Part - II

(Section - A)

Q.NO. 2. (Part. a)

Structure of the universe According to Big Bang Theory

The Big Bang Theory is the most widely accepted Scientific emplanation for the origin and structure of the universe. According to this theory, the universe originated approximately 13.8 billion years ago from an extremly hot, dense, and compact state known as a singularity. At this initial moment, all matter, energy, space, and time were concentrated in a single point.

Following the Big Bang, the universe began enpanding rapidly in an event known as cosmic inflation. As the universe enpanded, it cooled down, allowing fundamental particles to form. These particles later combined to produce hydrogen and helium

atoms, which became the basic building blocks of matter. Over millions of years, gravitational forces caused these gases to condence into stars and galaxies. Structurally, the universe is composed of billions of galaxies arranged in clusters and superclusters, separated by vast cosmic voids. Each galaxy contains billions of stars, planetary systems, interstellar gas, and dark matter. The universe is still expanding, as evidenced by the red shift of distant galaxies, indicating that space itself is continuously stretching. Thus, the Big Bang Theory not only explains the origin of the universe but also its large scale structure and dynamic expansion.

Part. b: Urinary system and the working of Nephron

The urinary system is a vital excretory

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system in the human body responsible for removing metabolic wastes, regulating water balance, and maintaing electrolyte and acid base balance. It consists of two kidneys, two ureters, a urinary bladder, and a urethra. The kidneys play the central role by filtering blood and producing urine.

The nephron is the structural and functional unit of the kidney. Each kidney contains appronimately one million nephrons, each designed to filter blood efficiently. A nephron consists of two main parts: the renal corpuscle and the renal tubule. The renal corpuscle includes the glomerulus, a network of capillaries, and Bowman's capsule, which surrounds it.

The working of the nephron begins with glomerular filtration, where blood pressure forces water, salts, glucose, urea, and other small molecules out

of the blood into Bowman's capsule. Large components such as proteins and blood cells remain in the blood stream. The filtrate then passes through the renal tubule, where selective reabsorption occurs. Essential substances such as glucose, amino acids, and required ions are reabsorbed into the blood, while excess salts and wastes remain in the tubule.

Finally, tubular secretion adds additional waste substances from the blood into the filtrate. The remaining fluid forms urine, which is collected in the collecting ducts and transported to the urinary bladder. Through this mechanism, the nephron maintains internal homeostasis.

Part. C: Unbalanced Diet & Its effects

An unbalanced diet refers to the consumption

of food that lacks the proper proportion of essential nutrients such as carbohydrates, proteins, fats, vitamins, minerals and water. It may involve either deficiency or excess of certain nutrients, both of which negatively effect health.

A diet deficient in essential nutrients leads to malnutrition, weak immunity, poor growth, and reduce physical and mental performance. For example, lack of proteins can cause muscle wasting, while deficiency of vitamins such as vitamin D or iron may result in bone disorders and anemia respectively. on the other hand, excessive intake of fats and sugars contributes to obesity, diabetes, cardiovascular diseases, and hypertension.

An unbalanced diet also disrupts metabolism and weakens the body's ability to fight infections. over time, it

increases susceptibility to chronic diseases and reduces life expectancy. Therefore, a balanced diet is essential for maintaining energy levels, proper organ function, and overall healthy living.

Part. d: Structure and Functions of Cell Wall, Cell Membrane, cytoplasm and Mitochondria.

The cell wall is a rigid, non living outer layer present in plant cells. It is primarily composed of cellulose and provides structural support, protection, and shape to the cell. The cell wall prevents excessive water intake and maintains turgidity, enabling plants to remain upright.

The cell membrane, also known as the plasma membrane, is a thin, flexible, selectively permeable membrane present in all cells. It is composed

of a phospholipid bilayer with embedded proteins. The cell membrane regulates the movement of substances into and out of the cell, maintains internal balance, and facilitates cell communication.

The cytoplasm is a jelly like semi fluid substance enclosed within the cell membrane. It contains various organelles and is the site of most metabolic and biochemical reactions. The cytoplasm supports cellular structures and enables the movement of materials within the cell.

Mitochondria are double membraned organelles known as the power house of the cell. They are responsible for cellular respiration and the production of energy in the form of adenosine triphosphate. The inner membrane is folded into cristae, increasing the surface area of energy

production. Mitochondria play a crucial role in supplying energy required for growth, repair, and cellular activities.

Q. No. 4. Part. a.

Role of Heart and Blood vessels in circulation.

The circulatory system is rensponsible for the transport of onygen, nutrients, hormones, and waste products throughout the body. The heart functions as a muscular pump that maintains continuous blood circulation, while blood vesels act as channels through which blood flows to and from body tissues. The heart is a four chambered organ consisting of two atria and two ventricles. The right side of the heart receives deonygenated blood from the body through the vena cava and pumps it to the lungs via the

pulmonary artery for onygenation. This process is known as pulmonary circulation. The left side of the heart receives onygenated blood from the lungs through the pulmonary veins and pumps it to the rest of the body through the aorta, forming systemic circulation. Rhythmic contraction and relaxation of the heart muscles ensure constant blood flow.

Blood vessels are of three main types: arteries, veins, and capillaries. Arties carry onygenated blood away from the heart under high pressure, except the pulmonary artery. Their thick, elastic walls help withstand pressure and regulate blood flow. veins carry deonygenated blood back to the heart and contain valves that prevent backflow. Capillaries are microscopic vessels with thin walls that allow enchange of onygen,

nutrients, and waste products between blood vessels maintain efficient circulation essential for survival.

Part. b. Cyclone and Its Formation

A cyclone is a large scale atmospheric system characterized by low pressure at its center, strong inward spiraling winds, and heavy rainfall. Cyclones commonly from over warm tropical oceans and are known by different names in different regions, such as hurricanes in the Atlantic and typhoons in the pacific.

