

According to the New Syllabus

**AHMER'S**

# GENERAL SCIENCE

**for Class - X**

Complete & Comprehensive Notes

**This Book Contains**

- ✓ Detailed Questions & Answers (DAQ's)
- ✓ Short Questions & Answers (SAQ's)
- ✓ Multiple Choice Questions (MCQ's)
- ✓ Complete Solution of Text Book Exercises
- ✓ Important Diagrams for Examinations

**by**

**Salima Moosa Sewani**



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**FOR  
MORE!!!**

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Chapter - 1

# Energy

## Section-I : Multiple Choice Questions (MCQ's)

1. **Energy is defined as:**
  - a) Force
  - b) Work
  - c) Fuel
  - d) Ability of body to do work ✓
2. **The energy that we get by eating food is known as:**
  - a) Mechanical energy
  - b) Potential energy ✓
  - c) Kinetic energy
  - d) Heat energy
3. **When we throw a ball up in the air, after reaching a certain height it begins to fall due to:**
  - a) Potential energy ✓
  - b) Mechanical energy
  - c) Chemical energy
  - d) Kinetic energy
4. **A fuel contains energy which is known as:**
  - a) Mechanical energy
  - b) Electrical energy
  - c) Potential energy ✓
  - d) Kinetic energy
5. **When running water moves a turbine the potential energy of water is changed into:**
  - a) Kinetic energy ✓
  - b) Mechanical energy
  - c) Electrical energy
  - d) Heat energy
6. **Solar energy is known as:**
  - a) Radiant energy ✓
  - b) Thermal energy
  - c) Mechanical energy
  - d) Chemical energy
7. **Which of the following is the most dangerous air-pollutant?:**
  - a) Dust particles
  - b) Garbage
  - c) Carbondioxide
  - d) Carbon monoxide ✓



8. Which of the following causes air pollution the most now a days?:

- a) Animal waste
- b) Burning of fuels ✓
- c) Stone crushing industry
- d) Liquid wastes from industries

9. What are aerosols?:

- a) Harmful gases
- b) Small material particles ✓
- c) Radio active substances
- d) Water vapour

10. In order to reduce air pollution we should reduce:

- a) The number of vehicles ✓
- b) The number of trees
- c) The electrical appliances
- d) Hydral power plants

11. The form of energy which is stored in body is :

- a) Kinetic Energy
- b) Potential Energy ✓
- c) Chemical Energy
- d) Electrical Energy

12. The energy by virtue of motion of the body is :

- a) Kinetic Energy ✓
- b) Poential Energy
- c) Chemical Energy
- d) Heat Energy

13. Machines are said to posses :

- a) Heat Energy
- b) Kinetic Energy
- c) Mechanical Energy
- d) All of above

14. Which of the following in not included in conventional source of energy:

- a) Coal
- b) Gas
- c) Oil
- d) Sun ✓

15. The inner most layer of the earth is called :

- a) Mantle
- b) Earth's crust
- c) Core ✓
- d) None of these

16. Energy obtained from plant residue, bagasse, molasses & animal dung, is :

- a) Geothermal Energy
- b) Tidal Energy
- c) Bio-Mass Energy ✓
- d) Energy from wind

17. Nuclear energy is also termed as :

- a) Solar Energy
- b) Atomic Energy ✓
- c) Tidal Energy
- d) Heat Energy

## Chapter - 1 : Energy

18. The exhaust fumes from a gasoline or diesel engine usually contains:

- a)  $\text{CO}_2$
- b)  $\text{CO}$  ✓
- c)  $\text{SO}_2$
- d)  $\text{NO}_2$

19. Aerosole are :

- a) Poisonous Gases
- b) Nitrogen Compounds
- c) Small material particles ✓
- d) Carbon gases

20. Which of the following is the most harmful air-pollutant?

- a)  $\text{CO}$  ✓
- b)  $\text{CO}_2$
- c)  $\text{SO}_2$
- d)  $\text{NO}_2$

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### Section-II : Short Answer Questions

Question: 1

Explain the term energy.

Answer:

Energy:

Energy is the capability to do work.

OR

Energy is an agent that can bring about any change.

Example:

- (a) If a boat allowed to float on the surface of flowing river, then the river water moves the boat along with it from one place to the other.
- (b) If we strike a nail with a hammer, the nail is driven into the wood.
- (c) A machine cannot do work by itself. It needs a source of energy which could be coal, gasoline, gas or any other fuel, and electricity.

( ) ( ) ( )

Question: 2

What is potential energy?

Answer:

Potential energy:

The energy which a body has because of its position. When a body is raised up from the earth. Its potential energy is equal to its mass multiplied by the acceleration due to gravity multiplied by the height it was raised.



## Chapter - 1 : Energy

### Question: 3

*What do you mean by kinetic energy?*

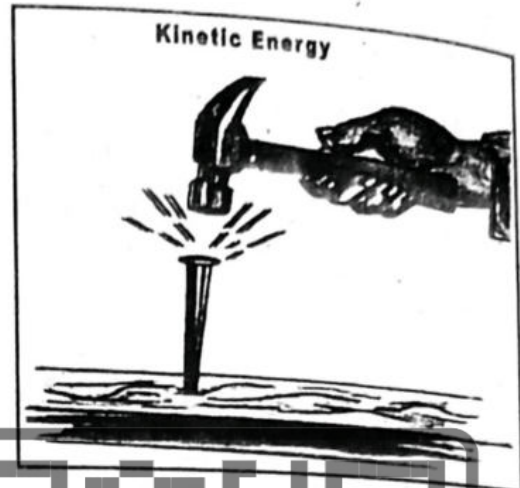
### Answer:

#### Kinetic energy:

The energy which a body has because of its moving. It is equal to one half the mass of the body multiplied by its velocity squared.

#### For Example:

When you kick a foot ball it goes up in the air. After the highest point in the air it begins to fall. While going up in the air it gains potential energy. As it starts falling, its potential energy changes to kinetic energy.



### Question: 4

*What are the main sources of energy at hand in Pakistan.*

### Answer:

#### Source of energy:

The sources of energy are classified as conventional and non-conventional.

#### Conventional Sources:

Conventional sources are coal, wood, oil and natural gas.

#### Non-Conventional Sources:

Non-Conventional sources are the sun, the wind, the tides, earth or geo-thermal, bio-mass and the nucleus of the atom.

### Question: 5

*Describe the conversion of energy.*

### Answer:

Energy conversion is the process of changing one form of energy to another form of energy.

Energy doesn't disappear - just changes the forms. Energy conversion process is happening all the time. Law of conservation of energy states that energy can change form, but it cannot be created or destroyed. That means the total amount of energy stays the always the same.



## Chapter - 1 : Energy

### Examples of Energy Conversion:

1. A toaster transforms electrical energy into thermal energy.
2. Our bodies convert chemical energy from food into mechanical and electrical energy to allow us to move.
3. A natural gas stove converts chemical energy from burning into thermal energy used to cook food.

( ) ( ) ( )

### Question: 6

**Explain the Conventional and Non-conventional sources of energy?**

### Answer:

#### Conventional sources:

We get energy from different sources, such as coal, natural gas, petroleum, water etc. These sources of energy are called the conventional sources of energy.

#### Non-Conventional Source:

We are trying to get energy from Solar rays, wind, tides, bio-gas and geothermal sources. These sources are called Non-conventional sources of energy.

### Question: 7

**Why it is necessary for us to explore non-conventional sources of energy?**

### Answer:

Non-conventional sources are the sun, the wind, the tides, earth or geo-thermal, bio-gas and the nucleus of the atom. Following are the reasons they make non-conventional sources of energy necessary for us:

1. Cheaper and Renewable: Most of the Non-conventional Power resources are cheaper and renewable as compared to the conventional sources.
2. Scarcity of Fossil Fuels: The overall limitation and scarcity of fossil fuels has given rise to the urgent need for exploiting alternative energy sources.
3. Rural Energy Needs: Locally available non-conventional and renewable power resources can meet localized rural energy needs with minimum transportation cost.
4. Inexhaustible and Environment friendly: Power from Non-conventional and Renewable is a must in order to reduce carbon dioxide (CO<sub>2</sub>) emissions of the coal-based power plants. It is inexhaustible in nature and environment friendly.



## Question: 8

*Describe some methods by which we can conserve energy.*

## Answer:

Some methods by which we can conserve energy are:

- 1) We must use energy wisely and economically without unnecessary wastage, because our conventional sources of energy are quite limited.
- 2) The fluorescent lamp uses less current to give the same amount of light that ordinary bulbs do. It is advisable to use fluorescent lamps instead of an incandescent bulbs.
- 3) Old vehicles and transportation trucks may not be allowed to be used any further because these vehicles not only consume more energy but also cause great amount of air pollution.
- 4) We should also use the natural gas very wisely. It should not be left burning in stoves and other appliances like gas heater, and gas lamps unnecessarily.
- 5) If we use these energy sources recklessly, we will be soon under energy crises. The result will be less production in industries and less national progress. It is advisable to use these national sources wisely, so that result will be more production in industries and more national progress.

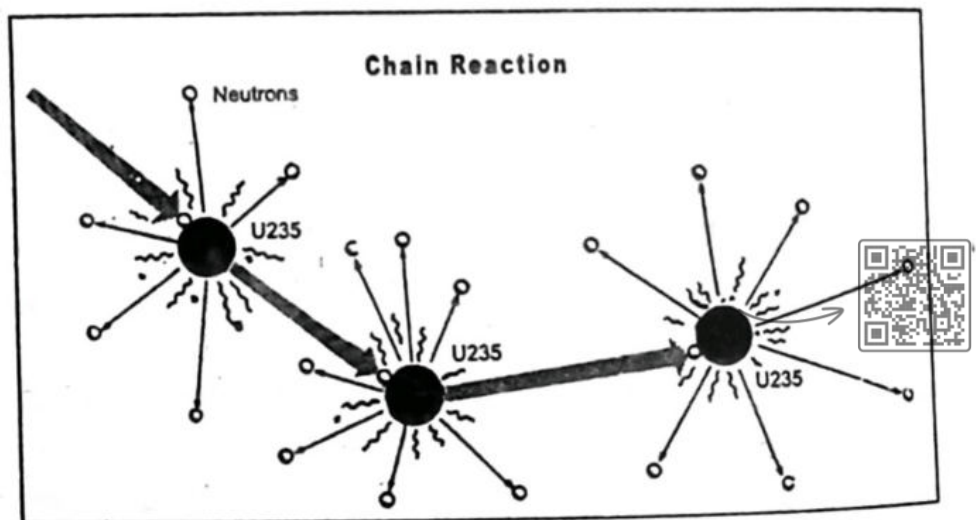
## Question: 9

*What do you understand by a Chain reaction?*

## Answer:

### Chain reaction:

When the nucleus of a uranium-235 atom is struck by a neutron, the nucleus splits into two main parts, but also sets free two or three more neutrons and energy. These neutrons strike other nuclei, which split to release even more neutrons. So, if too many neutrons do



## Chapter - 1 : Energy

not escape from the uranium the reaction will continue. If the piece of uranium is larger than a certain (critical) size the release of energy becomes explosive (atomic bomb). If the reaction is carefully controlled so that the number of neutrons remain steady then energy can be continuously taken away. (The basis of nuclear power station)

( ) ( ) ( )

### Question: 10

**Name any five different forms of energy in which you can convert the chemical energy of a dry cell.**

### Answer:

Chemical energy is stored in the dry cell in the form of potential energy. When we connect it with the bulb or for any button for its use. Chemical reaction starts and discharge of electron starts. Now when these electrons start moving potential energy or chemical energy changed into kinetic energy.

When filament more heated its brightness make the light and electric or heat energy convert into light energy. When bulb starts to give light this light heat up the room and the glass of bulb is heated. At this time light energy convert into heat energy or thermal energy. In this way dry cell provide different forms of energy. Following are the different forms of energy.

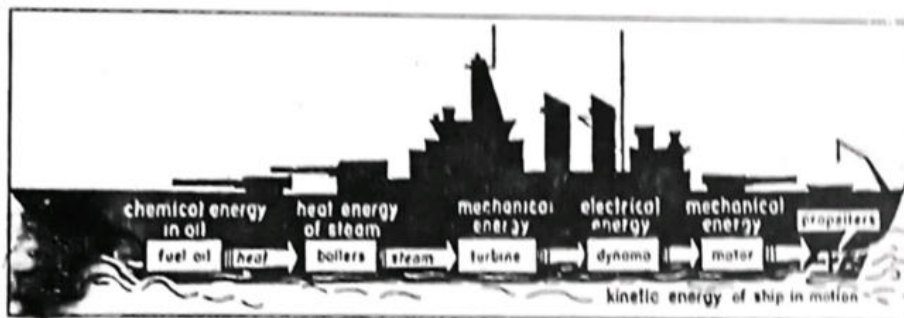
- 1) Electrical energy
- 2) Heat energy
- 3) Light energy
- 4) Magnetic energy
- 5) Mechanical energy

( ) ( ) ( )

### Question: 11

**Name different forms of energy.**

### Answer:



The different forms of energy are:

- (1) Chemical energy
- (2) Electrical energy
- (3) Nuclear energy
- (4) Magnetic energy
- (5) Heat energy
- (6) Light energy
- (7) Mechanical energy



### Question: 12

**Define chemical energy.**

### Answer:

There are many substances whose potential energy is due to their chemical composition. For example: dynamite, gunpowder, coal, gasoline, together with explosives and all fuels contain potential energy because of their chemical nature. This kind of energy is often called chemical energy.

( ) ( ) ( )

### Question: 13

**Define Electrical energy.**

### Answer:

This energy is in the form of kinetic and potential energy. It is related to the flow of electrons. This flow of electrons in a conductor is an example of electrical energy. In charged clouds, electrical energy is present in the form of potential energy. Electrical energy is produced when two clouds carrying opposite charges come close to one another produce thunder and lightening. These moving charged particles are in the form of kinetic energy.

( ) ( ) ( )

### Question: 14

**Define heat energy.**

### Answer:

Heat energy is due to the motion of the molecules in a body as the moving molecules possess kinetic energy. Thus the total kinetic energy of all the molecules inside a body constitute heat energy.

( ) ( ) ( )

### Question: 15

**Define Radiant energy.**

### Answer:

Waves that travel through space, such as light, radio, ultraviolet, radium and X-rays possess kinetic energy. This kind of energy present in waves, is called radiant energy.

( ) ( ) ( )

**Question: 16**

**What do you mean by Conservation of energy?**

**Answer:**

By conservation of energy we mean that whatever energy sources we have at hand, they must be used very carefully without any waste.

( ) ( ) ( )

**Question: 17**

**Describe the importance of Conservation of energy.**

**Answer:**

Conservation of energy requires :

- 1<sup>st</sup> : First of all, understanding of the importance of energy.  
2<sup>nd</sup> : Secondly, we must learn to avoid unnecessary use of energy.  
3<sup>rd</sup> : Thirdly, we must use those machines and appliances which use energy most efficiently.

( ) ( ) ( )

**Section-III : Detailed Answer Questions**

**Question: 1**

**Describe Conventional Sources of energy.**

**Answer:**

**Conventional Sources of energy:**

**(a) Coal, Extraction:**

- 1) Its colour is dark brown or black.
- 2) it is found in nature in solid form.
- 3) Its basic component is carbon, organic and inorganic substances.
- 4) Coal is formed by different pale antillogical plants.

**Uses:**

- 1) Pakistan's still mills run on coal.
- 2) Good quality of coal is used not as fuel, but also for the synthesis of many valuable organic compounds.
- 3) Coke used in the manufacture of iron and steel, is also derived from coal.

**(b) Petroleum, Extraction:**

- 1) Petroleum is the second conventional source of energy.
- 2) It is obtained from soil as a black colour viscous liquid which contains many other impurities.



- 3) Petroleum literally means oil that comes from rock.
- 4) It is first refined in the refineries by fractional distillation into various types of fuels and other chemical such as petrol, diesel and kerosene oil etc.

### Uses:

- 1) Petrol and diesel are used as source of energy to suns, motorcars and soil engines.
- 2) Kerosene oil is used as a common fuel to obtained energy.
- 3) Another oil obtained from petroleum is called lubricating oil. It is used in every machine to minimize the friction.

### (c) Natural Gas, Extraction

- 1) Natural gas is important source of energy.
- 2) This gas is generally found along with the deposits of petroleum.
- 3) The chemical analysis of the gas has shown that it is formed by many organic compounds such as methane, ethane, propane and butane.

### Uses:

- 1) Natural gas is widely used in Pakistan for heating and cooking purposes in our home.
- 2) It is used in many industrial plants and in fertilizer production.
- 3) It is also used in power plant units for generating electricity.

### (d) Water, Extraction

- 1) water is also another important source of energy.
- 2) It is collected in very big lakes and dams, and then allowed to fall under pressure on the turbines during which, the potential energy of water is converted into the mechanical energy.
- 3) This mechanical energy runs the turbine and electricity is produced by the generators attached to the turbine.

### Uses:

- 1) Heat and nuclear energy could also be the source of electric energy, but electricity produced by water is cheaper.

