

Q No: 2
(a)

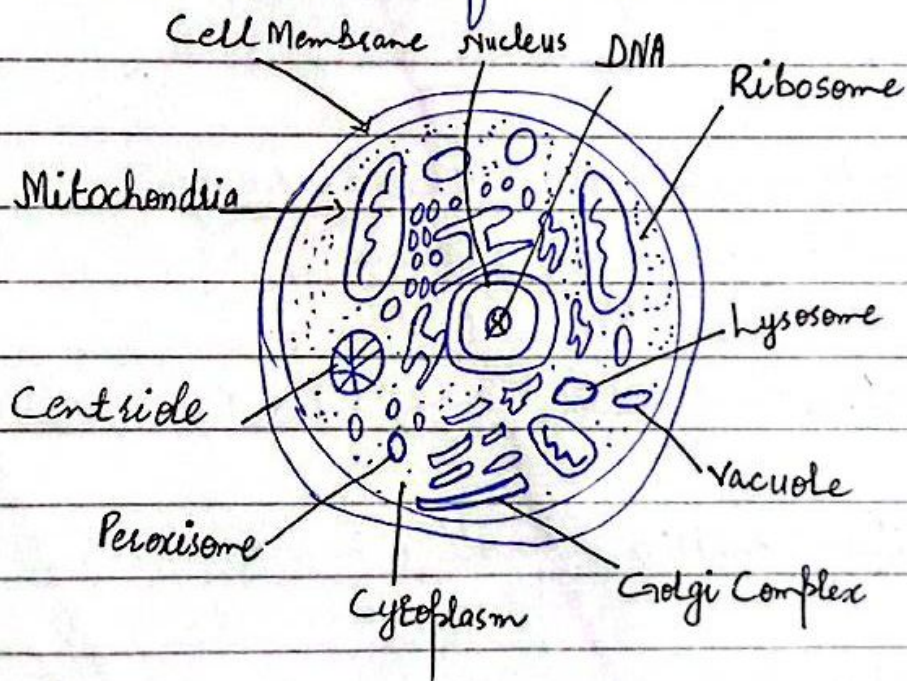
Main Components Of A Cell & Their Functions:-

- Cell Membrane - outer covering, controls entry / exit of substances.
- Cytoplasm - jelly-like fluid where chemical reactions occur.
- Nucleus - control center, contains DNA.
- Mitochondria - produce energy (ATP).
- Ribosomes - make proteins.
- Endoplasmic Reticulum (ER) - transport system; rough ER makes proteins, Smooth ER makes lipids.
- Golgi Apparatus - packages and transports proteins.

- Lysosomes - Break down waste.

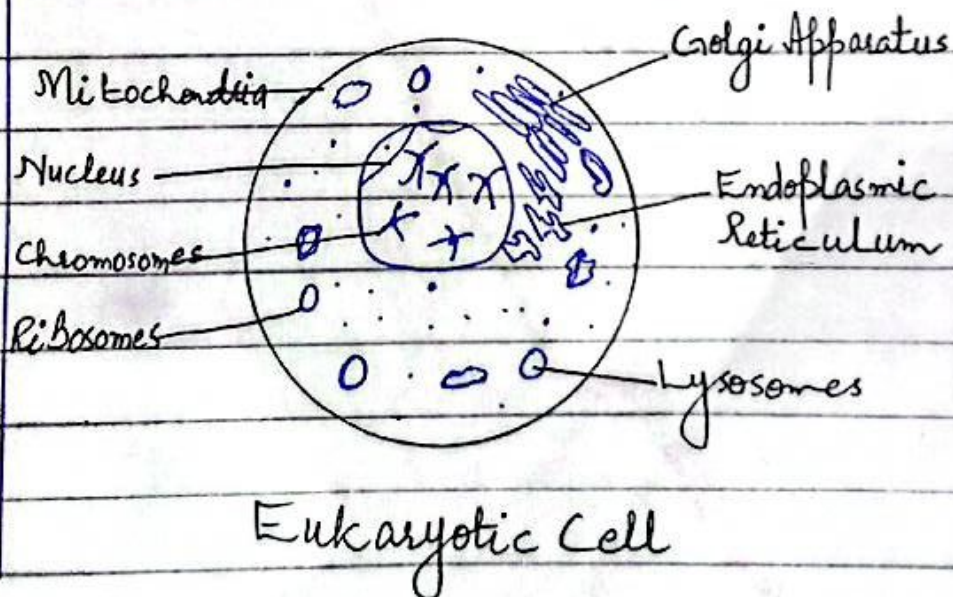
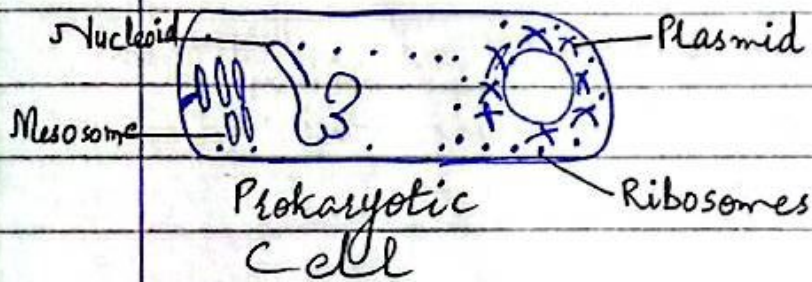
These all parts work together to:

- Produce energy,
- Build proteins,
- Transport materials,
- Remove waste,
- Control activities of the cell.



2. Prokaryotic Vs Eukaryotic Cells:-

Feature	Prokaryotic Cells (Bacteria)	Eukaryotic Cells (Plants, Animals, Fungi)
Nucleus	No nucleus (DNA free in cytoplasm)	Has nucleus with DNA inside
Size	Small (1-10 μm)	Larger (10-100 μm)
Organelles	Few, no membrane-bound organelles.	Many, membrane-bound organelles.
Complexity	Simple	Complex
Example	Bacteria, Archaea.	Human cells, plant cells.



3. How Cells Respond To External Stimuli & Maintain Homeostasis:

- Cells sense changes in environment (e.g., temperature, pH, nutrients).
- Cell membrane controls transport of ions, water, and nutrients.
- Proteins & hormones help send signals to adjust activity.

Example:

- If too hot $\rightarrow$ sweat glands release sweat (cooling).
- If low sugar - liver cells release glucose. This process is called homeostasis = maintaining stable internal conditions.

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Q No: 2
(b)

1. How Do Mobile Phones Work & Key Technologies Behind Them :-

Mobile phones work by converting voice data into radio signals, transmitting them to nearby cell towers, which relay them to other phones or the internet.

• Key Technologies :

- Cellular Networks (2G-5G) - divide areas into cells for coverage.
- SIM Cards - identify users.
- Satellites & Internet - for GPS and global communication.
- Wifi & Bluetooth - for short-range communication.

2. Advantages Of Mobile Phone Use :-

Communication: Instant calling,

texting, video chat.

- Access to information: internet, news, education.
- Convenience: banking, shopping, navigation (GPS).
- Emergency Use: quick help in crises.
- Social Connectivity: staying in touch across distances.

3. Disadvantages Of Mobile Phone Use :-

- Health Issues: eye strain, poor sleep, reduced attention span.
- Mental Health: anxiety, depression from overuse or social media.
- Addiction: excessive gaming / social networking.
- Reduced face-to-face interactions.
- Privacy & Security Risks: data theft, scams.

4. Impact On Social Interactions & Mental Health :-

- Positive: Connects people globally, strengthens

long-distance relationships.

- Negative:- Encourages superficial online interactions, cyberbullying, and reduced in person conversations leading to loneliness or stress.

5. How Mobile Phones Changed Communication & Access To Information :-

- From letters / landlines - instant messaging & video calls.
- Information Revolution: any one can access knowledge (Google, apps).
- Social Media: real-time sharing of news and opinions.
- Work & Education: online meetings, and e-learning.
- Lifestyle: mobile banking, e-commerce, telemedicine.

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Q No: 2

(c)

1. Layers Of The Earth & How They Interact :-

- Crust - outer solid layer, where we live; interacts with oceans & atmosphere.
- Mantle - semi-solid rocks, moves slowly (causes earthquakes & volcanoes).
- Outer Core - liquid iron & nickel, creates Earth's magnetic field.
- Inner Core - solid iron & nickel, very hot, source of earth's heat.

Interaction: Heat from the core drives mantle movement → moves plates in the crust causes earthquakes, volcanoes, and mountain formation.

Earth's Water Cycle & Its Role :-

- Evaporation - water changes into vapor.

