SCIENCE 027

3 HRS MARKS:100

Q.1.A. Answer the following: (any two) **06**

1. How is petroleum formed? Write a note on the fractional distillation of petroleum.
2. Write a note on the classification of a spectrum of electromagnetic waves.
3. State the characteristic symptoms of Kwashiorkor disease.

Q.1.B Answer the following in brief: (any five) **10**

1. Distinguish between conventional and non-conventional sources of energy.
2. What should be done to maintain the efficiency of machines?
3. Under what circumstances do women require Extra diet? Why?
4. Write a note on Solar cell.
5. Mention the relation between the unit of heat energy and the unit of mechanical energy.
6. State the characteristics of an ideal fuel.

Q.1.C. Answer in one sentence. **04**

1. How can the efficiency of solar cooker be increased?
2. What are fossil fuels?
3. What is hydroelectric power?
4. State one use of both types of heat engines.

Q.II.A. Answer the following: (any two) **06**

1. Write a short note on carbohydrates.
2. Mention the different methods of food preservation and describe them.
3. What is crop rotation? Explain its importance.

Q.II.B Answer the following in brief: (any five) **10**

1. Milk is a wholesome diet. Explain.
2. State the diseases caused due to deficiency of vitamins.
3. What is dry heating and wet heating?
4. Explain the importance of soil
5. How do rats and birds spoil the food grains?
6. What is malnutrition? State its effects.

Q.II.C. Answer in one sentence. **04**

1. What is the unit for measuring energy available from food?
2. What should be done to prevent goiter
3. Name the implement used in tilling.
4. What is a buffer stock?

Q.III.A. Answer the following: (any two) **06**

1. Explain the food web with figure and an example.
2. What steps should be taken to conserve natural wealth.
3. State the pathological and genetical dangers of radiation.

Q.III.B. Answer the following in brief: (any five) **10**

1. State two chemical properties and two uses of copper.
2. Explain recycling of waste products and its advantages.
3. State the importance of water for living organisms
4. Explain the green house effect.
5. Distinguish between true solution and colloidal solution.
6. Explain the following terms: Biosphere, Ecosystem.

Q.III.C. Answer in one sentence. **04**

1. What is silviculture?
2. What are the natural abiotic resources?
3. Name the bacteria that are present in leguminous plants.
4. How is fog produced

Q.IV.A. Answer the following: (any two) **06**

1. Describe the with the help of a diagram the preparation of ethane gas in the laboratory
2. Explain various forms of Phosphorous
3. How is copper purified electrolytically.

Q.IV.B. Answer the following in brief: (any five) **10**

1. What is an addition reaction. Give an example.
2. State the general properties of metals.
3. Give the uses of sulphur.
4. How will you distinguish between an alkane and an alkene.
5. How is rayon prepared? State its uses.
6. Distinguish between thermoplastics and thermosettingplastics.

Q.IV.C. Answer in one sentence. **04**

1. Write the chemical formula of two neutral oxides.
2. What is the full form of CMC?
3. What is produced on esterification of acetic acid and ethyl alcohol?
4. Which impurity is found in uranium and how much?

Q.V.A. **Answer the following: (any two)** **06**

1. Write a note on detergents.
2. Explain how a star is formed from the protostar phase
3. Write a note on rockets with solid fuel.

Q.V.B. **Answer the following in brief: (any five)** **10**

1. State the uses of artificial satellites
2. Write about Galaxy.
3. Explain light year.
4. Write a short note on the MOON.
5. Distinguish between Mars and Mercury.
6. Give scientific reason: Life is nto possible on far off planets.

Q.V.C. **Answer in one sentence.** **04**

1. Who was the pioneer of the BIG BANG THEORY.
2. What are asteroids?
3. State the principle of the working of a rocket.
4. At what height are the booster rockets detached from the space shuttle?