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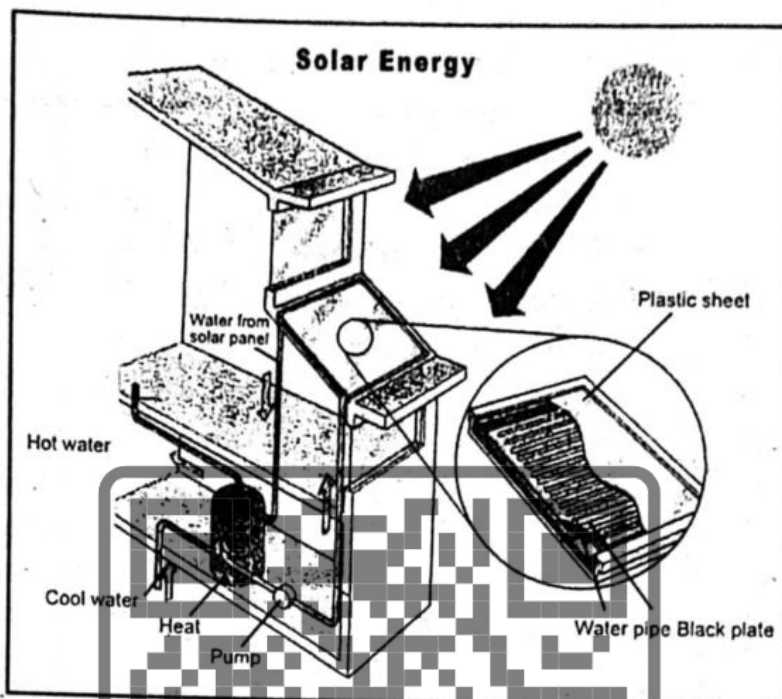
## Question: 2

Define non-conventional source of energy.

### Answer:

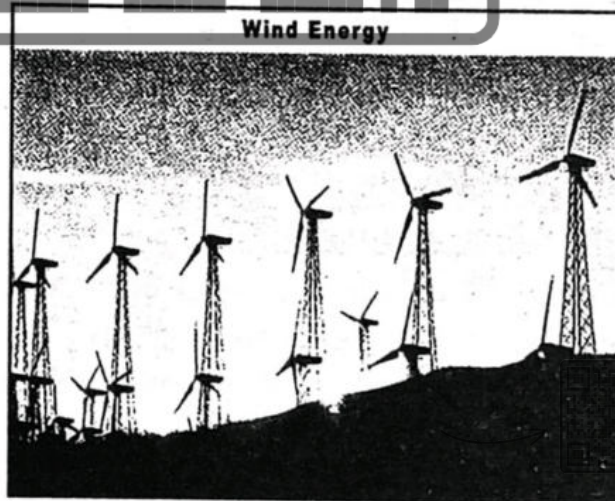
#### (a) Solar energy:

- 1) Now a days electric current is obtained from sun's energy. A device called a Solar cell can change the energy of sunlight to electrical energy.
- 2) It is used to generate electricity.
- 3) Batteries made up of solar cells have been used to run radios, television, equipment in artificial satellites going around the earth.
- 4) It is being used extensively for heating of homes and offices.
- 5) It is estimated that every square kilometre of earth's surface receives approximately 1500 mega watt of solar energy.



#### (b) Wind energy:

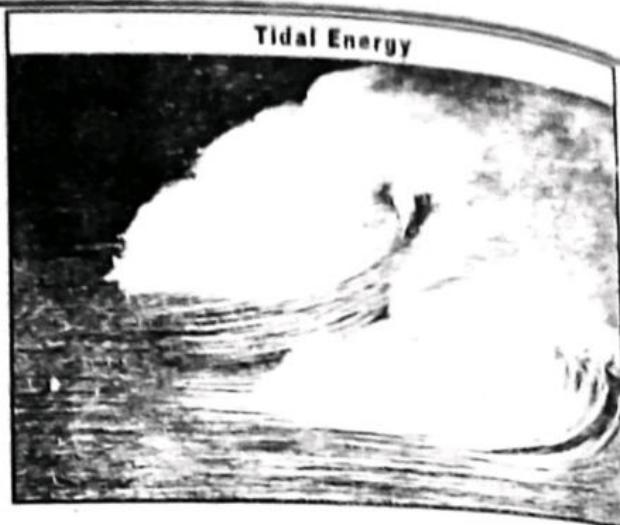
- 1) Wind mills are being used to generate electricity on a commercial scale.
- 2) In places where wind speed is high, large blades can be used to capture wind energy.
- 3) The motion of the blades can be used to run electric generators.
- 4) Wind mills were first used in Central Asia over 1300 years ago.
- 5) Wind mill can also be used to lift water from deep wells.





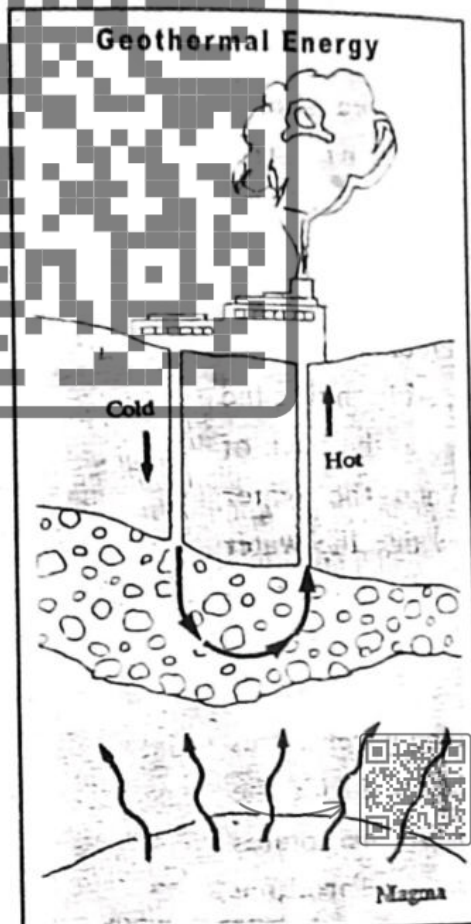
## (c) Tidal energy:

- 1) Tides rise in the sea due to gravitational pull of the moon on sea water.
- 2) Twice during twenty four hours huge amount of water rushes towards and recedes away from the sea shores. Making use of this phenomenon, cheap electricity can be generated.
- 3) A dam is constructed at the mouth of a Creek situated at the sea coast. When the water recedes at low tide, the water in the dam is allowed to flow out through the dam.
- 4) The outgoing water drives the turbine located inside the dam, and the turbine rotates the generator to produce electricity.
- 5) One such plant is generating 240 mega watt of electricity in France.



## (d) Geothermal energy:

- 1) Geo means earth, thermal means heat. This means the heat of the earth.
- 2) The source of this energy is molten lava in the interior of the earth.
- 3) In certain regions of the earth, this is situated near to earth surface.
- 4) Sometimes water deposits are found around this lava. Due to very high temperature of the lava, this water turns into steam. This steam can be used to generate electricity.

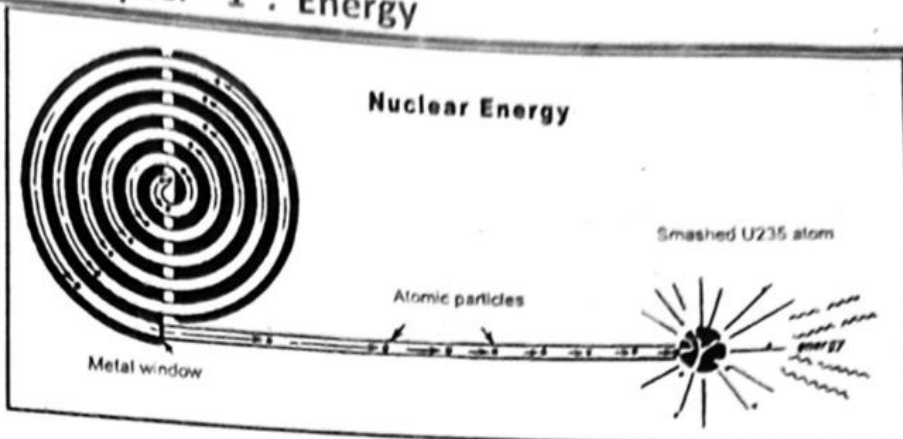


## (e) Nuclear energy:

- 1) Nuclear energy is the energy released from the nucleus of the atom, when it is hit by a slow moving atomic particle, called neutron.
- 2) At present energy is obtained from the nuclear reactor using uranium as fuel.

## Chapter - 1 : Energy

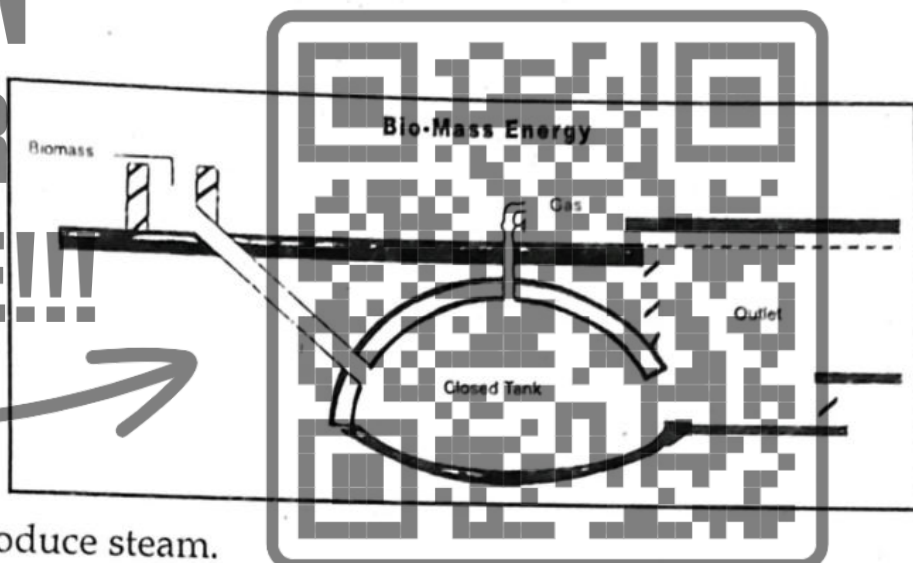
- 3) Energy released by splitting up all the atoms in just one pound of uranium 235, would send a ship three times around the world.



- 4) Significant amount of energy used in the world are obtained from this source.
- 5) Among the Muslim countries, Pakistan's first nuclear reactor near karachi, names KANNUP has the capacity to generate 170 mega watts of electricity.

### (f) Bio-Mass energy:

- 1) Wood, straws, biogas, crop residues and other biomass produces heat energy, when burned.
- 2) In sugar mills biogas is burnt extensively to produce steam.
- 3) Alcohol can be distilled after fermentation of molasses and grain.
- 4) Alcohol is used in medicines and laboratories for heating purposes.
- 5) In Brazil alcohol prepared from molasses is being successfully used as fuel for cars and trucks.



&&&

### Question: 3

**Write notes on Internal Combustion Engine.**

### Answer:

The internal combustion engine is an engine in which combustion of fuel and an oxidizer occur in a confined space called combustion chamber. This exothermic reaction creates gases at high temperature & pressure which are permitted to expand. Internal Combustion engine is defined by useful work



## Chapter - 1 : Energy

that is performed by expanding hot gases acting directly to cause the movement of solid parts of engine.

**Basic Process:-** It has 4 steps.

- i) **Intake:-** Combustible mixture are emplaced in combustion chamber.
- ii) **Compression:-** The mixture are placed under pressure.
- iii) **Combustion:-** The mixture is burnt almost invariable a deflagration although a few systems involved detonation.
- iv) **Exhaust:-** The cooled combustion products are exhausted.

( ) ( ) ( )

### Question: 4

**Discuss Conservation of Energy in Pakistan?**

### Answer:

Our energy sources in Pakistan are still limited we have nothing surplus to save for the future use. Our immediate demand of energy is much greater than its supply.

By conservation of energy we mean that whatever energy sources we have at hand, they must be used very carefully without any waste.

We must remember that only 5 percent of the electrical energy is changed into light in ordinary filament bulbs. On the other hand, the fluorescent lamp (commonly known as tube light rod) uses less current to give the same amount of light that ordinary bulbs do. It is advisable to use fluorescent lamps instead of an incandescent bulbs.

Oil consumption is also increasing day by day. Old vehicles and transportation trucks consumer more fuel than the new ones. These vehicles not only consume more energy but also cause great amount of air pollution. Such vehicles may not be allowed to be used any further.

The third conventional source of energy in Pakistan is natural gas. This gas is used in homes for domestic purpose, i.e cooking food and heating water and homes and is also used in fertilizer industry. Also it is used to produce thermal power. We should also use the natural gas very wisely. It should not be left burning in stoves and other appliances like gas heaters, and gas lamps unnecessarily.

If we use these energy sources recklessly, we will soon run short of these sources and we will be soon under energy crises. The result will be less production in industries and less national progress.

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Chapter - 2

# Current Electricity

## Section-I : Multiple Choice Questions (MCQ's)

1. The substance used as a medium between the two plates of a capacitor is known as:  
a) Conductor  
c) Dielectric ✓  
b) Semiconductor  
d) Electrolyte
2. If the charge on a plate of a capacitor is doubled, the potential difference between its two plates will become.  
a) Half  
c) Four times  
b) Double ✓  
d) One third
3. The unit of capacity is known as:  
a) Coulomb  
c) Ohm  
b) Volt  
d) Farad ✓
4. Which one is connected in series with the live wire in the electric circuit of a house:  
a) Galvanometer  
c) Fuse  
b) Voltmeter  
d) Ammeter ✓
5. The commercial unit of electric energy is known as:  
a) Ohm  
c) Farad  
b) Volt  
d) Kilo-watt-hour ✓
6. Electricity usually comes to our homes by two wire or lines, the live (L) and the:  
a) Positive  
c) Earth  
b) Negative  
d) Neutral ✓



7. A ring main circuit has a \_\_\_\_\_ wire which is connected to part (E) of the socket.
- a) First  
b) Second  
c) Third ✓  
d) Fourth
8. The unit of current is :
- a) Amperes ✓  
b) Volt  
c) Joule  
d) Coulomb
9. Energy or work per unit charge is known as :
- a) Current  
b) Resistance  
c) Voltage ✓  
d) Potential difference
10. The circuit which keeps the current flowing is called :
- a) Open circuit  
b) Closed Circuit ✓  
c) Direct Circuit  
d) Alternate Circuit
11. The capacity of capacitor which stores a charge of coulomb if the potential difference between the plates is 1 volt, is called :
- a) Coulomb  
b) Ampere  
c) Farad ✓  
d) Ohms
12. The current which changes its direction many times a second is called :
- a) Direct Current ✓  
b) Alternate Current  
c) Open Current  
d) Closed Current
13. The frequency of AC generated by the different power stations in Pakistan is :
- a) 20 Hz  
b) 50 Hz  
c) 100 Hz  
d) 150 Hz
14. A galvanometer having high resistance in series is called :
- a) Ammeter  
b) Volt meter ✓  
c) Multimeter  
d) DMMs
15. The instrument used to measure D.C, A.C and resistance values is called :
- a) Multimeter  
b) Ohmmeter  
c) Analogue multimeter ✓  
d) DMMs
16. DMMs stands for :
- a) Delicate multimeters  
b) Dangerous multimeters  
c) Digital multimeters ✓  
d) None of these

## Section-II : Short Answer Questions

**Question: 1**

**Define electric current and write its equation.**

**Answer:**

**Electric Current:**

When electrons flow through a wire, it is called electric current. An electric current can only be noticed by its effects. It sets up a magnetic field, causes heating of the conductor in which it flows, and can cause chemical action.

**Unit:** Its unit is ampere.

**Equation:**  $I = dQ/dt$

**Question: 2**

**What do you mean by Conventional current?**

**Answer:**

**Conventional Current:**

Electric current is taken as an electric fluid which flows from the positive terminal of the source of emf to the negative terminal.

OR

The direction of current is from positively charged body to a negatively charged body. This current is known as conventional current.

**Question: 3**

**State and explain Ohm's law.**

**Answer:**

This law was found experimentally by a German physicist George Simon Ohm.

**Statement:**

The current passing through a conductor is directly proportional to the potential difference applied across its ends, provided the temperature and other physical condition of the conductor are kept constant. This statement is referred to as Ohm's law.

**Formula :**  $V = IR$

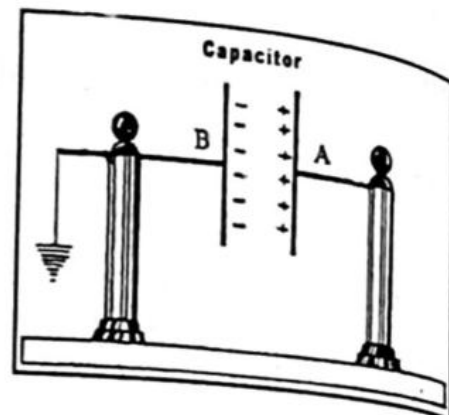


### Question: 4

**Define Capacitor.**

### Answer:

A device for storing electric charge. It usually consists of two parallel conductor separated by some insulating material (the dielectric)



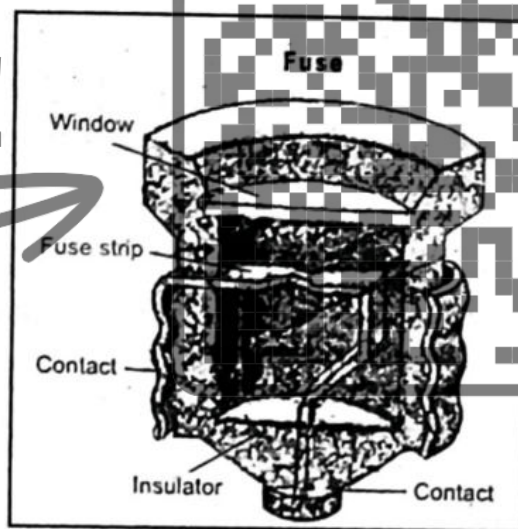
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### Question: 5

**Define Fuse.**

### Answer:

A thin piece of wire which protects an electric circuit. It is made so that it melts if too great a current.



