket fuel), acetic acid (vinegar).

Question 130. The salt used in photography as fixer is:

- (a) Sodium bicarbonate
(b) Sodium thiosulfate
(c) Calcium carbonate
(d) Potassium nitrate

Answer - (b)

Explanation – In traditional photographic film processing, the fixer is a chemical used to remove unexposed silver halide crystals from the film, making the image permanent and light-insensitive.

The most common fixer is Sodium thiosulfate ($\text{Na}_2\text{S}_2\text{O}_3$), also known as hypo.

Question 131. Choose the correctly matched pair:

- (a) NaHCO_3 – Saltpeter
(b) KNO_3 – Baking Soda
(c) CaCO_3 – Limestone
(d) CaSO_4 – Washing Soda

Answer - (c)

Explanation –

- (a) NaHCO_3 – Saltpeter

→ Incorrect. NaHCO_3 is Baking Soda, not Saltpeter.

Saltpeter is Potassium nitrate (KNO_3).

- (b) KNO_3 – Baking Soda

→ Incorrect. KNO_3 is Saltpeter, not Baking Soda.

Baking Soda is Sodium bicarbonate (NaHCO_3).

- (c) CaCO_3 – Limestone

→ Correct. Calcium carbonate is the chemical name for limestone, chalk, and marble.

- (d) CaSO_4 – Washing Soda

→ Incorrect. CaSO_4 is Calcium sulfate (used in plaster of Paris).

Washing Soda is Sodium carbonate ($\text{Na}_2\text{CO}_3 \cdot 10\text{H}_2\text{O}$).

Question 132. Which of the following salts is used in mirror making?

- (a) Silver nitrate
(b) Sodium chloride
(c) Sodium thiosulfate
(d) Magnesium sulfate

Answer - (a)

Explanation – Silver nitrate (AgNO_3) is a key chemical used in the silvering process of mirror making.

In this process, a glass surface is coated with a thin layer of metallic silver by reducing silver nitrate using a reducing agent (like glucose or formaldehyde).

The deposited silver forms a reflective layer, producing a mirror.

Question 133. Which of the following metals is stored in kerosene to prevent accidental fire?

- (a) Iron
(b) Zinc
(c) Sodium
(d) Aluminium

Answer – (c)

Explanation – Sodium reacts vigorously with air and water and is kept in kerosene to prevent ignition.

Question 134. Consider the following pairs:

1. Brass – Copper and Tin
2. Bronze – Copper and Zinc
3. German Silver – Copper, Zinc, Nickel

Which of the above pairs is/are correctly matched?

- (a) Only 3
- (b) 1 and 3 only
- (c) Only 2
- (d) All 3

Answer – (a)

Explanation – Brass = Cu + Zn; Bronze = Cu + Sn; German Silver = Cu + Zn + Ni.

Question 135. Assertion (A): Pure gold is rarely used in jewellery.

Reason (R): Pure gold is soft and lacks sufficient hardness for regular use.

Code:

- (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

Answer – (a)

Explanation – 24 carat gold is too soft. Hence, 22 carat gold is used after alloying with silver or copper.

Question 136. Match the following:

List I (Ore) – List II (Metal)

- A. Bauxite – 1. Zinc
- B. Cassiterite – 2. Aluminium
- C. Siderite – 3. Iron
- D. Zincite – 4. Tin

Code:

A B C D

- (a) 1 2 3 4
- (b) 2 4 3 1
- (c) 3 4 1 2
- (d) 2 1 3 4

Answer – (b)

Explanation – Bauxite (Al), Cassiterite (Sn), Siderite (Fe), Zincite (Zn).

Question 137. Which of the following is used to prevent rusting of iron?

- (a) Mixing iron with sulphur
- (b) Keeping iron in oxygen-free chamber

- (c) Galvanization with zinc
- (d) Storing iron in acidic solutions

Answer – (c)

Explanation –

Rusting of iron is a chemical process in which iron reacts with oxygen and moisture to form iron oxide ($\text{Fe}_2\text{O}_3 \cdot x\text{H}_2\text{O}$), commonly known as rust.

Galvanization is coating iron with zinc to prevent rust.

Coating iron with a layer of zinc prevents contact with air and moisture. Zinc also offers sacrificial protection, as it corrodes before iron.

Question 138. Which hydrocarbon is used for fruit ripening?

- (a) Acetylene
- (b) Benzene
- (c) Methane
- (d) Ethylene

Answer: (d)

Explanation: Ethylene acts as a plant hormone and is used commercially to ripen fruits like bananas and mangoes.

Question 139. Consider the following about TNT:

1. It is a yellow crystalline solid.
2. It is used in military explosives.
3. It is also called RDX.

Which are correct?

- (a) 1 and 2 only
- (b) 2 and 3 only
- (c) 1 and 3 only
- (d) 1, 2 and 3

Answer: (a)

Explanation: RDX is a different explosive compound; TNT is not called RDX.

Question 140. Which of the following non-metals is the most reactive?