The formation of a cyclone begins when warm ocean water heats the air above it, causing the air to rise and create a low pressure area. As warm air rises, cooler air from surrounding areas moves in to replace it, generating wind circulation. The Earth's

rotation causes these winds to spiral due to coriolis effect. As the rising air cools, water vapor condences to form clouds and releases latent heat, which further fuels the storm. With continuous supply of warm, moist air, the system intensifies and organizes into a rotating storm with a well defined center called the eye. Cyclones gain strength over warm waters but weaken rapidly when they move over land or cooler oceans. Examples include cyclone Biparjoy and cyclone Tauktae, which effected coastal regions of Pakistan and neighboring countries.

Part. C. Functions of Essential Nutrients and Minerals

Carbohydrates are the primary source of energy for the human body. They provide glucose, which is essential

for brain function and muscular activity. carbohydrates also help in maintaining blood sugar levels and spare proteins from being used as an energy source. Proteins are essential for growth, repair, and maintenance of body tissues. They form the structural components of muscles, skin, enzymes, harmones, and antibodies. proteins also play a vital role in immune defence and regulation of metabolic processes. Fats serve as a concentrated source of energy and help in the absorption of fat soluble vitamins such as vitamins A, D, E, and K. They provide insulation to maintain body temperature and protect vital organs from mechanical injury. Fats are also important for cell membrane structure and hormone production.

Calcium is major mineral required for the formation and maintenance of

strong bones and teeth. It plays a crucial role in muscle contraction, nerve transmission, and blood clotting. Adequate calcium intake helps prevent bone disorders such as osteoporosis.

Iron is an essential component of hemaglobin, the onygen carrying pigment in red blood cells. It is necessary for onygen transport from the lungs to body tissues. Iron deficiency leads to anemia, resulting in fatigue, weakness, and reduced immunity.

Part. d. Use of Remote Sensing for Environmental purposes.

Remote Sensing is the science of collecting information about the Earth's surface without direct physical contact, using sattelites, drones, and aerial sensors. It plays a significant role in environmental monitoring and management.

Remote sensing is widely used to monitor deforestation, land use changes, and vegetation cover. Satellite imagery helps identify forest loss, desertification, and urban expansion over time. It is also used in climate studies to observe changes in glaciers, ice caps, and sea levels.

In disaster management, remote sensing assists in early warning and damage assesment of floods, cyclones, earthquakes, and wildfires. For example, satellite data is used in Pakistan to monitor flood prone areas of the Indus river basin. Remote sensing also supports air and water quality monitoring by detecting pollutants and changes in atmospheric composition.

Additionally, it is employed in agriculture for soil analysis, crop health assessment and water resource management. Through continuous observation, remote

Sensing provides valuable data for sustainable environmental planning and conversation.

(Section - B)

Q.No. 6. A. Blood Relation Problem

Statement : Pointing to a women, Ahsan said, "Her granddaughter is the only daughter of my brother."

Step 1: The only daughter of Ahsan's brother means Ahsan's niece.

Step 2: If the granddaughter of the woman is Ahsan's niece, then the woman's child must be the parent of that neice.

Step 3: The woman is the mother of Ahsan's brother.

Answer: The woman is Ahsan's mother.

B. Ratio of length to breadth = 3 : 2
Speed of cyclist = 12 km/hr
Time taken = 8 minutes

Step 1: Convert speed into meters per minute
12 km / hr = 12 x 1000 ÷ 60
= 200 m / min

Step 2: Find the perimeter of the park
Distance covered in one round = Speed x Time
= 200 x 8
= 1600 m

So, perimeter = 1600 m

Step 3: Let Length and breadth be
Length = 3x
Breadth = 2x

Perimeter of rectangle = 2 (Length + Breadth)
= 2 (3x + 2x)
= 10x

10x = 1600
x = 160

Step 4: calculate length and breadth

Length = 3 x 160

= 480m

Breadth = 2 x 160

= 320 m

Step 5: Find Area

Area = Length x Breadth

= 480 x 320

= 153, 600 sq. m

Final Answer :

Area of the Park = 153, 600 sq. m

C. Two Digit Number Problem

unit digit exceeds tens digit by 2

product of the number and sum of its digits = 144

Let tens digit = x

Then units digit = x + 2

Number = $10n + (n+2)$

$= 11n + 2$

Sum = $n + (n+2)$

$= 2n + 2$

$(11n + 2)(2n + 2) = 144$

Divide both sides by 2

$(11n + 2)(n + 1) = 72$

$n = 2$

$(11n \times 2 + 2)(2+1)$

$= 24 \times 3$

$= 72$

Tens digit = 2

units digit = 4

Answer: The number is 24.

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D. LCM and Ratio

L.C.M = 48

Ratio of numbers = 2 : 3

Assume numbers

Numbers = $2n$ and $3n$

Express LCM

LCM of $2n$ and $3n$

$= 6n$

Equate with given LCM

$6n = 48$

$n = 8$

Find the numbers

First number $= 2 \times 8$

$= 16$

Second number $= 3 \times 8$

$= 24$

Find Sum

Sum $= 16 + 24$

$= 40$

Final Answer:

The sum of numbers is 40.

Q.NO.7. A.

40% of first number = two third of second number

Let first number = x

" second " = y

40% of x = 2/3 of y

$$\frac{40}{100}x = \frac{2}{3}y$$

Multiply both sides by 300 to remove fractions:

$$120x = 200y$$

Divide both sides by 40:

$$3x = 5y$$

$$\frac{x}{y} = \frac{5}{3}$$

Answer: The Ratio of first number to second number is 5:3
