FORCE AND ENERGY

TEACHING TASK

CONCEPTUAL UNDERSTANDING QUESTIONS (CUQ's)

Multiple Choice Questions

1. What is the definition of force?
   A) A push or pull exerted on an object
   B) The weight of an object
   C) The energy required to move an object
   D) The resistance to motion

Answer: A
Solution: A force is defined as a push or a pull that can change an object's motion or shape.

2.Which of the following is an example of static friction?
   A) Pushing a box that starts to slide
   B) A car slowing down when brakes are applied
   C) A book resting on a table
   D) A rolling ball on the ground

Answer: C
Solution: Static friction acts when there is no relative motion between surfaces in contact.

3. Which of the following has the least amount of friction when moving?
   A) Sliding a box on a rough surface
   B) Rolling a ball on the ground
   C) Pushing a book across a table
   D) Braking a car

Answer: B
Solution: Rolling friction is much smaller than sliding or braking friction.

4. What happens to the gravitational force between two objects if the distance between them doubles?
   A) It remains the same
   B) It doubles
   C) It quadruples
   D) It decreases to one-fourth

Answer: D
Solution: Gravitational force is inversely proportional to the square of the distance.

5. What is the weight of an object with a mass of 10 kg on Earth, where the acceleration due to gravity is approximately 9.8 m/s^2?
   A) 9.8 N B) 19.6 N C) 98 N D) 100 N

Answer: C
Solution: Weight = mass × gravity = 10 × 9.8 = 98 N

ADVANCED LEVEL

More than One Answer Type

6. Which of the following are effects of gravitational force? (Select all that apply)
   A) Causes objects to fall toward the Earth.
   B) Keeps planets in orbit around the Sun.
   C) Allows magnets to attract or repel.
   D) Influences ocean tides.

Answers: A, B, D
Solution: Gravity causes falling of objects, keeps planets in orbit, and affects ocean tides. Magnetism is not gravitational.

7. Which of the following are examples of magnetic force applications? (Select all that apply)
   A) Compass navigation
   B) Sliding a box across a table
   C) Magnetic levitation trains
   D) Refrigerator magnet

Answers: A, C, D
Solution: Compasses, maglev trains, and refrigerator magnets all use magnetic force.

Fill In the Blanks

8. _____ forces occur when two objects are in physical contact with each other, such as frictional and tension forces.
Answer: Contact forces
Solution: Friction and tension act only when objects touch.

9. _____ force is associated with magnets and is the force of attraction or repulsion between electrically charged particles.
Answer: Magnetic force
Solution: Magnetic force causes attraction or repulsion between magnets and charged particles.

Matching Type

10. Match each example with its corresponding force type.

Forces	Examples
1. Static Friction	A. A ball rolling to a stop on the ground.
2. Kinetic Friction	B. The force that keeps a pencil from sliding off a desk.
3. Magnetic Force	C. A compass needle aligning with Earth's magnetic field.
4. Gravitational Force	D. An apple falling from a tree.

Answer: 1-B,2-A,3-C,4-D
Solution:
Static friction acts between two surfaces that are in contact but not moving relative to each other.
Kinetic friction acts when two surfaces are moving against each other.
A compass needle aligns with Earth's magnetic field due to magnetic force, which

causes attraction or alignment of magnetic materials.
An apple falls from a tree because Earth's gravitational force pulls objects toward its center.

Answer the Following Questions

11. How does the concept of gravitational force play a role in both micro-scale (atomic) and macro-scale (astronomical) phenomena?

Solution:

At the micro-scale, gravitational force exists between atoms but is extremely weak compared to electromagnetic forces. At the macro-scale, gravity dominates and governs planetary motion, star formation, and galaxy structures.

12. What are the implications of friction in both natural and engineered systems, and how can engineers manipulate friction to their advantage?

Solution:

Friction enables walking, writing, and gripping objects but also causes wear and energy loss. Engineers control friction using lubricants, rough surfaces, or streamlined designs to improve efficiency and safety.

LEARNERS TASK

CONCEPTUAL UNDERSTANDING QUESTIONS (CUQ's)

Multiple Choice Questions

1. Which type of force occurs when two objects are in physical contact?

A) Gravitational Force B) Non-Contact Force
C) Contact Force D) Magnetic Force

Answer:C

Solution: Contact forces act only when objects touch each other, such as friction, normal force, and tension.

2. What type of friction opposes the motion of two surfaces sliding past each other?

A) Static Friction B) Kinetic Friction
C) Rolling Friction D) Gravitational Force

Answer:B

Solution: Kinetic friction acts when two surfaces are already moving against each other.

3. Which fundamental force is responsible for keeping planets in orbit around the Sun?

A) Magnetic Force B) Electromagnetic Force
C) Gravitational Force D) Nuclear Force

Answer:C

Solution: Gravity is the attractive force between masses and is responsible for planetary motion.

4. What occurs when a compass aligns itself with the Earth's magnetic field?
   A) Gravitational Attraction B) Frictional Force
   C) Magnetic Force D) Tension Force

Answer:C

Solution: The compass needle aligns due to magnetic force acting between the needle and Earth's magnetic field.

