

Q#1: a- What is Circulatory System? Describe the role of Human Heart in circulation of Blood

Ans: **Circulatory System:-**

The blood circulatory system is a system of organs that include heart, blood vessels and the blood which is circulated throughout the entire body of a human or other vertebrate

### General Instructions

⇒ **Role of Human heart in circulation:**

No bullet points.

1. Give numbering to headings
2. Do not write lengthy paragraphs. Write medium sized paragraphs with headings.
3. Do not use table for comparison and contrast questions
4. Draw figures/diagram/flowchart where needed.
5. Start new question from fresh page.
6. Write unit of the answer in ability section.
7. Explain mathematical steps and the reasoning for better score.
8. Change colour scheme for references to give them more visibility.
9. Manage time well.
10. Wide page borders are discouraged. Should be reasonable.
11. Avoid writing wrong references.
12. Give more weightage to expressedly asked part/s of the question.

- ① Human heart is a fist sized muscular organ that pumps blood through the body.
- ② Heart consists of 4 chambers. Upper two are called Atria or also called Auricles. The lower two are called ventricles.
- ③ Human circulatory system is called double circulatory system as heart pumps blood in two directions.
- ④ The oxygen poor blood from the body goes into atrium through veins and it is sent to lungs for oxygenation.
- ⑤ The oxygenated blood returns back to the left atrium This is called Pulmonary circulation

① The oxygenated blood is then taken from left side of the heart to the bodies through Arteries.

Components of circulation system?

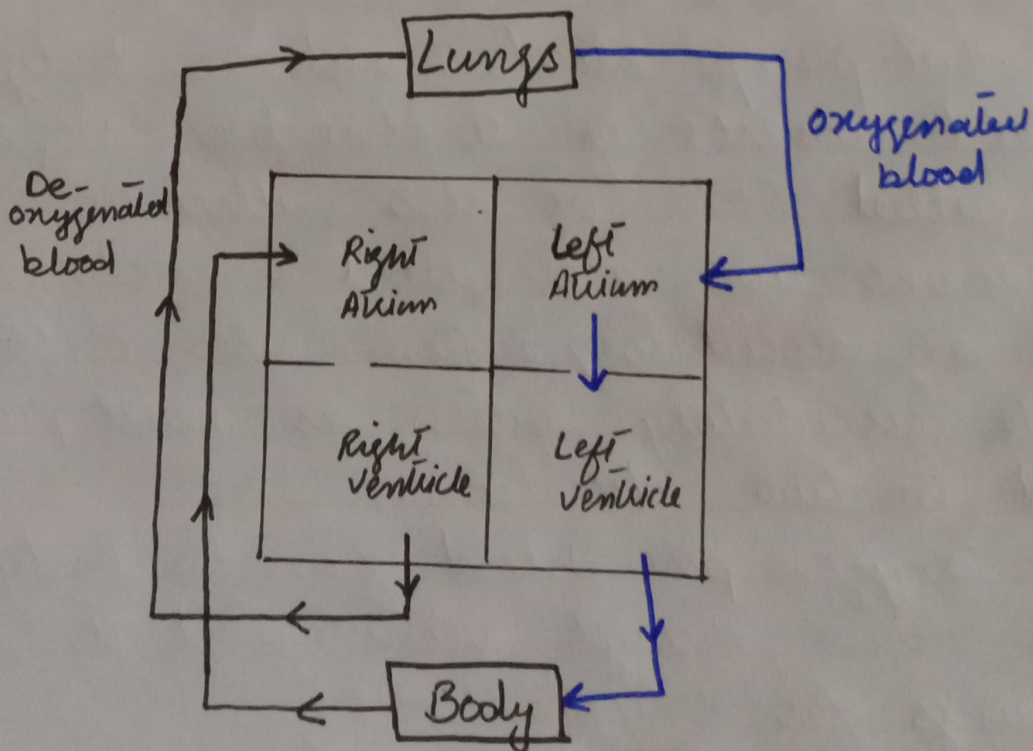
② The heart usually beats 60-100 times per minute, with each heart beat the heart sends blood throughout the body carrying oxygen to every cell.

③ Heart has four valves to prevent the back-flow of the blood.

i) Two valves are known as Atrio-ventricular. These are located between atria and ventricles.

ii) The other two are known as Semi-lunar valves and located between ventricles and arteries.

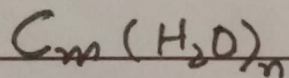
Valves opens in the direction of blood flow.



Q#2: b- What are the Carbohydrates? Give its Classification:

Ans: Carbohydrates:

Carbohydrate is a biomolecule consisting of carbon, hydrogen and oxygen atoms usually with a hydrogen oxygen ratio is 2:1. It has the empirical formula



Carbohydrates are also called Saccharides

The word Saccharid comes from Greek word **Sakkaron** which means Sugar.

