بسم الله الرحمن الرحيم

وقل رب زدني علماً

EDUCATION WITH HAMZA

SUBJECT:
BIOLOGY

CLASS:
11TH

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Education with Hamza

وَقُل رَّبِّ زِدْنِي عِلْمًا

DEDICATED TO

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Biology

Short Question Answer

Chapter-1: Cell & sub-cellular organelles

Q1. Name three organelles revealed by an electron microscope. & why cell wall is not present in animal cells? what holds the ribosomes together in polysome?

Ans: Ribosomes, lysosomes, Golgi bodies, ER, cell membrane, mitochondria. Animal cells lack cell wall due to their locomotors & active / dynamic mode of life. Magnesium ions hold the ribosomes together in poly some.

Q2. Why lysosomes are called suicide bags ? how is a chloroplast similar to a bacterium?

Ans: Autolysis is a self-digestion of a cell by the releasing the contents of lysosomes within the cell. In such circumstances lysosomes have been named as suicidal bags Autolysis is a normal event in some differentiation process e.g may occurs throughout a tissue e.g reabsorption of tadpole during metamorphosis . Autolysis also occur in muscles which are not exercised.

- Both have same sized ribosomes 70S.
- Both have DNA.
- Both have storage granules

Q3. Name the structure & organelles which are common in plant cell, animal & a prokaryotic cell? & what are prokaryotic cells ? list the structures missing in prokaryotic cells.

Ans: Usually. Non-membrane bounded organelle are found in eukaryotic & prokaryotic cells. e.g ribosomes granules, cell membrane , flagella, RNA , cytoplasm etc.

Cell's that have no well-defined , prominent nucleus & lack double membrane structures/ organelles. Centrioles. Double membranous organelles like mitochondria, E.R , Golgi Complex nucleus, Plastids etc.

Q4. Which organelles are single membrane bound , double membrane bound & lacking membrane? & compare the chemical composition of nucleoplasm with that of cytoplasm:-

Ans: NUCLEOPLASM: it is the trans parent semifluid ground substance formed of

- a mixture of protein
- enzyme(DNA&RNA polymerases)
- some nucleic acids
- histone & non-histone protein.

CYTOPLASM:

- amino acids
- carbohydrates
- Proteins
- Vitamins
- Nucleotide
- tRNA

Single layer membranous organelles	Double layer membranous organelles	non-membranous organelles
Vacuoles, lysosomes. Peroxisome etc	mitochondria, nucleus, chloroplast etc	Ribosomes, centrioles etc

Q5. Explain the nucleoli are the areas where ribosomes are assembled?

Ans: Palade: was the person who discovered nucleolus (plural- nucleoli)

The nucleolus is darkly stained visible body within the nucleus.

A nucleus can have more than one nucleoli.

Nucleolus appears during interphase & disappears during cell division. Nucleolus is associated with specific region of particular chromosome.

REGIONS OF NUCLEOLUS: There are two regions.

- **Peripheral/granular area:** It contains precursors of ribosomal subunits by which ribosomal subunits are formed.
- **Central/fibrillar area:** It contain rRNA & DNA. Function: nucleous take part in the synthesis of ribosomes.

Q6. write the different following

Rough ER	Smooth ER
RER has ribosomes attached to them. RER is called granular ER.	SER has ribosomes- SER is also called agranulos endoplasmic reticulum.
It is usually located near nucleous	It is usually located atta RER (away from nucleus)
Functions: RER is involves in the synthesis of exportable proteins.	SER, helps in deto-oxifications of harmful drugs

Chromatin	Chromosome
During interphase, chromosomes are in the shape of chromatin network.	Chromosomes are stained heavily hence visible only during cell division.
They lose their ability to stain. They are loosely coiled fibres.	Chromat fibre condense & coils up into structure called chromosomes
Their delicate membrane is disorganize & look disappers	Each chromosomes is bounded by delicate membrane

Q7. What are vesicles & what functions they perform? & Structure of fluid mosaic model?

Ans: Vesicles are small cell organelles are small, membrane - enclosed sacs found in cells.

OCCURRENCE: Vesicles are found in bacteria, Arched, plants & in animals.

(i) It is also involved in metabolism.

(ii) It is also involved in buoyancy control

(iii) It is also involved in enzyme storage

Q8. Define the following?

Ans: Stem Cells: Stem cells are cells with unique ability or potential to develop into: (i) More copies of themselves , (ii) Differentiate to produce many different specialized types of cells in the body.

Pluripotent Stem Cell: These cells can turn into almost any cell. Example: Cell from the early embryo are pluripotent.

Endocytosis: It is process by which substance are engulfed within the cell membranes, which then forms a vesicle containing the ingested material.

Phagocytosis: The process through which phagocytes or live cells ingest or consume other cells or particles.

Exocytosis: It is a form of active transport through which substances or large molecules are moved from the interior to the exterior of the cell.

Pinocytosis: Engulfing of solid liquid particles by vesicle or vacuole formation.

Q9. What are the advantages of using stem cells ?

Ans: (i) Replacement of damaged or lost cells: new cells are provided by the stem cells as they grow. They replace the specialized cells that are damaged or lost.

(ii) Differentiate into different cells: They can divide again again to produce new cells. As the stem cells divide they can change into other type of cells that make up the body.

(iii) Treatment by Stem cells: Benefits of stem cell therapy are in treatment of:

- Spinal cord injuries
- Diabetes Type 1

Q10. Explain the structure composition of function of ribosomes.

Ans: Ribosomes are dense granular structures present in cytoplasm of both prokaryotic & eukaryotic cells under EM. They were discovered by Palade (1955) under his EM.

OCCURRENCE: They are in eukaryotic may be found.

Freely disposed in cytoplasm or attached to Rough ER.

Synthesis: Nucleolus is factory of ribosomes synthesis while ribosome are factories of protein synthesis.

COMPOSITION: Eukaryotic ribosome are ribo-nucleoproteins in nature & composed of almost equal amounts of RNA & proteins.

i. RNA (40-50%) & ii. Protein (50-60%)

Thus they are also called as ribonucleo - proteins.

The RNA present in ribosomes known as ribosomal RNA (rRNA)

11. Structure & functions of golgi complex ?

Ans: Golgi apparatus was discovered by Italian biologist Camilo Golgi in 1898 & got Nobel Prize.

- It is found in all Eukaryotic cells.

Structure: Its structure was also revealed under EM.

Golgi apparatus consist of stacks of flattened, membrane bound sacs called cisternea.

Golgi vescile connected with cisternea are vesicles called Golgi vesicle.

Q12. Structures & function of vacuoles?

Ans: OCCURANCE: They are present both in plant & animal cells.

Structure: Plant vacuole is bounded by a membrane that contain ionic pumps & separates it from cytoplasm this special membrane of vacuole is tonoplast.

Function: Vacuoles act as site for storage of water & cell products or metabolic intermediates.

They provide supports to individual plant cell by maintaining turgor.

Q13. Structure & function of mitochondria?

Structure: Although they vary widely in their size, number, shape & internal structure depending on physiological activity of the cell i.e., some cells have one mitochondria while some have hundreds to thousands of mitochondria depending upon activity of cell.

Function: Mitochondria matrix help in several vital mitabolic process like kreb's cycle (enzymes in matrix catalyze reaction in kreb's cycle), aerobic respiration, fatty acid metabolism.

Q14. Four difference between prokaryotic & eukaryotic cells?

Prokaryotic	Eukaryotic
Nucleus & other membrane bound organelles are absent.	Nucleus & other membrane bound organelles are present.
Prokaryotic are the always unicellular.	Eukaryotic are unicellular & multicellular organism.
DNA is stored in cytoplasm.	DNA is stored within the nucleus.
They have one primary circular chromosome & various plasmids	The DNA stored in double stranded chromo-some.

Q15. Define cell signaling, What is the difference between a ligand and a receptor in cell signaling, & What are the three main steps involved in the signal transduction pathway?

Ans: 1. A process by which cells communicate with each other within their body and with the external environment is called cell signaling. It can also be defined as transfer of information from one cell to another.

2. A ligand is a signaling molecule that initiates signaling. It binds to a specific receptor protein on the cell's surface, triggering a cellular response.

3. **Reception:** The detection of the signaling molecule by the receptor protein.

Transduction: The conversion of the signal into a form that can trigger a specific cellular response.

Response: The final change in the cell's behavior, such as gene activation, protein synthesis, or a change in cell behavior.

Q16. What are the main steps involved in protein signaling, Why are steroid hormones considered to be fat-loving, & Explain how steroid hormones can directly influence gene expression.

Ans: 1. Protein signaling involves:

- Binding of the signaling molecule (first messenger) to its receptor protein on the plasma membrane.
- Generation of a second messenger (e.g., cAMP) within the target cell.
- Activation of downstream events by the second messenger, leading to a specific cellular response.

2. Steroid hormones are lipophilic (fat-loving). This means they can freely diffuse across the plasma membrane of a cell.

3. Steroid hormones can bind to receptors in either the cytoplasm or nucleus of the target cell, forming an active receptor-hormone complex. This activated complex will move into the nucleus and bind directly to DNA, acting as a transcription factor for gene expression. Estrogen, progesterone, and testosterone are examples of steroid hormones.

Q17. How is a chloroplast similar to a bacterium?

Ans: Similarity between Chloroplasts and Bacteria

Chloroplasts share several key structural and functional features with bacteria, supporting the endosymbiotic theory that they evolved from ancient prokaryotic cells.

- First, both contain their own circular DNA, which is not enclosed in a nucleus. This allows them to produce some of their own proteins independently.
- Second, chloroplasts and bacteria possess 70S ribosomes, which are typical of prokaryotes and differ from the 80S ribosomes found in the cytoplasm of eukaryotic cells.
- Third, both are capable of autonomous replication by binary fission, a method typical of bacteria.

CHAPTER-2: Biological Molecules

Q1. What are bio elements? Describe the chemical composition of protoplasm?

Ans: The element which occur in particular organism are called bio elements.

There are 92 natural element & only 25 are used in forming the chemical compounds from which living organism are made.

16 bio element are found in humans beings out of 25.

The protoplasm has water, proteins, carbohydrates, lipids, nucleic acid, enzymes, hormones & metabolites. Fundamental kinds of biological molecules are carbohydrates, proteins, lipids & nucleic acids

The nucleic acids like,

(a) DNA is present in nucleus, chromosome & gene. It control the cell activity.

(b) RNA is present in nucleoplasm & cytoplasm. It transmit genetic information & takes part in protein synthesis.

Q2. Why water is regarded as universal solvent? what is the importance of hydrogen bonding?

- water is the best solvent because it is polar & stable.
- Polar & ionic substance can be dissolved in it easily. Such substances separate into positive & negative ions in H2O in living beings & in aqueous medium.
- Non-ionic substances having charged groups in their molecules are dispersed in water.
- The polarity of water molecules makes them interact with eachother helping it to carry out reactions as solvent.
- Because of hydrogen bonding, water is a liquid at temperature suitable for life.

Q3. Why very large amount of heat can increase very little temperature of water? How water protects living things against sudden thermal change?

Ans: water has great ability to absorb heat with minimum change in its temperature.

This is because much of the energy is used to break hydrogen bonds so it does not lead to rise in temperature.

Water works as temperature /thermal stabilizes for organisms & protects living material from sudden thermal changes due to high heat of vaporization & hydrogen bonding. water protects organisms from rapid temperature changes helps them to maintain their normal internal temperature.

Q4. Describe the conversion of open chain of ribose into ring obtains & draw & show the ring forms of alpha & beta glucose?

Ans: ribose is an aldopentose with the molecular formula C5H10O5.

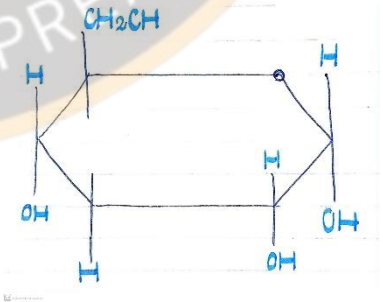
It can exist furanose ring in aqueous medium.

when it dissolved in water, the oxygen atoms from aldehyde groups reacts with second last carbon.

each pentose or hexose molecule in ring structure exist in either α or β forms (anomers) depending upon the position of -H & -OH group on C-1.

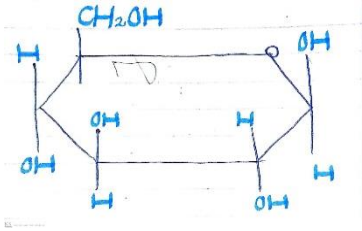
(a) a Form of Sugar

1f -OH group is found downward. C-1 then it is called a sugar.
e.g a-glucose



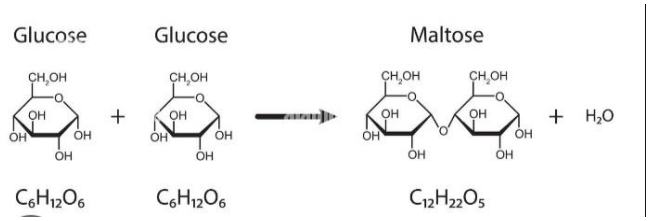
(b) β Forms of Sugar

If -OH is present up-wardon C - it is known as β sugar eg; β glucose.

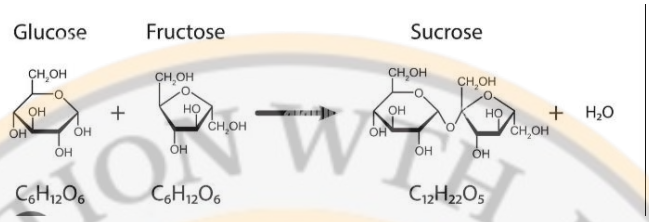


Q5. Illustrate the formation & breakage of (a) maltose (b) sucrose (c) lactose?

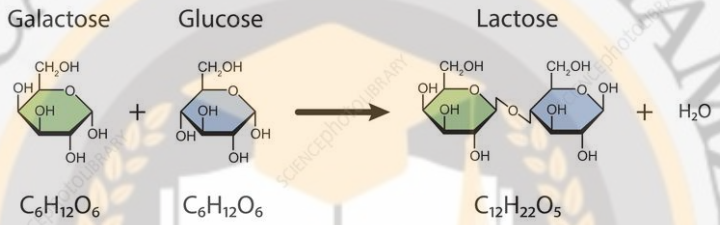
Maltose



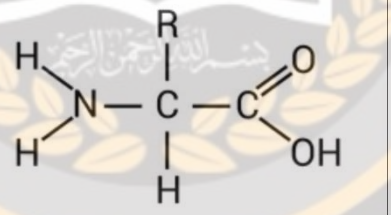
Sucrose



Lactose



Q6. Draw the structure formula of Amino Acid & outline the synthesis & breakage of peptide linkage?



