

VERY SHORT ANSWER TYPE QUESTIONS

1. What is the significance of vacuole in a plant cell?
2. What does 'S' refer in a 70S & an 80S ribosome?
3. Mention a single membrane bound organelle which is rich in hydrolytic enzymes.
4. What are gas vacuoles? State their functions?
5. What is the function of a polysome?
6. What is the feature of a metacentric chromosome?
7. What is refer-ed to as satellite chromosome?

SHORT ANSWER TYPE QUESTIONS

1. Discuss briefly the role of nucleolus in the cells actively involved in protein synthesis.
2. Explain the association of carbohydrate to the plasma membrane and its significance.
3. Comment on the cartwheel structure of centriole.
4. Briefly describe the cell theory.
5. Differentiate between Rough Endoplasmic Reticulum (RER) and Smooth Endoplasmic Reticulum (SER).
6. Give the biochemical composition of plasma membrane. How are lipid molecules arranged in the membrane?
7. What are plasmids? Describe their role in bacteria?
8. What are histones? What are their functions?

Assertion Reason Type Questions

Directions : In the following questions, a statement of assertion is followed by a statement of reason.

Select one answer and write explanation.

- (a) If both Assertion and Reason are true and Reason is the correct explanation of Assertion.
- (b) If both Assertion and Reason are true but Reason is not the correct explanation of Assertion.
- (c) If Assertion is true but Reason is false.
- (d) If both Assertion and Reason are false.

1. **Assertion:** Prokaryotes have a one envelop system.
Reason: There is not even a single membrane that surrounds the prokaryotic cell.
2. **Assertion:** Eukaryotic cells have more DNA than prokaryotic cells.
Reason: Eukaryotes are genetically more complex than prokaryotes.
3. **Assertion:** Ribosomes are non-membrane bound organelles found in the prokaryotic cells only.
Reason: These are present only in the cytoplasm.
4. **Assertion:** Eukaryotic cells have membrane bound organelles.
Reason: Prokaryotic cells lack membrane bound organelles.

5. **Assertion:** As per Schwann, cell wall is a unique character of the plant cell.
Reason: Body of plants and animals are composed of cells and products of cells.
6. **Assertion:** Schleiden and Schwann were the first to observe the cells and to put forward cell theory.
Reason: The cells are always living unit.
7. **Assertion:** Rudolf Virchow modified the hypothesis of cell theory given by Schleiden and Schwann.
Reason : Cell theory says that all cells arise from pre-existing cells.
8. **Assertion:** Smaller cells are usually metabolically active cells.
Reason: Smaller cell nucleocytoplasmic ratio and surface volume ratio is higher.
9. **Assertion:** Cell is an open system.
Reason: Cell receives a number of materials including energy containing nutrients from outside.
10. **Assertion:** The number of cells in a multicellular organism is inversely proportional to the size of body.
Reason: All the cells in the biological world are of same size.
11. **Assertion :** It is important that the organisms should have cell.
Reason : A cell keeps its chemical composition steady within its boundary.
12. **Assertion :** Living organisms possess specific individuality with the definite shape and size.
Reason : Both living and non living entities resemble each other at the lower level of organisation.
13. **Assertion:** The number of cells in a multicellular organism is inversely proportional to size of body.
Reason : All cells of biological world are alive.
14. **Assertion:** Specialization of cells is useful for organism.
Reason: It increases the operational efficiency of an organism.
15. **Assertion:** Organisms are made up of cells.
Reason: Cells are structural unit of living organisms. A cell keeps its chemical composition steady within its boundary.

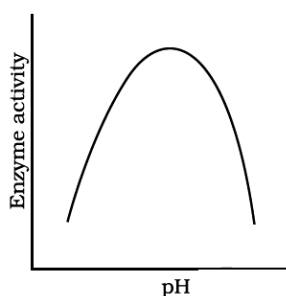
WORK SHEET-2 (Biomolecules)

VERY SHORT ANSWER TYPE QUESTIONS

- Medicines are either man made (i.e., synthetic) or obtained from living organisms like plants, bacteria, animals etc. and hence the latter are called natural products. Sometimes natural products are chemically altered by man to reduce toxicity or side effects. Write against each of the following whether they were initially obtained as a natural product or as a synthetic chemical.
 - Penicillin _____
 - Sulfonamide _____
 - Vitamin C _____
 - Growth Hormone _____
- Select an appropriate chemical bond among ester bond, glycosidic bond, peptide bond and hydrogen bond and write against each of the following.
 - Polysaccharide _____
 - Protein _____
 - Fat _____
 - Water _____
- Write the name of any one amino acid, sugar, nucleotide and fatty acid.
- Reaction given below is catalysed by oxidoreductase between two substrates A and A', complete the reaction. A reduced + A' oxidised \longrightarrow
- How are prosthetic groups different from co-factors?
- Glycine and Alanine are different with respect to one substituent on the α -carbon. What are the other common substituent groups?
- Starch, Cellulose, Glycogen, Chitin are polysaccharides found among the following. Choose the one appropriate and write against each.
Cotton fibre _____
Exoskeleton of cockroach _____
Liver _____
Peeled potato _____

SHORT ANSWER TYPE QUESTIONS

- Enzymes are proteins. Proteins are long chains of amino acids linked to each other by peptide bonds. Amino acids have many functional groups in their structure. These functional groups are, many of them at least, ionisable. As they are weak acids and bases in chemical nature, this ionization is influenced by pH of the solution. For many enzymes, activity is influenced by surrounding pH. This is depicted in the curve below, explain briefly.



