UNIVERSITY OF BALOCHISTAN, QUETTA.

Code No.

Name of Examination

Group ——— Evening / Morning ———

Subject. ———

Paper. ———

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Code No.

Name of Examination. B.Sc Annual 2018.

Group 1st

Subject BOTANY

Paper 'B'

Date 3rd October 2018

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Q.No1 BOTANY 'B'

Q.NO 1:- (A) Define the following terms:-

1 LINKAGE:-

The genes are located on chromoso-mes at specific loci. "Those genes which are linked together and pass to each gamete during gamete formation without any segreg-ation are called linked genes, and phenomena is known as linkage."

Linked Genes:-

"The genes which are present on same chromosome and associated so closely that they donot segregate during gamete formation are called linked genes." Their loci (position) is very close to each other.

Explanation :-

According to Mendel's law of independent assortment, the alleles of genes assort independently during gamete formation. Each gene consists of a pair of alleles and they segregate & separate when they form gametes. But on the other hand, there are evidences that some genes pass on to next progeny without undergoing segregation. These genes give rise to the phenomenon of linkage.

DISCOVERY OF LINKAGE :-

The phenomenon of linkage was first seen by scientist "MORGAN". He studied about mendel's law and perform different experiments. His experiments were different from Mendel and gave different results. He found that

There are some traits or characteristics which appear together. It seems that they always occur in resemblence with each other. If one of the character is present, then other should be there resembling its partner. These traits are due to presence of linked gene.

OCCURENCE OF LINKED GENES:-

These genes are present on same chromosome, and specific loci but so close that they fail to segregate. for example:- the chromosome showing linked gene may be:-

C and D loci of gene assort with each other, whereas A and B, and C & B seems to be non-linked and assort independently.

EXAMPLE OF LINKAGE:-

The presence of "brown hairs and black eyes" are seemed to be present on same gene loci, so they do not segregate and present usually together, whereas "golden hairs with coloured eyes" are present mostly in same organism. So these seems to be the linked traits.

2 ## CAMBIUM:-

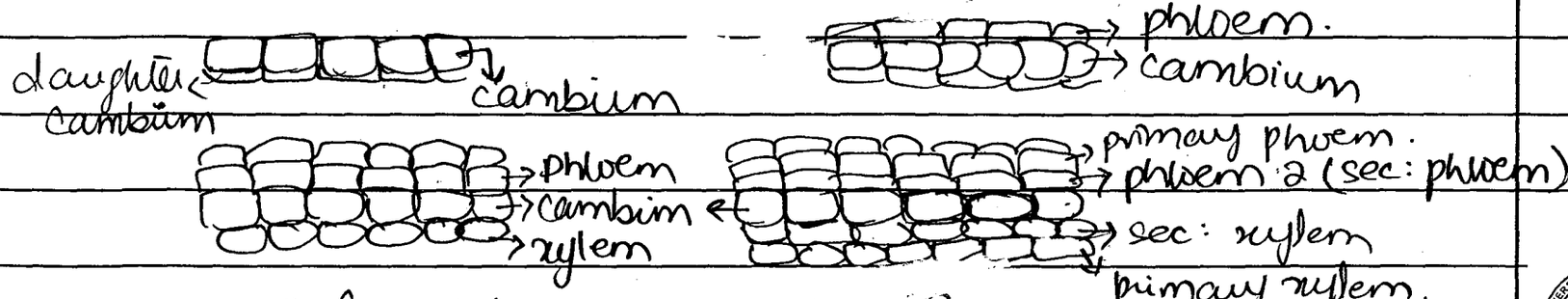
"The tissue present between xylem and phloem, resulting from secondary growth of tissues is called cambium."

Vascular Cambium:- It is a cambium tissue present in vascular bundle. The vascular cambium occurs between xylem and

phloem, so it is also regarded as vascular tissue. The vascular cambium increases the area of vascular tissue.