() () ()

### Question: 6

**Define Farad.**

### Answer:

The unit of capacity is called Farad. The symbol is F. A capacitor has capacitance of one farad, if the potential difference between its plates rises by one volt if it gains an electric charge of one coulomb.



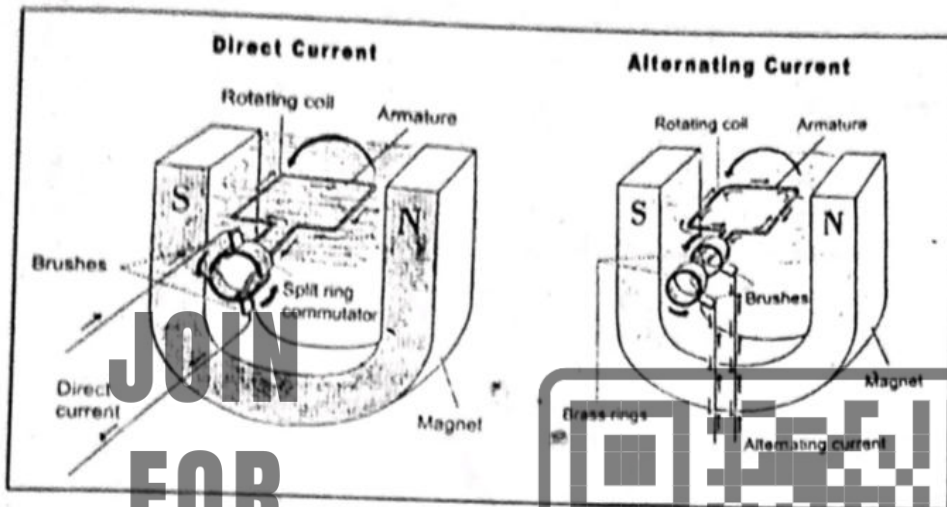
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**Question: 7**

**Define Direct and Alternate current.**

**Answer:**

An electric current flowing steadily in one direction is called direct current.  
A type of electric current whose strength varies regularly with time is called alternate current.



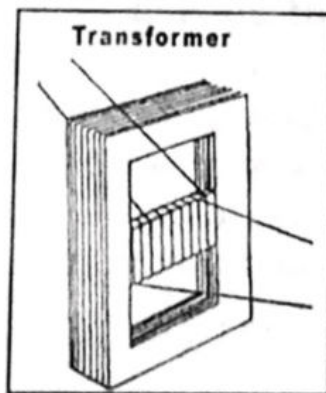
**Question: 8**

**Define Transformer.**

**Answer:**

A component which will change the potential difference of an alternating current supply very efficiently. It contains two coils wound on the same frame work or core, made of a special alloy. The alternating current flowing in the first (Primary) coil magnetises the core and the rapidly changing magnetic field induces (induction) an alternating current in the second (Secondary) coil. It is nearly true that,

$$\frac{\text{Potential difference across primary}}{\text{Potential difference across secondary}} = \frac{\text{number of primary turns}}{\text{number of secondary turns}}$$





**Question: 9**

**Define Ammeter.**

**Answer:**

A galvanometer having a low resistance in parallel with the coil is used to measure electric current and is called ammeter.

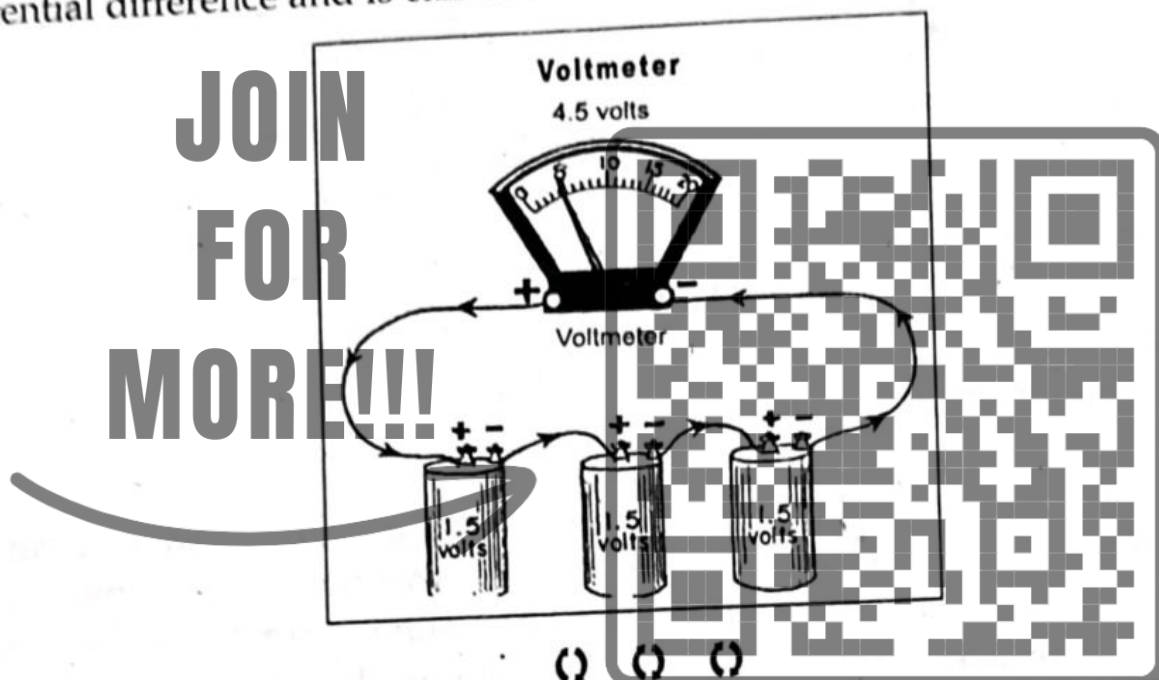
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**Question: 10**

**Define Voltmeter.**

**Answer:**

A galvanometer having high resistance in series is used to measure potential difference and is called voltmeter.



( ) ( ) ( )

### Section-III : Detailed Answer Questions

**Question: 1**

**Write short note on Unit of current.**

**Answer:**

The rate of flow of charge through a certain cross-section is called current. The amount of flow of electrons or current of electricity is measured in units called amperes. An amperes measures the flow of electricity that pass through any given point in an electrical conductor in one second.

( ) ( ) ( )

**Question: 2**

**Write short note on Volt.**

**Answer:**

Volt is a unit of voltage, i.e the pressure of electrons and is symbolized by "V". One volt is the potential difference (Voltage) between two points when one joule of energy is used to move one coulomb of charge from one point to the other.

() () ()

**Question: 3**

**Write short note on Switches.**

**Answer:**

Switches are commonly used for controlling, the opening or closing of circuits.

For Example: A switch is used to turn a lamp on or off.

**Switch of some kind**

- a) The type of switch indicated in Single Pole Single Throw (SPST) toggle switch.
- b) Single Pole Double Throw (SPDT) type of switch used to control the current to two different lamps, when one lamp is on the other is off vice versa.
- c) More examples of switches are Double Pole Single Throw (DPST) Double Pole Double Throw (DPDT), Push Button (PB) and Rotary.

() () ()

**Question: 4**

**Write short note on Resistance.**

**Answer:**

We know that an electric current is due to the motion of electrons. When these electrons move in a wire their motion is opposed by the atoms in the wire. The electrons move through the atom like a swarm of bees passing through the leaves and the branches oppose the free motion of the bees. The obstruction or hinderance offered to the flow of electron is known as the resistance of the conductor.



### Factors on which the resistance depends:

Magnitude of the resistance depends upon the following factors.

- (1) Nature of conductor
- (2) Length
- (3) Area of cross section
- (4) Temperature

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### Question: 5

*Write short note on Earthing and safety*

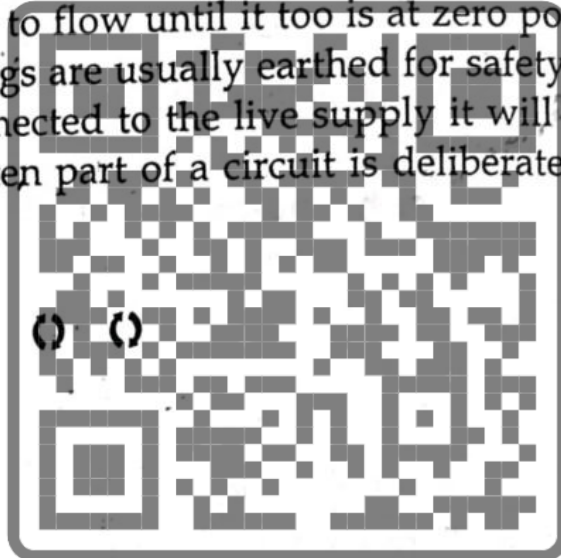
### Answer:

The connection of an electrical conductor to a large conducting body, such as the Earth, which is used as the zero in the scale of electrical potential. Earthing a conductor causing charge to flow until it too is at zero potential. In electrical appliances, any metal casings are usually earthed for safety, so that if the casing accidentally becomes connected to the live supply it will not give a shock to anyone who touches it. Often part of a circuit is deliberately earthed to fix its potential.

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# Basic Electronics

## Section-I : Multiple Choice Questions (MCQ's)

1. The materials in which electric current can flow easily due to their low resistance are called:
  - a) Insulators ✓
  - b) Semiconductor
  - c) Conductors
2. The electric resistance of a semiconductor is increased. temperature
  - a) Decreases ✓
  - b) Increases
  - c) Does not change
3. A p-type substance is formed when a semiconductor crystal is doped with a \_\_\_\_\_ element.
  - a) Trivalent ✓
  - b) Tetravalent
  - c) Pentavalent
4. The current passing through is directly proportional to the potential difference across its ends.
  - a) Insulators
  - b) Semiconductor
  - c) Conductors ✓
5. The frequency of radio lie in the range \_\_\_\_\_.
  - a) 20Hz to 20KHz
  - b) 30KH<sub>3</sub> to 30MH<sub>3</sub> ✓
  - c) 600 MH<sub>3</sub> and above





## Chapter -3 : Basic Electronics

6. Information and \_\_\_\_\_ are more valuable if they can be shared.
- Collection of data
  - Resources ✓
  - Network
7. Which type of element is used in doping Silicon & germanium?
- Pentavalent elements
  - Trivalent elements
  - Both a & b ✓
8. When Si or Ge is doped with pentavalent element, it forms :
- n-type semi conductor ✓
  - p-type semi conductor
  - Both a & b
9. The set of instructions given to a computer is called :
- Input
  - Output
  - Program ✓
10. Ruler, thermometer and speedometer are the examples of:
- Analogue Computer ✓
  - Digital computer
  - Mini Computer
11. LAN stands for :
- Land area network
  - Local area network ✓
  - Large area network

### Section-II : Short Answer Questions

#### Question: 1

What are semi-conducting substances?

#### Answer:

#### Semiconductor:

Semiconductor is a group of materials (e.g germanium and silicon) which come between insulators and conductors in their ability to carry an electric current. They form the basis of transistors and some (non-thermionic) diodes.

### Chapter - 3 : Basic Electronics

#### Question: 2

**Define and give the function of electromagnetic waves in Radio.**

#### Answer:

In case of Radio Transmission, the sound waves are converted into electromagnetic waves. This process is called Modulation and the device is called Modulator.

( ) ( ) ( )

#### Question: 3

**Define picture tube of television.**

#### Answer:

This is a long tube, with a broad, slightly curved front surface on which image appears. This tube is known as kinescope. It is commonly known as picture tube.

( ) ( ) ( )

#### Question: 4

**What are the basic units of computer?**

#### Answer:

A computer consists of four basic units. These are:

- (1) Input Unit
- (2) Control Unit
- (3) Memory Unit
- (4) Output Unit.

( ) ( ) ( )

#### Question: 5

**Name few computer networks.**

#### Answer:

The three most common types of network are:-

- (1) LAN (Local Area Network)
- (2) WAN (Wide Area Network)
- (3) GAN (Global Area Network) commonly called internet.

( ) ( ) ( )



### Question: 6

*What is Electronics?*

### Answer:

#### Electronics:

Electronics is a branch of physics which deals with the development of electron emitting devices and their utilization and controlling of electron flow in electric circuits designed for various purposes.

( ) ( ) ( )

### Question: 7

*What do you understand by the following:*

1) *Insulators*

2) *Conductors*

3) *Doping*

### Answer:

#### (1) Insulators:

Those substances which do not allow the electricity to flow through them are known as Insulators.

Examples: Rubber, Wood, Paper, Glass.

#### (2) Conductors:

Those substances through which the electricity can flow easily are known as conductors.

**Examples:** Materials like copper, iron, aluminium, gold and silver are the examples of conductors:

#### (3) Doping:

The electrical conductivity of silicon or Germanium can however be increased by adding in them a small amount of an element which has either three or five valence electrons in its atoms. This process is called Doping.

( ) ( ) ( )

### Question: 8

*What are Semi-Conducting substances?*

### Answer:

Crystals of Germanium and the Silicon are the example of Semi-Conducting substances.

( ) ( ) ( )

Question: 9

What is Information Technology?

Answer:

Information Technology:

It is a term that encompasses all forms of technology used to create, store, exchange and utilize information in its various forms including business data, conversations, still images, motion pictures and multimedia, Intranet / Internet. It provides the engine and includes computers, software, firmware and related resources.

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### Section-III : Detailed Answer Questions

Question: 1

What are semi conducting materials? Describe p-type and n-type materials.

Answer:

Semi conducting materials

Semiconductor is a group of materials (e.g. germanium and silicon) which come between insulators and conductors in their ability to carry an electric current. They form the basis of transistors and some (non-thermionic) diodes.

Crystals of Germanium and the Silicon are the example of Semi Conducting substances.

n-type Conductor:

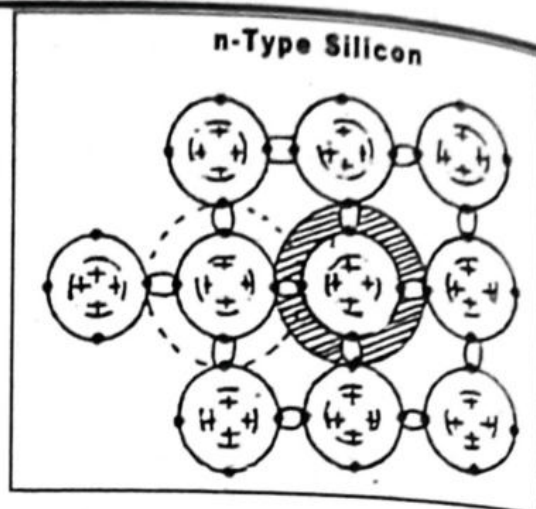
If a silicon crystal is doped with a pentavalent element such as arsenic four out of five electrons of an atom form four covalent bonds with four neighbouring silicon atoms. The fifth valence electron is however free to move





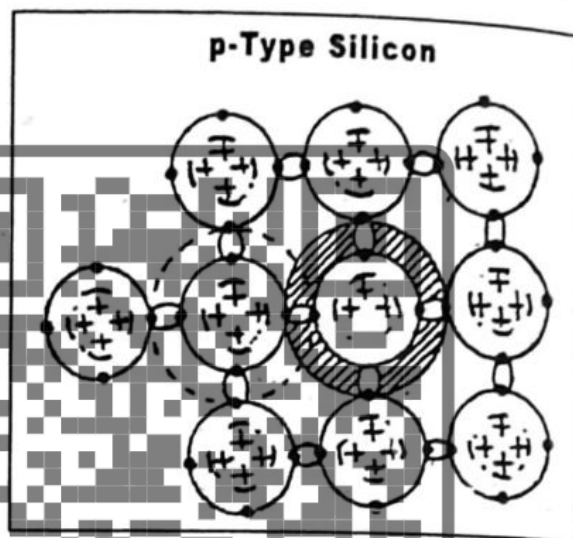
## Chapter - 3 : Basic Electronics

about which makes the doped silicon crystal a better conductor. This material is known as n-type semi-conductor because there is an excess of negative electrons in it to form an electric current. Germanium can also be changed into n-type semi conductor.



### p-type Semi Conductor:

If a silicon crystal is doped with a trivalent element such as Indium, all the the three available valence electrons of an atom form three covalent bonds with three neighbouring silicon atoms. A space known as a hole is so left in the silicon crystals due to the shortage of an electron. This hole behaves like a positive charge and can move from place to place in the crystal on the application of potential difference. Such a material is known as n-type semi conductor because there is an excess of positive charges in it. It should be remembered that holes flow in the direction opposite to electrons.