Amino acids are linked to form polypeptides. The polypeptides may assemble to form proteins.

Translation: Dipeptides & polypeptides are formed by the condensation of amino acid ribosome the instructions of mRNA which take these instruction from DNA.

Q7. Describe (a) Globular proteins (b) fibrous proteins.

	Fibrous Proteins	Globular
Natural shape	These proteins consist of one or more polypeptide chains in form fibrils. These protein fibres or filament like shape.	Polypeptide chains are tightly folded to form spherical orelliposoidal or globulas due to multiple folding of polypeptide chains
Structure	Secondary structure is very important in them. So they exist is secondary structure during function.	Therefore, they exist in tertiary or quaternary structure during function.
solubility	They are insoluble in aqueous medium.	They are soluble in aqueous medium such as salt solution

		Solution of acid or bases or aqueous alcohol

What role do lipids play in living organism?
Functions or importance of lipids.
(a) Lipids are components of cell membrane (Phospholipids & cholesterol).
(b) They act as energy stores (triglycerides).
(c) They act as chemical messengers (steroid).
(d) They are involved in protection, waterproofing, insulation & buoyancy.
Q8. Why phospholipids forms a thin layer on surface of an aqueous solution? & What is Isoprene unit. Explain?
Ans: Most phospholipids has two ends:
(a) Hydrophilic end: One end of the phospholipids molecule contains phosphate group. This additional compound is hydrophilic. It is polar & readily soluble in water.
(b) Hydrophobic end: The other end contains fatty acid side chains. It is hydrophobic. It is non-polar & insoluble in water.
Terpenes are the types of derived lipids & a large group of compounds which are made up of simple 5-C (isoprene) building blocks repeating isoprene units
(1) Mono-terpenes: 2 isoprene unit form a monoterpene e.g menthol
(2) Di-terpenes: 4 isoprene form a diterpene e.g vitamin A phytol tail
(3) Tri-terpene: 6 isoprene units form a triterpene e.g ambrein.
(4) Poly-terpene: Many isoprene units form a polyterpene e.g Natural rubber.
Q9. Describe a steroid nucleus? How might an error in DNA of an organism effect protein function?
Ans: A steroid consist of 17 carbon atoms arranged in 4 attached rings, 3 of rings contains six carbon atoms & the fourth contains five.
The length & structure of side chains that extend from these rings distinguish one steroid from another steroids.
Polypeptide chains of amino acid has sequence. It is a characteristic feature of primary structure of protein. It is responsible for proper functioning of proteins.
(b) Nucleotide in DNA determines its sequence. Point mutation may occur in DNA. The change of single or few nucleotides in DNA is called point mutations.
(c) These mutations may disturb the sequence of amino acid in particular proteins. It may cause serve defects in body. This happen in sickle cell anemia.
Q10. Define gene is a sequence of nucleotide as part of DNA which codes for the formation of a polypeptide & write difference?
Ans: A gene may be defined as unit of the biological inheritance.

- Each gene contains the information required to build specific proteins needs in an organisms such as they contain the instructions for our individual characteristics - like eye & hair colour.
- In order to make proteins, the gene from the DNA is copied into messenger RNA. This is called Transcription.

Major Bio elements: (1) The six commonest bio-elements forming 90% of protoplasm are called major bio element.
(2) It example is carbon, oxygen, hydrogen etc.
Minor Bio elements: (1) The elements Pound as less than 1% are called minor bio-elements.
(2) Its example is potassium, sulphur & chlorine.
Q11. Write monomers, dimers, Polymers, Polar & non-polar?
Ans: Monomers (1) Individual units of polymers are called monomers.
(2) It cannot be further hydrolyzed into the smallest units.
Dimers (1) The product of condensation reactions is called "dimers".
(2) It may be hydrolyzed. It gives two monomers.

Polymers (1) molecules formed of repeating units are called polymers.
(2) On hydrolysis. it yields a large number of monomers.
Polar: (1) In this case, sharing of electron between atom of the molecule is un-equal.
(2) Its example is water.
Non-Polar: (1) In this case, sharing of electron between two atom is equal. Therefore, covalent bond is non-polar
(2) Its example is molecule of H2 etc.

Q12. Write polyhydroxy aldehyde & polyhydroxy ketone e.g D- glucose & L-gulcose

Ans: Polyhydroxy ALDEHYDE: (1)The sugars with aldehyde group is called aldo -sugar.
e.g Glyceraldehydes, ribose, glucose, etc.

- D-Glucose: (right handed form): In D glucose, asymmetric carbon atom is farthest form aldehyde group. It is second last carbon or C-5 in glucose. It is also called penultimate carbon. this carbon has -OH group on right side.
- L-Glucose: In L-glucose, -OH group is projected on left side at penultimate carbon atom.
- Polyhydroxy Ketone: (1) The sugars with ketone group are called keto-sugars.

(2) e.g dihydroxyacetone, fructose etc.

Q13. Write amylose & amylopectin? & Primary & secondary structure of proteins?

Amylose: These have un-branched chains. Glycogen is animal starch.
Amylopectin: These have branched chains. These are insoluble in hot or cold water.
Primary Structure Protein: A primary structure is a linear polypeptide with a specific numbers, kind & sequence of amino acids in a protein molecule.
Secondary Structure Protein: It is the coiling of primary polypeptide chains. Other structural conformations -They usually coil into a-helix or β-pleated sheet by hydrogen bonding between opposite charge bearing groups of different amino-acids.

Q14. Define tertiary & quaternary structure of protein. Proise & pyrimidine?

Ans: Tertiary: In the tertiary structure, a polypeptide chain bends & folds upon itself are forming a globulus shape.
Structural maintenance: It is maintained by:
(a) Ionic bonds (b) Disulphide (-S-S-) bonds.
Quaternary: Proteins are polymers of several tertiary structures. In quaternary structure, the highly complex polypeptide tertiary chain are aggregated & held by:
(i) Hydrophobic interactions
(ii) Hydrogen bonds
(iii) Ionic bonds.

Q15. Write saturated & unsaturated fatty acids OR how fats differ from oil? Write DNA & RNA.

Ans: Saturated fatty acid (Animal Fats):

(i) They do not possess any double bond in their carbon chains.
(ii) They are straight chains
(iii) They have higher melting point then oils.

Q16. Diff b/w waxes, terpenes & phospholipids?

Ans: Natural waxes: These are simple lipids. They are by pirally esters of long chain fatty acids & long chain alcohol. e.g.
Synthetic waxes: These are generally derived from petroleum or polyethylene.
Phospholipids- They are a hot type of a compound /complex lipids & are derivation of phosphatidic arid.
Terpenoids: They are types of derived lipids & a large group of compounds which are made up of simple 5-C (Isoprene) building blocks repeating isoprene units.

Q17. Diff b/w steroids & prostaglandins?

Ans: Steroids: They are lipids that can be crystallized & have high molecular weight. They consist of 17 carbon atoms & arranged in 4 attached rings, 3 of the rings contain six carbon atoms & the fourth contains 5.

Prostaglandins: They are modified fatty acids, often derived from lipids in plasma membrane. They are derived from arachidonic acid (a tetra unsaturated 20-C fatty acid.
8(23):
Unsaturated Fatty acid (Plant Fat/oil) :(1) They possess one or more double bonds in their carbon chains. (2) They have bend or kink at double bond. (3) lower melting point.
DNA: (1) It is called de-oxy-ribo nucleic acids. (2) It is double helix. (3) In it nitrogen bases are A,T,G & C. (4) It has fixed amount in a cell. (5) It has deoxyribose with formula C5H10O4.
RNA: (1) It is called ribonucleic acids. (2) It is single stranded. (3) It is nitrogen bases are A,U,G & C. (4) It has variable amount in a cell. (5) It has ribose with formula C5H10O5.
Q18. Diff between sucrose, maltose & lactose?
Ans: Sucrose: Most common & abundant disaccharide is sucrose (cane sugar or Table sugar). It is widely used as sweetener at homes for making sweet dishes. It is non-reducing sugar. It is relatively unreactive chemically.
Maltose: It is commonly known as malt sugar. It is reducing sugar. It is the reactive chemically.
Lactose: It is commonly known as milk sugars found exclusively in milk in mammals. It is a reducing sugar. It is reactive chemically.
Q19. Define peptide bond & Diff btw dipeptide & tripeptide & polypeptide ?
Ans: Peptide bonds: They are formed when animal & plant cells store extra amino acids as polypeptides or proteins for their structural & functional role.
Dipeptides: Glycine & alanine combine to form glycylalanine.
Glycylalanine: two amino acids is called.
Tripeptides: If a new amino acids is added in dipeptide chains from its carboxylic acid -or -C terminal end or amino -N terminal end in same way.
Polypeptides: When several amino acids are linked together by many peptide bonds, the polypeptide chains is formed.

Chapter-3: Enzymes

Q1. What are ribozymes? & what is structure of enzymes?
Ans: They are the enzymes composed of RNA are found in ribosomes. For eg. Peptidyle transferase is a ribozyme which control polypeptide elongation during translation process. All of the enzymes except ribozymes are 3 dimensional globular proteins which are made up of one or more polypeptide. The retain their structure during & after the chemical reaction.
Q2. What is Prosthetic group? Give example & Explain the enzyme pepsin which does not require co-factor?
Ans: It is covalently bonded non-protein of enzyme. These are organic in nature. (1) It is firmly attached & shares their active sites & may be the permanent of enzyme. (2) Heme is an iron containing prosthetic group which acts as an electron carrier in cytochrome & oxygen carrier hemoglobin & myoglobin.
Pepsin released in inactive form from gastric gland of stomach called Pepsinogen. In this inactive state it has an additional polypeptide fragment attached to its active site which doesn't allow the binding substrate, so it remains inactive.
- Where pepsinogen is exposed in HCL in stomach cavity; additional polypeptide is removed resulting into conversion of in active pepsinogen in active pepsin.
Q3. What is mechanism of enzyme action? & what is role of free energy of activation in a chemical reaction?
Ans: As an enzyme is a 3 dimensional globular protein that's why it has a specific shape & chemical composition

- Due to its specificity, every enzyme reacts with a special substrate to form ES complex.
- Then, the substrate is converted into product while it is attached to enzyme (EP complex).

- Finally, the product is released, thus allowing the enzyme to start all over again; while enzyme remains intact.

In a reaction with a net release of energy, the reactant contains more energy than the products. In other words, the amount of this excess energy (called free energy) release into the environment is greater than activating energy required to chemical reactionn. These occur spontaneously & are called exergonic.

Q4. List the external condition that affect rate of enzyme action & compare the optimum temperature of enzymes of human & thermophile bacteria?

Ans: Substrate & enzyme concentration, PH, temperature, inhibitors, radiations, cofactors.
Most human (mammalian) enzymes function have a temperature optimum of about 37-38°C but bacteria living in hot springs may have a optimum temperature of 70°C or higher.

Q5. What are enzyme inhibitors? Name the molecules that act as enzyme inhibitors? & what is the importance of competitive enzyme inhibitors?

Ans: Inhibitor is a chemical substance which react with enzyme in place of substrate so its forms enzyme inhibitor complex in spite of ES- complex, hence is not transformed into products & blocks the active site of enzyme temporarily or permanently, So it is called enzyme inhibition.
e.g inhibitors include poisons, cyanides, antibodies, anti metabolites, penicillin, sulpha drugs etc.
It supports lock & key hypothesis.
It shows that enzymes cannot be fooled i.e substances which are similar to substrate are not acted upon by enzymes.
Competitive inhibitors are used as drugs in the control of bacterial pathogen. Antibiotics know as sulphonamides are used to combat bacterial infection.

Q6. Describe cyanides as irreversible non-competitive inhibitors & describe ions of heavy metals are irreversible non- competitive inhibitors?

Ans: Cyanides block the action of some enzymes by combining with iron which may be present in a prosthetic group or which may be required as an enzyme activator. Ions of heavy metals such as Hg+, Ag+ & Co+ combine with thiol (-SH) groups in enzymes breaking the disulphide bridges. These bridges are important in maintaining tertiary structure. When these bridges are broken, the enzyme becomes inactive.

Q7. Write the difference b/w binding site & catalytic site of enzyme

Ans: Active Sites: Those are the charge bearing sites, 3 dimensional cavity, composed of a few amino acid which perform catalytic reactivity for enzymes. So, active site is involved in catalytic activity of enzyme.

Binding Site: It recognize the specific substrate & attaches with it to form enzyme substrate complex - This reactionn or complex then activates the catalytic site.
Catalytic Site: The activated catalytic site changes the substrate into products.

$$E + S \rightarrow ES \text{ complex} \rightarrow E + P$$

Q8. Differentiate Apoenzyme & holoenzyme, Prosthetic group & co-enzyme.

Ans: Apo-enzyme: (1) enzyme without its proper cofactor is apoenzyme. (2) It cannot perform a chemical reaction. (3) It is inactive usually.
(4) Example: DNA polymerase, RNA polymerase, catalyse haem (without Mg++) etc.
Holo- enzyme: (1) enzyme with its proper cofactor is called holoenzyme. (2) It can perform a chemical reaction. (3) It is active .(4) Examples: DNA polymerase, RNA polymerase, Esterase .All need Mg++ as cofactor etc.
Prosthetic Groups (1) These are organic co-factor that are tightly bound to apoenzyme. (2) They usually become permanent part of enzyme.
(3) Example:* Peroxidase & catalase haem is prosthetic group-
Co-enzyme: (1) These are also organic compounds which are loosely bound to apo-enzyme .(2) The essential components of many co-enzymes is vitamin (3) Example NAD & NADP contain niacin.

Q9. write organic & inorganic & lock & key model & induced Fit model-

Ans: Organic Cofactor:- (1) Cofactor that contain C & H together. (2) These are usually enzymes & prosthetic group. (3) Examples: Heme group, vitamin C/A, NAD etc.

In-Organic: (1) Cofactor that donot contain C & H togethes. (2) These are usually metal ions. (3) Examples: Mg+2, Fe+2, Cu+2, Zn+2, Ca+2 etc.

lock & key model: (1) Emil Fischer in 1890, proposed lock & key model of enzyme & substrate interaction. (2) According to this manner a enzyme can transform only one substrate into products. (3) Active sites of enzymes are rigid structures.