SOLUTION OF SCIENCE (027)

Q.1.A.1. **How is petroleum formed? Write a note on the fractional distillation of petroleum.**

- Large no of plants and animals get buried deep down in the sea and under sedimentary rocks and get converted to petroleum under pressure and intense heat of the earth.
- Boiling points are different for different fractions and so fractional distillation is done for refining.
- Different fractions are obtained in descending order of their boiling points
- Petroleum gases up to 30 C used as domestic fuel
- Petrol between 30 to 120 C used a sa fuel in vehicles
- Naphtha between 120 and 180 C used as a solvent for petrochemicals
- Kerosene between 180 and 260 C used as domestic fuel
- Diesel between 260 and 340 C used as fuel in heavy vehicles
- Lubricating oil above 340 C for preparation of wax and grease
- Fuel Oil above 500 C used as fuel in steamers
- Asphalt (residue) used for construction of roads.

Q.1.A.2. **Write a note on the classification of a spectrum of electromagnetic waves.**

- Figure
- Electromagnetic waves from sunlight are classified according to their wavelengths and known as electromagnetic spectrum
- Waves within 4000 A and 8000 A is called visible light
- Violet(4000-45000 A);Blue(4500-5000 A);Green 5000-5500 A; Yellow(5500-6000 A); Orange (6000-6500);Red(6500-7000 A).
- Ultraviolet rays are between 100 A and 4000 A. Harmful to living organisms. Absorbed by ozone layer.
- Waves with wavelengths between 8000 – 20000 are infrared rays and . provide heat.
- Sun also emits X-rays Radio waves etc.

3. **State the characteristic symptoms of Kwashiorkor disease**

- Seen in children mostly
- Child looks fatty but has less weight
- He is dull inactive and unenthusiastic
- Skin colour becomes light or dark
- Edema of skin is seen
- Hair becomes scanty and reddish hue
- Edema of liver
- Walls of stomach and intestine become thin
- Secretion of digestive enzymes becomes less
- Diarrhea and Anemia may occur
- In long run kidneys are affected and excretion of amino acids in urine is seen.

Q.I.B 1. **Distinguish between conventional and non-conventional sources of energy.**

Conventional source of energy	Non conventional source of energy
All are non renewable except wood	All are renewable
Cause pollution when used	Don't cause pollution
Are exhaustible	Are in exhaustible
E.g. wood, coal, mineral oil, natural gas etc.	E.g. solar, wind, water energy.

2 **What should be done to maintain the efficiency of machines?**

- Service should be done regularly
- Air pressure in tyres of vehicles should be adequate
- Fuels used in the engines should be pure
- Proper lubricants should be used
- Care should be taken that engine does not become too hot
- Outdated machine should be replaced with new efficient ones.

3 **Under what circumstances do women require Extra diet? Why?**

- Women require extra diet when she is pregnant or nourishing her baby.
- Nutrition taken by pregnant women reach the embryo through blood
- Nutrition taken by nourishing mothers reach the infants through milk
- So extra nutrition required.

4. **Write a note on Solar cell.**

- Cells which convert solar energy to electrical energy are called solar cells
- They are the special devices made form silicon
- When light energy is incident on it a potential difference is developed
- When circuit is joined flow of electrons occur
- Electrical energy formed and is used to rum water pump sets esp. in remote areas where electricity is not available.

5. **Mention the relation between the unit of heat energy and the unit of mechanical energy.**

- Unit of heat energy is calorie and mechanical energy is joule
- Heat required to raise the temperature of 1 kg of water by 1 deg C is 1000 calories.
- Work done to raise the temperature of 1 kg of water by 1 deg C is 4186 joules
- 1000 cal = 4186 joules so 1 cal = 4.186 joules
- 4.186 joules is called the mechanical equivalent of heat.

6. **State the characteristics of an ideal fuel.**

- Calorific value must be high
- Ignition point must be proper and in accordance to the use.
- Fuel must burn quickly and completely

- Should be cheap
- Should be possible to store and transport easily
- Should cause pollution as little as possible.

Q.I.C.1. Having proper arrangement of the reflectors can increase the efficiency of the solar cooker.

2 The dead remnants of plants and animals remained buried underground for crores of years and get converted into fuel under intense heat and pressure. This fuel is known as fossil fuel

3 Electricity generated from flowing water, water of waterfall water stored in dams is called hydroelectric power.

4 External combustion engines are used in boilers in industries and internal combustion engines are used in light vehicle machines.