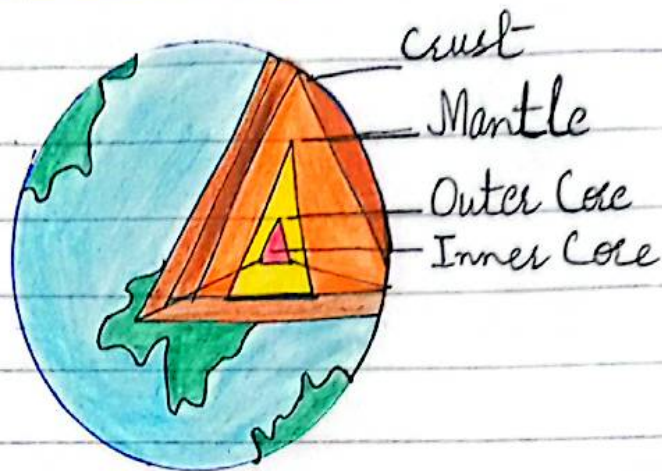
- Condensation - vapor forms clouds.
- Precipitation - rain, snow, hail.
- Collection - water returns to rivers, lakes, oceans.

• Supports life By:

- Providing fresh water for drinking, farming, animals.
- Regulating climate and temperature.
- Distributing nutrients across ecosystems.

3. Human Impact On Earth's Ecosystem & Resources:-

- Deforestation - destroys habitats, reduces oxygen.
- Pollution - air, water, and soil damage ecosystems.
- Overuse of resources - fossils fuels, water, minerals.
- Climate Change - global warming, rising seas, extreme weather.
- Biodiversity loss - species extinction.



Earth Layers

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Q No: 2
(d)

1. Main Sources Of Air Pollution :-

- Natural sources: Volcanic eruptions, dust storms, wild fires.
- Human Sources:
 - Burning of fossil fuels (vehicles, industries, power plants).
 - Agricultural activities (pesticides, stubble burning).
 - Waste burning & landfills.

2. Effects Of Air Pollution :-

- On Human Health:
 - Respiratory diseases (asthma, lung cancer).
 - Cardiovascular problems.
 - Eye and skin irritation.
- On Environment:
 - Acid rain (damages soil, crops, buildings).
 - Global warming & climate change.
 - Ozone layer depletion.
 - Harm to wild life and ecosystems.

3. Primary Vs Secondary Pollutants :-

- Primary Pollutants: emitted directly into the air.
- Examples: Carbon monoxide (CO), Sulfur dioxide (SO_2), Nitrogen oxides (NO_x), particulate matter (PM).
- Secondary Pollutants: formed in the atmosphere when primary pollutants react chemically.
- Examples: Ozone (O_3), Smog, Acid rain.

4. Reducing Air Pollution:-

- Individual Actions:
 - Use public transport / carpooling.
 - Conserve energy (less electricity / fuel use).
 - Plant trees.
 - Avoid waste burning.
- Collective Actions:
 - Strict laws on emissions.
 - Shift to renewable energy (solar, wind).
 - Promote electric vehicles.
 - Better waste management and recycling.

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Q No: 4
(a)

1. Fiber Optics & Their Work:-

Fiber optics

are thin strands of glass or plastic that transmit data as pulses of light. They work on the principle of total internal reflection, allowing light signals to travel long distances with minimal loss.

2. Advantages Of Fiber Optic Communication Over Copper Wire :-

- High Bandwidth - carries much more data.
- Faster Speed - signals travel at the speed of light.
- Low signal loss - can transmit over long distances without boosters.
- Immunity To Electromagnetic interference - Unlike copper wires.
- Security - harder to tap without detection.

3. Fiber Optics Enable High-Speed Data Transmission :-

By converting electrical signals into light pulses, fiber optics can transmit vast amounts of data at very high speeds with minimal distortion, enabling gigabit and even terabit communication.

Q No: 4
(b)

1. Causes Of Earthquakes:-

- Movement of tectonic plates.
- Volcanic activity.
- Faulting and sudden release of stress in Earth's crust.
- Human-induced causes like mining and reservoir-induced seismicity.

2. Effects Of Earthquakes:-

- Loss of life and property.
- Ground shaking, landslides, and tsunamis.
- Infrastructure damage and economic disruption.
- Secondary effects like fires, disease outbreaks, and displacement.

3. Types Of Seismic Waves & Measurement:-

- Primary (P) waves: Fastest, compressional

Waves.

- Secondary (S) waves: Slower, shear waves that shake ground perpendicular to motion.
- Surface waves (Love & Rayleigh): Most destructive, travel along Earth's surface.
- Measurement: Seismograph records waves; magnitude measured by Richter Scale, intensity by Modified Mercalli Scale.

4. Reducing Impact Through Preparedness & Construction:-

- Earthquake-resistant designs (flexible foundations, shock absorbers, reinforced materials).
- Strict building codes in seismic zones.
- Public awareness, drills, and early warning systems.
- Emergency response planning and disaster management.