Induced Fit Model: (1) Koshland in 1959, proposed this model on basis of new evidences. (2) According to this model, when a substrate combines with enzyme, it induces changes in the enzyme structure. This change allows the enzyme to do its catalytic activity more effectively. (3) active sites of enzyme are not rigid structure.

Q10. write competitive enzyme inhibitors & non-competitive & reversible & irreversible non-competitive enzyme inhibition?

Ans: Competitives- (1) their shape & structure resemble with substrate. (2) They compete with substrate to attach with enzyme. (3) They do not change globular shape of enzyme. Examples: malonic acid inhibits succinic dehydrogenase enzyme.

Non- Competitive- (1) Their shape/ structure does not resemble with substrate. (2) They do not compete with substrate.(3)They can change the globulus shape. examples: Urea, pencillin etc.

Reversibles- (1) The enzyme inhibitors work by preventing the formation of enzyme - substrate complexes. (2) examples: Feedback is an example of reversible non-competitive enzyme inhibition

Irreversibles- (1) Enzyme inhibitor destroys enzyme altering its shape so that the substrate cannot bind to active site. (2) examples- cyanide, & salt of heavy metals.

Q11. Explain the enzyme pepsin which does not require a cofactor. & What are cofactors in enzymatic reactions?

Ans: Pepsin is an example of an enzyme that does not require a cofactor. It is secreted by gastric gland from the stomach wall in an inactive state, called pepsinogen. In this state, it has an additional polypeptide fragment attached to its active site, which does not allow the binding of the substrate; hence, it remains inactive. When pepsinogen is exposed to HCl (as in the stomach cavity), the additional polypeptide fragment is removed, resulting in the inactive (apoenzyme) pepsinogen being transformed into its active (holoenzyme) form, the pepsin.

- Some enzymes also require a non-protein part called a cofactor, which is responsible for substrate attachment and participation in the catalytic process. The final shape of the active site is established after the cofactor attaches. An enzyme which requires a cofactor becomes active only if the cofactor is combined with it.

Q12. What is the mechanism of enzyme action? also Define non-regulatory and regulatory enzymes?

Ans: The substrate first binds to the active site of the enzyme to form an enzyme-substrate (ES) complex. Then the substrate is converted into product while it is attached to the enzyme (EP complex). Finally, the product is released, thus allowing the enzyme to start all over again.

Non-regulatory enzyme:

According to Lock and Key model, enzymes are highly specific in their action and each enzyme can carry out only one particular reaction. The enzymes, which work according to this model, are called non-regulatory enzymes.

Regulatory enzyme: According to Induced Fit model, the active site is flexible and can change shape to accommodate the substrate upon binding. Enzymes, which follow the induced fit mechanism, are called regulatory or allosteric enzymes for example hexokinase.

Q13. What are the factors affecting the rate of enzymatic action? & How does temperature affect enzyme activity?

Ans: The external conditions which affect the rate of enzyme reactions are temperature, pH, concentration of enzyme, and substrate concentration.

- if the temperature exceeds the optimum level, the enzyme may become denatured, leading to a decrease in the rate of reaction.

Q14. Give difference between lyases and ligases.

	Lyases	Ligases
Function	These enzyme catalyze the breakdown of specific covalent bonds and removal of groups without hydrolysis.	These enzymes bring about joining together of two molecules. The energy is delivered by hydrolysis of ATP.
Example processes	Histidine decarboxylase break the covalent bonds between carbon atoms in histidine forming carbon dioxide and histamine	Polymerases are responsible for linking monomers into polymer such as DNA or RNA.

Q15. What do you know nucleases?

Ans: These are the enzymes which are involved in breakdown of DNA and RNA. Examples are RNAses (digest RNA into ribonucleotides), DNAses (digest DNA into deoxyribo nucleotides) and ATPases (cause hydrolysis of ATP in muscles).

Chapter 4: Bioenergetics

Q1. What is electromagnetic spectrum? & Explain action spectrum of photosynthesis?

Ans: Sunlight is a form of energy that travels as waves known as electromagnetic or radiant form of energy also called radiations. The full range of electromagnetic radiation in universe is called electro-magnetic spectrum. Visible light is small part of spectrum that the eye can see ranges between 380nm to 750nm which not only seen by naked eye but is also effective for the process of photosynthesis.

"Such a graph which shows the effectiveness of different wavelength of light for the process of photosynthesis is called action spectrum".

Analysis of action spectrum indicates that blue (430nm) & red (640nm) wavelength of light are the most effective for the process of photosynthesis.

Q2. Describe Absorption spectrum of syn photosynthesis?

Ans: A graph of absorption of light of different by a pigment is called a absorption spectrum of the pigment.

The part of the spectrum which is absorbed by the chlorophyll is called absorption spectrum.

The absorption of different colours of light by a particular pigment can be determined (34):

by help of spectrophotometer. The data of a spectrophotometer is represent in graph.

- A graph which shows absorption of different robons of light by a particular pigment is called absorption spectrum of pigment.
- The main photoreceptor are chlorophyll a & b & both show more absorption in violet blue (400nmto 470nm) & orange -red (630nm to 660nm) regions of the visible spectrum.
- Carotenoids show more absorption at 430nm to 500nm.

Q3. What is role of CO_2 in photosynthesis? & how it was confirmed that water is source of hydrogen releasing oxygen as a byproduct?

Ans: - Carbohydrate act as carbon source for the synthesis of organic compounds in photosynthesis. Plants are therefore known as Autotrophs because they use inorganic compounds for the synthesis of their organic compounds.

- Sugar is formed during light independent reaction of photosynthesis by the reduction of CO_2 using ATP & NADPH.
- ATP & NADPH are products of light dependent reaction.

In 1930's, Van Niel hypothesized that plant split water as a source of hydrogen & the oxygen is released as a by- product.

Neils hypothesis was confirmed during 1940S when first time isotope of (O18) was used.

"An isotope is used in biological research to trace a chemical reaction."
Results:
Group-1 alga suspension: $CO_2 + 2H_2O^{18} \rightarrow CH_2O + H_2O + O^{18}$
Group-2 alga suspension: $CO_2 + 2H_2O \rightarrow CH_2O^{18} H_2O + O_2$

Q4. Write chlorophyll a & chlorophyll b & Carotene & xanthophylls?

Ans: Chlorophyll a:- (1) Molecular formula is $C_{55}H_{72}O_5N_4$ Mg. (2) The functional group bonded to the porphyria is methyl group(-CH3).(3) Blue- green (4) It is found in photosynthetic organisms except photosynthetic bacteria.(5) Some wavelengths not absorbed by chlorophyll b are effectively absorbed by chlorophyll a.

Chlorophyll b:- (1) Molecular formula $C_{55}H_{70}O_6N_4$ Mg. (2) The functional group bonded to the porphyria is the carbonyl group (-CHO).(3) Yellow - green.(4) It is found with chlorophyll a in all green plant & green algae.(5) Some wavelength not absorbed by chlorophyll a are effectively absorbed by chlorophyll b.

Carotenes- (1) They are orange red pigments
& are composed of isoprenoid units. (2) Beta-carotene, which is a carotenoid, absorbs 450 nm wavelength. (3) They does not contain any oxygen atoms in its structure.

Xanthophylls- (1) They are yellow or brown in colour & are composed of isoprenoid units. (2) While lutein & violoxanthin, which are the xanthophylls, absorb 435- nm. (3) They contain an oxygen atom in its structure.

Q5. Write action & absorption spectrum & Antenna complex & reaction centre ?

Ans: Absorption spectrum- (1) A graph of absorption of light of different wavelength by a pigment. is called absorption spectrum of pigment.(2) Peaks in absorption spectrum are less broader.(3) Valley in absorption spectrum is deep.(4) Valley in absorption spectrum is more steeper.

Action Spectrum- (1) Plot showing effectiveness of different wavelengths of light in doing photosynthesis is called action spector photosynthesis. (2) Peaks in action spectrum are broader.(3) Valley in action spectrum is not deep.(4) Valley in action spectrum is less steeper.

Antenna Complex:- (1) The peripheral part of Photosystem is called antenna complex which consist of accessory pigment such as chlorophyll -b & carotenoids. (2) It has many molecules of chlorophyll a, chlorophyll b & carotenoids. Most of them forward energy to reaction centre.

Reaction-Centre:- (1) The central part of photosystem is called REACTION centre which contains only chlorophyll-a & associated proteins. (2) (a) one or more molecules of chlorophyll a, (b) a primary electron acceptor & electron caries of electron transport system.

Q6. Write light dependent & light independent reaction of photosynthesis. & Oxidative phosphorylation & photophosphorylation?

Ans: Light dependent:- (1) It occurs in the thylakoid membrane of chloroplast. (2) light reaction depends on sunlight .(3) Chlorophyll are the pigment involved in light reaction. (4) Photolysis occurs in PSII during the light reaction.

Light Independent:
(1) Dark reaction occurs in stroma of chlorophyll.
(2) Dark reaction is independent of sunlight.
(3) No pigment are involved in dark reaction.
(4) No photolysis occurs during dark reaction.

Creative Phosphorylation:-
(1) The synthesis of ATP due to light energy is called
photo phosphorylation.
(a) As the electrons move down the chain & their energy on decreasing.
This energy goes on decreasing. This energy is used by the Thylakoids membrane of the chloroplast to synthesise ATP.

Oxidative :- (1) The synthesis of ATP molecule in the present oxygen is called oxidative phosphorylation.

(2) Normally, oxidative phosphorylation takes during respiratory chain. Three ATP molecules formed during three steps of the respiration-

Q7. Write cyclic , non-cyclic photophosphorylation & C4 & C3 CO2 fixation:-

Ans: Non- Cyclic:- (1) In non- cyclic electron flow, electron doesn't return back to same excited chlorophyll.

(2) Both, photosystem II & I are involved in it.

(3) End productive of non-cyclic electron flow is ATP & NADPH.

Cyclic:

(1) In cyclic electron flows there is returning back of some excited electrons to excited chlorophyll by producing a molecule of ATP.

(2) Only Photosystem II is involved in it.

(3) Only molecule of ATP is produced due to cyclic flow.

C3 CO2 fixation:- (1) Photosynthesis occurs in mesophyll cells.

(2) The CO2 molecule acceptor is RuBP.

(3) First stable product is a 3C compound called 3PGA.

(4) Photorespiration rate is high. So leads to loss of fixed CO2. It decreases CO2 Pixation rate.

C4 CO2 fixation:- (1) Photosynthesis occurs in mesophyll & bundle sheath cell.

(2) The CO2 acceptor molecule is phosphoenol pyruvate.

(3) The first stable product is 4C compound called OAA.

(4) Photorespiration is negligible so it is almost absent. Hence it increases CO2 fixation rate.

Q8. Write batic acid & bactic alcoholic Permentation?

Ans: Alcoholic Fermentation:- (1) The pyruvic acid is broken down in alcohol & CO2 by alcoholic fermentation.

(2) Alcoholic fermentation takes place in some primitive cells & some eukaryotic cells like yeasts.

Latro acid Pesmebtations- (i) In this cases each pyruvic acid molecule is converted into lactic acid (C3H6O3-

(ii) It occurs in muscle cells of humans & in other animals.

Calvin Cycle- (i) It is a part of dark part of photosynthesis.

(ii) It takes place in stroma of chloroplasts.

(iii) In it ATP & NADPH2 are used.

(iv) It occurs only in photosynthetic plants.

(v) In it Co2 is used & carbohydrates are formed.

Krebs cycle- (i) It is a part of aerobic respiration.

(ii) It takes place in matrix of mitochondria.

(iii) It leads to synthesize ATP, NADH2, FADH2.

(iv) It take place in all organism with Aerobic respiration.

(v) In it Co2 is produced & carbohydrates are generally used.

Chapter-5:Acellular life

Q1. Give the classification of viruses based on their hosts & determine the method a virus employs to survive / Passes unfavorable conditions, when it does not have host to complete the life cycle?

Type	Nature and structure	Examples
Plant viruses	Usually RNA viruses, variable shapes.	TMV etc
Animal viruses	Usually DNA some have RNA too, variable shape.	HAV, HBV, HCY, HIV, polio virus, etc.
Bacteriophage (attack bacteria)	DNA virus with a polyhedral head & nelical tail	T2, T4 etc.

host to complete the life cycle.

Viruses unlike other “living” organisms do not need food to survive.

They remain dormant or inactive outside the host body.

Factors Effecting Virus:-

- PH & temperature, as these would denature the protein.
- The violence of virus outside host is maintained for certain period of time & the time period depend on what virus is or PH & temperature of medium.

(i) Non-enveloped viruses:- can fact survive for long periods outside the host.

(ii) Enveloped viruses:- survive for short time period. This is because: & many enveloped viruses rely on proteins on surface of membrane to attach to host cell,

Envelope is generally sensitive to deration to sun-light & normal cleaning procedures.

Q2. Justify the name of virus i.e. "Human Immunodeficiency virus" by establishing T- helper cell as basis of immune system. Reasons out the specificity of HIV on its host cell?

Ans: HIV preferentially infects & kills helpers (CD4) T lymphocytes so the virus doesn't cause any disease itself . As the virus affects the human immune system, so the virus has been named Human Immunodeficiency Virus (HIV). As helpers T cells regulate immunity by enhancing the response of other immune cells. So, the decrease in the number of helpers T cells causes deficiency of human immune system.

HOST SPECIFICITY:- It has been found recently that HIV infects & multiply in monkey but don't cause disease in them. Moreover it has specific spikes/ receptors glycoproteins 120 on its envelope to bind with the CD4 protein on the surface of T4 cells. It means that HIV is host specific.

Q3. List symptoms of AIDS & explain opportunistic disease that may attack an HIV victims?

Ans: (1) Asymptomatic Symptoms:- they may include

exp. (i) fever (ii) Chills (iii) aches (iv) Swollen

(iv) an itchy rash.

(2) AIDS Related Complex (ARC): The most common symptoms of ARC are:

(i) Swollen lymph glands in neck, armpit or groin that persist for months.

(ii) Persistent Diarrhea,

(iii) Night sweats

(IV). Persistent cough & flu

(3) Full blown AIDS- The common symptoms in final stage are-

(i) Severe weight loss & weakness due to persistent diarrhea etc.

(ii) Usually one of several opportunistic infections. For examples: a Pneumocystis carinii pneumonia Kaposi sarcoma etc.