( ) ( ) ( )

### Question: 2

*Highly pure silicon and germanium crystals are almost insulators, especially at low temperatures. Explain why?*

### Answer:

#### Silicon and Germanium as insulators at low temperature:

Highly pure Silicon and Germanium crystals are almost complete insulators at low temperature because all four valence electrons of each atom form covalent bonds with their neighbouring atoms. As these electrons are tightly bound in covalent bonds so there are no free electrons to form an electric current on the application of a potential difference.

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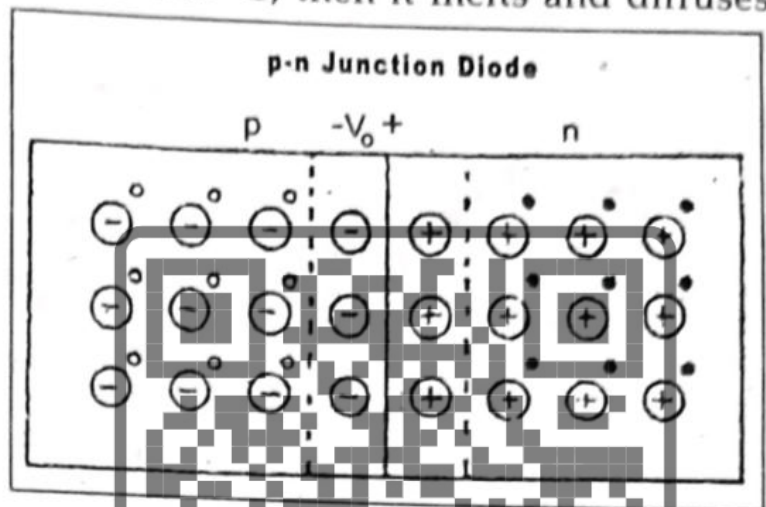
## Question: 3

*p-n junction diode always allows electric current to pass through it in one direction. Why?*

**Answer:**

**p-n Junction diode:**

p-n junction is that electronic device which is formed from a p-type and n-type semi conductors. A p-n junction is fabricated by placing a small amount i.e of indium on a plate (known as wafer) of n-type germanium. When indium is heated to the temperature of  $550^{\circ}\text{C}$ , then it melts and diffuses through the small part of n-type germanium. As Indium is acting as p-type impurity so it converts the part of n-type material ultimately a junction is formed between p-type section and n-type section of the germanium. A brass base is used for fixing p-n junction to which leads are attached. Afterward it is sealed in a metal or glass container.



A positive charge layer is formed on the n-type material and negative charge layer is formed on the p-type material. A potential barrier is developed across the junction which does not to p-type material allow further flow of charge from one side to other. Such a semi conductor device is known as a Diode.

( ) ( ) ( )

## Question: 4

*How does a television camera work to produce a picture?*

**Answer:**

**Television:**

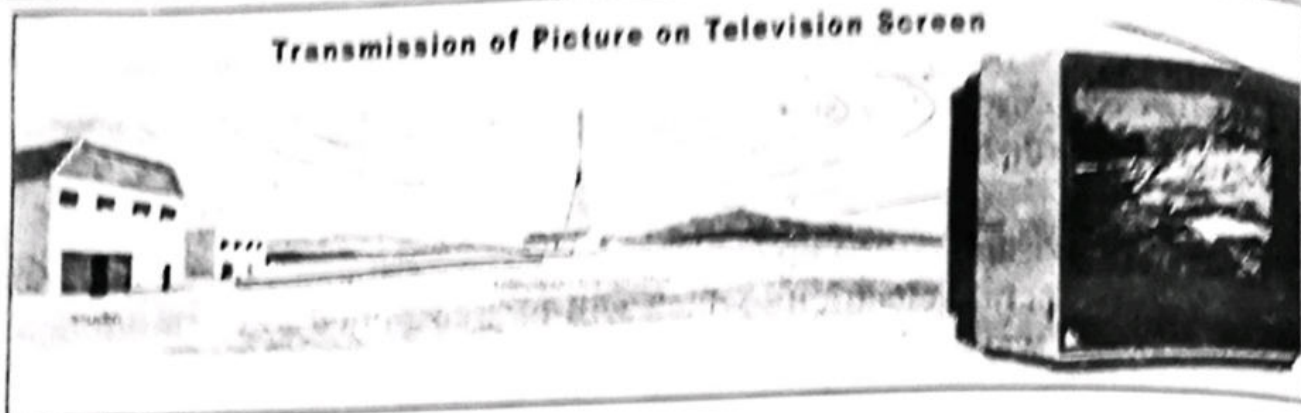
Television is very useful invention. It provides us with entertainment and information about many things including important events going on in Pakistan and the rest of the world. Television is more popular than radio. By means of radio, we can only listen to stories and news, while with television, we can see the pictures of the persons who are speaking or acting.



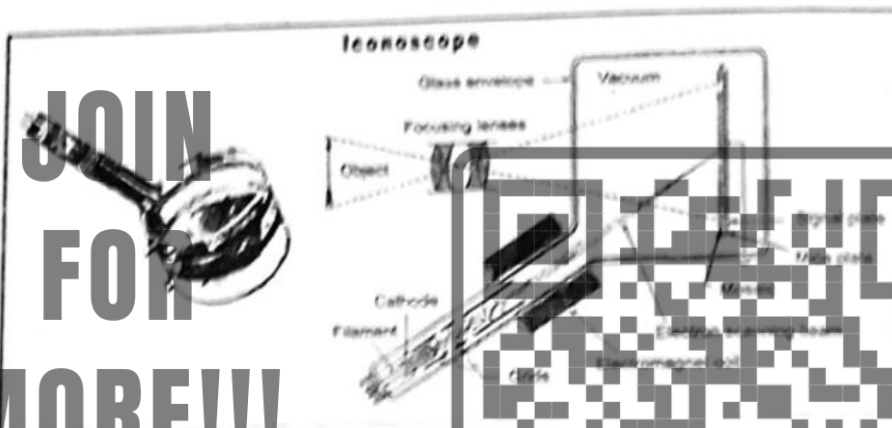


## Chapter - 3 : Basic Electronics

### Transmission of Picture on Television Screen



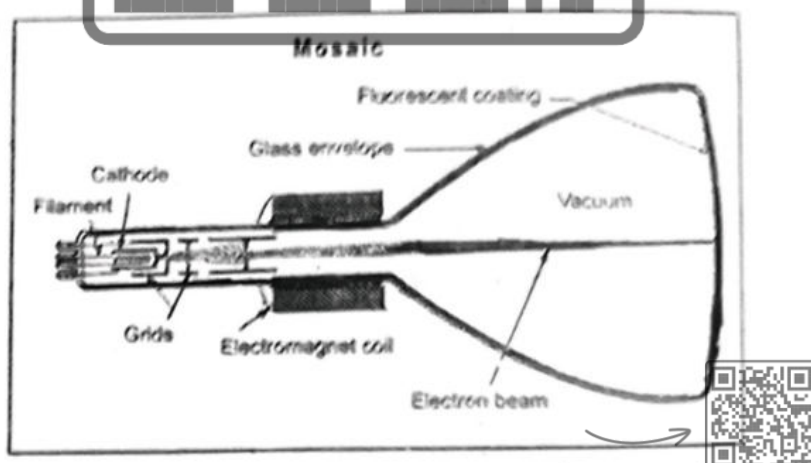
### Iconoscope:



### Formation of Picture:

If we look into the television camera, we see the lenses, as used in any camera, but also there is peculiar radio tube that looks like a cooking pot, made entirely of glass. This tube is called iconoscope and the screen is called mosaic.

**Mosaic Screen:** The convex lens of the camera produces an image of the object scene on a thin photo sensitive plate known as mosaic. In the camera tube the material of the mosaic screen has the ability to emit electrons when the light strikes it.



**Video Signals:** When the electrons are collected they range into voltage pulses known as video of signals.

**Audio Signals:** Sound after converting into voltage pulses is known as Audio signals.

### Chapter - 3 : Basic Electronics

**Function of Amplifier:** Amplified video and audio signals are modulated with the carrier waves of the transmitter and transmitted through an antenna in the form of electromagnetic waves. The components in the T.V set separate the audio and video signals. These signals are also amplified. Audio signals are transmitted to the speaker which changes them back into sound waves.

**Picture Tube:** Video signals are again amplified in the T.V set and a special tube changes these signals back into picture. The tube changing video signals into picture is called picture tube. This tube is known as kinescope.

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**Question: 5**

**What is the importance of Information Technology in Pakistan.**

**Answer:**

Information technology is the advancement of technology of 21<sup>st</sup> century. Pakistan IT sector is trying its level best to educate every one in IT.

Education of computer has been made compulsory in most of the school.

**Information Technology is important in Pakistan because:**

- (1) It's help our country to progress towards the developed country.
- (2) As we know that Pakistan is not on the path of technological advancement. Therefore, IT will help us to boost our economy.
- (3) IT education will bring revolutionary changes in Pakistan.
- (4) It will help our country to connect with International market.
- (5) IT is important for Pakistan to provide access to research and modern information through the internet.
- (6) IT will help to modernize the educational system of Pakistan.

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**Question: 6**

**Write a brief note on Radio.**

**Answer:**

**Radio:**

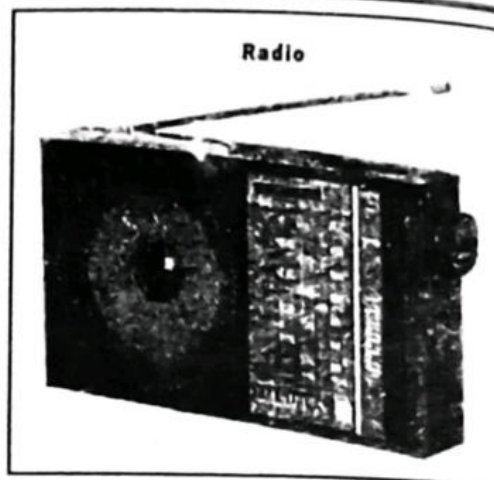
Heinrich Hertz a German Scientist was the first scientist who produced waves through air called radio waves. These waves are always associated with electric and magnetic affects and are therefore, called electromagnetic waves. They are also called Hertzian waves after the name of their discovers.



## Chapter - 3 : Basic Electronics

### Development of Radio:

- In 1906, the human voice was transmitted first time Radio.
- Now a days Radio is playing an important role in human life on land, on sea and in the air.
- It also has great an important role in navigation.



### Basic Principle Concerning the working of Radio:

For radio Broadcasting we require a transmitting station from where the information is sent out through the antenna into atmosphere. At the other end there should be receiving equipment connected to antenna which receives the information.

### Modulation and Modulator:

In case of Radio Transmission, the sound waves are converted into electromagnetic waves. This process is called Modulation and the device is called Modulator.

### Question: 7

*Write a short note on Live Cricket Matches from Australia and England on T.V.*

### Answer:

We have frequently watched on Television set a cricket match which is being played several thousand kilometers away in Australia or England and being shown live in Pakistan. It has become possible due to communication satellite orbiting around the earth.

### Static Satellites in Orbit:

For global communication purposes the satellite launched around the earth must be synchronous. It indicates that they must be kept in their position static relative to the earth. It can be possible only when the orbital velocity of the satellite matches with the spinning velocity of the earth.

### Hovering Satellites:

The satellites which appear to hover motion less above the same point on earth are called Hovering Satellite.

### Geo-Stationary Orbits:

The orbits of the hovering satellites are known as Geo-Stationary Orbits.

### Source of Power Supply of Satellites:

Actually there are several hundreds of communication and weather satellites in geo-stationary orbits at various location around the earth at a height of 36000 km above the earth.

It should be remembered that modern communications satellites are generally powered by solar cells i.e the source of their power supply is solar cell. The solar cells convert sun's radiant energy in electricity. Nuclear energy is also used for supplying power to communication satellite.

### Main Purposes of sending satellites above the earth:

Satellites are sent above the earth for the following purpose:-

- 1) They are designed for T.V transmission for covering the entire world.
- 2) High power directive and land based transmitters send wide band micro waves signals to the communication satellites above the earth.
- 3) They receive the transmission, amplify it and re-transmit to narrow region on the earth below.
- 4) Three geo stationary satellites above equatorial orbits at  $120^\circ$  with each other can cover the transmission for the whole world.

( ) ( ) ( )

### Question: 8

**Write short note on Networking.**

### Answer:

Information and resources are more valuable if they can be shared. A network is simply a collection of data communications, hardware, computers, communication software, and communication media connected in meaningful group to enable the users to share the information and equipment. Networking



## Chapter - 3 : Basic Electronics

has been essential for the following reasons.

1. Network enables users to share files with others. Different department of an organizations may be separated physically being at distant places, but there data could be stored on a central computer. This data is accessed by computers located in different departments. The data at the central computer may be updated from time to time and accessed by all users.
2. Network enables users to share equipments such as laser printers and large hard disk drives which are expensive.

There are many types of computer networks, but the 3 most common types of network.

- i. LAN (Local Area Network)
- ii. WAN (Wide Area Network)
- iii. GAN (Global Area Network)

**Question: 9**

*Describe the development of electronics and its importance in daily life.*

**Answer:**

### Development of Electronics and its importance in daily life

- 1) All of us know that the impact of electrons on the daily life of people all over the world is too much now a days.
- 2) Radio, television, stereo, Hi-Fi sound system, motion pictures and video cassette recorders give us a lot of entertainment and information.
- 3) Calculators have made our work simple and convenient.
- 4) Electronic computers are being used in business, offices, industry, hospitals and research centres.
- 5) Electronics also control the operation of satellites orbiting round the earth. The satellites serve the world-wide communications.

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### Question: 10

**What is a computer? Describe its four important parts.**

### Answer:

#### Computer:

Computer is an invention which can solve complicated problems by following given instructions in a very short time. The set of instructions given to a computer is called the program.

The four important parts of a computer are the following below:

#### (1) Input Unit:

All information in the form of data, and the instructions to handle it are entered into the computer through the input unit. It is a keyboard of an ordinary typewriter.

#### (2) Control Unit:

The information or data given to input unit enters a system which consists of a control and arithmetic logic unit. Control unit acts according to the given instructions and instructs the arithmetic logic unit to perform the necessary calculations.

#### (3) Memory Unit:

Memory unit stores the data, information and instructions needed to solve the problem. It can also store any other information or record, which a person wants to save in the memory notebook of computer.

#### (4) Output Unit:

The happenings in the computer are displayed on the output unit, which is usually a television type screen along with a printer.

The results can be viewed on the television screen and can be printed on the printer for permanent record.



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Chapter - 4

# Science and Technology

## Section-I : Multiple Choice Questions (MCQ's)

1. *Pakistan science foundation was set up in:*  
a) 1973 ✓  
b) 1963  
c) 1975  
d) 1962
2. *National science council of Pakistan was set up in:*  
a) 1962 ✓  
b) 1965  
c) 1972  
d) 1973
3. *During which century many advances were made in different fields of science:*  
a) 17th  
b) 18th  
c) 19th ✓  
d) 20th
4. *P.C.S.I.R was setup in:*  
a) 1952  
b) 1954 ✓  
c) 1962  
d) 1964
5. *The plastic industry has suffered because of lack of support from the:*  
a) Sugar industry  
b) Steel industry  
c) Cement industry  
d) Petrochemical industry ✓
6. *Which of the radioactive ray travel with the speed of light ?:*  
a)  $\alpha$ -rays  
b)  $\beta$ -rays  
c)  $\gamma$ -rays ✓  
d) All of the above
7. *Which of the given particles is nearly four time the mass of*  
a)  $\alpha$ -rays ✓  
b)  $\beta$ -rays  
c)  $\gamma$ -rays  
d) None of these
8. *The rays which are electro magnetic in nature are :*  
a)  $\alpha$ -rays  
b)  $\beta$ -rays  
c)  $\gamma$ -rays ✓  
d) None of these

## Chapter - 4 : Science and Technology

9. **Isotopes of an element have different number of :**  
a) Electrons  
b) Protons  
c) Neutrons ✓  
d) Atomic number
10. **Phosphorus - 32 is used to :**  
a) Study thyroid glands  
b) Locate position of tumour ✓  
c) Tracing blood circulation  
d) Internal haemorrhages
11. **Sound of frequencies higher than 20,000 Hz are called :**  
a) Ultrasounds ✓  
b) Infrasounds  
c) x-rays  
d) None of these
12. **EEG is used in diagnosing disorders of :**  
a) Heart  
b) Brain ✓  
c) Lungs  
d) Stomach
13. **Steel is an alloy of :**  
a) Iron & Copper  
b) Iron & Carbon ✓  
c) Copper & Carbon  
d) Chromium & Carbon
14. **PAEC was established in :**  
a) 1920  
b) 1947  
c) 1959 ✓  
d) 1990
15. **The plastic industry has suffered a lot because of lack of support from:**  
a) Petrochemical industry ✓  
b) Glass industry  
c) Cement industry  
d) Steel mills

( ) ( ) ( )

## Section-II : Short Answer Questions

### Question: 1

**What is the technique of MRI (Magnetic Resonance Imaging)?**

### Answer:

The technique called Magnetic Resonance Imaging (MRI) is based on the fact that the detected EM signal is unique in intensity and duration to each type of tissue in the body.

OR

It is the diagnostic procedure that uses a magnetic field to provide three dimensional images of internal body structures.



**Question: 2**

*What is the importance of sugar industry?*

**Answer:**

**Sugar industry of Pakistan:**

Sugar industry has made a tremendous progress and the number of sugar factories have increased to 78 as against 9 at the time of partition.