Q.II.A.1. **Write a short note on carbohydrates.**

- Chief component of food and main source of energy
- Main sources are wheat, rice, bajra, potato, sweet potato, banana, sugarcane and sugar.
- Occurs in the form of (i) CELLULOSE : present in fibrous foods like green vegetables. Enzymes of animal origin cannot digest it. (ii)STARCH AND GLYCOGEN: Digested and converted into malt sugar and further into simple sugars like glucose. (iii)SUGARS: present in milk and jaggery. Digested and converted into simple sugar like glucose and sucrose. Surplus is stored in liver as glycogen and some as fats in different parts of the body. Useful in respiration of cells.
- Provides heat energy of 4 Kcal per gram
- Hard working people require more carbohydrates.

2. **Mention the different methods of food preservation and describe them.**

- FOOD PREPARATION: There should be no loss of nutritive value while cooking or polishing e.g. rice
- DISINFECTION: Food should be stored in disinfected bottles or containers and sealed. Clean cloth should be used for wiping.
- COOLING N REFRIEGERATION: Food should be stored at low temperatures like below 8deg C e.g. fruits and vegetables fish etc.
- DRY STORAGE: After drying in the sun grains etc can be stored in air tight containers at room temperatures.
- DEHYDRATION: Process of removal of water so as not to lose its nutritive value e.g. grapes unripe mangoes fig etc. Dehydrating after addition of salt preserves fish.
- ADDITION OF PRESERVATIVES: certain acids (benzoic acid, acetic acid) used as preservatives so as to avoid bacterial growth. Salt solution also helpful in preserving lemons and mangoes. Thick syrup of sugar in preserving jams.
- IRRADIATION: Gamma radiation of potatoes and onions prolong their shelf life.

3 **What is crop rotation? Explain its importance.**

- The practice of growing crops of pulses and cereals alternately instead of the same crop repeatedly is known as rotation of crops.
- Importance of crop rotation:
- It prevents the soil from being deficient of the same nutrient by growing the same crop every time.
- Quality of soil is maintained
- Yield is more
- Crops of cereal and pulses alternately have nitrogen fixing bacteria
- Waste products of cereals useful for pulses and that of pulses useful for cereals.
- Fertility of soil increases.
- Insects and pests, which are harmful to cereals, cannot harm pulses and vice versa.

Q.II.B.1. **Milk is a wholesome diet. Explain.**

- Milk contains
- Lactose sugar as carbohydrates
- Casein as proteins
- Cream as fat
- Calcium, iron and phosphorous as mineral
- All vitamins except Vit C
- Thus milk contains all types of nutritive value so it is wholesome diet.

2 **State the diseases caused due to deficiency of vitamins**

- Vit A : reduced vision and night blindness
- Vit B_1 : beri beri
- Vit B_4: pellagra, anaemia
- Vit C: scurvy,anaemia
- Vit D: rickets
- Vit E: sterility impotency
- Vit K: delayed blood clotting

3 **What is dry heating and wet heating?**

- DRY HEATING
- Due to more moisture in stored grains the no. of bacteria increases and temperature rises due to their respiratory activity. This si called dry heating.
- WET HEATING
- Due to excess of moisture and temperature the fungi increases and so increases the temperature and moisture in grains. This is called wet heating.

4. **Explain the importance of soil**

- It is the natural medium for growth of a plant.
- Plants obtain water and certain minerals through their roots and from the soil.
- Physical, chemical and biological changes go in the soil and depending on composition of soil fertilizers and water is added to

the soil.
- Soil also provides oxygen to the roots.
- It is a mechanical support to the plants.

5 **How do rats and birds spoil the food grains?**
- Rats and birds not only eat the food but spoil them too.
- They leave fallen hair urine and faecal pellets on stored food
- Birds damage fruits and vegetables and grains in warehouses.
- Excreta of birds contain bacteria called salmonella, eggs of tapeworms.
- So they make the food unhealthy for human consumption.

6 **What is malnutrition? State its effects.**
- Disorders arising from deficiency of carbohydrates. Proteins and lipids in a balanced diet is called malnutrition.
- It causes weak health
- Children are most affected
- Mental and physical growth is retarded.
- Overcome by proper diet of all essential nutrients.