⇒ Classification of Carbohydrates.

Carbohydrates are classified into

1- Simple Carbohydrates

2- Complex Carbohydrates.

1- Simple Carbohydrates:

Simple carbohydrates are

1- Monosaccharides

2- Oligosaccharides.

i) Monosaccharides:

Mono means 'one' and saccharide means Sugar. Monosaccharides are often called simple sugars. They are simplest sugars and cannot be

Hydrolyzed. Their general formula is  $C_n(H_2O)_n$ .  
Monosaccharides are subdivided into Tetroses, Pentoses, hexoses, heptoses etc.

Examples: Glucose, Galactose, Fructose. These are monosaccharide.

ii) Oligosaccharides:

Oligo means 'Few'. These are compound sugars that yield 2 to 10 molecule of same or different monosaccharide on Hydrolysis.

The general formula of oligosaccharides oligosaccharide are disaccharides, trisaccharides and so on.

Example: Sucrose, Lactose, Maltose. These are oligosaccharides.

2- Complex carbohydrates:

Complex carbohydrates include Polysaccharides

i) Polysaccharide:

Poly means 'Many'. These are compound sugar and yield more than 10 molecule of monosaccharide on hydrolysis. They are of further two types

i) Homo polysaccharide: Monosaccharides of the same type

ii) Hetero Polysaccharide: Monosaccharides of different type

General formula of Polysaccharide is  $(C_6H_{10}O_5)_n$

Example: Starch, glycogen, cellulose, Pectin etc. These are Polysaccharides.

Q#3: a- Describe the Role of Kidney in urine formation?

Ans: Kidneys:

Kidneys are the part of excretory system. Kidneys is composed of numerous microscopic coiled tubules called **Nephron** or renal tubules. Nephron is the functional unit of kidney.

© Structure of Nephron:

Nephron consists of a twisted tubule closed at one end, open at the other with a network of associated blood vessels.

Nephron is differentiated into 4 regions

- i) Bowman's Capsule
- ii) Proximal convoluted Tubule
- iii) Loop of Henle
- iv) Distal convoluted Tubule

→ Role of Kidney in Urine formation

Three steps involved in urine formation

1- Glomerular Filtration:

Glomerulus is a net of capillaries surrounded by a cup like structure Bowman capsule. As the blood flows through the glomerulus, blood

Pressure pushes water and solute from the capillaries into capsule through a Filteration membrane. The Filterate flows from the capsule further into nephron.

## 2- Reabsorption:

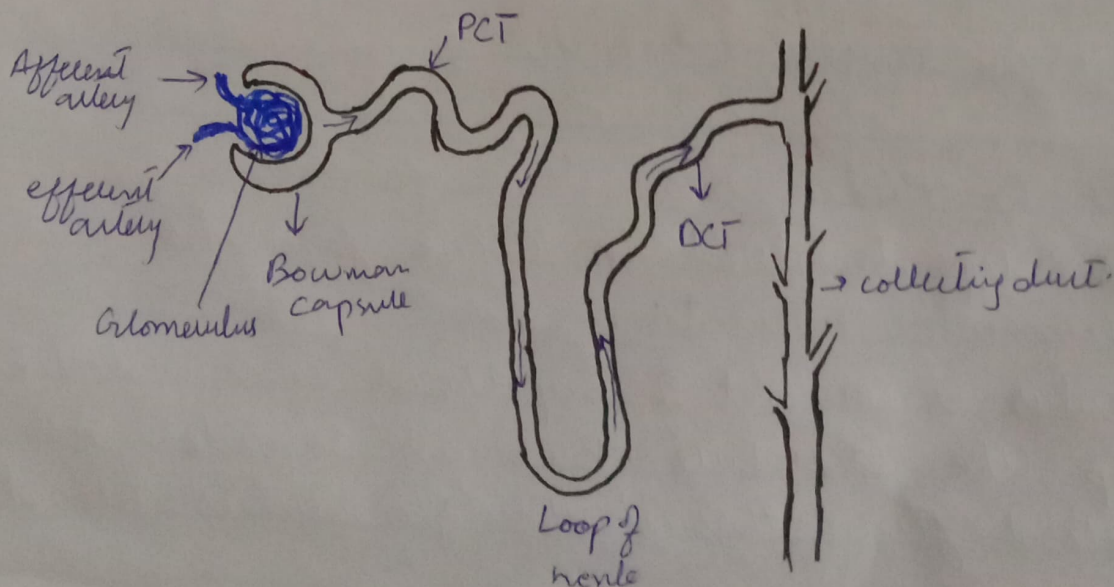
Glomerulus filterate water and small solutes out of the blood stream. Now the filterate flows into a duct in the nephron called the renal tube. As the filterate passes through loop of henle further reabsorption occur into capillaries

## 3- Secretion:

As the reabsorption occur in the renal tubule At the same time waste ions and hydrogen ions pass from the capillaries into renal tubule

This process is called secretion.