Getting the opportunity of less or no immune system i.e. weak defense system a person suffering from Aids is attacked by disease called opportunistic disease. For example:

(i) Pneumocystis carinii pneumonia

(ii) Kaposi sarcoma

(iii) viral infections

(iv) nervous system disease

(V). gastrointestinal disease

Q4. List some common control measures against the transmission of HIV & Describe the structure of Prions & name any two disease caused by them?

Ans: The HIV is transmitted by following ways so following precautionary measure will prevent Aids.

- Do not used used syringes & needles.
- For blood transfusion, blood must be used after proper screening for HIV.
- Do not share tooth brushes, blades & towel with anyone. Special care to be Taken at barbers shop or hair cutting salons, beauty salons.

Surgical instruments must be properly sterilized.

STRUCTURE:- Prions are infectious particles that are composed solely of proteins. i.e they contain no detectable nucleic acids so they are different from viruses.

Furthermore electron microscopy reveals filament rather than virus particles.

PATHOGENESIS:- (i) In man it causes certain fatal neurodegenerative disease e.g Kuru

(ii) In Cattle it causes Bovine spongiform encephalopathy (mad cow disease).

Q5. Describe the structure of viroids & name the disease caused by them? & what do you mean by AIDS,HIV, ART, CJD & TMV?

Ans: STRUCTURE:-

Viroids consist solely of a single molecule of circular RNA only.

They have no protein coat or envelope.

There is extensive homology b/w bases in the viroid RNA, leading to large double stranded regions.

PATHOGENESIS: (i) They cause several plant diseases. potato • coconut • apple • peach

(i) Viroids usually do not cause disease in animals. The only Human disease known to be caused by a viroid is hepatitis D.

ABBREVIATIONS	MEANING
AIDs	Acquired immune deficiency syndrome.
HIV	Human immuno - deficiency virus.
ART	Anti- retroviral therapy
CLuD	Cotton leaf curl disease
TMV	Tobacco

Q6. Distinguish b/w: Bacteriophage & HIV, lytic & lysogenic cycle bacteriophage, viroids & viruses.

Ans: (a) Bacteriophage:(1) These viruses attack & eventually kill them. (2) These viruses are usually non-enveloped. (3) These viruses have single stranded DNA. (4) These are icosahedral & tadpole like shape.

(b) HIV: (1) These viruses infect T-lymphocytes of humans & cause AIDS. (2) These viruses are enveloped. (3) These viruses have 2 single-stranded RNA genome. (4) These viruses have somewhat spherical shape.

(c) Lytic cycle or master-Slave relationship: (1) In it bacteria is killed readily. (2) In it no prophage formation occurs - (3) In it phage controls & uses metabolic machinery of bacterium completely. (4) In it only phage multiplies.

(d). Lysogenic Cycle os host - Guest relationships:

(1) In it bacteria survives - (2) In it prophage formation occurs. (3) In it phage does not control & use metabolic machinery of the bacteria completely. (4) In it both phage genome & bacterium multiplies.

(e). Prions and Viroids: Prions are infectious agents made of abnormally folded proteins without nucleic acids. They replicate by converting normal cellular proteins into the prion form and primarily affect the nervous system, causing diseases like Creutzfeldt-Jakob disease and mad cow disease. Viroids, on the other hand, are made up of small, circular single-stranded RNA molecules with no protein coat. They infect only plants, disrupting growth and development. Viroids replicate using the host's RNA polymerase, often hijacking plant machinery without producing any protein

Chapter 6: Prokaryotes

Q1. Write the pigment composition of cyanobacteria? Sp Do you know the difference b/w the bacteria & Archaea?

Ans: PHOTOSYNTHETIC SYSTEM:

- For photosynthesis they have a chlorophyll a Sp photosystem II.
- This photosynthetic system closely resembles to that of eukaryotes.
- They carryout oxygenic photosynthesis .In this case they use water as an electron donor Sp generate oxygen during photosynthesis.

PHYCOBILINS:

- Phycocyanin pigment is their predominant phycobilin.
- Cyanobacteria use phycobilins as a accessory pigments.

Bacteria: (1) These are bacteria.

(2) These bacteria cannot withstand very harsh conditions. (3) Their cell wall chiefly made up of peptidoglycan. (4) For example: E.coli, Vibrio cholera.

Archaea: (1) These are most ancient bacteria. (2) These bacteria can withstand very harsh condition. (3) Their cell wall is not made up of peptidoglycan; instead of proteins, glyco protein & polysaccharides. (4) For example: thermus, aquatics etc.

Q2. What are the morphological forms of bacteria?

Ans: On the basis of shapes bacteria can be classified in 3 main shapes as cocci, bacilli & spirilli.

- Most of bacteria species have constant characteristic shapes.
- However, some are pleomorphic & present in many shapes. For example: Helicobacter pylori exist as both a helix - shaped form & a spherical form.

Give the function of following in bacteria?

RIBOSOMES:

- They are mostly free in the cytoplasm.
- Sometimes they are loosely attached to the plasma membrane.
- They are smaller (70S) than eukaryotic (80S) ribosome.

CELL MEMBRANE:

- Beneath the cellwall is the cell membrane or plasma membrane.
- It is thin, delicate, flexible & completely surround the cytoplasm. Any damage to its results in death of bacteria.

FUNCTION:-

a. Cell membrane regulates transport of the proteins, nutrients, Sugar & electrons.
b. It also contain enzymes for respiratory metabolism.

NUCLEOID:

- The DNA of bacteria is single, circular & double stranded molecule. It aggregates as in irregular shaped dense material called nucleoid.
- Other names for nucleoid are nuclear body, chromatin body & nuclear region.
- In bacteria chromosomes & nuclear membrane are absent.

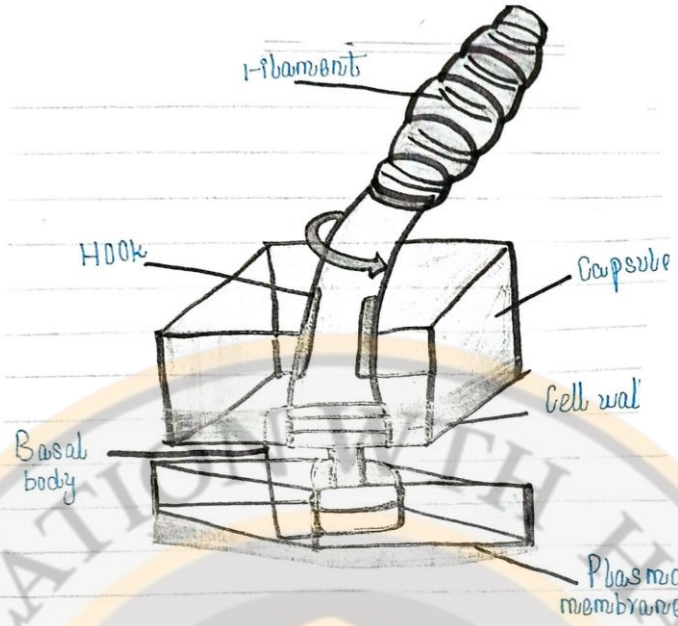
Q3. How the mechanism of photosynthesis in cyanobacteria is similar & different form that of plants. How chemosynthetic bacteria are autotrophic in nature?

Cyanobacteria:- (1) Oxygenic photosynthesis.
(2) Chlorophyll A present. (3) Photosynthetic pigments & electron transport chain components are located in thylakoid membrane. (4) Photo system II is present only.

Plants: (1) Oxygenic photosynthesis. (2) Chlorophyll A present. (3) Photosynthetic pigments & electron transport chain components are located in thylakoid membrane. (4) Photosystem I & II both are present.

These bacteria can oxidize inorganic compound like ammonia, nitrates, sulphur or ferrous iron. As a result energy is released which is used for their synthetic reaction. As they do not depend upon other organism for their food hence chemosynthetic bacteria are autotrophic in nature. Example: Nitrifying bacteria are chemosynthetic.

Q4. Draw & label structure of flagellum & which chemical methods are used to control microbes?



Chemical method for control of bacteria include antiseptics & disinfectants & chemotherapeutic agents.
(i) ANTISEPTICS: These are chemical substances used on living tissues to kill & inhibit the growth of microorganism.
(ii) DISINFECTANTS: These chemical agents are used to inhibit the growth of vegetative cells on the non-living materials. These include oxidizing & reducing agents.
(iii) CHEMOTHERAPEUTIC: Chemotherapeutic agents & antibiotics work with natural defence to stop the growth of bacteria & other microbes. They destroy or inhibit the growth of bacteria & other microbes. They destroy or inhibit the growth of microorganisms in living tissues. These sulphonamides , tetracycline , penicillin.

Q5. Give physical methods to control microbes? & Define the term normal flora?

Ans: Many physical methods are applied growth- For examples: steam, dry heat , gas, filtration & radiations.
Normal flora is the term used to describe the various bacteria that are permanent residents of certain body parts, especially the skin, oropharynx, colon & vagina. So, they contribute in lives & processes of plants & animals .

Q6. What is chemical composition of cell wall of bacteria? Write 2synonyms & Measosome?

Ans: The cell walls of most bacteria have a singly covalently linked macromolecule called peptidoglycan.
- Its amount varies in different types bacteria.
- Peptidoglycan is derived from the peptide & sugars that make up the molecule. Synonyms for peptidoglycan are murein & mucopeptide.

Lysosome:- (1) It is found in eukaryotes only. (2) It is a vesicle evolved from Golgi Complex involved in digestion & defence etc.
Mesosome: (1) It is found in prokaryotes only. (2) It is membrane like structure evolved from cell membrane involved in cell respiration & division.

Q7. Write peptidoglycan & Muramic acid- & lytic bacteria & lysogenic bacteria?

Ans: Peptidoglycan:- It is composed of long glycan chains cross-linked with peptide fragments.
Muramic acid: Synonymes for peptidoglycan are murein & mucopeptide. So. murian is made up of muramic acid that provides peptidoglycan strength even in its low concentration in gram negative bacteria.
Lytic bacteria: (1) These bacteria readily kill the bacteria. (2) They are also called the virulent bacteria as they develop master-slave relationship.

Lysogenic bacteria:- (1) These bacteria do-not kill the bacteria. (2) They are also called non-virulent / temperate bacteria as they develop host- guest relationship.

Q8. write pathogen & non-pathogen & Photosynthetic & chemosynthetic bacteria?

Ans: Pathogenic bacteria or Bacteria that cause disease in man. (2) Mycobacteria Shigella sp.

Non- Pathogenic bacteria: (1) Bacteria that do not cause disease in man. (2) Lobar bacillus, certain lactic bacillus sp.

Photo synthetic Bacteria: (1) The bacteria synthesize their food by the process of like photosynthesis. (2) Green sulphur bacteria, purple sulphur bacteria & purple non-sulphur bacteria are photosynthetic bacteria.

Chemosynthetic bacteria: (1) These bacteria can oxidize inorganic compounds like ammonia, nitrate, nitrite, sulphur or ferrous iron. As a result, energy is released which is used for synthetic reaction. (2) Nitrifying bacteria are the chemosynthetics.

Q9. Autotrophy & heterotrophy & Mutation?

Ans: Autotrophy: (1) Mechanism in which organisms prepare their own food by themselves using simple molecules. (2) Photosynthetic & chemosynthetic bacteria.

Heterotrophy: (1) Mechanism in which organisms depend upon other organism for their food. (2) Saprotrophic & parasitic bacteria.

Mutations- (1) Process is which DNA or its part changes. (2) For example: CAT codes for valine in sickle cell anemia normal code is GTT for glutamic acid.

Mutant: (1) Organism in which mutation occurs. Sickle cell anemia person.

Q10. How do bacteria survive under unfavorable conditions?

Ans: Granules & Storage bodies : Bacteria live in competitive environment & nutrients become short . So, they store extra nutrients when possible.

Storage Material: Spores are metabolically dormant bodies & are produced at a late stage of cell growth. Certain species of bacteria produces spores.

TYPES SPORES: (a) baspores: These are formed external to vegetative cells. (b) Endospores: These are formed within the vegetative cells.

CYSTS: They are dormant thick-walled desiccation resistant forms.

- However they are not heat resistant.
- These can germinate under suitable condition.
- They are developed during differentiation of vegetative cells.

Q11. How do bacteria survive under unfavorable conditions? List four ways in which bacteria are beneficial to man.

Ans. In unfavorable conditions such as extreme temperature, drought, or chemical exposure, certain bacteria produce endospores—thick-walled, dormant structures that encapsulate the genetic material and essential enzymes. Endospore formation enables bacteria to withstand boiling, radiation, desiccation, and disinfectants.

1. Digestion: Gut bacteria like Lactobacillus help break down food and synthesize vitamins B and K.
2. Bioremediation: Bacteria degrade environmental pollutants like oil and heavy metals.
3. Industrial Production: Used in manufacturing antibiotics, enzymes, ethanol, and bioplastics.
4. Agriculture: Rhizobium and Azotobacter fix atmospheric nitrogen, enriching soil fertility.

Q12. What are the benefits of bacterial flora to humans? & What is the primary function of the F factor in bacterial cells?

Ans. Normal bacterial flora provides multiple benefits to human health. In the gut, bacteria aid in digesting food and synthesizing essential vitamins such as vitamin K and B12. They also prevent colonization by pathogens through competition for nutrients and space (colonization resistance). On the skin and mucosal surfaces, resident microbes act as a barrier against infection Key Points

The F factor (fertility factor) is a plasmid found in some bacterial cells that enables the process of conjugation, a method of horizontal gene transfer. Cells containing the F plasmid are known as F^+

(donor) cells, while those without it are F^- (recipient) cells. During conjugation, the F^+ cell forms a sex pilus that attaches to an F^- cell, creating a cytoplasmic bridge

Chapter-7: Protists and Fungi

Q1. What are primary modes of obtaining nutrients in fungi? & Where can fungi be found in various ecosystem & what can fungi do? Are their diverse habitats?
Ans: All Fungi lack chlorophyll & are heterotrophic. (Obtaining carbon and energy from organic matters). They obtain their food by direct absorption from the immediate environment. So are thus absorptive heterotrophs.
- All parts of fungi growing through the substrate are metabolically active.
- Fungi display diverse modes of life, including saprophytic, mutualists, parasitic, predatory.
- Their adaptability & varied life styles make fungi essential components of ecosystem.

Q2. Why are fungi considered heterotrophic? & list two differences between fungal cell walls & plant cell walls.
Ans: Fungi are not able to prepare their own food as they lack chlorophyll, hence they are heterotrophic & rely on extra-cellular digestion.
Plant cell wall is made up of cellulose while chitin in fungi. Plasmodesmata is present in plants while its absent in fungi.