Q.II.C.1. The unit for measuring energy available from food is calories or kilocalories.
2. Use of iodized salt can prevent goiter.
3. Implement used in tilling is a plough.
4. The necessary stock of food to cope up with the unexpected emergency situations is called a buffer stock.

Q.III.A.1 **Explain the food web with figure and an example.**
- DIAGRAM
- Living organisms in an ecosystem are interlinked and interdependent.
- Green plants are the producers
- Insects feed on the grass and plants. They are called primary consumers or herbivorous.
- Frogs lizards eat these insects and so are called carnivorous consumers of the first order
- Snakes in turn take frogs and lizards so are known as consumers of the second order
- All these are consumed by vultures, eagles etc which are known as consumers of the third order.
- Decomposers obtain nutrition form the dead bodies of all producers, herbivores and carnivores.
- Transformers disintegrate simple organic substances to inorganic.
- This chain is called a food web.

2. **What steps should be taken to conserve natural wealth.**
- Natural wealth includes air water minerals oils forests birds animals microbes etc.
- There should be control in utilization of natural wealth through

proper management.
- Regeneration of natural resources should eb taken care of
- Tree plantations should be increased by VAN MAHOTSAVS
- Wild life should be protected under programmes like PROJECT TIGER
- Techniques like SILVICULTURE should eb adopted for rapid growth of forests.
- Sanctuaries should be developed
- Legal control should eb imposed to check misuse of natural resources.

3. **State the pathological and genetical dangers of radiation**
- PATHOLOGICAL DANGER
- Radiation causes ionization in the living cells of the body.
- Biochemical equilibrium gets disrupted and cells are destroyed
- Destroys tissues and blood cells and so leukemia and cancer may occur.
- If radiation is more than 600 roentgens then the person may die due to pathological damage to the body.
- GENETICAL DANGER
- Radioactive radiation can cause damage to the chromosomes in the cells n genes.
- Affects the future genration
- Cause irreparable harm to pregnant women and growing children

Q.III.B.1 **State two chemical properties and two uses of copper.**
- On reaction with moist air and carbon dioxide copper forms green coloured substance $Cu(OH)2.CuCO3$.
- Copper forms appropriate salts with acids. Give equations.
- Copper is used in electric wires, domestic tools and utensils.

2 **Explain recycling of waste products and its advantages**
- Reprocessing of waste products for reuse is called recycling
- E.g. metallic tins, glass containers, paper and paper products.
- Helps to conserve natural resources.
- Reduces pollution from disposal of waste products
- Polythene bags primarily stored and then reused through h proper planning so reduces the use of new raw materials.
- Dirt, paper waste leaves etc are used to form compost manure.
- Minimizes the cutting of trees to manufacture paper.

3. **State the importance of water for living organisms**
- Life originated in water
- Basic necessity for growth and development of living organisms
- Medium for physiological reactions in the living body
- Absorption of minerals salts by plants from soil is through water
- Turgidity of cells in plants to keep them erect
- Exchange of gases in plants with help of water
- Useful solvent

- Medium of transportation of materials in animals.

4. **Explain the green house effect.**
   - The effect arising through the property of gases like carbon dioxide of absorbing solar radiation as infra red from the land is called green house effect.
   - Atmosphere would be heated up
   - Atmospheric temperature of the earth would increase
   - Polar regions would melt
   - Sea level would rise
   - Coastal cities would be submerged
   - Plants and animals will have to migrate to higher altitudes
   - Unexpected changes in season would occur.
5. **Distinguish between true solution and colloidal solution**

True solution	Colloidal solution
Particles of solute exist in form of molecular atoms	Particles remain dispersed in the liquid medium
Size is 10^{-8} cm in diameter.	Size is 10^{-7} to 10^{-5} cm

6. **Explain the following terms: Biosphere, Ecosystem.**
   - In general living forms are mostly dispersed on the surface of the earth. This is known as the BIOSPHERE.
   - The system or unit formed by the biotic and abiotic components is known as a eco system

Q.III.C.1 Modern technique adopted by the forest division for rapid growth and development of trees is called silviculture.