- (a) Oxygen
- (b) Fluorine
- (c) Nitrogen
- (d) Sulphur

Answer: (b)

Explanation: Fluorine is the most reactive non-metal and the strongest oxidizing agent due to its highest electronegativity.

Question 141. Consider the following statements:

1. Graphite is a good conductor of electricity.
2. Diamond conducts electricity due to free electrons.

Choose the correct option:

- (a) Only 1
- (b) Only 2
- (c) Both 1 and 2
- (d) Neither 1 nor 2

Answer: (a)

Explanation: Diamond does not conduct electricity as all its electrons are involved in bonding.

Question 142. Which of the following statements about Hydrogen is/are correct?

1. It forms covalent bonds.
2. It exists as a diatomic molecule.
3. It is a good conductor of electricity.

Select the correct Answer:

- (a) 1 and 2 only
- (b) 2 and 3 only
- (c) 1 and 3 only
- (d) 1, 2 and 3

Answer: (a)

Explanation: Hydrogen forms covalent bonds and exists as H_2 , but is a poor conductor.

Question 143. Match the following:

- A. Rhombic Sulphur – 1. Plastic-like form
- B. Monoclinic Sulphur – 2. Needle-shaped crystals
- C. Plastic Sulphur – 3. Stable at room temp
- D. Sulphur Hexafluoride – 4. Electrical insulator

Code:

- (a) A-1, B-3, C-2, D-4
- (b) A-3, B-2, C-1, D-4
- (c) A-2, B-1, C-3, D-4
- (d) A-4, B-3, C-2, D-1

Answer: (b)

Explanation:

Rhombic Sulphur → Stable at room temperature

- Most stable crystalline form of sulphur at room temp (S_8 rings in orthorhombic structure).

Monoclinic Sulphur → Needle-shaped crystals

- Less stable, forms at higher temps and crystallizes as long needles.

Plastic Sulphur → Plastic-like form

- Formed by rapidly cooling molten sulphur; has a rubbery texture and amorphous structure.

Sulphur Hexafluoride (SF_6) → Electrical insulator

- A heavy, inert gas used as a dielectric in high-voltage equipment.

Question 144. Which of the following gases is primarily present in biogas?

- (a) Carbon dioxide
- (b) Hydrogen
- (c) Methane
- (d) Nitrogen

Answer: (c)

Explanation:

Biogas is a mixture of gases produced by the anaerobic decomposition of organic matter (like animal dung, sewage, and plant waste) by bacteria.

Its major components are:

- Methane (CH_4): 50–75% → Main combustible component
- Carbon dioxide (CO_2): 25–45%
- Traces of hydrogen (H_2), nitrogen (N_2), and hydrogen sulfide (H_2S)

Methane is the primary and most energy-rich component, responsible for biogas being used as a fuel for cooking and electricity.

Question 145. Consider the following statements:

1. Fly ash bricks are eco-friendly.
2. Coal tar is used in road construction.
3. Petroleum yields petrochemicals.
4. Coke is used in fertilizer production.

Which of the above statements are correct?

- (a) 1, 2 and 3 only
- (b) 2, 3 and 4 only
- (c) 1 and 4 only

(d) All of the above

Answer: (a)

Explanation: Coke is used in metallurgy, not in fertilizers.

Question 146. Which petroleum product is used for making road tar?

- (a) Diesel
- (b) Bitumen
- (c) Kerosene
- (d) Natural gas

Answer: (b)

Explanation: Bitumen is the residue left after refining petroleum and is used in road surfacing.

Question 147. The atomic number of an element represents:

- (a) Number of neutrons
- (b) Number of electrons in the outer shell
- (c) Number of protons in the nucleus
- (d) Atomic mass

Answer – (c) Number of protons in the nucleus

Explanation – Atomic number = number of protons, which determines the element's identity.

Question 148. Which chemical is known as "laughing gas"?

- (a) Nitric oxide
- (b) Nitrous oxide
- (c) Nitrogen dioxide
- (d) Ammonia

Answer – (b) Nitrous oxide

Explanation – N_2O is mildly anesthetic and causes euphoria — hence "laughing gas".

Question 149. Which substance is added to toothpaste to prevent tooth decay?

- (a) Calcium carbonate
- (b) Fluoride
- (c) Sulphate
- (d) Magnesium

Answer – (b) Fluoride

Explanation – Fluoride ions prevent dental cavities by hardening enamel.

Question 150.

The process of separating dissolved solids from a liquid by evaporation and condensation is called:

- (a) Sedimentation
- (b) Filtration
- (c) Decantation
- (d) Distillation

Answer – (d) Distillation

Explanation –

Distillation is a physical separation technique used to separate a solvent from dissolved solids or to separate components of a mixture of liquids with different boiling points.

It involves heating the solution to form vapour, then condensing the vapour to recover the pure liquid.

This method is commonly used for purifying water or separating alcohol from mixtures.

Other options:

- (a) Sedimentation – separates insoluble solids from a liquid by allowing them to settle.
- (b) Filtration – also separates insoluble solids, not dissolved ones.
- (c) Decantation – involves pouring off liquid from settled solids.

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