Q3. Differentiate b/w endomycorrhizae & ectomycorrhizae based on their interactions with plant roots. & what makes imperfect fungi unique & why are they sometimes referred to as imperfect?
Ans: Ectomycorrhizae: (1) The fungal hyphae don't penetrate in root cell walls. (2) The fungal hyphae simply grow around the extended b/w the cell. (3) These are mostly formed with pines, firs etc.
Endomycorrhizae: (1) Fungal hyphae penetrate the outer cells of plant root. (2) Fungal hyphae forming coils swellings & minute branches. (3) These are mostly with angio-sperms etc.
These fungi are called "imperfect fungi" owing to absence of sexual stage in their life cycle. These fungi lead a saprophytic or parasitic life on plants.
EXAMPLES: They have well-known economic importance. Penicillium, Aspergillus, Alternaria & Fusarium are few examples of imperfect fungi

Q4. What is 'zygospore' & how is it formed? & What is histoplasmosis?
Ans: Plus & minus nuclei then fuse to form a diploid nucleus, the zygote. During their sexual reproduction, zygote is formed directly by the fusion of hyphae forms temporary, dormant, thick walled resistant structure zygospore
(i) Histoplasmosis: is a serious infection of lungs caused by inhaling spores of a histoplasma fungus which is common in soil contaminated with bird's feces.

Q5. Write two salient features of following
Ans: (a) Coenocytic hyphae: lack septa or cross walls.
(b) Conidia: Conidium is asexual reproductive spore produce externally upon a conidiophore.
(c) Ascocarp: It is fruiting body of ascomycetes, ascocarp has many asci which release ascospores. Ascocarps are formed sexually.
(d) Sporangia: The spores are produced inside the sporangium are formed in both sexual & asexual reproduction. Sporangium releases spores. Sporangium is found in various groups of fungi.
(e) Basidium: A is a terminal cell which produces basidiospores. It is found in Basidiomycota or Basidio mycetes.

Q6. How do fungi store carbohydrates? & Name the four major groups of fungi based on their methods of reproduction?
Ans: fungi store food in form of glycogen, along with oil bodies. Reserve food varies in different species . It can be in various form of the carbohydrates such as fructose, sucrose or starch in plants & as glycogen in animals & fungi. zygomycota, Ascomycota, basidiomycota & Deuteromycota

Q7. Define polyphyletic origin? where they come from?
Ans: Protists don't all come from the same ancestor.

In facts, they have many different origins.
We put any eukaryotic creature that is not a fungus, animal or plant into the protist category just for convenience.
The term "polyphyletic" refers a grouping of organism that don't share a common evolutionary ancestor & may have evolved independently from different ancestral sources & not closely related in terms of their evolutionary history.

Q8. Difference b/w mutualism, lichen & mycorrhizae?

Ans: Mutualism is association in which both the partners get benefit.
Mycorrhizae represent mutually beneficial partnerships b/w soil fungi & the roots of majority of plants
Lichen: They are an association b/w a fungus a cyanobacterium or green alga.
Fungus protects algal partner from strong light & desiccation (drying out) & penetrate its hyphae into or enveloping photosynthetic cells get food from alga.

Chapter 8: Kingdom Plantae

Q1. How are cones & flowers alike? & How they are different? & what is the importance of alternation of generations , pollen tube & seed?

Ans: Similarities:

CONES	Flowers
Both are used as reproductive structures.	
Both produce seeds	

DIFFERENCE

CONES	Flowers
Cones are woody structure	Flowers are not woody instead are made up soft tissues.
Pollination occurs through wind	Pollination occurs through insects ,air, animals & water etc.

Importance of alternation of generations, pollen tube & seed:
- Reshuffling of genes takes place during formation of 1N spores from spore mother cells (2N) during meiosis.

- Variable genetic makeup of spores is produced. Moreover, a large amount is produced.
- Importance of alternation of pollen tube, The pollen tube carried male gametes into the embryo sac to fertilize egg.
- Importance of seed:

(1) The seed provides maximum protection to adeveloping embryo under the unfavorable terrestrial environment.
(2) The evolution of seed habit was a great success & jump which allowed the plants to live on land permanently.

Q2. Write three main features of bryophytes? & Name the land adaptation features of bryophytes?

Ans: Distinguishing character: (i) Vascular system absent. (ii) Multicellular sex organs produce embryo. (iii) Sporophytes are smaller & attached to gametophyte for food.
To adjust on land habitat, bryophytes have developed following characteristics.
1. Reduced surface area
2. Development of photosynthetic tissues .
3. Efficient rhizoids
4. Heterogamy.

Q3. Write any four features of vascular plants. & why are bryophytes called amphibious plants?

Ans: o. Root, stem & leaves.
o. Vascular system in roots, stems & leaves.
o. Protected sporangia, leading to seed evolution.

o. Pollen tube development for transferring of male gametes to female gametes independent of water is much safer.
o. Flowers & fruit for dispersal.
o. Heteromorphic alternation of generations.
Bryophytes are said to be the amphibians (L-Dual natured) of plants world because they cannot live away from water. They actually need water for development, existence & reproduction.

Q4. What is importance of seedless vascular plants & write botanical names & families of following plants?

Ans: The seedless vascular plants are of economic importance.
o. Lycopodium & Selaginella are chiefly grown as ornamental plants & are utilized in the preparation of Christmas wreathers. Spores & stems of Lycopodium have got some the medicinal importance. Docks & other aquatic animals feed upon the corn of Isoetes.
o. Ferns are mostly ornamental plants of gardens & green houses.

Common name	Botanical name	Family
Rice	Oryza sativa	Poaceae
Potato	Solanum tuberosum	Solanaceae
Sugar cane	Saccharum officinarum	Poaceae

Q5. Write any four uses of bryophytes & gymnosperms?

Ans: Uses of Bryophytes:
- Mosses play an important role in their environment.
- They hold the soil in place & help prevent erosion.
- They provide food for animals, especially birds & small mammals.

Uses of Gymnosperm:
- Pine seeds like chilgoza are eaten as dry fruits.
- Ephedra: Ephedrine, a drug from the Ephedra is used for the relief of the asthma & other respiratory ailments.
- Conifers are source of soft wood for construction, packing, plywood, board & for making paper.
- Resins, terpentine & tar & many are obtained.

Q6. Define: Angiosperms, inflorescence, & alternation of generation & What is the advantage of the seed?

Ans: - Angiosperm: Plants whose seed are covered e.g Rose, mango, apple etc.
- Inflorescence: Pattern of flowers on the angiospermic plants.
Alternation of generations: Phenomenon in which sporophyte (2n) generation alternates into Gametophyte (1n) generations & vive versa.
- The seeds provide maximum protection to a developing embryo under the unfavourable terrestrial environment.
- The evolutions of seed habit was a great success & jump which allowed the plants to live on land permanently.
- Seed help in dispersal of plant species.

Q7. What do monocots & dicots have in common? How do they differ

Ans: Similarities
(i) Both are tracheophytes (Vascular Plants).
(ii) Both are flowering plants.
(iii) Both are spermato phytes (produce seeds).
(iv) Both have megaphyllous leaves.

Differences

Monocots	Dicots
Plants having 1 cotyledons in their seeds are called monocot-	Plants having 2 cotyledons in their seeds.
Petals & sepals 3 or multiple of 3.	Petal 4 or 5 or multiple of 4 or 5.
Vascular bundles Scattered.	Vascular bundles in a ring.

Parallel leaf venation	Network.

Q8. Different between paraphyse & protonema ?

Ans: - Paraphyses: The sex organs are developed in clusters in which they are intermixed with some multicellular hair like structure.

- Protonema s:- It germinates into an alga like structure called protonema, having buds & branches. The bud rise to mature gametophyte.

Q9. Define pteridophytes? Different sporphytes & sporangia?

Ans: Pteridophyta:- Pteridophytes are seedless vascular plants with further consist of earlier three complete sub-divisions of tracheophytes.

(i) Sporophytes:- They have rootless sporophytes. it consist of: (i) Underground Rhizome, (ii) Aerial/erect Stem.

(ii) Sporangia:- They are reproductive organs of sporophyte which develop at tips or on the lateral sides of the aerial branches.

Chapter-9: Diversity in Plant Function

Q1. What are carnivorous plants? Give examples. & define osmosis & diffusion?

Ans: Insectivorous plants are partly autotrophs but they grow in marshy area where they cannot fulfill their need of nitrogen. So they catch & digest insects so as to fulfill their need of nitrogen.

Examples:- Pitcher plants: Sarracenia purpurea

Venus fly trap; Dionea muscipula Sundew;

Drosera intermedia

Diffusion	Osmosis
Movement of solutes from higher to low concentration is diffusion.	Movement of water from higher to low concentration through semipermeable membrane
Semi-permeable membrane may or may not be necessary	Semi-permeable membrane is necessary.

Q2. What is water potential? & why exchange of gases occurs more efficiently in air than water?

Ans: water molecules have kinetic energy by which they move rapidly & randomly from one place to another place in liquid or gasses, therefor greater the concentration of water molecules in a system, the greater is the total kinetic energy of water molecules. This is called water potential (Ψw).

1. Water moves from a region of higher Ψw to lower Ψw.

2. Using this terms osmosis can be defined: Gas particles ran move easier through air molecules than they could through waters molecules. Oxygen diffuses more slowly in water than in air more energy is required to move water than air because water is denses & more viscous. Water is more dense & viscous than air & hold less O2 per unit volume.

Q3. Name the hormones involved in each of the following physiological processes.

Ans: (a) Germination of seeds: Auxins, Gibberellins, enhance seed germination.

(b) Stem elongation: Auxins, Gibberellins, Cytokinins, increase stem elongation.

(c) Ripening of fruits: Auxins, cytokinins promote fruit growth. GA promotes fruit setting but delay ripening. Ethene promotes fruit ripening.

(d) Abscission of leaves: Auxins, inhibit abscission, ABA promotes abscission.

(e) Dormancy of seeds: Gibberellins, Cytokinins break bud & seed dormancy. ABA promotes bud & seed dormacy.

Q4. Differentiate between Collenchyma & sclerenchyma, photoperiodism & phototropism ?

Ans: Collenchyma Cells: (1) have protoplasts, (2) Are living usually dark secondary walls. have angular thickening in their primary walls.

Sclerenchyma Cells- (1) They lose their protoplast after maturity. (2) They have mostly non- living cells & contain lignin. (3) They have thick secondary cell walls with no angular thickening.

Photoperiodism:- response of a plant to the relative length of day or nights, particularly with respect to flowering. (2) In it light & dark periods are involved. (3) Example: short day & long day plants.
Phototropism:- (1) It is movement of part of plant in response stimulus of light. (2) It is caused by the differential growth of part of plant like stem or root (+ or -). (3) Example: leaf & shoot.

Q5. Define the following?

Ans: Nutrition: The process of acquiring energy & materials for cell metabolism is known as nutrition.

Nutrients: They are components of food. These components are carbohydrates, proteins & fats etc. & these provide energy.

Osmotic adjustments: lowering of osmotic potential by active solute accumulations.

Primary Growth: In it primary tissues are added by apical & meristem. It is increases the length of the plant.

Secondary Growth: Secondary tissues are added by the inter calary or vascular cambium . It increases the thickness of plant.

Homeostasis: Is the maintenance of internal conditions in a cell or in a organism by means of self-regulation mechanisms.

Cohesion: It is attraction among the water molecules which hold water together.

Adhesion: It is attractive force between water molecules & other substances.

Q6. Why support is needed in terrestrial life? & what is path of salts & water is vascular plants?

Ans: Both plants & animals need support against gravity

In plants collenchymatous cells give support to baby plant & sclerenchymatous cells adult plants

o In animals muscles, cartilage & bone provide support. They enable them to move toward food, away from danger & for shelter.

The water which enters the epidermal cells moves along the concentration gradient & passes through cortex, endodermis, pericycle, & finally to xylem cells.

o Therefore water & solutes particularly salts in form of ions must pass through the cell surface & into the cytoplasm of the cells of the endodermis.

o The ions cross the endodermis by the entering the cytoplasm & possibly the vacuoles.

o Here, the processes of diffusion or active transport are involved. The ions then reach the xylem cells.

Q7. How does symplast differ from apoplast? & what are annual rings? Define primary & secondary growth in plants?

Ans: Apoplast Pathway: 1) The movement of the ions through the extracellular pathway b/w the cell walls of adjacent cells. 2) Ion easily reaches the endodermis cells by the Apoplast pathway. But the casparian strips of endodermis prevent the further movement.

Thus those ions must enter into the endodermal cells by diffusion or active transport.

Symplast Pathway: (1) The movement of minerals through the plasmodesmata of cells. (2) There is a concentration gradient down the cells of cortex, endodermis, Pericycle & sap of xylem cell. So, the minerals move down through plasmodesmata into the cells of cortex, endodermis, Pericycle & then to the sap of xylem.

- ANNUAL RINGS: The xylem tissues are formed accordingly to the two xylem tissues are differentiated on the basis of large sizes in spring & small sizes during autumn. It makes ring structures. These are called annual rings & are used to determine the age of plant

- Primary Growth: occure at primary meristems. (2) Primary growth results in increase of height of plant

- Secondary Growth: (1) It occurs at secondary meristems. (2) It results is an increase in girth of plant.

Q8. What does the wood of many tropical trees lack annual rings? & what are the types of movement in plants in response to stimuli?

Ans: The xylem tissues are formed accordingly. So the two xylem tissues are differentiated on the basis of their large size in spring & small sizes during autumn. It makes ring structures. These are called annual rings & are used to determine the age of plants.
Plants as their characteristic don't show locomotion but the individual plants organs may show movement in response of same stimulus.
(i) Phototropism: It is the response of a shoot or a root toward the source of light or away from light. Shoots show positive phototropism. & roots show negative phototropism
(ii) Thigmotropism: These movement are due to the touch stimulus. Such movements are shown by climbing plants that require any supportive structure such as a wall, a wooden stick or rod or even a rope to climb eves.
(iii) Geotropism: Movement of shoots & roots against & towards force of gravity. Shoots show negative geotropism.
(iv) Chemo tropism: The stimulus is a chemical e.g movement of hypheal / mycelium of fungi is chemotropic.