**Stages in the Extraction of Sugar:**

There are four stages in the Extraction of Sugar. They are:-

- 1) **Extraction of Juice:** The sugarcane is passed through heavy cutting rollers where it is cut into small pieces. These pieces are then passed through roller mills, where they are crushed and sugarcane juice is extracted.
- 2) **Purification of Juice:** The juice is collected in a big tank 2-3% of milky lime water is added. It helps to (a) prevent fermentation and (b) also neutralizes organic acids. It is then heated and passed through filter press. After filtration, sulphur dioxide is added to (i) precipitate any lime present, and (ii) to decolorize organic colouring matter. The juice is finally filtered again.
- 3) **Concentration and Crystallization:** Purified juice is heated in vacuum pans. Steam is passed through the pans. Crystals of sugar begin to form when liquid juice gets thick enough.  
The syrupy liquid mostly comprises sugar crystal and molasses. Crystals are separated by employing a centrifuge. The crystals are then dried up.

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**Question: 3**

*What do you know about synthetic fibre?*

**Answer:**

**Synthetic Fibre:**

Synthetic Fibre are the result of an extensive search by scientists to increase and improve upon the supply of naturally occurring animal and plant fibres that have been used in making cloth.

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## Chapter - 4 : Science and Technology

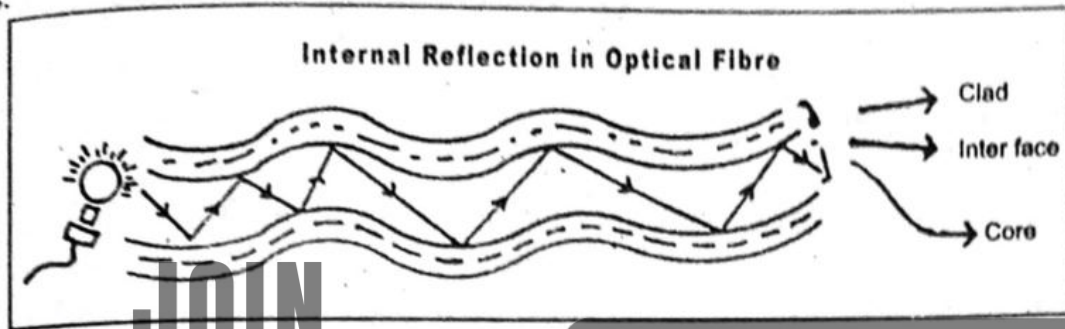
**Question: 4**

**What do you know about Optical fibre?**

**Answer:**

**Optical Fibre:**

Its use of fine transparent fibres to transmit light and to view inaccessible objects.



**Question: 5**

**What is meant by Technology? Name three important technologies.**

**Answer:**

**Technology:**

The branch of knowledge that deals with the creation and use of technical means and their inter-relation with the life and environment is called Technology.

**Important Technologies:**

(1) C.T Scan,

(2) Angiography,

(3) X-rays.

**Question: 6**

**Define Hovering Satellites.**

**Answer:**

The satellites which appear to hover motionless above the same point on earth are called Hovering Satellites.



**Question: 7**

**Define Geostationary Orbits.**

**Answer:**

Orbits where these hovering satellites appear stationary from the earth are called Geostationary orbits.

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**Question: 8**

**Define C.T Scan.**

**Answer:**

It is a type of imaging scan that shows the internal structure of a person brain.

OR

It is a diagnostic imaging procedure that uses a computer and x-rays to present cross section slices of areas of the body.

() () ()

**Question: 9**

**Explain the function of the C.T Scan.**

**Answer:**

**Function of the C.T Scan:**

- 1) It can reveals tumours and small strokes in the brain.
- 2) It is used to determine the cause of cerebral palsy in a child.
- 3) It helps to look at the areas of brain that have not properly developed.
- 4) It can differentiates between the grey and the white matter of the brain.

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**Question: 10**

**Define Angiography.**

**Answer:**

**Angiography:**

Angiography is a procedure to X-ray blood vessels. The blood vessels can be seen because of an injection of a dye through balloon catheter that shows up in a X-ray pictures. It is a tool diagnos many diseases affecting the arteries and veins.

() () ()

**Question: 11**

**Define Electrocardiograph (ECG).**

**Answer:**

It means Electro Cardio Gram, measures the electrical activity of the heart using electrodes attached to the surface of the chest. ECG is being successfully used for diagnosing various heart diseases. To regulate the heart beats an electronic instrument known as "Pace make" is commonly transplanted.

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**Question: 12**

**Define EEG.**

**Answer:**

EEG stands for electro-en-cephalograph. It is a machine which records electric activity of the brain. They are important in the diagnosis of brain diseases for example: Epilepsy, disorders of the brain.

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**Question: 13**

**Name some important industries of Pakistan.**

**Answer:**

Some important industries of Pakistan are:

- |                     |                      |                     |
|---------------------|----------------------|---------------------|
| (1) Sugar           | (2) Steel            | (3) Pharmaceuticals |
| (4) Synthetic Fibre | (5) Textile Industry | (6) Leather         |

() () ()

### Section-III : Detailed Answer Questions

**Question: 1**

**What is the importance of science and technology in Pakistan?**

**Answer:**

**Importance of Science and Technology:**

- (1) It has improved the live of our citizens
- (2) By introducing modern technologies in Pakistan, we are able to explore new minerals and underground resources.



## Chapter - 4 : Science and Technology

- (3) Much of the problems have been solved through an advancement in science and technology.
- (d) Science and technology has helped Pakistani people to have adequate facilities for communication and transport.
- (e) A country is now a nuclear power country. It was because of the development of modern technology, we have been able to secure our country.
- (f) Much of the basic facilities in rural areas have been provided through the advancement of science.
- (g) Pakistan is an agricultural country, bio-technology has improved the productivity of food crop.
- (h) Production of goods and service make human life easy.
- (i) Modern technology helps in the industrial development and in acquiring skills. It puts a country on the road of progress.
- (j) It has helped Pakistani people to have adequate facilities for education in various fields of science and technology.
- (k) Science and technology has improved our health care system in Pakistan.
- (l) Many recent inventions such as ultra sound system are now routinely used in our hospitals.
- (m) In Pakistan there has been a special increase in institution giving training in medicine, engineering and agriculture.
- (n) There are now over 60 organization and research centres involved in carrying out and promoting scientific and technological research in Pakistan.

( ) ( ) ( )

### Question: 2

*What is the role of science in present day industrial production?*

### Answer:

#### Role of Science and Technology in Industry:

When Pakistan came into being, there was hardly any industry in the country. In the next forty years, as a result of various policies several large textile mills were setup. In addition, industries have been established for the manufacture of cement, petrochemicals, paper, electrical and electronic goods and for assembling of motor vehicles. Pakistan has also established a large industry for the manufacture of arms and ammunition. In spite of all this, Pakistan still has to depend largely on imports, for meeting the requirements

## Chapter - 4 : Science and Technology

of machinery and raw material for these industries. Even now most of the equipment used in communication, transport and defence, is being imported. Most of the medicines as well as equipments required for diagnosis are also being imparted. Pakistan has to pay heavily for the use of imported technology and technological products. Pakistan will have to increase its own productivity in scientific and technological fields, so as to cut down the huge expenses on imports. Pakistan is also taking similar steps to boost up her scientific and technological production.

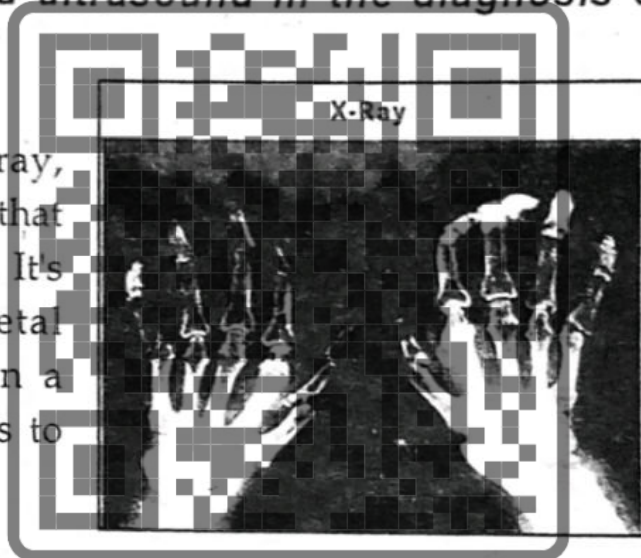
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### Question: 3

*Describe the role of X-rays, and ultrasound in the diagnosis of diseases for treatment.*

### Answer:

X-rays means an electro magnetic ray, having an extremely short wave length that ranges from about 0.1 to 10 nanometres. It's formed by the bombardment of a metal target with high speed electrons in a vacuum tube by the transfer of electrons to the inner shells of heavy rays.



### The Role of X-Rays:

- 1) X-rays are used on large scale to see the picture of bones and parts of the body.
- 2) It is basically used in medical photography.
- 3) It has become possible to ascertain other diseases like tuberculosis of lung, hollow and spongy teeth and stone in the kidney.
- 4) Stomach and food canal can also be examined with the help of X-rays.
- 5) X-rays are used for examining suspected broken bones which are denser than flesh.

### Ultrasound:

The study of sounds that are too high-pitched to be detected by the human ear, i.e have a frequency greater than about 20 kilohertz.



## Role of Ultrasound:

- 1) Ultrasonic waves are used in echo-depth sounding devices to determine the depth of the sea floor.
- 2) Ultrasonic are used to obtain cross-sectional pictures of patients in hospitals.
- 3) Ultrasonic guidance devices are used for the blind, to detect cracks in mental structures, to kill bacteria and micro-organism in liquid.
- 4) Ultrasound are used for different purposes in medicine.
- 5) Ultrasound is considered best to examine the soft fleshy parts of the body e.g the foetus in a pregnant woman.



## Question: 4

Explain Radioactive properties.

## Answer:

### Radio activity

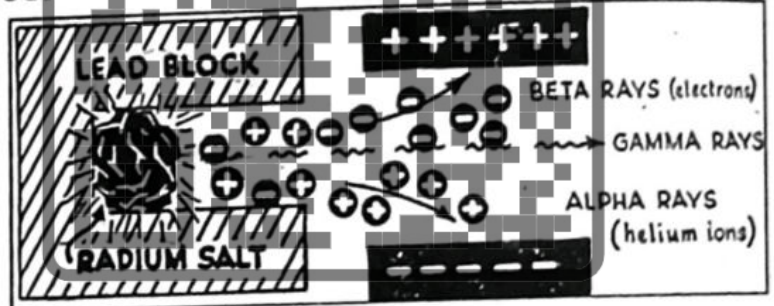
Heavier elements like radium, uranium which affect the photographic plate, this is called Radio activity. The rays emitted are of three types.

- (1) Alpha rays      (2) Beta rays      (3) Gamma rays

### (1) Alpha rays Properties:

Alpha rays consist of such particles which are nuclei of helium. These rays possess the following properties.

- 1) Alpha rays produce fluorescence in certain substances.
- 2) The charge on each alpha-particles is positive and equal to twice the charge on a proton.
- 3) The mass of each alpha-particles is nearly four times the mass of hydrogen nucleus.
- 4) The ionization capability of a  $\alpha$ -rays is very large.
- 5) Penetration power of these rays is very small.



### (2) Beta rays:

These rays consist of fast moving electrons. They possess the following properties.

- 1) The kinetic energy of  $\beta$ -rays is less than that of  $\alpha$ -rays.
- 2) These rays affect the photographic plate.
- 3) These rays produce fluorescence easily, especially in Barium platinocyanides.
- 4) The ionization power of these rays is very small.
- 5) Due to their small mass, these rays as compared to  $\alpha$ -particles are easily scattered by the nuclei of atoms.

### (3) Gamma Rays

They are electromagnetic radiation. Similar to X-rays. They possess the following properties.

- 1)  $\gamma$ -rays produce feeble fluorescence when incident on a screen coated with barium platinocyanides.
- 2) They eject electrons when incident on metals.
- 3) The speed of these rays is equal to that of light.
- 4) like alpha rays, these rays also get absorbed in various materials.
- 5) Penetrating power of  $\gamma$ -rays is very large. It is about hundred, times larger than that of  $\beta$ -rays.

( ) ( ) ( )

### Question: 5

**Explain the function of C.T Scan and MRI.**

### Answer:

- 1) **C.T Scan:** It is a type of imaging scan that shows the internal structure of a person brain.

### Functions of C.T Scan:

- i. It can reveals tumours and small strokes in the brain.
- ii. It is used to determine the cause of cerebral palsy in a child.
- iii. It helps to look at the areas of brain that have not properly developed.
- iv. It can differentiate between the grey and the white matter of the brain.





## Chapter - 4 : Science and Technology

### Function of MRI:

MRI uses a large magnet radio frequencies, and a computer.

- (a) It produces details images of organs and structures within the body.
- (b) It is often done to examine a baby's brain stem, spinal cord and soft tissues.
- (c) It reveal a contrast between normal and abnormal tissues.
- (d) It crates the picture of the internal body tissues.
- (e) The MRI technique avoid the harmful effects of the Ionizing radiation caused by the current prevailing techniques.

( ) ( ) ( )

### Question: 6

*Describe the impact of science on our society.*

### Answer:

#### Impact of Science On Our Society:

1. Science and technology have contributed very significantly to the field of chemical industry.
2. Science and technology as described earlier have enabled man to understand his environment and make use of the materials found in the environment.
3. Man can travel as fast as 1000 km/hour in the air and at an speed of 100 to 120 km/hour on the surface of the earth.
4. Today man is no more ignorant because of the invention of print and electronic media.
5. Today man enjoys a comfortable and easy life as compared to the life of his ancestors and this possible due to the advancement of science and technology.

( ) ( ) ( )

### Question: 7

*What is the role of Science and technology in Pakistan for the formation of scientific institutions?*

### Answer:

#### Formation of Scientific Institutions

At the time of creation of Pakistan there were almost no institutes for development of science and technology. On the instructions of Quaid-i-Azam many institutes were established.

## Chapter - 4 : Science and Technology

- (a) Pakistan agricultural research council PARC was established to carry out research in agricultural research.
- (b) Council for Scientific and Industrial Research PSIR was established to conduct and promote scientific and industrial research.
- (c) For research in atomic energy, Pakistan Atomic energy commission PAEC was establishment.
- (d) For the scientific research and development activities in the field of defence production, an organization in the name of Defence Science Organization, DSO was created in 1962.
- (e) In 1964, for research in irrigation field. Research council (IRC) was setup.
- (f) To regulate the scientific and technical progress and coordinate the various activities at the ministerial level of Govt. A Research Division of Science and technology was continued in 1964.
- (g) Pakistan Science Foundation (PSF) was created in 1973 to co-ordinate and support research in science and technology.
- (h) As a result of all these efforts, there are now over sixty organizations and research centres involved in carrying out and promoting scientific and technological research in Pakistan.



### Question: 8

*Describe in detail the steel industry of Pakistan.*

### Answer:

#### Steel Industry of Pakistan:

In Pakistan a big steel mills is established in 1973 by the collaboration of Russia, at Pipri, near Karachi.

#### Manufacture of Steel:

The pig iron or cast iron is heated strongly to melt it in a specific furnace called Bessemer Converter. A blast of cold air is blown through the molten mass. The oxygen of air burns out most of carbon, phosphorus and other impurities. The carbon content is dropped to the required value.

After about ten minutes the air blast is shut off and carefully measured amounts of other elements like Manganese, Chromium, Nickel are added to get the required quality of steel.



### Stainless Steel:

Stainless steel is prepared by adding of chromium; Nickel and Molybdenum in calculated amounts.

### Alloy Steel:

Alloy steel is prepared by adding manganese, Silicon and Nickel in calculated amounts to have the required quality of steel.

### Uses:

Its use ranges, from house hold goods like cutlery to ships, skyscrapers, automobiles and thousands of other products. Manganese steel is used for making railways tracks, safes and armour plates.

( ) ( ) ( )

### Question: 9

*What is the importance of Pharmaceutical industry?*

### Answer:

### Pharmaceutics:

The pharmaceutical industry, in Pakistan is totally dependent on imported raw materials and formulations under the protective umbrella of powerful international corporations bearing the stamp of their world renowned trade marks. The present position is that, most of the pharmaceutical firms in the country are engaged in packing and mixing imported ingredients. The beverage industry represents another example of the pharmaceuticals.

( ) ( ) ( )

### Question: 10

*What do you know about Optical fibre? Write its uses.*

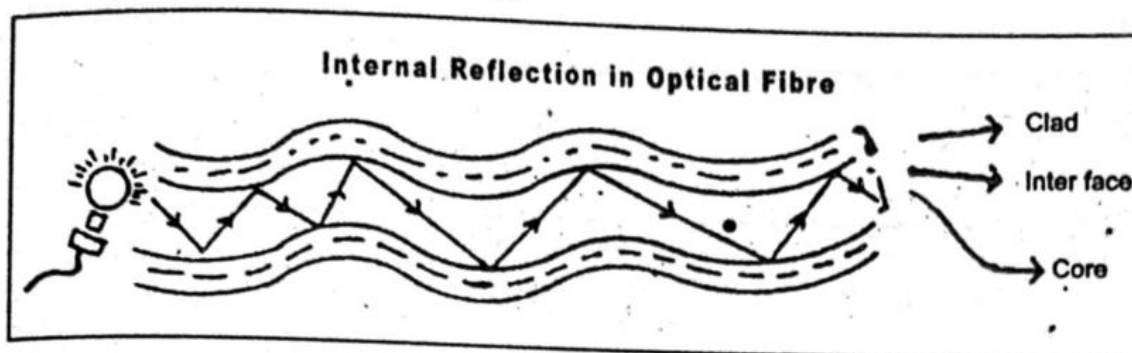
### Answer:

### Optical Fibre:

Its use of fine transparent fibres to transmit light and to view inaccessible objects.