The secreted ions combines with the remaining filtrate and become urine. Urine flows out of nephron tubule into collecting duct. It passes out of kidney through renal pelvis into ureter and down to bladder.



Q#3-b- Describe Food Preservation Method?

Ans: Food Preservation:

It is any of a number of methods by which food is kept from spoilage after harvest or slaughter.

→ Methods of Food Preservation:

Following are the methods of food preservation

1. Heat:

Most bacteria, yeast and molds grow best in the temperature range of about  $16-38^{\circ}\text{C}$ . Thermophiles will grow in the range  $60-82^{\circ}\text{C}$ . Most bacteria are killed in the range  $82-93^{\circ}\text{C}$  but many bacterial spores are not destroyed even by boiling water at  $100^{\circ}\text{C}$ . To ensure sterility, total destruction of microorganisms a temperature of  $121^{\circ}\text{C}$  must be maintained for 15 min or longer.

Most of the disease causing bacteria are destroyed by Pasteurization at  $63^{\circ}\text{C}$  for 30 min

2. Cold:

Most bacteria, yeast and molds grow best in temperature range  $16-38^{\circ}\text{C}$ . Psychrotrophs will grow down to  $0^{\circ}\text{C}$ . At temperature lower

than  $10^{\circ}\text{C}$  the growth is slow and becomes slower the colder it gets. The slowing of microbial activity with decreased temperature is the principle behind **Refrigeration and Freezing.**

### 3- Drying:

Microorganism in a healthy growing state may contain in excess of 80% water. They get this water from the food in which they grow. If water is removed from the food water will also be removed from bacterial cell and multiplication will stop. This process of preservation used since ages.

### 4- Sugar and Salt:-

Fruits are preserved by placing them in Sugar Syrup. Certain meat products are preserved by placing them in brine solution. When bacteria, yeast and mold are placed in heavy sugar syrup or salt brine water in the cells move out through the membrane in the concentrated syrup or brine. This causes partial dehydration of bacterial cell referred to as **Plasmolysis.**

Other methods?

### 5- Chemicals.

Many chemicals kill or inhibit the growth of microorganism but most of these are not permitted in food. A few that are permitted in prescribed low levels in certain food include. Sodium benzoate, Sorbic acid, Sodium and calcium propionate, ethyl formate, sulphur dioxide. Surface of cheese treated with sorbic acid. Sorbic acid is effective in preventing mold.



Q#4-a- What is Vaccine? Elaborate the different types of vaccines?

Ans: Vaccine:- Excess attempt

A vaccine is a biological preparation that improves immunity to a particular disease. A vaccine typically contains an agent that resembles a disease causing micro-organism and is often made from weakened or killed forms of the microbe, its toxins or one of its surface proteins.

The agent stimulates the body's immune system to recognize the agent as foreign, destroy it and remember it, so that the immune system can more easily recognize and destroy any of these microorganism that it later encounters.

⇒ Types of Vaccine:

Following are the different types of vaccine

1- Attenuated vaccine:

It is a vaccine created by reducing the virulence of a pathogen but still keeping

able. It can still provoke an immune response

**Example:** Vaccines for measles, Mumps and Rubella (MMR) are attenuated vaccines

## 2- Killed (inactivated):

It is a vaccine consisting of either whole viruses or bacteria, or fractions of either that have been grown in culture and then killed using physical and chemical methods

**Example:** IPV (inactivated Polio virus) vaccine

## 3- Toxoid vaccines:

It contains an inactivated toxin produced by the bacterium. The immune response is targeted to the toxin instead of the whole germ.

**Example:** Vaccines for Diphtheria and Tetanus are toxoid vaccines.

## 4- Conjugate vaccine:

It is a type of vaccine which combines a weak antigen as a carrier so that the immune system has a stronger response to the weak antigen

**Example:** Haemophilus Influenza Type b or Hib contains parts of bacteria combined with protein.

Q#9-b. Show diagrammatically, how an ionic and covalent bond is formed?