Q No: 4
(C)

1. Balanced Diet & Why Is It Essential:-

A balanced diet provides the right proportions of carbohydrates, proteins, fats, vitamins, minerals, fibers, and water. It is essential for energy, growth, immunity, and overall well-being.

2. Importance Of Macronutrients & Micronutrients:-

- **Macronutrients:** Carbohydrates give energy, proteins build and repair tissues, fats support cell function and hormone production.
- **Micronutrients:** Vitamins and minerals regulate body processes, strengthen immunity, and prevent deficiencies.

3. Balanced Diet And Chronic Disease Prevention:-

A balanced diet lowers the risk of obesity, diabetes, hypertension, heart disease, and certain cancers by maintaining healthy weight, stable blood sugar, and proper nutrient intake.

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Q No: 4
(d)

1. Main Sources & Effects Of Water Pollution:-

- Sources: Industrial waste, agricultural runoff (pesticides, fertilizers), sewage discharge, oil spills, and plastic waste.
- Effects: Contamination of freshwater, loss of aquatic life, reduced water quality, and ecosystem imbalance.

2. Impact On Human Health & Environment :-

- Human Health: Causes waterborne diseases (cholera, diarrhea, typhoid), poisoning from heavy metals, and long-term illnesses.
- Environment: Destroys aquatic habitats, decreases biodiversity, leads to eutrophication, and disrupts food chains.

3. Prevention And Control Measures:

- Proper sewage treatment and waste management.
- Use of eco-friendly agricultural practices.
- Industrial regulation and water recycling.
- Public awareness and community participation in clean water initiatives.

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Section-II

Q No: 5

(a)

Solve:-

- a) Let the three consecutive primes be p_1, p_2, p_3 . Try nearby primes (or notice squares trick below).

Checking primes gives:

$$59 + 61 + 67 = 187.$$

Answer: 59, 61, 67.

- b) Solve:-

Equation: $x + 17 = 60 \cdot \frac{1}{x}$ Multiply by x :

$$x^2 + 17x - 60 = 0.$$

Solve quadratic: discriminant $= 17^2 - 4(1)(-60) = 289 + 240 = 529$. $\sqrt{529} = 23$.

Roots:

$$x = \frac{-17 \pm 23}{2} = \{3, -20\}.$$

Positive root is 3.

Answer: 3.

Q No: 5
(c)

Solve:-

$$\text{Total percent increase} = \frac{262500 - 175000}{175000} \times 100\%$$

$$100\% = \frac{87500}{175000} \times 100\% = 50\%$$

If we take the simple average percent per year:

$$50\% \div 10 = 5\% \text{ per year.}$$

(The compound annual growth rate

solve $(1+r)^{10} = 1.5$; that gives about 4.14%;

but the usual answer is the simple average

5%).

Answer: 5% per year (simple average).

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Q No: 5
(d)

Solve:-

$$\text{Number of eggs} = 20 \times 12 = 240.$$

$$\text{Total cost} = 20 \times 375 = 7500 \text{ Rs.}$$

$$\text{Total revenue} = 240 \times 33 = 7920 \text{ Rs.}$$

$$\text{Profit} = 7920 - 7500 = 420 \text{ Rs.}$$

$$\text{Percentage Profit} = \frac{420}{7500} \times 100\% = 5.6\%$$

Answer: 5.6% profit.

Q No: 6
(a)

Solve:-

Product of two numbers = 120.

Sum of their squares = 289.

Use $(a+b)^2 = a^2 + b^2 + 2ab = 289 + 2 \cdot 120$.

$$120 = 289 + 240 = 529.$$

So, $a+b = \sqrt{529} = 23$ (take positive).

Answer: 23.

(b)

Solve:-

Let present ages be K, S . From conditions:

$$\frac{K-6}{S-6} = \frac{6}{5}, \quad \frac{K+4}{S+4} = \frac{11}{10}$$

Solving these two gives $K=18, S=16$.

Answer (Salman now): 16 years.

(c)

Solve:-

Let first = $2k$, second = $3k$. Also second = $5m$, third = $8m$. For consistency $3k = 5m$ so let $k = 5t, m = 3t$. Then numbers are:

first = $10t$, second = $15t$, third = $24t$.

$$\text{Sum} = 49L = 98 \Rightarrow L = 2. \text{ So second} = 15L = 30.$$

Answer: 30.

_____ x _____

Q No: 6
(d)

Solve:-

$$\text{Selling price} = \text{Cost} \times (1 + 0.225) = \text{Cost} \times 1.225. \text{ So cost} = 392 / 1.225 = 320 \text{ Rs. Profit} = 392 - 320 = 72 \text{ Rs.}$$

Answer: Profit = Rs. 72.

_____ x _____