### Uses:

- Optical fibres are used to carry telephone signals and other communication system using laser beams.



- A single strand of light carrying fibre can carry several thousand telephone messages simultaneously without interfering with each other.
- A bundle of 30 fibres are often used to form a cable.
- The information carrying capacity of light is thousand times greater than that of electricity.

### Question: 11

*What do you know about Textile Industry?*

### Answer:

#### Industry:

- Textile industry in Pakistan is mainly based on agricultural or mineral raw materials.
- Textile is most important sector of Pakistan's economy.
- At present the number of textile mills in the country is 503.
- Pakistan is an important products of cotton, which was mainly exported to U.K and Japan.
- Now Pakistan is consuming most of the cotton produced in the country.
- There are some centers of cotton textile manufacturing in the country which include Faisalabad, Karachi, Hyderabad, Multan and Lahore etc.



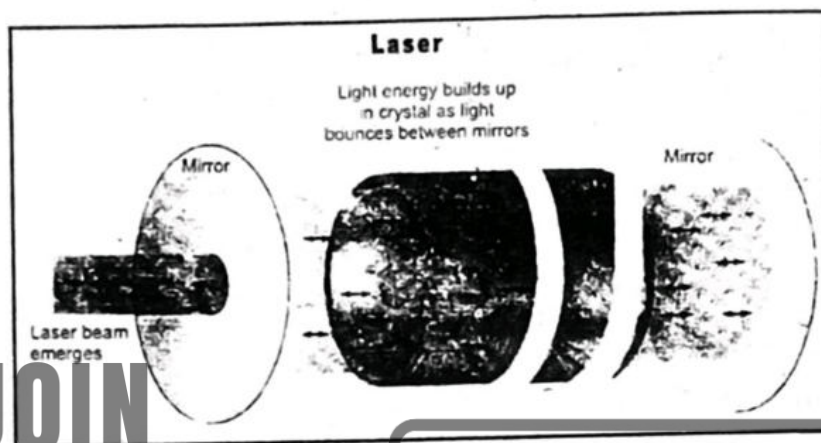


### Question: 12

**Define laser and its Properties and uses.**

### Answer:

#### Laser:



Laser stands for Light Amplification by Stimulated Emission of Radiation. Laser is a most powerful and highly concentrated ray of light. Laser travel in one direction only and for this reason, they travel longer distances without dispersing.

#### Properties:

- 1) It is most powerful and highly concentrated ray of light.
- 2) It travels in one direction only and for this reason, they travel longer distances without dispersing.

#### Uses:

Lasers are widely used in many ways. Some of these are described below:

- 1) They are used for micro surgery of the retina of the eye.
- 2) Very fine lasers are used to destroy the harmful tissues of the body.
- 3) Lasers are used for welding metal joints.
- 4) Lasers are also employed tanks, missiles and bombers to locate the exact position of the enemy and to measure the speed and distance of the planes of enemy.
- 5) Solid state low energy lasers are being widely employed in many electric appliances, like record players.

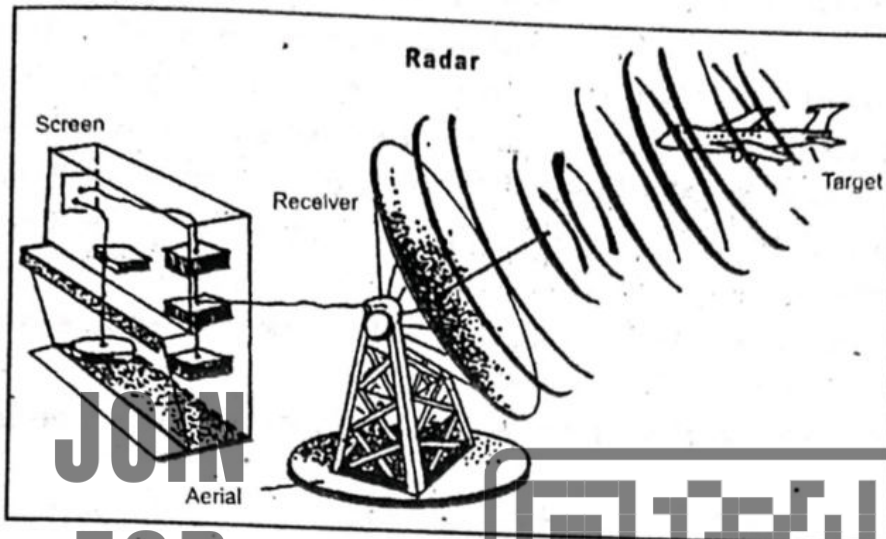
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**Question: 13**

**Define Radar and its importance.**

**Answer:**

**Radar :**



Radar stands for Radio Detection and Ranging. Radar is an acronym for radio direction and ranging. A system for the precise location of distant objects (especially ships and aircrafts) by means of radio.

**Importance:**

- 1) It helps in saving a country from the air raids of the enemy.
- 2) It can help the landing of aircraft in low visibility due to fog or darkness.
- 3) It can help the captain of a ship to be aware of other ships, icebergs and hidden rocks in the surrounding.
- 4) Every modern airport is equipped with a radar system.
- 5) Other important uses of radar are air-traffic control, weather observation and storm warnings.

**Question: 14**

**What are Radio-Isotopes and its uses?**

**Answer:**

**Radio Isotopes:**

Atoms of same element having mass number different from other atoms are called Isotopes. Some of these emit radiations naturally. These are called Radio-Isotopes.



## Chapter - 4 : Science and Technology

### Uses of Radio-Isotopes:

- 1) Radio-Isotopes are used in industries to control the thickness or density of finished goods.
- 2) Radio-Isotopes can also be used to detect leakages in pipes.
- 3) Radiation is also used to kill bacteria and preserve food stuff.
- 4) One very important use of radio isotopes is to determine the optimum amount of fertilizers and other nutrient intake by plants.
- 5) They have helped in the diagnosis and cure of many complicated diseases.
- 6) Certain types of cancers also respond to treatment by radiation emitted by radio isotopes.
- 7) Radio-isotopes are used to find exact intake of an element in plants, animals and humans.
- 8) They are also used to find the exact quantity of fertilizer needed by plants.

### Question: 15

**What are Radioactive Rays? Write four radiation hazards and three precautionary Measures to minimize their harmful effect.**

### Answer:

#### Radioactive Rays:

Heavier elements like radium, uranium which affect the photographic plate, this is called Radioactivity. The rays emitted are of three types i.e. Alpha rays, Beta rays and Gamma rays. These are called Radioactive Rays.

#### Radiation Hazards:

1. Anaemia
2. Leukemia
3. Malignant
4. Cataracts.

#### Precautions to minimize radiation Hazards:

1. One should keep a safe distance away from the radiation emitting sources.
2. The doctor, while giving treatment to a patient by radiation, should take the minimum possible time for radiation exposure.
3. The radiation from a reactor are shielded by thick concrete walls.
4. In laboratories, where radioactive materials are handled the radioactive substance is kept covered in a lead box with a lid made of lead. Lead is a high density material and therefore stops radiations passing through it. The experiments are performed in separate rooms and the students are instructed to handle the apparatus carefully.

Question: 16

Define an Isotope. Write three isotopes of hydrogen.

Answer:

**Isotopes:** Atoms of same elements, having same atomic number, but different atomic masses are called isotopes.

Hydrogen has 3 isotopes i.e.

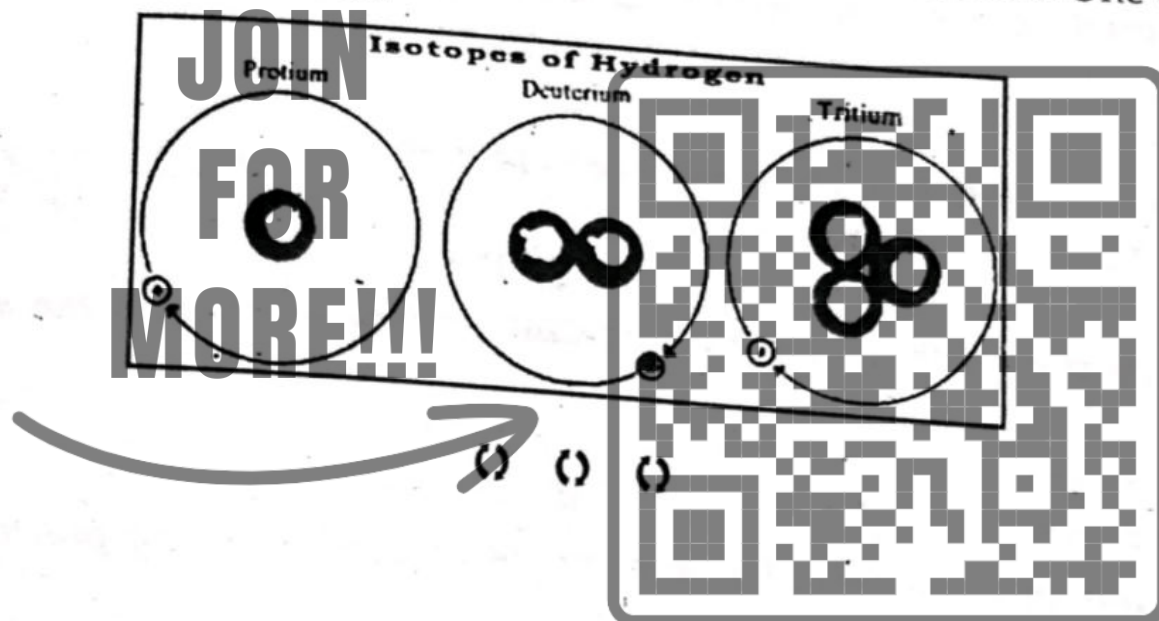
1.  $H$  Protium      2.  $H^2$  Deuterium

3.  $H^3$  Tritium

(i) **Protium (ordinary hydrogen):** It has one proton in the nucleus and one electron in K shell. It has no neutron.

(ii) **Deuterium:** It has one proton and one neutron in the nucleus. One electron revolves in K shell.

(iii) **Tritium:** It has one proton and two neutrons in the nucleus. One electron revolves around the nucleus.





Chapter - 5

# The Space & Nuclear Programme of Pakistan

## Section-I : Multiple Choice Questions (MCQ's)

- 1. National Science Council of Pakistan was setup in:**  
a) 1962 ✓  
b) 1963  
c) 1972  
d) 1973
- 2. Defence science organization was setup in:**  
a) 1962 ✓  
b) 1964  
c) 1979  
d) 1954
- 3. Above the surface of earth, the atmosphere extends to the distance of:**  
a) 250 Km  
b) 350 Km  
c) 450 Km  
d) 650 Km ✓
- 4. The minimum speed of space rocket to overcome the gravity of the earth should be:**  
a) 16,000 km/h  
b) 23,000 km/h  
c) 16,000 km/h  
d) 40,000 km/h ✓
- 5. The new field of science and technology that has emerged a result of space exploration is:**  
a) Space engineering  
b) Space travel ✓  
c) Space information  
d) Space science
- 6. Earth's atmosphere extends at least \_\_\_\_ km from the surface of earth:**  
a) 65 km  
b) 650 km ✓  
c) 6500 km  
d) 6.5 km

## Chapter - 5 : The Space & Nuclear Programme of Pakistan

7. Which of the following country started sending artifical satellite first time?

- a) U.S.A.  
c) China
- b) Russia ✓  
d) pakistan

8. The first men walk on moon, were from :

- a) U.S.A. ✓                      b) Russia  
c) China                              d) Pakistan

9. The abbreviation for space and upper atmosphere research corporation :

- a) SPARCO  
a) K-Electric

**10. The second nuclear power plant is :**

- a) KANUPP      b) CHASNUPP ✓  
a) K-Electric      b) PAEC

## Section-II : Short Answer Questions

### Question: 1

## What do you know about SUPARCO?

**Answer:**

SUPARCO stands for Space and Upper Atmosphere Research Corporation. This organization has its research and testing facilities at Sonmiani near Karachi. It has fired several rockets for weather research. It has also established ground stations to receive data from weather satellites round the clock, for short and long range weather forecasts.

⌂ ⌂ ⌂

**Question: 2**

***What are the misuses and disadvantages of nuclear energy?***

**Answer:**

Nuclear energy released during the explosion of an atomic and hydrogen bomb produces the most harmful effect on living beings (animals and plants). The temperature rises to many million degrees Fahrenheit. As a result of this high temperature, every living being in a radius of several hundred kilometers gets killed.

⌂ ⌂ ⌂



## Chapter - 5 : The Space & Nuclear Programme of Pakistan

### Question: 3

*What is the function of satellite?*

### Answer:

The satellites are launched into the space to do a specific job , There are satellites that are launched to monitor the cloud patterns for the weather station , There are satellites that launched to send television signals for TV , And every satellite has to be designed specifically to fulfill its function. Following are the some functions of satellite.

- (i) The satellites send television signals directly to homes, they send the signals from a central station that generates programming to smaller stations that send the signals locally via the cables or the airwaves.
- (ii) The satellites provide in the flight phone communications on the airplanes, They are the main conduit of voice communication for the rural areas and the areas where the phone lines are damaged after a disaster.
- (iii) The satellites have the ability to rapidly communicate between a number of widely dispersed location.
- (iv) The satellites provide the instant credit card authorization and automated teller banking services to even small towns, They pay at the pump gas at the freeway gas stations , and video conferencing for the international corporations.
- (v) The satellites are the new technology that are mounted on earth orbiting satellites or on the deep space probes , and they can give us an unobstructed view without the earth's atmosphere interfering.
- (vi) They carry the detectors to record the electromagnetic radiation at wavelengths shorter than visible light.
- (vii) The satellite based navigation systems like Global Positioning Systems enable anyone with a handheld receiver to determine his location to within a few meters ,They are known colloquially as GPS .
- (viii) The satellites are used to spy on other countries, They provide intelligence information on the military activities of foreign countries , They can detect the missile launches or the nuclear explosions in space .
- (ix) The satellites are used to search for the ships or the submarines , They can spot the nuclear vessels , And new advancements may allow them to scan the depths of the ocean.
- (x) The use of satellites with the Internet would make access faster and cheaper. This would allow consumers to link their home computers to the Internet.

( ) ( ) ( )

## Chapter - 5 : The Space & Nuclear Programme of Pakistan

### Question: 4

*How many kilometers does the earth's atmosphere extend from the surface of the earth?*

### Answer:

Earth's atmosphere extends at least 650 km from the surface of the earth.

( ) ( ) ( )

### Question: 5

*What was the main purpose to launch space shuttle?*

### Answer:

The main purpose to launch space shuttle was to perform a number of experiments in the field of physics, chemistry and biology.

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( ) ( ) ( )

### Question: 6

*Who is responsible for development of nuclear power in the country?*

### Answer:

Pakistan Atomic Energy Commission (PAEC) is responsible for development of nuclear power in the country.

( ) ( ) ( )



**Section-III : Detailed Answer Questions**

**Question: 1**

***What is the state of science and technology in Pakistan?***

**Answer:**

**State of Science and Technology in Pakistan:**

At the time of creation of Pakistan there were almost no institutes. After creation many institutes were build.

- (1) Pakistan agricultural research council PARC was established to carry out research in agricultural sector.
- (2) Council for scientific and Industrial Research PSCIR was established to conduct and promote scientific and industrial research.
- (3) For research in atomic energy, Pakistan Atomic energy commission PAEC was established.
- (4) In 1959, on the recommendations of the science commission, several large national organization were set up.
- (5) For the scientific research and developmental activities in the field of defence production, an "Organization" in the name of Defence Science Organization, DSO was created in 1962.
- (6) In 1964, for research in irrigation field, Irrigation Research Council (IRC) was setup.
- (7) To regulate the Scientific and technical progress and co-ordinate the various activities of the ministerial level of Govt, A Research Division of Science and technology was constituted in 1964.
- (8) Pakistan Science Foundation (PSF) was created in 1973, to co-ordinate and support research in science and technology.
- (9) As a result of all these efforts, these are now over sixty organizations and research centres involved in carrying out and promoting scientific and technological research in Pakistan.
- (10) There has been an increase in the number of institutions providing education in various fields of science and technology.
- (11) A few centres of excellence have also been established in various universities, to undertake postgraduate education.



## Chapter - 5 : The Space & Nuclear Programme of Pakistan

- (12) Success of famous Pakistani Scientists, have able to make a name for themselves in the world. For example: Dr. Abdul Qadeer Khan, who worked in the field of Atomic energy.
- (13) Many other scientists in the field of Biology, Engineering and Atomic energy are world famous for their research.
- (14) On 18th May 1998, when Pakistan was busy in Islamic Bomb Blast in response of the Indian Bomb Blasts.