ORIGIN:-

The cambium is originated from the meristematic tissues, that had become permanent (ceased growth) for some period of time but later on resume activity. These tissues are involved in increasing the girth of plant, so associated with secondary growth of plant.



"Cambium giving rise to phloem & xylem"

FUNCTIONS OF CAMBIUM:-

Following functions are performed by cambium:

1- Cambium tissue increase the girth or diameter of plant, usually of stem.
2- Cambium is dividing tissue, so add new cells to the growing vascular tissue.
3- It is associated with the growth of primary and secondary xylem and phloem.
4- Cambium is present in dicots and gymnosperms, so the stem of these plants seems broader.
5- It provides strength to the plants, acting as mechanical supporting structure.
6- The collenchyma has thick walls, so give resistance to adverse conditions.

3 CONJUGATION:-

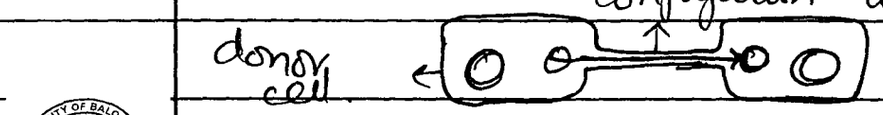
"The form of genetic recombination in bacteria (especially E. coli) in which gene segments are exchanged between two organisms by the formation of conjugation Tube, is called conjugation"?

CHARACTERISTICS OF CONJUGATION:-

1- It is the type of sexual reproduction in bacteria.
2- Genetic variation is caused by conjugation
3- It involves the formation of tube, acting as connecting link between the donor bacteria and recepient bacteria.
4- F factor is involved in conjugation.
5- It ensures the recombinant DNA in one of the daughter cells.

F - factor :-

The f- factor is involved in the formation of conjugation tube during the procss of conjugation. There are pili on slimy capsule of bacteria, that contain f- factor or sex-factor. It causes the sexual linkage between two organisms of bacteria by forming tube through which DNA fragment can cross towards receptor cell. These f-factor contain special proteins, called pilin which causes or initiates this linkage during recombination of genetic material.



"process of conjugation"

4 FRUIT :-

"The ripened ovary is called fruit" OR "Ovary which donot develop into seed or after seed formation undergoes ripening is called fruit."

Formation of Fruit :-

Fruit is the characteristic of plants in which ovary doesnot able to receive the sperm or anther and undergoes certain changes in seed formation and transformed into fruit. It may be caused due to environmental factors or caused by the plant itself. Almost all plants have fruits, which distinguish them from different species of plants.

5. **PERIANTH :-**

When we cannot distinguish between calyx and corolla of plant, then we use the term perianth. It can be defined as :- "The characteristic of plant showing corolla and calyx altogether, without differentiating between them is perianth."

Example:-

This characteristic feature is present in those plants which are considerably small and cannot be disected at micro level, so corolla and calyx appear as the perianth.

⇒ Grass family: Graminae.

2) Differentiate between the followings:-

i Hypogeal and Epigeal gelmination.

HYPOGEAL GERMINATION	EPIGEAL GERMINATION.
1- The form or type of germination of seed from its lower end.	Type of germination from the upper end of seed is called epigeal.
2- Hypo means below.	Epi means above.
It give rise to aerial plant parts.	It give rise to lower parts of plants.
This germination cause formation of stem, leaves, flowers, etc.	It causes formation of roots, root hairs, rhizomes etc.
seed → germination of lower parts.	seed

(ii) Climber and parasite.

	CLIMBER	PARASITE
1-	The type of plant which climbs on other plants to get its nutrition, shelter, etc is called climber.	1- The animal or plant which causes harm to other by getting its nutrients from the host cells and using it for itself is called parasite.
2-	It may be mutual asso-ciation.	2. It is host-parasite relationship.
3-	Climber donot affect the plant on which it falls.	3- The parasite may be pathogenic = i.e cause disease to its host.

(iii) Foliage and Scale leaves.