5. Which force allows you to walk without slipping?
   A) Gravitational Force B) Kinetic Friction
   C) Normal Force D) Static Friction

Answer:D

Solution: Static friction prevents the foot from slipping backward when walking.

ADVANCED LEVEL

More than One Answer Type

6. Which of the following describe characteristics of friction? (Select all that apply)
   A) It can prevent motion or slow it down.
   B) It is always greater than the applied force.
   C) It arises from surface irregularities.
   D) It can be increased by making surfaces smoother.

Answers: A, C

Solution: Friction can prevent motion or slow it down.It arises due to irregularities on the surfaces in contact.It is not always greater than the applied force.Smoother surfaces usually reduce friction, not increase it.

7. Which of the following are examples of non-contact forces? (Select all that apply)
   A) Gravitational Force B) Tension Force
   C) Electromagnetic Force D) Normal Force

Answers:A, C

Solution: Gravitational and electromagnetic forces act without physical contact. Tension and normal forces require contact.

Fill In the Blanks

8. _____ force is the attractive force between two masses, commonly experienced as gravity.

Answer: Gravitational force

Solution: Gravity attracts all objects with mass.

9. The force that prevents an object from starting to move is known as _____ friction.

Answer: Static friction.

Solution: Static friction acts before motion begins.

Matching Type

10. Match each type of force with its correct description.

Column A	Column B
1. Contact Force	A. The force that attracts two masses toward each other.
2. Non-Contact Force	B. A force that opposes the mo tion of objects in contact.
3. Frictional Force	C. A force acting between charged particles without direct contact.
4. Gravitational Force	D. Forces that occur when objects are physically touching.

Answers: 1-D, 2-C, 3- B,4-A

Solutions:

Contact forces act only when objects touch.
Forces like electromagnetic force act without touching.
Friction opposes motion between contacting surfaces.
Gravity attracts masses toward each other.

Answer the Following Questions

11. How does understanding the different types of friction (static, kinetic, and rolling) influence the design of everyday objects like vehicles or sports equipment?

Solution:

Understanding friction helps engineers design vehicles, shoes, and sports equipment. Static friction provides grip (tyres, shoes), kinetic friction helps control motion (brakes), and rolling friction allows smooth movement (wheels, balls). Proper control of friction improves safety and efficiency.

12. In what ways do magnetic forces and gravitational forces differ in their applications and effects on objects in everyday life?

Solution:

Gravitational force acts between all masses and is always attractive, influencing motion of planets and falling objects. Magnetic force acts only on magnetic materials or moving charges and can attract or repel, playing an important role in devices like compasses, motors, and electric generators.

ENERGY

TEACHING TASK

CONCEPTUAL UNDERSTANDING QUESTIONS (CUQ's)

Multiple Choice Questions

1. What is the definition of energy?
   A) The ability to move objects
   B) The ability to do work or cause change

C) The capacity to generate heat
D) The force applied to an object

Answer: B

Solution: Energy is defined as the capacity to do work or bring about change in objects or systems.

2. Which type of energy is associated with an object in motion?
A) Potential Energy
B) Mechanical Energy
C) Kinetic Energy
D) Thermal Energy

Answer: C

Solution: Any moving object possesses kinetic energy.

3. What type of energy is stored in the bonds of chemical compounds?
A) Electrical Energy
B) Nuclear Energy
C) Chemical Energy
D) Mechanical Energy

Answer: C

Solution: Chemical energy is stored in the bonds of molecules and is released during chemical reactions

4. Which of the following is an example of potential energy?
A) A speeding car
B) Water flowing in a river
C) A book on a shelf
D) Heat from a stove

Answer: C

Solution: Potential energy is stored due to position or condition.

5. What is mechanical energy the sum of?
A) Kinetic and Thermal Energy
B) Potential and Chemical Energy
C) Kinetic and Potential Energy
D) Electrical and Nuclear Energy

Answer: C

Solution: Mechanical energy includes both motion energy and stored energy.

ADVANCED LEVEL

More than One Answer Type

6. Which forms of energy involve movement? (Select all that apply)
A) Kinetic Energy
B) Mechanical Energy
C) Chemical Energy
D) Wind Energy

Answers: A, B, D

Solution:

- Kinetic energy involves motion.
- Mechanical energy includes motion.

- Wind energy is caused by moving air.
- Chemical energy does not involve motion directly.

7. Which of the following are examples of renewable energy sources? (Select all that apply)

A) Solar Energy
B) Fossil Fuels
C) Wind Energy
D) Nuclear Energy

Answers: A, C

Solution: Solar and wind energy are naturally replenished. Fossil fuels and nuclear energy are non-renewable.

Fill In the Blanks

8. The energy related to the temperature of an object, which is the total kinetic energy of its particles, is called _____ energy.

Answer: Thermal energy.

Solution: Thermal energy depends on the motion of particles within a substance.

9. _____ energy is the sum of kinetic and potential energy in a system, like a swinging pendulum.

Mechanical energy is the sum of kinetic and potential energy.