Chapter-10: Animals

Q1. write four distinct features of animals & what are nematocysts?
Ans: Kingdom Animalia consist of all animals which are
(1) multicellular
(2) diploid
(3) ingestive heterotrophs
(4) eukaryotics
(5) develop from 2 different haploid gametes.
The mouth is surrounded by a series of tentacles. These bear stinging cells or the nematocysts. These are organs of defense & offense.
Q2. Give three features of platyhelminthes for parasitic mode of life. & Give three distinguishing features of Aschelminthes?
Ans: The platyhelminthes have adapted following characters for parasitic mode of life
(i) CUTICLE: The epidermis is absent & resistant cuticle is formed for protection.
ADHESIVE ORGANS: (such as suckers & hooks) for attachment to host have developed.
DIGESTIVE SYSTEM: Is simple & less developed due to increased dependence on host.
The name Nematoda means worms with pointed ends.
The animals of this group have elongated worm like body with pointed ends.
i. The body cavity is pseudocoelom. It is not formed from the mesoderm.
ii. A fluid filled space is present between the body wall & the alimentary canal. It provides tube within tube type structure in true nematodes.
Q3. How locomotion takes place in Annelids? & write five salient features of phylum Arthropoda?
Ans: The body wall contain muscles which help in locomotion. The muscle are two types.
i. Circular Muscles: These are arranged along the circumference of body.
ii. Longitudinal Muscles: These are arranged along the length of body.
o They have jointed appendages.
o These appendages have been modified for specialized functions.
o The body is covered with waterproof chitinous cuticle secreted by the epidermis.
o It is well developed & consist of the Malpighian tubules. The nitrogenous wastes are excreted in the form of solid uric acid.
Q4. List the similarities between echinoderms & chordates? & what does the term amphibian mean? Why amphibian are not considered a very successful group of the vertebrates?
Ans: (1.) RADIAL CLEAVAGE: radial cleavage during development of embryos.
(2.) DEUTEROS TOMES : The blastopore forms the anus in echinoderms as well as in chordates.
(3.) PHOSPHOCREATIN: It is present in both.

(4.) SKELETON: Both have mesodermal exo-skeleton. (5.) SEMILARITY IN DEVELOPMENT: Early development stages are same.
Examples: Asterias (star fish), Sea urchin, Sea cucumber, Cake urchin, Brittle star.
o Their name also means double life.
o Structurally they are b/w the fish & the reptiles. o Although amphibians have acquired some land characters but they have still some aquatic characters as the result of their dependese on aquatic habit.

Q5. List the adaptations that distinguish reptiles from amphibis & help them adapt in dry terrestrial ?

Ans: In their change from aquatic to land environment, modifications occurred in the animals /reptiles to face the condition on land. These modifications are:
(1) Protective skin: Development of skin to protect from dry condition.
(2) Shelled egg: The eggs of land animals have shells. These shells protect the eggs from drying & mechanical injury. The size of egg large because it has space for food stbosage.
(3) Lungs: The land animals developed lungs in place of gills. The lungs take oxygen from air.
(4) Circulatory systems:- when the lung developed changes had also occured in circulatory system to take oxygen from air.

Q6. Distinguish blw Endothermic & poikilothermic & Give examples of both? Name two phyla of animals that are radially symmetrical & two that are bilaterally, symmetrical

Ans: (a) ENDOTHERMIC: These are the animals that generate their own body heat through heat production as by-product during metabolism For examples: Those include birds, some Reptiles & flying insects & mammals.
(b) ECUTHERMS: These are animals which produce metabolic heat at low level so that is also exchange quickly with environment, absorb heat from their surroundings.
Radially Symmetrical:
Bilaterally Symmetrical: Annelids, arthropods chordata

Q7. Write three main differences b/w Prototheria, Metatherias & eutheria & How do mammals differs from birds & what adaptation do they share?

Prototheri	Metatheria	Eutheria
These are egg laying mammals	They have an abdominal pouch the marsupium	They are placental mammals.
They are ovoviviparous.	The young when born are immature in rudimentary form	They are viviporous & young ones are fully developed.
Their mammary gland are without nipples.	The nipples of glands are in the marsupium	Their mammary glands have nipples

Difference b/w oviparous & mammalian character:
i- Mammary glands on the body with/ without nipples to feed the young ones.
(ii) It has thick fur on its body
(iii) Hair on blue body
(iv) Outer ear present
(v) They give birth to young ones.
Again characters shared with mammals.
(i) Both are Endotherms
(ii) Both are aminates
(iii) They care about their young ones.
(iv) The animals have cloaca & cloacal opening.
There is no separate opening for digestive system & urogenital system.

Q8. Write Animals , Parazoa & Eumetazoa?

Ans: Animals: The name animalia is derived from Latin word anima which means breath or soul-multicellular, diploid, eukaryotic, without cell wall, digestive heterotrophs & develop from two different haploid gametes.

Parazoa: (1) In these animals there is
no tissue organization & have no organs.
(2) They have indeterminate shape & are asymmetrical.
(3) These are simplest animals.
Eumetazoa: (1) In these animals the tissues are organized into organs & organ systems.
(2) They have determinate shape & are symmetrical.
(3) These are the Complex animals.

Q9. Write dipoblastics animals & triploblast animals , Radial symmetry , Biradial symmetry?

Ans: Dipoblastic: The body of dipoblastic animals consist of two germ layers of cells, the ectoderm & endoderm. Such animals have tissue level of organisation.
Triploblastic: The body of triploblastic animals consist of three germ layers ectoderm, mesoderm & endoderm.
Grade Radiata: It includes all the animals with radial symmetry having a top & bottom & similar body parts are arranged as spokes of radiate form a central body axis.
Grade Bilaterals: In it , a plane through the midline of the body divides it into roughly equivalent right & left halves that are mirror image.

Q10. Write coelom , Blastula?

Ans: Coelom: It is a cavity between the body wall & the alimentary canal & is lined by mesoderm. The mesoderm splits into. The cavity between both layers is true coelom.
- It is filled with fluid called coelomic fluid.

Blastula: Early during development & the embryo consist of little ball of cells known as blastula.

Q11. Write Mesoglea, polymorphism & zooids , Radula?

Ans: Mesoglea: The body wall of Cnidarians consist of two germ layers of cells, outer ectoderm & inner endoderm.
Polymorphism & Zooids: The occurrence of the structurally & functionally more than two types of individuals called the zooids within the same organism is called polymorphism.
i. The gastrozooids are feeding individuals
ii. The gonozooids or blastostyles are asexually reproducing individuals.
Radula: In the mouth cavity of many molluscs there is a rasping tongue-like radula provided with many tiny teeth.

Q12. Write Trochophore larva, Parapodia, Haemocoel & metamorphosis?

Ans: Trochophore larva: A cap shaped ciliated larva is produced during the development of annelids.
Parapodia: These are locomotory structures found in polychaetes / Annelids. e.g., Nereis.
Haemocoel: It is a circulatory fluid in the arthropod circulatory system.
- They have open circulatory system.

Metamorphosis occurs in life cycle of insects. metamorphosis is an abrupt change of form or structure during life cycle.
In complete metamorphosis there are three morphological forms in life cycle.
i. The large egg develops into larva,
ii. Larva is converted into motionless pupa,
iii. The pupa finally develops into adult.

Q13. Write protochordata, Notochord ?

Ans: Protochordata: The lower chordates are called protochordates/ Acraniates as they donot have bony brain case & their notochord is not replaced by vertebral column.
Notochord: The notochord is rod-like semi-rigid body of vacuolated cells which are filled with proteinaceous material which may extend the length of body b/w entenic canal & the dorsal hollow central nervous system.

- Notochord is a solid unjointed rod located in mid-dorsal line between gut & the central nervous system.

- Notochord serves as an axial endoskeleton, giving support of body,& providing space for muscle attachment.

Q14. Write swim bladder, Amnion ,Placenta ?

Ans: Swin bladdess: It is an organ present in bony fishes. Function: Swin bladder produces resistance against gravity in fisher p.e provides buoyancy hence help is swimming in fishes. It may be attached to pharynx or root. Gases present in swim bladders are carbon dioxide, nitrogen & oxygen.

Amnion: It is an extra embryonic membrane that protects the embryo. These are with foetal membrane.

Placenta: During development placenta is formed through which foetus is nourished. The placenta has endocrine function also. For this reason these mammals are called placenta mammals.

Q15. write Acoelomate, coelomate & Pseudocoelomate?

Ans: Acoelomate: (1) The animals without body cavity are called mesenchyma or parenchyma.

(2) The mesoderm forms a loose cellular tissue called mesenchyma or parenchyma. It fills the space b/w the ectoderm & endoderm. It forms a packing around the internal organs of animals to support & protect them.

Coelomate: (1) Animals with coelom derived from mesoderm are called coelomate.

(2) True coelom is a cavity present b/w body wall & the alimentary canal. It is lined by mesoderm. The mesoderm split into two layers.

Pseudocoelomate: (1) Animals with false coelom developed from blastocoele are Pseudocoelomates

(2) The space b/w the body wall & the digestive tube is called Pseudocoelom. The pseudocoelom is not homologous to true coelom. It is developed from the blastocoel of the embryo. It is not lined by coelomic epithelium.

Pinacoderm & choanoderm:

In most sponges the body wall is formed of two layers.

i. The outer layer is pinacoderm. It is made up cells called pinacocytes.

ii. The inner layer is choanoderm. It is made of flagellated collar cells called, choanocytes.

Q16. Write spongocoel & Gastrovascular cavity & Polyps/hydroids & medusae?

Ans: Spongocoel: (1) Cavity found in sponges; phylum porifera. (2) Water enters into the spongocoel through ostia & leaves through osculum. For example: Sycon.

Gastrovascular cavity: (1) It is the body cavity of cnidarians lined by endoderm. (2) GVC is a digestive cavity with single opening serving for both mouth & anus. For example Hydra, obelia, & jelly fish.

Polyps / hydroids: (1) Polyps have cylindrical body. (2) Polyps are sessile. (3) Polyps reproduce asexually.

Medusa: (1) It have inverted bowl/ cup / umbrella shaped body. (2) It are motile. (3) It reproduce sexually.

Chapter-11: Reproduction

Q1. List the structures of male reproductive system. & explain hormonal control of human male reproductive function?

Ans. The male reproductive system include the organs: testes, Epididymis, vasa deferential, seminal vesicles, prostate gland, urethra, bulbourethral glands & penis.

Process of spermatogenesis is controlled by hormonal secretion from hypothalamus & pituitary gland.

(a) GnRH: hypothalamus releases gonadotropins releasing hormone (GnRH), which controls the release of the anterior pituitary gonadotropins follicle - stimulating hormone (FSH) & luteinizing hormone (LH).

(b) FSH: It stimulates spermatogenesis by stimulating the sertoli cells to complete the development of sperm from the spermatids.

(c) LH: It stimulates leydig cells to release testosterone. Testosterone causes the growth & development of germinal epithelium to form sperms.

(d) Inhibin: Inhibin hormone is produce by the sertoli cells & serves to control the spermotogenesis normal rate. When the sperm count is high inhibin release increase & it inhibits anterior pituitary release of FSH & hypothalamic release of GnRH . When sperm count falls, inhibin secretion declines sharply.

Q2. List the structure of female reproductive system & list the structure in order, through which a sperm passes on its way from seminiferous tubules of the testis to the fallopian tubule of the female?

Ans. Female reproductive system consist of pair of ovaries, oviducts, uterus, cervix & vagina& seminiferous tubules → Rete testis → vasa efferentia → Epididymis → vasa deferntia (sperm duct) → urethra through penis into vagina → cervix → uterus → oviduct.

Q3. What changes occurs in ovulation & menstruation during gestation period?
Name the three phases of menstruation cycle & mention the characteristic days?

Ans. Due to increase levels of progesterone during gestation period ovulation & menstruation does not occur Based upon over all changes & hormonal regulation the cycle * can be divided into 3 phases i-e

1- Menstrual phase (M-stage, Day 1-5)
2- Proliferative phase (F-stage Sp O - stage , days 6-14)
3- Secretory phase (M-stage, Days 15-28)

Q4. What is the role of corpus luteum in a menstrual cycle? & what are the actions GnRH , FSH Sp LH in human reproductive functions?

Ans. Follicle cells are modified to form a yellowish, glandular structure called" Corpus luteum". Progesterone is a hormone secreted by corpus luteum. Rising level of progesterone from corpus luteum act on the estrogen primed endometrium, causing the arteries to elaborate & converting the functional layer to a glandular secretory layer. If fertilization has not occurred.

Gonadotrophic Hormones: These are of three types.
(i) Follicle stimulating hormone (FSH).
(ii) Luteinizing hormone (LH also called interstitial cell stimulating hormone ICSH, in male).
(iii) Prolactin (sometimes inappropriately called luteotrophic hormone, LTH).

Release: FSH & LH/ICSH share a common hypothalamic releasing factor gonadotrophins releasing factor. Prolactin is continuously produced from the pituitary & is inhibiting factor from the hypothalamus.

Q5. Why are so many sperm produced in male & so few ova produced in female? & Enlist the reasons of human male infertility?

Ans. Males produce so many sperms so as to increase the chance of fertilization & only the fittest & normal sperm could fertilize the egg while travelling through the coarse of female reproductive tract while the weak & abnormal sperm will die, avoiding the chances of such sperm for fertilization. Common causes of male infertility are azoospermia. sperm deformities & auto - immune disorders.

Q6. Write the differential between.

Ans. Human male reproductive system:

(1) Male reproductive organ function to produce sperms & transfer it to female reproductive organ to get fertilized & produce the new one of their kind. (2) The reproductive system of male is located outside body & around the pelvis region, to maintain the temperature required by the sperm to stay healthy. (3) It produces Androgen & Testosterone.

Human female reproductive system:

Female reproductive organ functions in producing ovum(egg) & when get fuse with male gamete (sperm), produces the young ones & nurture it till the full growth before birth. (2) The female reproductive system is located entirely inside the body, with entry & exist points at the vulva, & separate openings for urination & menstruation.

(3) It produce progrestrone & estrogens.

Q7. Write spermatogenesis & Oogenesis?

Ans. Spermatogenesis: (1) It is production of sperm cell in males. (2) It vertebrates Spermatogenesis occur in testes. (3) Spermatogenesis start from primary spermatocyte. (4) Spermatogenesis results four functional spermatozoa from a primary spermatocyte. (5) In it cytokinesis result in 2 sized cells.
Oogenesis: (1) It is the production of ovum in females. (2) It vertebrates, Oogenesis occur in female ovary. (3) It starts from a primary oocyte. (4) In contrasts oogenesis result a single ovum & three polar bodies from a primary oocyte. (5) In oogenesis It results in two highly unequal cells.

Q8. Write Primary & secondary spermatocytes & sertodi cell & leyding cells?