( ) ( ) ( )

### Question: 2

*Describe some of the benefits of artificial space satellites.*

### Answer:

#### Benefits of Artificial Space Satellites

The benefits of artificial space satellites are:

- Use of space satellites has brought about a revolution of worldwide communications.
- Telecommunication contacts can be established from one corner of the world to the other through space satellites.
- Space science has developed high technologies in rocket propulsion.
- Weather forecast over extended periods has become possible through space satellites.
- Satellites help to explore and determine the topographic features of earth.
- The first US satellite, Explorer-I opened new avenues of research.
- Space vehicles provide a means to travel to space.
- Aerial and space photography is being used in prospecting minerals, oil, gas and underground water resources.



( ) ( ) ( )



## Chapter - 5 : The Space & Nuclear Programme of Pakistan

### Question: 3

*Write a note on Pakistan space programme.*

### Answer:

#### Pakistan's Space Programme

Pakistan is one of the very few developing countries which has established an organization for space research. The name of this organization is SUPARCO. It stands for Space and Upper Atmosphere Research Corporation. This organization has its research and testing facilities at Sonmiani near Karachi. It has fired several rockets for weather research. It has also established ground stations to receive data from weather satellite round the clock, for short and long range Weather forecasts. Pakistan is a large country spread over a vast area. It must, therefore, have its own communication satellite plans, to send two satellites in different Geosynchronous Orbits to ensure round the clock communication all over Pakistan. Out of these one satellite, Badr 1 has been realised into space in July 1990.

### Question: 4

*Explain the informations about space obtained by space science and technology.*

### Answer:

- 1) Space exploration yields useful information and provides useful economic benefits. Now many nations besides USSR and USA have established their own powered by engines which produce high speed gases which are allowed to escape from the bottom end of the rocket. The rocket as a result is propelled forward.
- 2) The first rockets were made in the beginning of the present century.
- 3) The real break through came with the development of the V-range of rockets, by the Germans during the second world war.
- 4) USSR started the era of space exploration by sending their first ever artificial satellite.
- 5) The first man to orbit the earth is an artificial satellite was a Russian astronaut.
- 6) The first men walk on the moon and then return to earth were two Americans. They landed on the moon in July, 1966.

## Chapter - 5 : The Space & Nuclear Programme of Pakistan

- 7) Space exploration has opened new vistas for development. The very first US satellite, Explorer-1 opened new avenues of research.
- 8) The idea of a permanent space was first advanced by a Russian scientist. He thought that such a station could be used as a supply depot for rockets going further beyond. The station could also be used as an experimental laboratory, where experiments not possible on earth could be performed.
- 9) The first TV relay station Telstar was released in space in 1962.
- 10) Weather satellites provide daily information about short and long range weathers.
- 11) Other satellites provide information about earth's magnetic field and cosmic rays.
- 12) Communication satellites provide reliable and continuous telephone and television transmission throughout the world.



### Question: 5

**What is the role of Russia and America in space exploration and technology?**

### Answer:

Russia and America plays an important role in the exploration and technology.

- Russia started the era of space exploration by sending their first ever artificial satellite Sputnik-1 into space by a powerful rocket on 4th October, 1957. USA soon followed.
- The first rocket to land on the moon was fired by Russia.
- The first man to orbit the earth in an artificial satellite was also a Russian astronaut.
- The first men to walk on moon and then return to earth were two Americans. They landed on the moon in July 1969.



## Chapter - 5 : The Space & Nuclear Programme of Pakistan

- The idea of a permanent space station was first advanced by Russian Scientists.
- Space exploration has opened new vistas for development, The first US Satellite, Explorer-1 opened new avenues of research. It discovered certain regions around the earth which are populated by charged particle. These regions have been given the name Van Allen Belts.



### Question: 6

*Throw light upon the nuclear programme of Pakistan.*

### Answer:

#### Nuclear Programme of Pakistan:

- 1) In 1955, Pakistan Atomic Energy Commission was established. In 1972 an Atomic Power Reactor was established, near Karachi. This reactor is capable of producing 170 megawatt of electricity.
- 2) Pakistani scientists have successfully fabricated fuel rod from uranium mined in Pakistan. The fuel used in the Karachi Nuclear power plant, is also made in Pakistan.
- 3) Besides energy, atomic technology is being successfully exploited in the fields of agriculture, medicine and industry.
- 4) One institute called Nuclear Institute of Agriculture and Biology (NIAB) at Faisalabad, and one centre at Tando Jam are engaged in producing new varieties of seeds, which are disease resistant.
- 5) Long time preservation of food and fruits by irradiating them are being introduced through the nuclear centre of food and agriculture near Peshawar.
- 6) Under the supervision of Pakistan Atomic Energy Commission, the use of nuclear radiations in medicines has been introduced in 09 Nuclear Medical Centers/Institutes in the country.
- 7) Pakistan has made significant progress in the field of atomic energy.
- 8) It is expected that in future atomic energy will play an important role in Pakistan's economy.

○ ○ ○

**Question: 7**

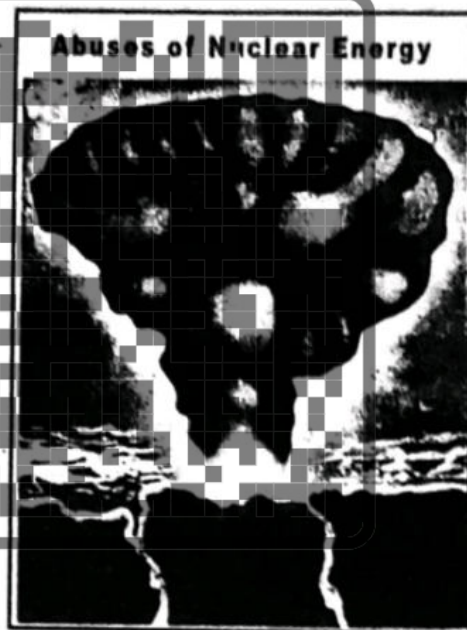
**What are the hazards of Nuclear energy?**

**Answer:**

**Hazards of Nuclear energy:**

The Hazards/disadvantages of Nuclear energy are:

- 1) Nuclear energy released during the explosion of an atomic and hydrogen bomb produces the most harmful effect on living beings, animals and plants.
- 2) The temperature rises to many million degrees fahrenheit. As a result of this high temperature every living being in a radius of several hundred kilometers gets killed.
- 3) Nuclear weapons are very terrible and can destroy countries.
- 4) Radio active particles are carried away by wind to long distances and affect life of animals and plants wherever they fall.
- 5) The plants absorb these radioactive particles and the animals eat these affected plants.
- 6) When radio active particles fall in a stream, it is take up by fish. Such fishes if taken as food by man cause harm to man too.
- 7) The human beings inhale these particles from air. In addition to this, dangerous rays come out of the affected bodies which harm other healthy beings.
- 8) Nuclear reactions can damage our body cells.
- 9) Excessive nuclear radiations may cause cancer and other dangerous diseases.



( ) ( ) ( )



### Question: 8

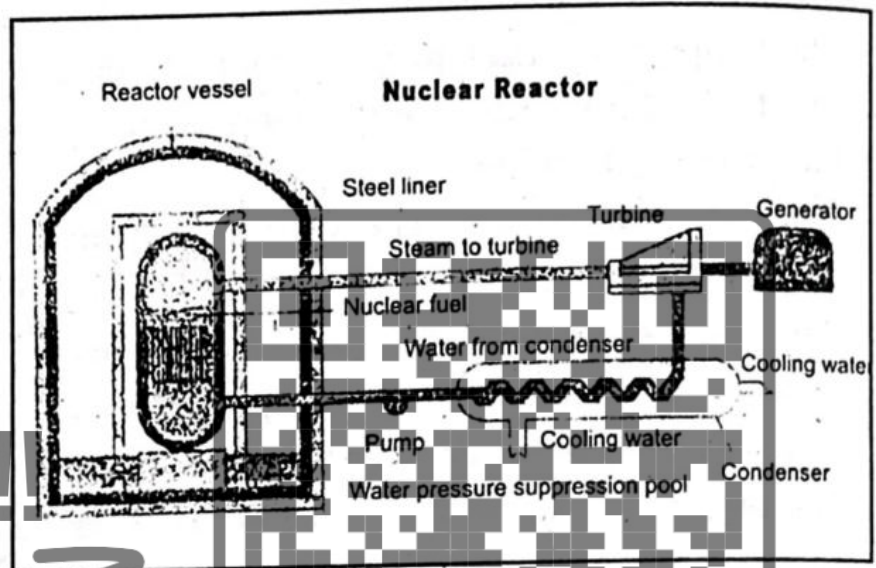
**What are the uses and advantages of nuclear energy?**

### Answer:

#### Uses and advantages of nuclear energy:

Nuclear energy is useful for us in following ways:

- 1) Now a days nuclear energy is being used to operate big ships and submarines.
- 2) The most important use of nuclear energy is that, electricity can be produced by Atomic power.
- 3) Ships can undertake long journeys without carrying huge quantity of oil with them.
- 4) Submarines operated by nuclear energy. Such submarines have successfully crossed the Arctic ocean under its ice cap.
- 5) Radio-iostopes are used in detecting the diseased part of the body.
- 6) Radio-isotopes can be used to detect certain types of cancers.
- 7) Radio-isotopes are very useful in medicine, agriculture, industry and archaeology.
- 8) Radio-isotopes have helped in understand the basic working of many of the internal organs and vital metabolic processes.



**Question: 9**

**What is an artificial satellite?**

**Answer:**

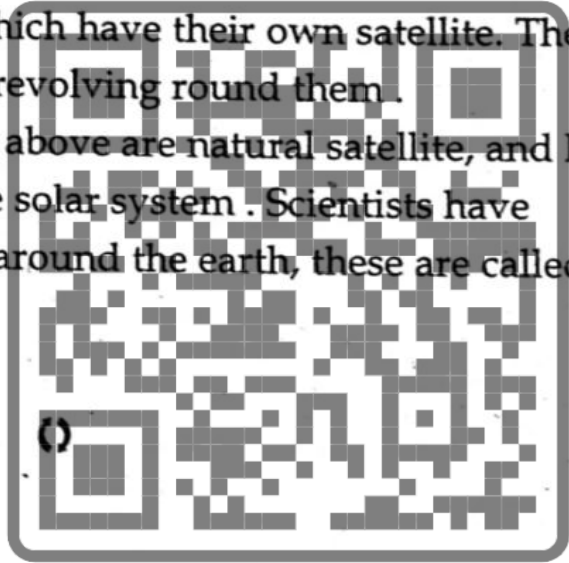
**Artificial Satellite:**

You know that the moon revolves round the earth. It completes one revolution in more than twenty seven days. The earth also revolves around the sun and completes one revolution in more than three hundred and sixty five days.

We call the moon a satellite of the earth. Similarly the earth is a satellite of the sun.

A Satellite revolves along a fixed path which we call the orbit of the satellite. There are other solar planets, which have their own satellite. There are planets that have more than one satellite revolving round them.

The satellites that we have discussed above are natural satellites, and have been revolving since the beginning of the solar system. Scientists have succeeded in sending their own satellite around the earth, these are called Artificial Satellites.



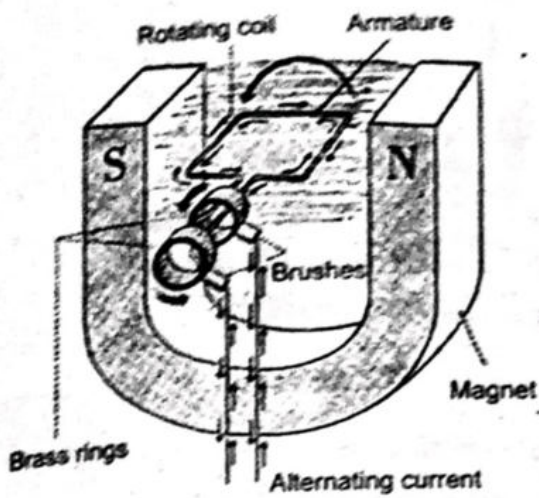




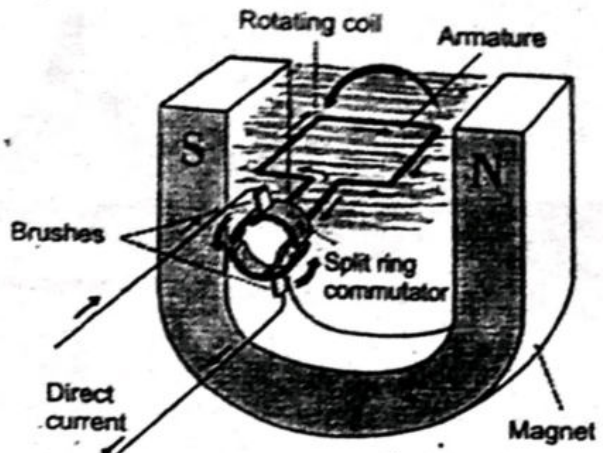
# APPENDIX

**Appendix - I**  
**Important Diagrams**  
**Page # 79-80**

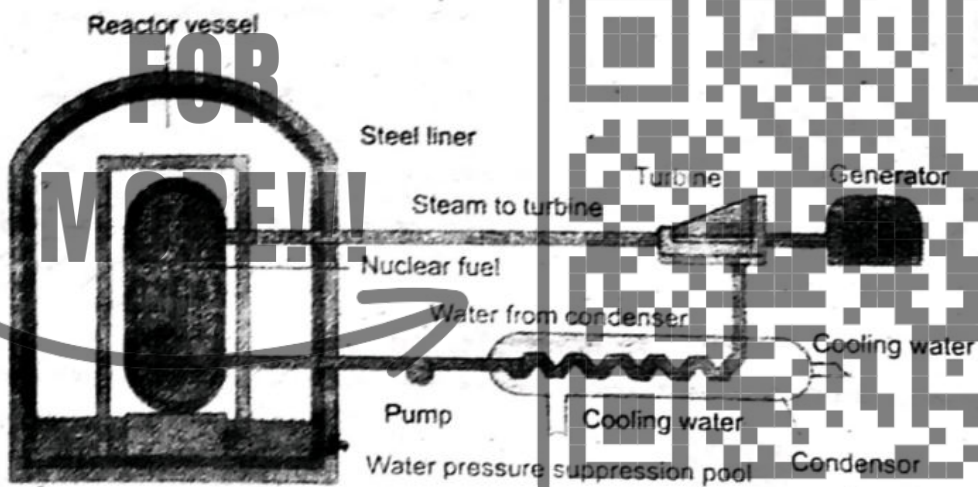
**Appendix - II**  
**Solved Exercises of Text Book**  
**Page # 81-94**



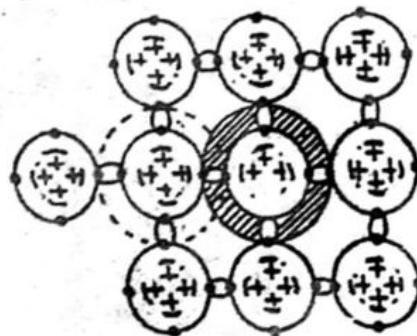
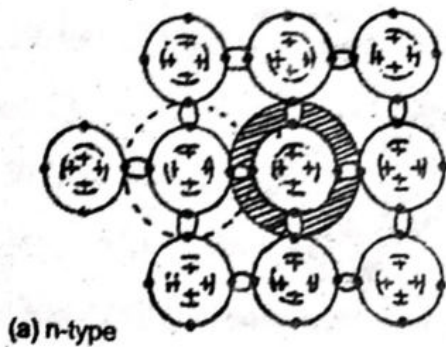
**Alternating current**