Solution: Systems like pendulums possess both energies.

Matching Type

10. Match each type of energy with its correct definition.

Column A	Column B
1. Kinetic Energy	A. Energy stored in the bonds of chemical compounds.
2. Potential Energy	B. The energy of an object in motion.
3. Thermal Energy	C. The total kinetic energy of particles in a substance.
4. Chemical Energy	D. Stored energy based on position or condition.

Answer:1-B, 2-D, 3-C, 4-A

Solutions

- Kinetic Energy: Energy of motion
- Potential Energy: Stored due to position
- Thermal Energy: Total kinetic energy of particles
- Chemical Energy: Stored in chemical bonds

Answer the Following Questions

11. In what ways can the conversion of one form of energy to another impact technological advancements in renewable energy sources?

Solution:

Energy conversion allows renewable sources like solar and wind to be transformed into usable electrical energy. Improved conversion efficiency leads to better solar panels, wind turbines, and energy storage systems, promoting sustainable development.

12. How does the concept of energy transformation apply to everyday activities, and what are the implications for human health and well-being?

Solution:

Daily activities like eating, walking, and cooking involve energy transformations. Proper energy use supports human health, while inefficient energy use can lead to waste and environmental harm.

LEARNERS TASK

CONCEPTUAL UNDERSTANDING QUESTIONS (CUQ's)

Multiple Choice Questions

1. Which type of energy is produced by vibrating objects?
   A) Light Energy B) Sound Energy
   C) Radiant Energy D) Thermal Energy

Answer: B

Solution: Vibrating objects cause disturbances in the surrounding medium, which travel as sound waves. Hence, sound energy is produced.

2. What is solar energy primarily derived from?
   A) Wind movement B) The Earth's core
   C) The sun's radiation D) Chemical reactions

Answer: C

Solution: Solar energy comes from the radiation (light and heat) emitted by the sun.

3. In which form of energy do electrons play a crucial role?
   A) Nuclear Energy B) Thermal Energy
   C) Electrical Energy D) Mechanical Energy

Answer: C

Solution: Electrical energy is produced due to the movement of electrons through a conductor.

4. What type of energy is harnessed by wind turbines?
   A) Kinetic Energy B) Thermal Energy
   C) Radiant Energy D) Chemical Energy

Answer: A
Solution: Wind turbines use the kinetic energy of moving air to rotate blades and generate electricity.

5. Which of the following energy types is considered non-renewable?
A) Wind Energy B) Solar Energy
C) Nuclear Energy D) Geothermal Energy
Answer: C
Solution: Nuclear energy depends on limited fuels like uranium, which cannot be replenished easily.

ADVANCED LEVEL

More than One Answer Type
6. Which of the following are forms of energy? (Select all that apply)
A) Kinetic Energy B) Magnetic Energy
C) Chemical Energy D) Electrical Energy
Answer: A, B, C and D
Solution: All listed options represent different recognized forms of energy.

7. Which types of energy can be transformed into electrical energy? (Select all that apply)
A) Solar Energy B) Thermal Energy
C) Chemical Energy D) Sound Energy
Answer: A, B and C
Solution: Solar panels convert solar energy, thermal power plants convert heat energy, and batteries convert chemical energy into electrical energy. Sound energy is generally not used efficiently for electrical conversion.

Fill In the Blanks
8. Energy is the ability to do _____ or cause change.
Answer: work
Solution: Energy enables an object to perform work, such as moving, heating, or bringing about any physical change.

9. _____ energy is derived from the sun's radiation and can be converted into thermal or electrical energy.
Answer: Solar
Solution: Solar energy comes from the sun’s rays and can be used directly for heating or converted into electricity using solar panels.

Matching Type

10. Match each energy type with its corresponding example.

Column A	Column B
1. Electrical Energy	A. Energy from sunlight.
2. Radiant Energy	B. Energy from nuclear reactions.
3. Nuclear Energy	C. Energy produced by moving air.
4. Wind Energy	D. Power flowing through wires.

Answer: 1 – D, 2 – A, 3 – B, 4 – C

Solution:

Electrical energy is produced by the movement of electric charges through wires.
Radiant energy is energy that travels in waves, such as light from the sun.
Nuclear energy is released during nuclear fission or fusion reactions.
Wind energy comes from the movement of air and is used to generate electricity.

Answer the Following Questions

11. How can understanding the different forms of energy lead to more efficient energy consumption and sustainability practices in everyday life?

Answer:

Understanding different forms of energy helps individuals choose efficient energy sources and reduce wastage. For example, using solar energy reduces dependence on fossil fuels, and energy-efficient appliances consume less electricity. This awareness promotes conservation, lowers costs, and supports sustainable living.

12. What role does energy play in environmental changes, and how can an understanding of energy conservation principles inform policies aimed at combating climate change?

Answer:

Energy production and consumption significantly affect the environment through pollution and greenhouse gas emissions. Understanding energy conservation helps governments design policies that promote renewable energy, reduce emissions, and encourage efficient energy use. Such policies help combat climate change and protect natural resources.