Ans: **Ionic Bond:**

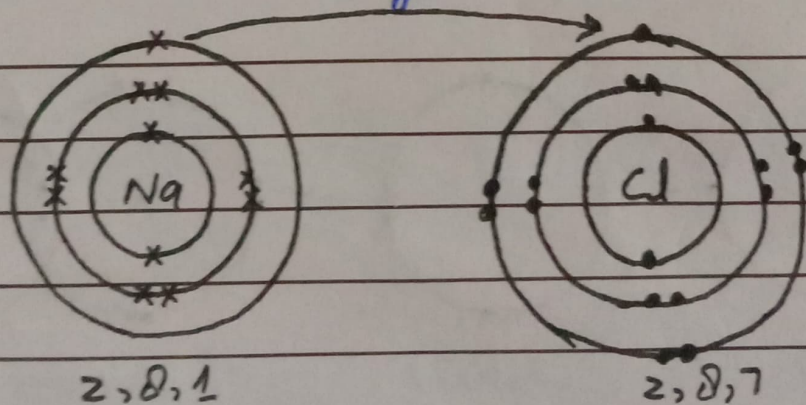
The electrostatic force of attraction between oppositely charged ions result in the formation of ionic bond or electrovalent bond.

**Bond Formation:**

Let's take an example of sodium chloride (NaCl)

- ⊙ The sodium ion has the electronic structure  $[2, 8]^+$ , same as that of neon.
- ⊙ The chloride ion has the electronic structure  $[2, 8, 8]^-$ , same as that of Argon.

**Dot and Cross Diagram**



Both sodium and chlorine to attain nearest noble gas electronic configuration forms bond

Sodium loses its electron and becomes positive ion while chlorine accept this electron and becomes negative ion.

## 2- Covalent Bond:-

It is a chemical bond that involves the sharing of electrons between atoms.

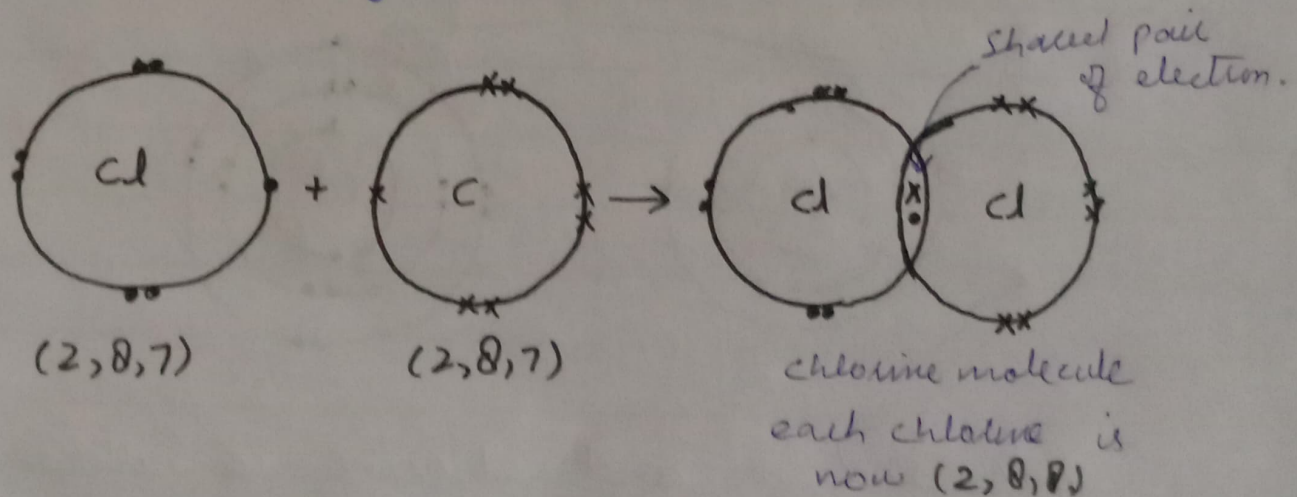
When two non-metal atoms combine, they share one, or more pairs of electrons.

A single covalent is represented by single line. Double covalent bond represented by double line and triple with triple line.

### Bond Formation:

Let's take an example of chlorine. It exist as diatomic gas. When chlorine atom combines not all the electron pair take part in bond formation. The electron pair not used in bonding are called **Lone pair**.

### Dot and cross diagram:



Q#NO6 - i)

Sol:

Present age of son = 30 year

Present age of Father =  $x$ .

5 years ago age of Father =  $x-5$

5 years ago age of son =  $30-5$

Thrice

Sol:

$$x-5 = 30-5$$

$$x-5$$

Father's age was thrice of son's age

$$x-5 = 3(30-5)$$

$$x-5 = 3(25)$$

$$x-5 = 75$$

$$x = 75+5$$

$$\boxed{x = 80}$$

Hence:

The current age of the Father is 80. <sup>Years</sup>