Ans. Primary Spermatocytes: (1) Spermatogonia divide by mitosis & give rise two distinct cell types-i.e types A & B . Type B cell of spermatogonia becomes a primary spermatocyte. (2) It is 2N. (3) Each primary spermatocyte undergoes meiosis I, forming 2 smaller haploid cells called secondary spermatocytes.
Secondary Spermatocytes: (1) Each primary spermatocyte undergoes meiosis I forming 2 smaller haploid cells called secondary spermatocytes. (2) It is N. (3) Each secondary spermatocyte after meiosis II produce two daughter cells spermatids.

Sertoli cell (sustentacular cell):
(1) These are present in between germinal epithelial cells of seminiferous tubules. (2) These cells are found singly & are elongated. (3) a. They provide nourishment to developing spermatogonia-sperms. (b). they also secrete androgen binding proteins (ABP) that concentrates testosteron in seminiferous tubules. (c). It also secretes a protein hormone inhibin that suppresses FSH synthesis.
Leydig cell (Interstitial cells): (1) These are present in between the seminiferous tubules. (2) These are found in smaller groups & are round in shape . (3) They secrete androgens.

Q9.

Ans. Spermabids: (1) spermatids are immature male gametes, formed from spermatogonia meiosis. Spermabids are formed during meiosis of germ cells. (2) It are undifferentiated cells . (3) They are immature forms of male gametes. (4) They are large cells with a rounded-shape.
Spermis: (1) Sperm cells are formed spermatids in a process known as spermiogenesis .(2) spermo cells are differentiated cells.(3) They are mature form of male gametes.(4) They have mostly an elongated shape with flagella.

Perimetrium:
(1) It is the outes most thin covering layer of uterus. (2) It is less vascular & contain no glands. (4) It is just a connective serous layer.
Endometrium:(1) it is the inner spongy lining of the uterine cavity & is richly supplied with blood vessels .(2) It is highly vascular & contain glands. (3) It fertilization occurs, the young embryo takes root into the endometrium & reside there fore the rest of its development

Q10. Write Primary oocyte & secondary & menarche & menopause?

Ans. Menarche: (1) It is first menstruation.
(2) From menarch female starts producing ova. (9) This usually happens at the age of puberty sp onwards.
Menopause: (1) The end of complete stop of the menstrual cycle in female. (2) After the menopause female stops producing ova. (3) This usually but the age of 50 spplus.
Primary oocyte: It is diploid cell. (2) It is formed in foetal ovary when the gamete mother cell, oogonia is at the prophase - I of meiosis. (3) At puberty, a small number of primary oocytes are recruited each month, however only one is selected each to continue meiosis I ultimately producing 2 haploid cells.
Secondary oocyte: (1) It is haploid cell. (2) It is formed from primary oocyte that completes its first meiotic division. In human, the secondary oocyte arrests in metaphase II & it is this cell that is ovulated. (3) It divides meiotically into secondary oocyte & 1st polar body.

Chapter-12: Inheritance

Q1. Describe the multiple alleles provide many and state the alleles responsible for the ABO blood groups. Why can multiple alleles provide many different phenotypes for a trait?

Ans. Most alleles genes actually exist in more then two allelic form. Simply and conventilly such alleles that may exist in more then two different alternative form are called multiple alleles -The ABO blood group in humans are one Example of multiple allele. Blood group of a person depends upon the presence of antigens on RBC. There different form of same gene and effect Similar Organs or Process in the Organisms. In Shorts Multiple alleles are only variant on the Same gene at the Same locus.

For Example:

if a trait is Controlled by 3 multiple alleles i.e. A_1, A_2 and A_3 but every individual Carries any two of them like A_1A_1, A_1A_2, A_2A_2, A_1A_3 or A_3A_3.

Q2. Name Various human blood group System? Describe the antigens of ABO blood group System?

Ans. There are more than 200 times minor blood groups, 36 other Known blood groups (belong to the rest of blood group System other than ABO and RH system) and 600 antigens that usually don't Complicate the blood transfusions System these are known as Rare blood Type.

Blood Type	Genotype	Antigen	Antibodies	Transfusion
Blood group "A".	$I^A I$			
Homozygous	$I^A I^A$	AP	B	A & O
Hetrozygous	$I^A i$.			
Blood group "B".				
Homozygous	$I^B I^B$	B	A	B & O
Hetrozygous	$I^B i$			
Blood group "AB"	$I^A I^B$	AB	no	All
Blood group "O"	ii	no antigen	A & B both	only O

Q3. Why Rh incompatibility Could be a danger to developing foetus and mothers? investigate the reason for O (negative) individuals as universal donor & AB⁺(positive) as universal recipient?

Ans. The most Commonly happens:

- When a women with RH- negative blood get marries to a man with Rh- positive blood and conceives a baby with Rh -positive blood.
- If the men genotype is DD, all of their offspring will have Dd genotype and will be Rh positive.
- If man" genotype is Dd, half of their offspring with Dd genotype will be Rh +

O blood group individuals are called universal donor and AB blood group individuals are called universal recipients because they can receive transfusion of blood from any of the four blood group. AB blood can be transfused only into AB recipents because they have neither anti A, and Anti B antibodies. O blood has neither A nor B antigens but it does have anti A and anti B antibodies. An O recipient can only be given transfusion from a donor O.

Q4. Why a receives group allele "I" is more frequent in population? list at least five polygenic traits discovered in humans.

Ans. Because allele I not only expresses in homozygous Condition (ii) but also it Exist in heterozygals form in 2 blood groups i.e, A and B ($I^A i$ and $I^B i$.

Example of polygenic inherilence:

- color; in animal Size, longevity, or disease resistance; and in plants with grain colour, length of maize , or flower size. All of those traits are influence by multiple genes and Considered Polygenetic.

Q5. What is genes Linkage? Explain Crossing Over?

Ans. When genes are located on the homologous Chromosome they are Said to be linked and phenomenon is called gene linkage. It Shows a physical relationship between the genes. Example:

Genes of gout. color blindness and homophilia are closed enough and do not assort independently Showing linkage.

Crossing Over:

Crossing over is an Exchange (reciprocal) of chromosomal Segments between nonsister chromatids of homologues during meiosis.

Q6. Describe XX-XY type pattern of Sex determination?

Ans. This type of inheritance is found in human, Drosophila and many other Organisms.

Male Chromosome:

Male is XY and is determine heterogametic / biagametic.
of One type of Sperm Contain X Chromosome and other Y chromosomes.
of Chance for both types of Sperms are equal.

Female Chromosome:

Female is XX and homogametic /isogametic/unigametic producing only one type of eggs having X chromosomes.

Sex Determination:

Here male determines the Sex:
- If an X Carrying Sperm fertilizes the egg, the Zygote will be XX and female Produced.
- If Y Carrying Sperm fertilizes the egg the Zygote will be XY and male offspring will be produced. The Sex ratio between male and female offspring is 1:1.

Q7. Why is human male referred as heterogametic or In human male determines the sex of offspring. Explain how? & what is sex linkage?

Ans. Human male is heterogametic because after meiosis it produces 2 different types of sperm. i.e 50% sperm have Y chromosome while remaining 50% have X chromosome fused with homogametic egg of female. Sex linkage is phenotypic expression of an allele that is dependent on the gender of individual & is directly tied to sex chromosome. For example: Directly tied to sex chromosome. example: Man: Haemophilia, colour blind loss, hypophosphatemic rickets etc. Drosophila: white eye colour.

Q8. Describe Y-linked inheritance in man. OR write reasons that Y linked inheritance is present in male ? & name some of Sex -linked disorder of man & Drosophila?

Ans. The genes located on Y chromosome , whose alleles are absent on X chromosome are Y- linked genes or holandric genes – to passed from father to son. For example:
i. hypertrichoste (hairs on pinna of ear)
ii. porcupine man (straight hair on body) &
iii. webbing of toes
Man: Haemophilia, colour blindness, hypophosphatemic rickets etc eye
Drosophila: white eye color.

Q9. How gene linkage encounters independent assortment? & under what circumstance is it possible for father & son to suffer from haemophilia?

Ans. Linked genes whose loci are close to each other do not obey Mendel's law of independent assortment because these cannot assort independently during meiosis.
This could be only possible if mother is hemophilic (X^nX^n) then all of son will be hemophillic (100%). If mother is carrier (X^nX^n) then chances of son to be hemophilic will be 50%. So, it is concluded that there is No contribution of hemophilic father (X^nY) to suffer his son to be hemophillic as hemophilia is a X-linked recessive trait. So mother is responsible for her son to get hemophillic (X^nY).

Q10. Explain Dichromacy? monochromacy?

Ans.A dichromate can perceive two primary colours but is unable to perceive the one whose gene mutated.
It is further of 3 types:
(i) Deuteranopia : In it person is green colour blind.
(ii) Protanopia: In it person is red colour blind.
(iii) Tritanopia: It person is blue colour blind. A monochromate can perceive only one colour.

- Monochromacy is true colour blindness.
- Blue one monochromacy is X-linked recessive trait in which both red & green cone cells are absent. That is why it is called red-green colour blindness

Q11. Sex limited traits & sex influenced traits

Ans. Sex limited traits: (1) Sex limited traits is limited to only one sex due to anatomical differences. (2) Such type of traits affects a structure or function of body present in only males.

Sex influenced traits:- (1) Such type of trait is found in both sexes but is more common in one sex. (2) Such type of traits effects a structure or function of body present in both male & female.

Examples: (i) Genes for milk yield in dairy cattle affect only cows.

Sex influenced traits- Pattern baldness is a sex influence trait men are more affected than women.

Q12. Write pattern baldness in human and females?

Ans. Male patterns in human & female;

Pattern of baldness in human male: (1) It is controlled by an allele that is expressed as recessive in male while dominant in the female. (2) Men are more affected than women. This trait is autosomal which is dominant in male.

Pattern of baldness in human females:

(1) It is controlled by an allele that is expressed as dominant in female while recessive in male.
(2) Women are less affected than men.
(3) This trait is autosomal which is recessive in female.

Q13. Write the differences between dominance and epistasis.

Ans. Dominance is an interaction between alleles of the same gene locus. One allele (dominant) masks or suppresses the expression of the other (recessive).

Epistasis, however, involves interaction between genes at different loci, where one gene (epistatic) modifies or suppresses the phenotypic expression of another gene (hypostatic)

Q14. What is gene linkage?

Ans. Gene linkage refers to the physical proximity of two or more genes on the same chromosome. These genes tend to be inherited together because the chance of a crossover event separating them during meiosis is low.

Q15. Explain crossing over.

Ans. Crossing over occurs during prophase I of meiosis, where homologous chromosomes pair up and form tetrads. At points called chiasmata, segments of chromatids are exchanged between non-sister chromatids.

Chapter-13: Chromosome and DNA

Q1. Describe central dogma of gene expression. describe the four characteristic of genetic code?

Ans. Ideal that DNA makes protein via an intermediate RNA is known as central dogma of molecular genetics. All organisms use the same basic mechanism of reading & expressing genes, which is often referred to as central dogma.

(1) Transcription: The 1st step of central dogma is transfer of information from DNA to RNA, which occurs when an mRNA copy of gene is produced. The process is called Transcription.

(2) Translation: The second step of the central dogma is transfer of information from RNA to proteins, which occurs when the information contained in mRNA is used to direct the synthesis of polypeptides by ribosomes. This process is called translation.

(i) Genetic Code is degenerate: The genetic code is degenerate because some amino acids are only encoded by a single codon; while other are encoded by up to four codons. This property is known as code degeneracy.

(a) Some other are encoded by up to 4 codons. For example: Proline, Alanine, Glycine Valine etc
(b) Some others are encoded 6 codons; For example leucine, Arginine & serine.

Genetic Code of universe: The It is the same in almost all organisms. For examples: AGA specifies arginine in bacteria, humans & all others organisms whose genetic code has been studied.

Q2. Explain why the length of transcribed mRNA (in eukaryotic) shortens as it enters cytoplasm for translation? & Interpret how many types of t-RNA molecules are necessary for a living cell, if the genetic code is triplet code?

Ans. Eukaryotic mRNA also contains some non-coding region called introns which are removed or spliced during this process. The removal of introns & maturations of primary mRNA to secondary or functional mRNA is called splicing within the cells. e.g. Enzymes required for glycolysis, Krebs cycle, ETC ; photosynthesis etc.

- Storage Proteins like egg albumin are not only synthesized inside cells but also are used within the cells for development of embryos etc.
- Contractile proteins like actin & myosin are not only synthesized inside cells but also are used within cells for motility etc.
- Proteins like Tubulin (Microtubules), Histone etc are not only synthesized inside cells but also are used within cells for cell division.

Q3. Write differences between the following? (a) Metacentric & Submetacentric chromosomes(b) Acrocentric & Telocentric chromosome?

Metacentric	Sub-metacentric	Acrocentric	Telocentric
Centromere is in the of the arms of the chromosome.	Centromere is just above or below the center of the arm of the chromosome.	Position of centromere is at one end of the chromosome	Centromere is at the chromosome.
The two arms have equal length.	The two arms un-equal length.	Chromosome has a very short & a very long arm.	It has a single arm.
It gives V shape to the chromosome	It gives L shape to the chromosome	It gives J shape to the chromosome	It gives i shape to the chromosome

Q4. (c) Nucleosome & Primosome & Heterochromatin & Euchromatin?

Ans. Nucleosome: (1) About every 200 nucleotides of the DNA duplex is coiled around a core of 8 histone proteins (2 of each H2A,H2B,H3 & H4) forming a complex. (2) It is the basic structural unit of chromosome.

Primosome: (1) The primase & DNA helicase enzymes are found in form of a complex. (2) It is initiating unit that starts up replication.

Heterochromatin: (1) It is densely packed. (2) Heterochromatin is only present in eukaryotes. (3) It is easily & highly stained but not euchromatin.

Euchromatin: (1) It is loosely packed DNA. (2) It is present in both prokaryotes & eukaryotes. (3) It is loosely & highly stained but not euchromatin.

Q5. Write DNA helicase & DNA Gyrase? write DNA polymerase I & II & DNA polymerase III?

Ans. DNA helicase: (1) It breaks down the base pairs of DNA. (2) So, the 2 strands gradually separate from each other & give a bubble like appearance at origin of replication.

DNA Gyrase: (1) It opens the turns of DNA duplex. (2) So, the DNA is converted from spiral ladder like form to straight Like form.

