Tamil Nadu 2026 Class 12 Part III Science Public Question Paper with Solutions(Memory Based)

Time Allowed :3 Hour	Maximum Marks :70	Total Questions :21

General Instructions

- The total duration of the examination is 3 hours (180 minutes).
- Candidates are allotted 15 minutes for reading the question paper and verifying their particulars.
- The maximum marks for the theory paper is 70.
- Check the question paper for fairness of printing. If there is any lack of fairness, inform the Hall Supervisor immediately.
- Use Blue or Black ink to write and underline, and use a pencil for drawing diagrams.
- The question paper consists of four parts (Part I, II, III, and IV).
- Part I is compulsory and contains multiple-choice questions.
- Internal choices and "answer any x out of y" options are provided in Parts II, III, and IV.
- Diagrams should be drawn wherever necessary and labeled neatly.
- Scientific calculators and other electronic gadgets are strictly not allowed.

1. Explain the differences between Mass and Weight.

Solution:
Concept: Mass and weight are fundamental physical quantities related to matter. Mass refers to the amount of matter present in an object, whereas weight is the force exerted on that mass due to gravity.
Step 1: Definition.

- **Mass:** Mass is the amount of matter contained in an object.
- **Weight:** Weight is the gravitational force acting on an object due to the attraction of the Earth.

Step 2: Dependence on gravity.

- **Mass:** Mass remains constant everywhere and does not depend on gravity.
- **Weight:** Weight depends on gravitational acceleration and can change from place to place.

Step 3: Units of measurement.

- **Mass:** The SI unit of mass is kilogram (kg).
- **Weight:** The SI unit of weight is newton (N).

Step 4: Measuring instruments.

- **Mass:** Measured using a beam balance or electronic balance.
- **Weight:** Measured using a spring balance.

Step 5: Mathematical relation.
Weight is related to mass by the formula:
where W is weight, m is mass, and g is the acceleration due to gravity.
Final Answer:
Mass is the amount of matter in a body and remains constant everywhere, whereas weight is the gravitational force acting on that body and varies depending on the value of gravity.

Quick Tip

Mass → constant quantity measured in kg.
Weight → gravitational force measured in newtons and varies with gravity.

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2. State the laws of Reflection of Sound and its applications like Echo.

Solution:
Concept: Sound waves can be reflected when they strike a hard surface such as a wall, cliff, or building. The reflection of sound follows certain laws similar to the reflection of light. This principle is responsible for phenomena such as echoes and is widely used in various technologies.
Step 1: First law of reflection of sound.
The angle of incidence is equal to the angle of reflection. This means that the direction in which sound strikes a surface and the direction in which it is reflected follow the same angular relationship.
Step 2: Second law of reflection of sound.
The incident sound wave, the reflected sound wave, and the normal at the point of incidence all lie in the same plane.
Step 3: Application: Echo.
An echo is the repetition of sound heard after it is reflected from a distant surface. For a distinct echo to be heard, the reflected sound must reach the listener at least 0.1 seconds after the original sound.
This occurs when the reflecting surface is approximately 17 meters or more away from the listener.
Step 4: Other practical applications.
Reflection of sound is also used in:

- SONAR technology for detecting underwater objects

- Designing auditoriums and concert halls for better sound distribution
- Stethoscopes used by doctors to hear internal body sounds

Final Answer:
The laws of reflection of sound state that the angle of incidence equals the angle of reflection, and the incident sound, reflected sound, and normal lie in the same plane. These principles explain phenomena such as echoes and are used in technologies like SONAR and auditorium design.

Quick Tip

An **echo** is heard when reflected sound reaches the ear after at least **0.1 seconds**, usually when the reflecting surface is about **17 m or more** away.

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3. Differentiate between a Convex lens and a Concave lens with their applications.

Solution:
Concept: Lenses are transparent optical devices that refract light to form images. They are mainly of two types: convex lenses and concave lenses. These lenses differ in shape, behavior of light rays, and the type of images they form.
Step 1: Shape and structure.

- **Convex Lens:** Thicker at the center and thinner at the edges.
- **Concave Lens:** Thinner at the center and thicker at the edges.

Step 2: Effect on light rays.

- **Convex Lens:** Converges (brings together) parallel rays of light to a focal point, hence called a converging lens.
- **Concave Lens:** Diverges (spreads out) parallel rays of light, hence called a diverging lens.

Step 3: Image formation.

- **Convex Lens:** Can form real and inverted images or virtual and erect images depending on the position of the object.
- **Concave Lens:** Always forms a virtual, erect, and diminished image.

Step 4: Applications.