2. Minerals, air, water, mineral oils etc are examples of natural abiotic resources.
3. Rhizobium is present in leguminous plants
4. Fog is formed due to the mixing of dust particles, carbon particles and water vapour in the atmosphere.

Q.IV.A.1 **Describe the with the help of a diagram the preparation of ethane gas in the laboratory**
   - Diagram
   - Apparatus: hard glass test tube, cork, delivery tube, trough, gas jar, beehive shelf, burner and stand
   - Materials: kerosene, sand, china clay
   - Method: Mix some sand with kerosene and put in a glass test tube.
   - Arrange the apparatus as shown in the diagram
   - Introduce the porcelain pieces in the front of the test tube
   - Heat the porcelain pieces to red-hot and immediately heat the mixture of sand and kerosene.
   - Repeat the process and collect the gas by downward displacement

of water.
- Ethene is insoluble in water and is colourless and odourless.
- Combustible gas burns with a blue flame.

2 **Explain various forms of Phosphorous**
- Phosphorous has three allotropes yellow, black and red phosphorous.
- YELOW PHOPHOROUS
- Most reactive, catches fire in presence of oxygen so kept under water.
- Tetrahedral structure, nonmetallic and cannot conduct electricity
- Forms phosphine gas with hot concentrated sodium hydroxide.
- Forms phosphorous chlorides with chlorine gas.
- Forms oxides with oxygen
- RED PHOSPHOROUS
- Less reactive so not kept under water
- Structure not defined yet
- Does not react with sodium hydroxide
- Reacts with chlorine and oxygen
- BLACK PHOSPHOROUS
- Least reactive
- Structure is hexagonal rings each atom linked with three other atoms
- Metallic, possesses luster and conducts electricity.

3. **How is copper purified electrolytically.**
- figure
- Copper sulphate solution acts as an electrolyte
- Impure copper acts as an anode
- Strips of copper metals act as cathode
- When current is passed pure copper deposits on cathode
- Anode slowly dissolves in the electrolyte
- Reactions at anode: loss of electrons
- Reactions at cathode: Gain of electrons

Q.IV.B.1. **What is an addition reaction? Give an example.**
- A reaction in which a molecule of unsaturated hydrocarbons combines with a molecule of another compound and forms a molecule of a saturated hydrocarbon is called an addition reaction.
- Ethene reacts with bromine by addition reaction to form saturated hydrocarbon
- $H_2C = CH_2 + Br_2 \rightarrow BrCH_2\text{-}CH_2Br$

2 **State the general properties of metals**
- Generally solid except mercury
- Lustrous bright and can be polished
- Generally heavy except sodium potassium magnesium
- Have high melting and boiling points as compared to non metals
- Generally hard except sodium and potassium.

- Some metals are sonorous
- Good conductors of heat and electricity
- Ductile and Malleable
- Forms alloys with other metals.

3. **Give the uses of sulphur**
   - Manufacture of sulphuric acid
   - Preparationof skin ointments
   - Preparation of disinfectants
   - Making of gun powder and crackers
   - Vulcanisation of rubber
   - Preparation of organic solvents like carbon disulphide
   - For insecticides for agricutltural products
4. **How will you distinguish between an alkane and an alkene**
   - Alkene undergoes addition reaction and decolourises almond colour of bromine and also violet colour of potassium permanganate.
   - Alkenes also undergo polymerization reaction
   - Alkanes do not do any of these.
5. **How is rayon prepared? State its uses.**
   - Preparation
   - Cellulose present in wood pulp is treated with cold sodium hydroxide solution to purify it.
   - Purified cellulose reacted with carbon disulphide to obtain cellulose xanthate, a viscous liquid
   - This viscous liquid is passed under heavy pressure through metallic mesh in the presence of dilute sulphuric acid to get rayon fibres.
   - Uses
   - In textile industry
   - For preparation of carpets
   - For preparation of string of tyres
   - For preparation of bandages
6. **Distinguish between thermoplastics and thermosetting plastics.**

Thermoplastics	Thermosetting Plastics
Become soft on heating and retains its properties on cooling.	Does not become soft on heating if once set.
Molecules have long parallel chains	Molecules have long chains which are interlinked
E.g. polythene, PVC, polystyrene	E.g. Bakelite, melamine, Formica

Q.IV.C.1. Carbon Monoxide, CO, and Nitrogen Dioxide, N_2O are two neutral oxides.