- Is rubber a primary metabolite or a secondary metabolite? Write four sentences about rubber.
- Schematically represent primary, secondary and tertiary structures of a hypothetical polymer say for example a protein.
- Nucleic acids exhibit secondary structure, justify with example.
- Comment on the statement "living state is a non-equilibrium steady state to be able to perform work".

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 - If Assertion is true but Reason is false.
 - If both Assertion and Reason are false.
- Assertion:** Palmitic acid has 20 carbon atoms including carboxyl carbon.
Reason : Arachidonic acid has 16 carbon atom including carboxyl carbon.
 - Assertion :** Unsaturated fats are more reactive compared with the saturated fats.
Reason : Unsaturated fats have only single bonds in their structure.
 - Assertion :** Vegetable oils are fats which are present in plant cells in soluble form.
Reason : Vegetable oils occur only in cells of embryo.
 - Assertion:** Nine amino acids are essential amino acids for human.
Reason: They are essential for human health.
 - Assertion:** Amino acids are amphoteric in their function.
Reason: All amino acids are necessary for our body.
 - Assertion:** The long protein chain folds upon itself like a hollow ball giving rise to the tertiary structure.
Reason : Tertiary structure gives a 3-dimensional view of a protein.
 - Assertion:** Proteins are a heteropolymer.
Reason : Dietary proteins are the source of non-essential amino acids.
 - Assertion:** Amino acids are known as α -amino acids.
Reason : Amino acids are organic compounds containing an amino group and carboxylic group as substituent on the α -carbon.
 - Assertion :** The amino acid glycine comes under the category of nonessential amino acids.
Reason : This is due to the fact that it can not be synthesised in the body
 - Assertion :** Human diet should compulsorily contain glycine, serine and tyrosine.
Reason : Essential amino acids can not be synthesized in the human body.

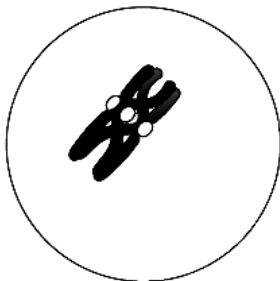
11. **Assertion :** Comparative biochemistry provides a strong evidence in favour of common ancestry of living beings.
Reason : Genetic code is universal.
12. **Assertion:** Secondary metabolites are produced in small quantities and their extraction from the plant is difficult and expensive.
Reason: Secondary metabolites can be commercially produced by using tissue culture technique.
13. **Assertion:** In living system, all the metabolic conversions are aided by catalyst.
Reason: The catalyst which hasten the rate of a given metabolic conversion are not proteins.

14. **Assertion:** Living organisms have more nitrogen and oxygen per unit mass than inanimate objects (e.g., earth crust).
Reason: Living organisms have more Ca, Mg, Na in them than inanimate object.
15. **Assertion:** The living state is a equilibrium steady state to be able to perform work.
Reason : Living process is a constant effort to prevent falling into non-equilibrium.

WORK SHEET-3 (Cell Cycle & Cell Division)

VERY SHORT ANSWER TYPE QUESTIONS

- Between a prokaryote and a eukaryote, which cell has a shorter cell division time?
- Which of the phases of cell cycle is of longest duration?
- Name a stain commonly used to colour chromosomes.
- Which tissue of animals and plants exhibits meiosis?
- Given that the average duplication time of *E.coli* is 20 minutes, how much time will two *E.coli* cells take to become 32 cells?
- Which part of the human body should one use to demonstrate stages in mitosis?
- What attributes does a chromatid require to be classified as a chromosome?
- The diagram shows a bivalent at prophase-I of meiosis. Which of the four chromatids can cross over?



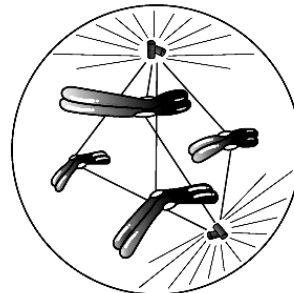
Prophase I

- If a tissue has at a given time 1024 cells, how many cycles of mitosis had the original parental single cell undergone?
- An anther has 1200 pollen grains. How many pollen mother cells must have been there to produce them?
- At what stage of cell cycle does DNA synthesis take place?
- It is said that the one cycle of cell division in human cells (eukaryotic cells) takes 24 hours. Which phase of the cycle, do you think occupies the maximum part of cell cycle?
- It is observed that heart cells do not exhibit cell division. Such cells do not divide further and exit _____ phase to enter an inactive stage called _____ of cell cycle. Fill in the blanks.