- **Convex Lens:**
  - Magnifying glass
  - Camera lenses

- Microscopes and telescopes

- **Concave Lens:**
  - Spectacles used to correct myopia (short-sightedness)
  - Door viewers (peepholes)
  - Certain optical instruments

Final Answer:
A convex lens is thicker at the center and converges light rays to form real or virtual images, whereas a concave lens is thinner at the center and diverges light rays, always forming virtual and diminished images. Both lenses are widely used in optical instruments and vision correction.

Quick Tip

Convex lens → Converging lens used for magnification.
Concave lens → Diverging lens used to correct myopia.

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4. Describe the mechanism of the Human Eye and how to correct defects like Myopia and Hypermetropia.

Solution:
Concept: The human eye is a sensory organ that enables vision by detecting light and forming images on the retina. It works in a manner similar to a camera, where light entering the eye is focused by the lens to produce a clear image. Sometimes defects in the eye cause improper focusing, leading to vision problems such as myopia and hypermetropia.
Step 1: Mechanism of the human eye.
Light rays from an object enter the eye through the *cornea* and pass through the *pupil*. The *eye lens* refracts the light and focuses it onto the *retina*. The retina contains light-sensitive cells that convert the image into electrical signals, which are transmitted to the brain through the optic nerve. The brain then interprets these signals as visual images.
Step 2: Myopia (Short-sightedness).
Myopia is a defect in which a person can see nearby objects clearly but cannot see distant objects clearly. This occurs when the image of a distant object is formed in front of the retina due to excessive curvature of the eye lens or an elongated eyeball.
Correction:
Myopia is corrected using a *concave lens*. The concave lens diverges the incoming light rays so that the image forms correctly on the retina.
Step 3: Hypermetropia (Long-sightedness).
Hypermetropia is a defect in which a person can see distant objects clearly but cannot see nearby objects clearly. This happens when the image of a nearby object is formed behind the retina due to insufficient curvature of the eye lens or a shorter eyeball.
Correction:
Hypermetropia is corrected using a *convex lens*. The convex lens converges the light rays before they enter the eye so that the image forms on the retina.
Final Answer:
The human eye forms images by focusing light on the retina using the eye lens. Defects such as

myopia and hypermetropia occur due to improper focusing of light and can be corrected using concave lenses and convex lenses respectively.

Quick Tip

Myopia → Cannot see distant objects → Corrected by concave lens.
Hypermetropia → Cannot see nearby objects → Corrected by convex lens.

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5. Define Horse Power, Doppler Effect, and Nuclear Fusion.

Solution:
Concept: Horsepower, Doppler Effect, and Nuclear Fusion are important concepts in physics related to power, wave motion, and nuclear reactions respectively.
Step 1: Horse Power.
Horsepower is a unit of power that measures the rate at which work is done or energy is transferred. It is commonly used to express the power of engines and machines.
One horsepower is equal to approximately 746 watts.
Step 2: Doppler Effect.
The Doppler Effect is the apparent change in the frequency or wavelength of a wave when there is relative motion between the source of the wave and the observer.
For example, the pitch of a siren appears higher when an ambulance approaches and lower when it moves away.
Step 3: Nuclear Fusion.
Nuclear fusion is a nuclear reaction in which two light atomic nuclei combine to form a heavier nucleus, releasing a large amount of energy. This process occurs naturally in the Sun and other stars.
Final Answer:
Horsepower is a unit used to measure power, the Doppler Effect is the change in frequency of waves due to relative motion between source and observer, and nuclear fusion is the process in which light nuclei combine to form a heavier nucleus while releasing large amounts of energy.

Quick Tip

Horsepower → Unit of power (1 HP = 746 W).
Doppler Effect → Change in frequency due to motion.
Nuclear Fusion → Combination of light nuclei releasing huge energy (as in the Sun).

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6. Explain the differences between Atoms and Molecules.

Solution:
Concept: Atoms and molecules are the basic building blocks of matter. An atom is the smallest unit of an element, whereas a molecule is formed when two or more atoms chemically combine together.

Step 1: Definition.

- **Atom:** An atom is the smallest particle of an element that retains the chemical properties of that element.
- **Molecule:** A molecule is the smallest particle of a substance that can exist independently and consists of two or more atoms chemically bonded together.

Step 2: Structure.

- **Atom:** Consists of subatomic particles such as protons, neutrons, and electrons.
- **Molecule:** Formed by the chemical combination of atoms of the same element or different elements.

Step 3: Existence.

- **Atom:** Usually does not exist independently except in noble gases such as helium and neon.
- **Molecule:** Can exist independently and represents the smallest unit of a compound or molecular element.

Step 4: Examples.

- **Atom:** Hydrogen atom (H), Oxygen atom (O), Carbon atom (C).
- **Molecule:** Water (H_2O), Oxygen (O_2), Carbon dioxide (CO_2).