2. The full form of CMC is carboxymethyl cellulose
3. Esterification of acetic acid and ethyl alcohol produces ethyl acetate.
4. 1 ppm of boron is found as impurity in uranium.

Q.V.A.1.

Q.V.A.1. **Write a note on detergents.**

- Petroleum hydrocarbons are used to make detergent
- Very good substitute of soaps for washing
- Better washing properties than soap.
- Sodium sulphonate is the functional group
- Chemicals like CMC added to keep dirt suspended in water and prevents resticking to clothes.
- Lathers even in hard water
- Popular than soap.

2 **Explain how a star is formed from the protostar phase**

- Inner temperature is –173 C Gravitation force is large
- Contraction of hydrogen molecules continues for 10 lacs years
- Inner temperature becomes very high and thermonuclear fusion starts where 4 hydrogen molecules form one helium molecule
- Since mass is now less the loss is converted into energy by E=mc2
- This energy is released in the form of radiation.
- Radiation pressure exerted in the opposite direction to gravitational pressure
- So contraction continues till gravitational and radiation pressure becomes equal and opposite.
- Lots of energy produced in the form of visible light waves.
- Protostar glows and becomes a star. It is a middle aged star.

3. **Write a note on rockets with solid fuel.**

- Figure
- A wick in upper portion of combustion chamber ignites solid fuel by ammunition or by reaction with chlorides.
- Temperature becomes more than 3000 K
- Gases rush out from the lower chamber and gives a thrust in the upward direction
- Rockets are made with special type of alloy to prevent melting at such high temperature.
- Simple construction
- Drawback is once combustion is started cannot be stopped or restarted according to will. So not used for space travel
- Used for military purposes. Known as missiles.

Q.V.B.1 **State the uses of artificial satellites**

- To relay telephone and telegraph messages and TV programmes
- Weather conditions are forecast
- Water and mineral sources can be detected
- To detect diseases in crops and plants on a large scale
- To determine agriculture yield
- Used for spying in wars
- Useful in oceanography
- Talk back channel provided to conduct meeting throughout the country

- Useful for country wide classrooms

2. **Write about Galaxy**
   - Figure
   - Big clusters of stars in the universe are called galaxies
   - Stars are not evenly distributed in the universe
   - Approximately there are 10^{11} galaxies in the universe and each galaxy ahs 10^{11} stars.
   - The galaxies are found in different shapes like spiral elliptical and irregularly shaped
   - Our galaxy is called the milky way and is spiral shaped in the middle and pointed at the end
   - The diameter of the Milky Way is 10^5 light years.

3 **Explain light year.**
   - Light year is an unit to measure distance between two heavenly objects
   - The distance traveled by light in one year is called one light year
   - I light year = 9.46×10^{12} km

4 **Write a short note on the MOON.**
   - Natural satellite of the earth
   - Day time temperature is 100 C and at night –115 C
   - Less gravitation and so gases escape and there is no atmosphere
   - Life is not possible on moon due to extreme temperatures and no atmosphere.

5 **Distinguish between Mars and Mercury.**

Mercury	Mars
Nearest to the sun	Fourth form the sun
No satellites	Two satellites
No atmosphere	Thin atmosphere
Day temp is 525 C	Day temp is 10 C
Night temp is –175 C	Night temp is –100 C
Craters are seen	Dry rivers and valleys are seen

6 **Give scientific reason: Life is not possible on far off planets.**
   - Temperatures of planets far from sun are low
   - Far off planets have poisonous gases like methane in large proportion

Q.V.C1. Edwin Hubble was the pioneer of the BIG BANG THEORY

2 Asteroids are debris of small objects found in the belt of between Mars and Jupiter, which failed to become a planet.

3 The working of the rocket is based on Newton's 3rd Law which states that "Actio and reaction are equal and opposite"

4 The booster rockets are detached from the space shuttle at a height of 45 kms.