14. In which phase of meiosis are the following formed? Choose the answers from hint points given below.
- Synaptonemal complex _____
 - Recombination nodules _____
 - Appearance/activation of enzyme recombinase _____
 - Termination of chiasmata _____
 - Interkinesis _____
 - Formation of dyad of cells _____

SHORT ANSWER TYPE QUESTIONS

- State the role of centrioles other than spindle formation.
- Mitochondria and plastids have their own DNA (genetic material). What is known about their fate during nuclear division like mitosis?
- Label the diagram and also determine the stage at which this structure is visible.



- A cell has 32 chromosomes. It undergoes mitotic division. What will be the chromosome number (N) during metaphase? What would be the DNA content (C) during anaphase?
- While examining the mitotic stage in a tissue, one finds some cells with 16 chromosomes and some with 32 chromosomes. What possible reasons could you assign to this difference in chromosome number. Do you think cells with 16 chromosomes could have arisen from cells with 32 chromosomes or vice versa?
- The following events occur during the various phases of the cell cycle, Name the phase against each of the events.
 - Disintegration of nuclear membrane _____
 - Appearance of nucleolus _____
 - Division of centromere _____
 - Replication of DNA _____

7. Mitosis results in producing two cells which are similar to each other. What would be the consequence if each of the following irregularities occur during mitosis?
 - a. Nuclear membrane fails to disintegrate
 - b. Duplication of DNA does not occur
 - c. Centromeres do not divide
 - d. Cytokinesis does not occur.
8. Both unicellular and multicellular organisms undergo mitosis. What are the differences, if any, observed in the process between the two?
9. Name the pathological condition when uncontrolled cell division occurs.
10. Two key events take place, during S phase in animal cells, DNA replication and duplication of centriole. In which parts of the cell do events occur?
11. Comment on the statement – Meiosis enables the conservation of specific chromosome number of each species even though the process per se, results in reduction of chromosome number.
12. Name a cell that is found arrested in diplotene stage for months and years. Comment in 2-3 lines how it completes cell cycle?
13. How does cytokinesis in plant cells differ from that in animal cells?

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1. **Assertion :** In animal cells, the cytokinesis is marked by the appearance of a furrow in plasma membrane.
Reason : In plant cells, the formation of the new cell wall starts with the formation of simple precursor called cell plate.
 2. **Assertion :** Mitosis is important in the life of an organism, especially in the growth of a multicellular organism.
Reason : Mitosis restores the nucleocytoplasmic ratio.
 3. **Assertion :** Mitosis is often called indirect division.
Reason : Mitosis divides a parent cell into two daughter cells.
 4. **Assertion:** During anaphase, centromere of each chromosomes splits and chromatids separate.
Reason : Chromatids move to opposite poles.
 5. **Assertion:** Prophase is the first stage of mitosis which follows S and G₁ phases of interphase.
Reason : Prophase is marked by the initiation of clusters of chromosomes.

6. **Assertion :** Karyokinesis occurs in M-phase.
Reason : Cell division stops in M-phase.
7. **Assertion :** Mitosis maintains the genetic similarity of somatic cells.
Reason : Chromosomes do not undergo crossing over.
8. **Assertion :** Every chromosome, during metaphase has two chromatids.
Reason : Synthesis of DNA takes places in the S-phase of interphase.
9. **Assertion :** Cell growth is a continuous process in terms of cytoplasmic increase.
Reason : DNA synthesis occurs only during two specific stages in the cell cycle.
10. **Assertion:** Cell growth results in disturbing the ratio between the nucleus and cytoplasm.
Reason : Mitosis helps the cell to restore the nucleocytoplasmic ratio.
11. **Assertion:** G₁ phase is the interval between mitosis and initiation of DNA replication.
Reason : The cell is metabolically inactive during G₁ phase.
12. **Assertion:** Due to inactivation of the cell cycle, some cells undergo G₀ phase.
Reason : G₀ phase occurs due to non-availability of mitogen and energy rich compounds.
13. **Assertion :** DNA synthesis occurs in G₁ and G₂ periods of cell cycle.
Reason : During G₁ and G₂ phase, the DNA content become double.
14. **Assertion :** Histones are basic proteins of major importance in packaging of eukaryotic DNA. DNA and histones comprise chromatin, forming the bulk of eukaryotic chromosome.
Reason : Histones are 5 major types H₁, H₂A, H₂B, H₃ and H₄.
15. **Assertion :** Interphase is resting stage.
Reason : The interphase cell is metabolically inactive.