**Direct current**

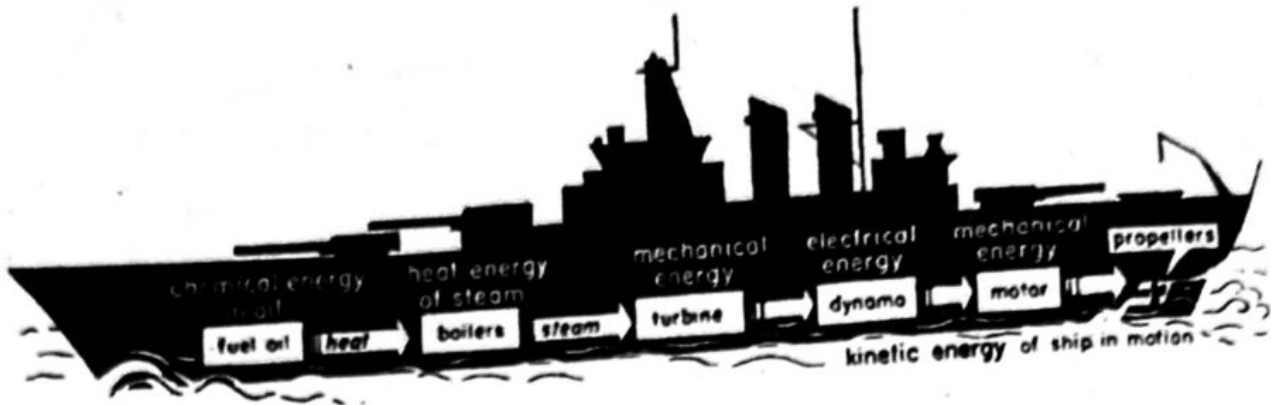


**Nuclear reactor**



**n-type and p-type silicon**



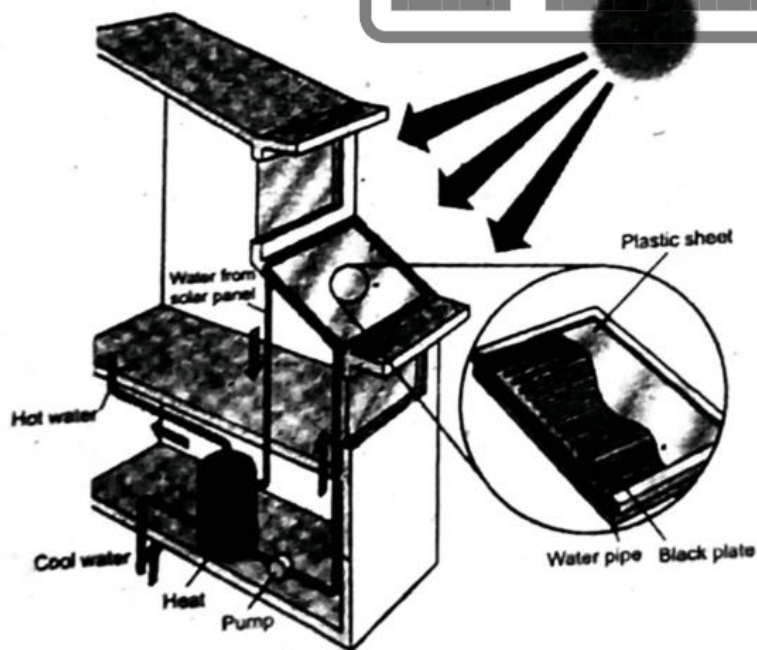
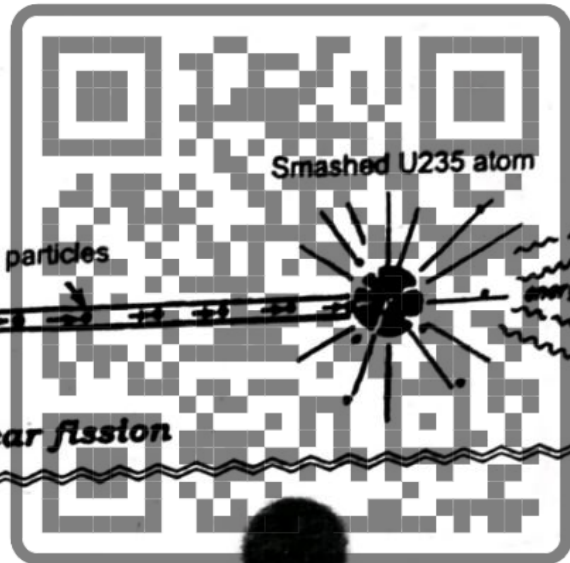


**Ship**



Atomic particles

**Nuclear fission**



**Solar energy**



## APPENDIX - II

### Solved Exercises of Text Book

#### Chapter - 1

JOIN

FOR

Energy

MOBILE

Solved Exercise



**Q.1. Answers of the following questions :**

**(i) Explain the term energy.**

Ans. See Q. No.1, Page No.13.

**(ii) What is potential energy?**

Ans. See Q. No.2, Page No.13.

**(iii) What do you mean by kinetic energy?**

Ans. See Q. No.3, Page No.14.

**(iv) What are the main sources of energy at hand in Pakistan.**

Ans. See Q. No.4, Page No.14.

**(v) Describe the conversion of energy.**

Ans. See Q. No.5, Page No.14.





(vi) Explain the conventional and non-conventional sources of energy?

Ans. See Q. No.6, Page No.15.

(vii) Why it is necessary for us to explore non-conventional sources of energy?

Ans. See Q. No.7, Page No.15.

(viii) Describe some methods by which we can conserve energy.

Ans. See Q. No.8, Page No.16.

(ix) What do you understand by a chain reaction?

Ans. See Q. No.9, Page No.16.

(x) Name any five different forms of energy in which you can convert the chemical energy of a dry cell.

Ans. See Q. No.10, Page No.17.

Q.2. Encircle appropriate answer:

1. Energy is defined as:

- a) Force
- b) Work
- c) Fuel
- d) Ability of body to do work ✓

2. The energy that we get by eating food is known as:

- a) Mechanical energy
- b) Potential energy ✓
- c) Kinetic energy
- d) Heat energy

3. When we throw a ball up in the air, after reaching a certain height it begins to fall due to:

- a) Potential energy ✓
- b) Mechanical energy
- c) Chemical energy
- d) Kinetic energy

4. A fuel contains energy which is known as:

- a) Mechanical energy
- b) Electrical energy
- c) Potential energy ✓
- d) Kinetic energy



5. When running water moves a turbine the potential energy of water is changed into:

- a) Kinetic energy ✓
- b) Mechanical energy
- c) Electrical energy
- d) Heat energy

6. Solar energy is known as:

- a) Radiant energy ✓
- b) Thermal energy
- c) Mechanical energy
- d) Chemical energy

7. Which of the following is the most dangerous air-pollutant?:

- a) Dust particles
- b) Garbage
- c) Carbondioxide
- d) Carbon monoxide ✓

8. Which of the following causes air pollution the most now a days?:

- a) Animal waste
- b) Burning of fuels ✓
- c) Stone crushing industry
- d) Liquid wastes from industries

9. What are aerosols?:

- a) Harmful gases
- b) Small material particles ✓
- c) Radio active substances
- d) Water vapour

10. In order to reduce air pollution we should reduce:

- a) The number of vehicles ✓
- b) The number of trees
- c) The electrical appliances
- d) Hydral power plants



## Chapter - 2

# Current Electricity

## Solved Exercise



Q.1. Fill in the blanks with appropriate terms :

- i) Like charges attract each other and unlike charges seprate each other.



## Appendix - II

- ii) One milli ampere is equal to 10<sup>-3</sup> ampere.
- iii) The difference in potential energy in electric terms is called voltage.
- iv) The unit of voltage is volt.
- v) The rate of flow of electric charge in a conductor is called electric current.
- vi) A battery is a source of electrical energy having fixed polarity and terminals.

### Q.2. Write whether the following statements are true or false :

- i) The potential difference between two points in an electric field is the force exerted on a unit positive charge as it is moved between these two points. (False)
- ii) The electrons in metals which are not attached to any particular atom are known as free electrons. (True)
- iii) The flow of current in a metal is due to the flow of protons (False)
- iv) Volt is the unit of electric current. (False)
- v) The conventional current always flows from a point at a higher potential to a point at lower potential. (False)
- vi) The current passing through a conductor is proportional to the square of the potential difference across its two ends. (False)
- vii) Alternating current is that which changes its direction of flow after definite period of time. (True)
- viii) The unit of electric power is ampere. (False)
- ix) The lamp is controlled from one place by one way switch. (True)

### Q.3. Encircle appropriate answer :

1. The substance used as a medium between the two plates of a capacitor is known as:

- a) Conductor
- b) Semiconductor
- c) Dielectric ✓
- d) Electrolyte

2. If the charge on a plate of a capacitor is doubled, the potential difference between its two plates will become.

- a) Half
- b) Double ✓
- c) Four times
- d) One third

3. The unit of capacity is known as:

- a) Coulomb
- b) Volt
- c) Ohm
- d) Farad ✓

4. Which one is connected in series with the live wire in the electric circuit of a house:

- a) Galvanometer
- b) Voltmeter
- c) Fuse
- d) Ammeter ✓

5. The commercial unit of electric energy is known as:

- a) Ohm
- b) Volt
- c) Farad
- d) Kilo-watt-hour ✓

6. Electricity usually comes to our homes by two wire or lines, the live (L) and the:

- a) Positive
- b) Negative
- c) Earth
- d) Neutral ✓

7. A ring main circuit has a \_\_\_\_\_ wire which is connected to part (E) of the socket.

- a) First
- b) Second
- c) Third ✓
- d) Fourth

Q.4. Write answers of the following questions :

(i) Define electric current and write its equation.

Ans. See Q. No.1, Page No.27.





(ii) **What do you mean by Conventional current?**

Ans. See Q. No.2, Page No.27.

(iii) **State and explain Ohm's law.**

Ans. See Q. No.3, Page No.27.

**Q.5. Write short notes on the following :**

- |                         |                            |
|-------------------------|----------------------------|
| (i) Unit of Current     | (See Q. No.1, Page No. 30) |
| (ii) Volt               | (See Q. No.2, Page No. 31) |
| (iii) Switch            | (See Q. No.3, Page No. 31) |
| (iv) Resistance         | (See Q. No.4, Page No. 31) |
| (v) Earthing and safety | (See Q. No.5, Page No. 32) |

Chapter - 3

Basic Electronics

Solved Exercise

**Q.1. Fill in the blanks with appropriate terms :**

- Semiconductors doped with pentavalent element are called n-type substances.
- The sound carried through space by fluctuating radio waves, also known as radio carrier waves.
- The synchronous satellites launched into an orbit around the earth must keep their position static relative to the earth.
- The set of instruction given to the computer is called program.

v) The input or output units cannot function until they receive signals from the CPU of computer.

vi) In a television network pictures as well as sound are transmitted through electro magnetic wave from one place and are received at far off places.

**Q.2. Write whether the following statements are true or false :**

- i) The electric current can hardly pass through the p-n junction. (False)
- ii) Sound waves travel in a space with the velocity of light. (False)
- iii) The current voltage behaviour of a semiconductor diode is ohmic. (False)
- iv) The statements are also designed to scan earth's natural resources. (True)
- v) n-type semi conductors contain excess of positive charge. (False)
- vi) A p-n junction diode is formed from p-type and n-type semiconductors. (True)
- vii) A diode allows the flow of charge from one side to the other. (False)
- viii) A carrier wave is not a radio waves. (False)
- ix) In a computer the control unit instructs the arithmetic unit. (True)
- x) Micro processor is just a chip. (True)

**Q.3. Encircle appropriate answer :**

1. The materials in which electric current can flow easily due to their low-resistance are called:

- a) Insulators ✓
- b) Semiconductor
- c) Conductors

2. The electric resistance of a semiconductor temperature is increased.

- a) Decreases ✓
- b) Increases
- c) Does not change



3. A p-type substance is formed when a semiconductor crystal is doped with a \_\_\_\_\_ element.

- a) Trivalent ✓
- b) Tetravalent
- c) Pentavalent

4. The current passing through is directly proportional to the potential difference across its ends.

- a) Insulators
- b) Semiconductor
- c) Conductors ✓

5. The frequency of radio lie in the range \_\_\_\_\_

- a) 20Hz to 20KHz
- b) 30KHz to 30MHz ✓
- c) 600 MHz and above

**Q.4. Write detailed answers of the following questions :**

(i) What are semi conducting materials? Describe p-type and n-type materials.

Ans. See Q. No.1, Page No.37.

(ii) Highly pure silicon and germanium crystals are almost insulators, especially at low temperatures. Explain why?

Ans. See Q. No.2, Page No.38.

(iii) p-n junction diode always allows electric current to pass through it in one direction. Why?

Ans. See Q. No.3, Page No.39.

(iv) How does a television camera work to produce a picture?

Ans. See Q. No.4, Page No.39.



(v) **What is the importance of information technology in Pakistan?**

Ans. See Q. No.5, Page No.41.

**Q.5. Write short answers of the following questions :**

(i) **What are semi-conducting substances?**

Ans. See Q. No.1, Page No.34.

(ii) **Define and give the function of electromagnetic waves in Radio.**

Ans. See Q. No.2, Page No.35.

(iii) **Define picture tube of television.**

Ans. See Q. No.3, Page No.35.

(iv) **What are the basic units of computer?**

Ans. See Q. No.4, Page No.35.

(v) **Name few computer networks.**

Ans. See Q. No.5, Page No.35.

**Chapter - 4**

## Science and Technology

### Solved Exercise

**Q.1. Fill in the blanks with appropriate terms :**

- Council for Scientific and Industrial Research PCSIR was established to conduct and promote Scientific and industrial research.
- Pakistan Atomic Energy commission (PAEC) was established for research in 1955.
- Council for works and housing was formed in 1962 for constructional works.



- iv) Laser travel in one direction only and for this reason, they travel longer distances without dispersing.
- v) SUPARCO is the institution for space research in Pakistan.
- vi) In Pakistan the central office of SUPARCO is in Karachi.
- vii) The invention of x-rays was made in 1895.

**Q.2. Write whether the following statements are true or false :**

- i) The advanced countries spend about 2.25 percent of the income on scientific research and development. (True)
- ii) Pakistan Research Council was set up in 1962 in Pakistan for research in irrigation. (False)
- iii) In Pakistan the Pakistan Science Foundation was set up in 1964. (False)
- iv) A laser produces very powerful and highly concentrated beam of light. (True)

**Q.3. Encircle appropriate answer :**

1. *Pakistan science foundation was set up in:*

- a) 1973 ✓                      b) 1963
- c) 1975                         d) 1962

2. *National science council of Pakistan was set up in:*

- a) 1962 ✓                      b) 1963
- c) 1972                         d) 1973

3. *During which century many advances were made in different fields of science:*

- a) 17th                              b) 18th
- c) 19th ✓                         d) 20th

4. *P.C.S.I.R was setup in:*

- a) 1952                              b) 1954 ✓
- c) 1962                              d) 1964

5. The plastic industry has suffered because of lack of support from the:
- Sugar industry
  - Steel industry
  - Cement industry
  - Petrochemical industry ✓

Chapter - 5

Q.4. Write detailed answers of the following questions :

- (i) What is the importance of Science and technology in Pakistan?

Ans. See Q. No.1, Page No.51.

- (ii) What is the role of science in present day industrial production?

Ans. See Q. No.2, Page No.52.

- (iii) Describe the role of X-rays, and ultrasound in the diagnosis of diseases for treatment.

Ans. See Q. No.3, Page No.53.

- (iv) Explain radioactive properties.

Ans. See Q. No.4, Page No.54.

- (v) Explain the function of MRI and C.T Scan.

Ans. See Q. No.5, Page No.55.

Q.5. Write short answers of the following questions :

- (i) What is the technique of MRI (Magnetic Resonance Imaging).

Ans. See Q. No.1, Page No.47.

- (ii) What is the importance of sugar industry?

Ans. See Q. No.2, Page No.48.

- (iii) What you know about synthetic fibre?

Ans. See Q. No.3, Page No.48.

- (iv) What do you know about optical fibre system?

Ans. See Q. No.4, Page No.49.



**Chapter - 5**

# The Space & Nuclear Programme of Pakistan

## Solved Exercise

**Q.1. Fill in the blanks with appropriate terms :**

- i) The name of the space research centre of Pakistan is SUPARCO.
- ii) The first man who went around the earth is an artificial satellite was Sputnik-I.
- iii) The rockets which have been sent by Pakistan Space Program are known by the name of weather research.
- iv) In space travel, man got the first significant success on 4th October 1957.
- v) Space travel began in the year 1957.

**Q.2. Write whether the following statements are true or false :**

- i) Radar was invented during the World War-II. (True)
- ii) The idea of space station was first given by an American Scientist. (False)
- iii) Space satellites have brought about revolution in telecommunications. (True)
- iv) Aerial and space photography is used to explore underground natural resources. (False)
- v) Pakistan has also established an institution for space exploration (True)

**Q.3. Encircle appropriate answer :**

**1. National Science Council of Pakistan was setup in:**

- a) 1962 ✓  
b) 1963  
c) 1972  
d) 1973

**2. Defence science organization was setup in:**

- a) 1962 ✓  
b) 1964  
c) 1979  
d) 1954

**3. Above the surface of earth, the atmosphere extends to the distance of:**

- a) 250 Km  
b) 350 Km  
c) 450 Km  
d) 650 Km ✓

**4. The minimum speed of space rocket to overcome the gravity of the earth should be:**

- a) 16,000 km/h  
b) 23,000 km/h  
c) 16,000 km/h  
d) 40,000 km/h ✓

**5. The new field of science and technology that has emerged a result of space exploration is:**

- a) Space engineering  
b) Space travel ✓  
c) Space information  
d) Space science

**Q.4. Write detailed answers of the following questions :**

**(i) What is the state of science and technology in Pakistan?**

Ans. See Q. No.1, Page No.68.

**(ii) Describe some of the benefits of artificial space satellites.**

Ans. See Q. No.2, Page No.69.

**(iii) Write a note on Pakistan space programme.**

Ans. See Q. No.3, Page No.70



(iv) **Explain the information about space obtained by Science and Technology.**

Ans. See Q. No.4, Page No.70.

(v) **What is the role of Russia and America in space exploration and technology?**

Ans. See Q. No.5, Page No.71.

(vi) **Throw light up the nuclear program of Pakistan.**

Ans. See Q. No.6, Page No.72.

(vii) **What are the hazards of nuclear energy?**

Ans. See Q. No.7, Page No.73.

**Q.5. Write short answers of the following questions :**

(i) **What do you know about SUPARCO?**

Ans. See Q. No.1, Page No.65.

(ii) **What are the misuses and disadvantages of nuclear energy?**

Ans. See Q. No.2, Page No.65.

(iii) **What is the function of satellite?**

Ans. See Q. No.3, Page No.66.

(iv) **How many kilometers does the earth's atmosphere extend from the surface of the earth?**

Ans. See Q. No.4, Page No.67.

(v) **What was the main purpose to launch space shuttle?**

Ans. See Q. No.5, Page No.67.

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