DNA Polymerase I: (1) It is a relatively small enzyme. (2) It catalyses the replacement of RNA primers by DNA nucleotides in termination phase of replication. So, it provides a support to DNA polymerase-III in the main replication process.

DNA Polymerase II: (1) It is thought to be having a supporting role in repair/ proof reading DNA. (2) It involves in the repairing process of DNA damages during the life time of a cell.

DNA Polymerase III: (1) This enzyme is a dimer So is 10 times larger far more complex in structure. (2) It is main enzyme that synthesizes both daughter strands along the template during replication process.

Q6. Write conservation & dispersive mode of DNA replications?

Conservative Model	Semi-conservative Model	Dispersive Model
In this model whole of parental DNA strads are conserved	In this model half of parental DNA strands are conserved.	In this model of parental DNA strands are dispersed. Daughter DNA shards
The conservative model stated that the parental double helix would remain intact & generates DNA copies consisting of entirely new molecule	It semi-conservative replication, the two strands of the duplex separate out each acting as model or mold along which new nucleotides strand are arranged giving rise to two new duplexes contain one old and strand each.	This dispersive we model pre-ducted that Parental DNA would become completely dispersed so that each strand of all daughter molecules would be a mixture of old & new DNA
It is not acceptable models of the DNA replication	It is acceptable model of DNA replication.	It is not acceptable model of DNA replication

Q7. Write leading & lagging strands of the Replication Fork & Exons & Introns?

Ans. Lagging Strand/ discontinuous replication:

(1) It is oriented & synthesised in '5' to '3' direction away from duplication fork. (2) It exhibits discontinuous replication.

(3) The generation of Okazaki fragments can be found only in lagging strand synthesis.

(4) DNA- ligase is required for lagging strand synthesis.

(5) DNA replication on lagging strand synthesis requires new primer often to accommodate repetitive events.

Leading Strand Continuous Replication:

(1) It is facing sp synthesized in 5 to 3 direction towards replication fork.

(2) Leading strand exhibits continuous replication.

(3) Okazaki fragment cannot be found in leading strand synthesis.

(4) DNA - ligase is not required for leading strand synthesis.

(5) DNA replication on leading strand needs to be primed only once.

Exons: (1) They are coding areas of the gene.

(2) Exons code for the proteins. They are very much conserved & their sequence doesn't change rapidly over time or in b/w species.

(3) They are DNA sequences represented in the final RNA molecule.

Introns: (i) They are non-coding areas of blue gone.

(ii) They are not implicated with protein coding.

(iii) They are less conserved as their sequences change very frequently over time.

(iv) They are removed through RNA splicing for generating a mature RNA molecule.

Q9. Write Start Codons , stop or Non-Sense codons. & Non-sense codons sp sense codons?

Ans. Start Codons: (i) It marks the site at which translation into protein sequence begins.

(ii) Starting as initiation codon in eukaryotes is AUG.

(iii) It is translated as Methionine.

Stop or Non-sense Codons: (i) It marks the site at which translation ends.

(ii) UAG,UAA, UGA are eukaryotic stop codons.

(iii) It is recognized by only release factor; & it codes for any amino acid.

Non-Sense Codons: (i) It is not recognized or coded by any amino acid while it is recognized by on release factor.

(ii) Stop or non-sense codon in eukaryotic is UAG, UAA, UGA.

Sense - Codons: (i) These are recognized as coded by specific amino acids is-

(ii) For example: AUG codes for Methionine GUA codes for alanine etc.

Q10. Write Point mutation & chromosomal mutations? harmful & useful aspects of mutations?
Ans. Point Mutations: (1) A mutation what causes change of single or few nucleotides in the DNA OR An alteration of the nucleotide sequence of a gene. (2) Errors in the DNA replication or mutagens such as UV or chemical cause gene mutation.
(3) The alterations occurs in nucleotide sequence of a gene. (ii) A single is affected.
Chromosomal Mutation: (1) The mutations that causes change in the structure or numbers of chromosome OR Alterations in the chromosome structure or chromosome numbers are referred to as chromosomal mutation.
(2) Error in crossing over during meiosis cause chromosomal mutations.
(3) Several genes are affected by a chromosomal mutation.
Harmful aspects Mutations: (1) A mutation that decreases the fitness of the organism in the environment is called harmful mutations.
(2) A mutation is some times a form of adaptations.
Useful aspects mutations: A mutation that increases the fitness of organism in the environment.
(2) Mutations are also considered as contributing factors toward evolutions.
Q11. a) Down's Syndrome sp Klinefelter's Syndrome b) Kline Klinefelter's Syndrome & Turners Syndrome?

	Down's Syndrome	Klinefelter's Syndrome	Turner's Syndrome
Origin	It is commonly known as - "Mongoid idiocy" or mongolism. It was discovered by Dr. Downs.	It is commonly known as "Male Gynachomas". It was discovered by Dr. Klinefelter.	It is commonly known as "It was discovered by Dr. Torney.
Karyotype	- It is trisomy. - Of individual autos some an extra occurs in both male & female.	It is a trisomy. Individual has an extra X chromosome (X1) i.e; 47, XXY. o autosome +XXY.	it is monosomy. individual affected by turners syndrome have one missing X chromosome (2n-1).
Symptom/ abnormalities	- Defective nervous system (CNS) & blood circulatory system.(BUS) - Mental retardation. - Producing flat, broad face.	Phenotypically males with Large breasts. Tendency to tallness, obesity, Sterility Small testes. no sperms.	If survive then havefemale appearance: short stature (height). wobbed neck.
Chance/ risk	- It will result into early positions or death	It occur in males	Such individual do not survive born pregnancy (aborted mostly).

Chapter 14: Evolution

Q1. Natural selection is a mechanism of evolution explain how is convergent evolution different from divergent evolution?
Ans. Evolution is not a random process. The genetic variation on which natural selection acts may occur randomly but natural selection itself is not random at all.
Divergent: This pattern of evolution in which different species have been evolved from common ancestors at different habits is known as.

Convergent: This pattern of evolution in which different species have been evolved from diff ancestors at common habitat.

Divergent: Body parts that are similar in structure but different in functions because they were inherited from a common ancestors are called homologous. Structure & their similarity is called homology. e.g, bones of fore arm in bat, whales man, & dog.

Divergent: b) On the other hand the organs which are similar in function but differ in structure are called analogous organs or structures & their similarity is called analogy. e.g wings of birds & butterfly.

Q2. Explain endosymbiosis hypothesis & what are homologous structure, explain with example.

Ans. This proposes that the prokaryotic cell like large anaerobic amoeboid cells ingested but retained or adjusted small aerobic bacteria to giving rise to Eukaryotic cell. i.e Endosymbiont origin. This was given by Lynn Margulis.

Body parts that are similar in structure but different in function because they were inherited from a common ancestor are called homologous structures so their similarity is called homology eg bones of fore arms in bat, whale, man,sp dog. This pattern of evolution in which different species have been enveloped from common ancestor at different habitat known as divergent evolution.

Q3. What are vestigial organs? & give few examples from human body?

Ans. VESTIGIAL ORGANS: Organs or structures that are highly reduced & functionless but were once useful in an animals evolutionary past. Some species have certain homologous structures which are rudimentary i.e highly reduced & functionless. Examples.

(i) Vermiform appendix: The appendix in man & mammals is small, useless organ, although concerned with digestion is homologous with functional appendix of herbivorous mammals.

(ii) Ear muscles:- In many mammals like dogs, horses, & cows etc, the ear muscle, have lost their function but are still present as more vestiges.

(iii) Coccyx (Tail bone): Tail is present in most vertebrates but in man it has lost its function & is represented by the homologous coccyx as a vestigial organ.

Q4. Enlist few characteristic found only in mammals?

Ans.- Mammary glands are present that produce milk.
- Hair or fur (chemically different from hair like structures on non-mammals.)
- Malleus, incus & stapes in the ear.

Q5. Discuss the evidence surrounding Lamarckism according to the text. & Describe the relationship between the environment and phenotypic changes as per Lamarck's views.

Ans: According to the text, there is no experimental proof of Lamarckism. This lack of empirical evidence has contributed to the general rejection of Lamarck's theories in favor of Darwinian evolution and the understanding of genetic inheritance.

Lamarck's view acknowledged that the environment plays a crucial role in producing phenotypic changes in individuals. However, the text clarifies that these changes are ultimately non-genetic, cannot influence the genotype, and therefore cannot be inherited by subsequent generations.

Q6. Explain how overproduction contributes to the process of natural selection. & What are the four observations that form the basis of Darwin's theory of natural selection?

Ans: Overproduction leads to the competition among individuals for limited resources such as food, water, light, space, and growing space.

Darwin's mechanism of evolution by natural selection consists of four observations about the natural world:

(1) Overproduction, where each species has the capacity to produce more offspring than will survive.
(2) Variations present among individuals.
(3) Survival of the fittest, where individuals with favorable traits are more likely to survive and reproduce.
(4) Natural selection.

Q7. What role does genetics play in the process of evolution according to Neo-Darwinism? Also Enlist few characteristics found only in mammals.
Ans: Genetics plays a crucial role in Neo-Darwinism as it emphasizes the importance of genetic variation in populations as the substrate for natural selection. Changes at the genetic level may either enhance or reduce an organism's fitness in its environment.
Some characteristics found only in mammals include the presence of hair or fur, three middle ear bones, mammary glands that produce milk for feeding young, and a neocortex region in the brain. These features set mammals apart from other vertebrate groups and reflect their unique evolutionary path.

Chapter-15: Ecology

Q1. Describe water in environments & describe the ways of nitrogen fixations?
Ans. A basin is a depression , or dip, in earth's surface. The major types of basins are river drainage basins, structural basins & ocean basins. River Drainage Basins.
A river drainage basins in an area drained by a river & all of its tributaries river basin is made up of made up of many different watersheds. The water within the basin is called bakes / ponds.
Atmospheric fixation: Nitrogen fixation that occurs spontaneously by lightning is called atmospheric fixation.
(i) A small amount (S-8%) only is fixed in fixed in this way.
lightning allows nitrogen of oxygen to combine to produce various oxides of nitrogen. o/ these are carried by the rains into the soil where they can be used by plants.
(ii) Industrial fixation: Synthesis of nitrogen containing fertilizers is called industrial fixation e.g Sona urea, Ammonium phosphate etc-
(iii) Biological fixations: Nitrogen fixing bacteria Fix 60% of nitrogen gas in atmosphere.
Q2. Give the role of decomposers in the nutrient cycle? & what is productivity? Describe productivity in desert ecosystem?
Ans. They are mainly fungi & bacteria which obtain energy from the dead bodies decaying plants & animals. dead bodies of living organisms are source of energy for other organisms. Also waste matter which passes out of living bodies is also source of energy & nutrients. These materials are not wasted by ecosystem. They are utilized by decomposers.
Primary Productivity: Primary productivity in deserts is relatively low due to scarcity of water & limited plant cover. Plants like drought - assistant grasses & shrubs from the food chains.
Q3. Explain the pyramid of energy. & differentiate b/w primary & secondary succession.
Ans. It is most useful pyramids as it represent the amount of energy at each trophic level. Producers at the bottom have largest energy level as they fix light energy but themselves. Energy level decreases from producers to top consumer level. At each trophic level energy is used by organism to perform life activities & some is lost as wastes or heat. So pyramid of energy show a required pattern of decrease in energy at each level.
Primary Succession: The succession which starts on a bare area (like newly-emerged land or water, such as bare rock & sand or clear glacial pool) that has no trace of previous life, is termed as primary succession. It takes thousands of years to reach to the climax stage. The ecological succession occurring in pond, lakes & marshes or elsewhere in water are termed hydrach & different stages are called hydroseres.
Succession initiated on bare rocks, sand dunes, rocky slopes etc. where there is deficiency of water, are termed xerarch & different stages of development are called xeroSera.
Secondary Succession: the formation of a new ecosystem after the disturbance of an existing ecosystem.
The primary succession may be disturbed by fire or cultivation etc, resulting in the elimination of principal species. In such case, the succession developing later is called the secondary succession.

Q4. What is net primary productivity? & Describe Explain the term "biosphere"

Ans. The amount of energy left behind after meeting the respiratory needs of the plants is the net primary productivity which is expressed as plant biomass. Biosphere is thin life containing blanket surrounding the earth.

- Biosphere includes all ecosystems on earth.
- The presence of life on earth is possible conditions required for life are properly fulfilled. These include the steady supply of energy from sun, presence of the water as medium of life. suitable range of temperature, correct proportion of minerals & screening of ultraviolet radiations by ozone.

- There are 45 different types of tRNA's in a human cell.
- As there are 20 different amino acids that commonly occur in proteins so, at least 20 tRNA are needed for translation.
- According to another point of view there should be 61 tRNAs are required by a cell according to 64 genetic codes in table.

Q3. Make a list of some commonly occuring miruas mutations in humans? & Suggest possible way in which synthesized protein can be used within or outside a cell synthesized it?

Ans. Such as:

- Microcephaly
- cleft palate
- Cases of abnormal number of chromosome (Down syndrome, Klinefelter's syndrome, Turner's syndrome etc). Heredity disorders like:
- sickle cell anaemia
- Phenylketonuria etc.

Exportable Proteins: Proteins like many Enzymes that are synthesized inside cells are exported outside of cell. e.g pepsin, trypsin, enzyme released by saprotrophs & parasites etc.

- Structural proteins like keratin found in hairs, hooves etc. are exported outside of cell.

Intracellular Proteins: Many enzymes of the metabolic activities are not only synthesized inside cells but also are used within the.

Q5. How Ammonification differs from nitrification? & diff b/w Assimilation & Ammonia?

Ans. Ammonification: The release of ammonia or ammonium ions (NH4+) by the breakdown of amino acids & nucleic acids by microbes like fungi & bacteria.

Nitrification: The conversion of ammonia or ammonium ions are converted into nitrates by nitrifying bacteria. or Some ammonia escapes into soil, but much of the ammonium ions are converted into nitrates by nitrifying bacteria.

Assimilation: The highly soluble nitrates are dissolved in soil water & are taken up by the roots of the plants. The absorption & utilization of ammonia or nitrates by plants.

De-nitrification (Nitrogen Depletion): Loss of nitrogenous compounds from the soil is called nitrogen depletion.

Q6. Diff b/w succession & community relaying & Diff b/w sere & seral stage?

Succession: The process by which species are replaced over time is called succession.

Community relay: In this case animals replace one another in a sequence.

These changes take place according to changes in environment in which succession occurs.

Sere & seral Stages: Individual succession are known as seres e.g hydrosere, xerosere. The development phases are called seral stage.