Final Answer:
An atom is the smallest unit of an element, while a molecule is formed by the chemical combination of two or more atoms and represents the smallest unit of a substance that can exist independently.

Quick Tip

Atom → Smallest unit of an element.
Molecule → Two or more atoms chemically bonded together.

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7. Why is Diamond the hardest allotrope of carbon?

Solution:
Concept: Diamond is an allotrope of carbon in which each carbon atom is strongly bonded to other carbon atoms in a rigid three–dimensional structure. This unique arrangement of atoms gives diamond exceptional hardness.
Step 1: Tetrahedral bonding structure.
In diamond, each carbon atom is covalently bonded to four other carbon atoms. These atoms

are arranged in a tetrahedral structure, forming a strong three–dimensional network throughout the crystal.

Step 2: Strong covalent bonds.

The carbon atoms in diamond are connected by very strong covalent bonds. These bonds extend in all directions, making the structure extremely rigid and difficult to break.

Step 3: Absence of weak layers.

Unlike graphite, diamond does not have layered structures. Because there are no weak planes between atoms, it is extremely resistant to scratching and deformation.

Final Answer:

Diamond is the hardest allotrope of carbon because each carbon atom forms strong covalent bonds with four other carbon atoms in a rigid three–dimensional network, making the structure extremely strong and resistant to breaking.

Quick Tip

Diamond is extremely hard because of its **three-dimensional network of strong covalent bonds** between carbon atoms.

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8. State the Law of Conservation of Mass and demonstrate it with a reaction.

Solution:

Concept: The Law of Conservation of Mass is a fundamental principle in chemistry. It states that during a chemical reaction, mass is neither created nor destroyed. The total mass of the reactants is always equal to the total mass of the products.

Step 1: Statement of the law.

The Law of Conservation of Mass states that in a chemical reaction, the total mass of substances before the reaction is equal to the total mass of substances after the reaction.

Step 2: Demonstration with a chemical reaction.

Consider the reaction between calcium carbonate and hydrochloric acid:

$$CaCO_3 + 2HCl \rightarrow CaCl_2 + H_2O + CO_2$$

In this reaction, calcium carbonate reacts with hydrochloric acid to produce calcium chloride, water, and carbon dioxide.

Step 3: Explanation of mass conservation.

If the masses of all reactants and products are measured in a closed system, the total mass before the reaction will be equal to the total mass after the reaction. This proves that mass is conserved during the chemical process.

Final Answer:

The Law of Conservation of Mass states that mass cannot be created or destroyed in a chemical reaction. The total mass of reactants is always equal to the total mass of products, as demonstrated in balanced chemical reactions.

Quick Tip

Mass of Reactants = Mass of Products in every chemical reaction when the reaction occurs in a closed system.

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9. Describe the process of Photosynthesis and the critical role of Chlorophyll.

Solution:
Concept: Photosynthesis is the process by which green plants prepare their own food using carbon dioxide, water, and sunlight in the presence of chlorophyll. This process converts light energy into chemical energy and produces glucose and oxygen.
Step 1: Absorption of sunlight.
The leaves of green plants contain a pigment called *chlorophyll* present in chloroplasts. Chlorophyll absorbs light energy from the Sun, which is necessary to drive the photosynthesis process.
Step 2: Uptake of raw materials.
Plants absorb carbon dioxide from the atmosphere through small openings in leaves called stomata. Water is absorbed by the roots from the soil and transported to the leaves through the xylem.
Step 3: Conversion into food.
Using the absorbed sunlight, chlorophyll helps convert carbon dioxide and water into glucose (a form of food for the plant). During this process, oxygen is released as a by-product.
Step 4: Storage and use of food.
The glucose produced is either used immediately for energy or stored as starch in different parts of the plant for future use.
Step 5: Overall chemical reaction.

$$6CO_2 + 6H_2O \xrightarrow[\text{Chlorophyll}]{\text{Sunlight}} C_6H_{12}O_6 + 6O_2$$

Final Answer:
Photosynthesis is the process by which green plants use sunlight, carbon dioxide, and water to produce glucose and oxygen. Chlorophyll plays a crucial role by absorbing sunlight and providing the energy required for this process.

Quick Tip

Photosynthesis needs four essential components: sunlight, chlorophyll, carbon dioxide, and water.

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10. Why does a mammalian RBC lack a nucleus and cell organelles?

Solution:
Concept: Red Blood Cells (RBCs) in mammals are specialized cells responsible for transporting oxygen and carbon dioxide in the blood. To perform this function efficiently, they undergo structural modifications during their development.

Step 1: Removal of nucleus during maturation.
During the maturation of RBCs in the bone marrow, the nucleus and most cell organelles are removed. This process creates more internal space within the cell.
Step 2: More space for haemoglobin.
The absence of the nucleus and organelles allows RBCs to contain a larger amount of haemoglobin, the protein responsible for carrying oxygen in the blood. This increases the oxygen-carrying capacity of each cell.
Step 3: Improved flexibility and shape.
Without a nucleus, RBCs become biconcave and flexible. This shape helps them pass easily through narrow blood capillaries and increases the surface area for efficient gas exchange.
Final Answer:
Mammalian RBCs lack a nucleus and cell organelles to provide more space for haemoglobin and to maintain a flexible biconcave shape, which improves their efficiency in transporting oxygen throughout the body.

Quick Tip

Mammalian RBCs lose their nucleus to **increase haemoglobin content and improve oxygen transport efficiency**.

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11. What are the functions of Colostrum in infants?

Solution:
Concept: Colostrum is the first form of milk produced by the mammary glands of the mother during the initial days after childbirth. It is thick, yellowish in colour, and highly nutritious, providing essential nutrients and antibodies to newborn infants.
Step 1: Provides immunity.
Colostrum is rich in antibodies, especially immunoglobulin A (IgA), which helps protect the newborn from infections and strengthens the immune system during the early stages of life.
Step 2: Supplies essential nutrients.
It contains proteins, vitamins, minerals, and growth factors that are important for the healthy growth and development of the infant.
Step 3: Supports digestive system development.
Colostrum helps in the maturation of the infant's digestive system and promotes the growth of beneficial bacteria in the gut.
Step 4: Helps in passing meconium.
Colostrum has a mild laxative effect that helps the newborn pass meconium (the first stool), which helps remove excess bilirubin and reduces the risk of jaundice.
Final Answer:
Colostrum provides immunity, essential nutrients, supports digestive development, and helps newborn infants pass meconium, thereby protecting and strengthening the infant during the early stages of life.

Quick Tip

Colostrum is called the **"first vaccine"** for newborns because it contains antibodies that protect infants from infections.

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12. Explain the importance of Energy Conservation and list various Biofuels for transportation.

Solution:
Concept: Energy conservation refers to the careful and efficient use of energy resources to reduce wastage and ensure their availability for future generations. It is essential for sustainable development and environmental protection.
Step 1: Reducing depletion of natural resources.
Most conventional energy sources such as coal, petroleum, and natural gas are non-renewable. Conserving energy helps slow down the depletion of these limited resources.
Step 2: Protection of the environment.
Energy production from fossil fuels releases pollutants and greenhouse gases. Energy conservation helps reduce air pollution and global warming.
Step 3: Economic benefits.
Using energy efficiently lowers energy consumption and reduces costs for households, industries, and governments.
Step 4: Ensuring sustainable development.
Energy conservation supports sustainable development by balancing present energy needs with the needs of future generations.
Step 5: Biofuels used for transportation.
Biofuels are renewable fuels produced from biological materials such as plants and organic waste. Some commonly used biofuels include:

- Bioethanol
- Biodiesel
- Biogas
- Methanol

Final Answer:
Energy conservation is important for reducing the depletion of natural resources, protecting the environment, lowering costs, and ensuring sustainable development. Biofuels such as bioethanol, biodiesel, biogas, and methanol are renewable alternatives used for transportation.

Quick Tip

Energy conservation helps **save resources, reduce pollution, and promote sustainable development**, while biofuels provide cleaner alternatives to fossil fuels.

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13. What are the objectives of the POCSO Act?

Solution:
Concept: The Protection of Children from Sexual Offences (POCSO) Act, 2012 is a law enacted by the Government of India to protect children from sexual abuse, harassment, and exploitation. The Act provides a legal framework for safeguarding the rights and dignity of children.
Step 1: Protection of children from sexual offences.
The primary objective of the POCSO Act is to protect children below the age of 18 years from sexual assault, sexual harassment, and pornography.
Step 2: Establishing strict legal provisions.
The Act defines various sexual offences against children and prescribes strict punishments for offenders to deter such crimes.
Step 3: Child-friendly legal procedures.
The Act ensures child-friendly procedures during reporting, recording of evidence, investigation, and trial so that the child victim is not further traumatized.
Step 4: Speedy justice through special courts.
The POCSO Act provides for the establishment of special courts to ensure the speedy trial of cases related to sexual offences against children.
Final Answer:
The objectives of the POCSO Act are to protect children from sexual abuse and exploitation, define and punish sexual offences against children, ensure child-friendly legal procedures, and provide speedy justice through special courts.

Quick Tip

The **POCSO Act (2012)** aims to protect children under **18 years** from sexual offences and ensure **strict punishment and child-friendly justice**.