FOLIAGE LEAVES	SCALE LEAVES.
Leaves occuring in bent shape, in form of axial spherical, enrool itself is called foliage leaves.	1 Leaves occuring as parallel to one another in form of layers are termed scale leaves.
Circinate venation is seen in young foliage leaves.	2- No circinate venation.
Veins may be alternate E.g Gymnosperms.	3- Parallel venation.
	4- E.g= Pteridophytes.

Monosomy and Trisomy.

MONOSOMY

It is a form of mutation.

TRISOMY

Trisomy is also a kind of mutation.

2- The monosomy is type of aneuploidy.	2- This mutation belongs to aneuploidy.
3- "There is reduction in one chromosome in an individual."	"The type of mutation in which organism have an extra chromosome in its cells."
4- Represented as $2n-1$	4- Representation = $2n+1$
5- Disorder:- Down's Syndrome	Disorder = Klinefelter syndrome.

V= Test Cross and Back Cross:

TEST CROSS	BACK CROSS
1- "When genotypes are crossed with homozygous recessive parents, then such a cross is	1- "Cross between any gene with homozygous recessive or homozygous dominant is called back cross."

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called Test cross.

"Performed to identify the genotype of unknown organism's genotype."

Example =

Homozygous Tall = TT

Heterozygous Tall = Tt.

Homozygous short = tt.

Heterozygous tall always appear as tall but it also contains dwarf gene. So in order to determine the genotype of apparent phenotype, we perform Test cross.

e.g (1) Tt x tt

Tt x Tt x tt x tt.

→ It indicates that individual is heterozygous tall.

(2) TT x tt

Tt ⇒ Tt, Tt, Tt.

All Tall: indicates that individual is the homozygous tall.

Example of Back cross:

Any of above cross (1) or (2) is called back cross, plus:-

TT x TT.

TT, TT, TT, TT.

Tt x TT.

TT, TT, Tt, Tt.

It is back cross.

x x x.

Q NO3:- What is chromosomal abberation?

Discuss change in chromosome Number?

Answer:- MUTATION:-

Any change in genetic makeup

or in chromosome is called as mutation." It is of two types =

1- Chromosomal mutation
2- Genetic Mutation.

Here I discuss only about chromosomal mutation or chromosome abberation.

CHROMOSOMAL ABBERATION:-

"The mutation of chromosome due to change in its structure and number is called chromosome abberation."

CAUSE OF CHROMOSOMAL ABBERATION:-

There are various causes of chromosomal abberations. There are

Chemical Cause: Due to presence of certain harmful chemicals, such as nitrogen

oxides, sulphur oxides, ozones, etc. These causes harm to structure of chromosome.

2- Biologically:- Many living organisms, such as bacteria, viruses may also cause abberation.

3- Radiations:- The radiations such as x-rays, ultraviolet rays, α rays, β rays, affect the gene sequence in a chromosome.

MUTAGEN:-

"The agent that causes mutation or abberation is called mutagen."

TYPES OF CHROMOSOMAL ABBERATION:-

It is of two types.

1. Change in chromosome structure.
2. Change in chromosome Number.

STRUCTURAL CHANGE IN CHROMOSOME:-

It is of following four types:-

1- Duplication.
2- Deletion.
3- Inversion.
4- Translocation.

CHANGE IN CHROMOSOMAL NUMBER:-

The change in chromosome number cause mutation in an organism.

TYPES:- Two major types are
(1) Aneuploidy (2) Euploidy
These are further divided as shown in following chart:-

Aneuploidy

Hypoploidy Hyperploidy

Monosomy (2n-1) Nullisomy (2n-2) Trisomy (2n+1) Tetrasomy (2n+2)

Euploidy

Monoploidy (x) Diploidy (2x) Polyploidy (3x, 4x, 5x...)

(1) EUPLOIDY:-

"The type of chromosomal abberation in which whole pair of the chromosome undergo mutation."

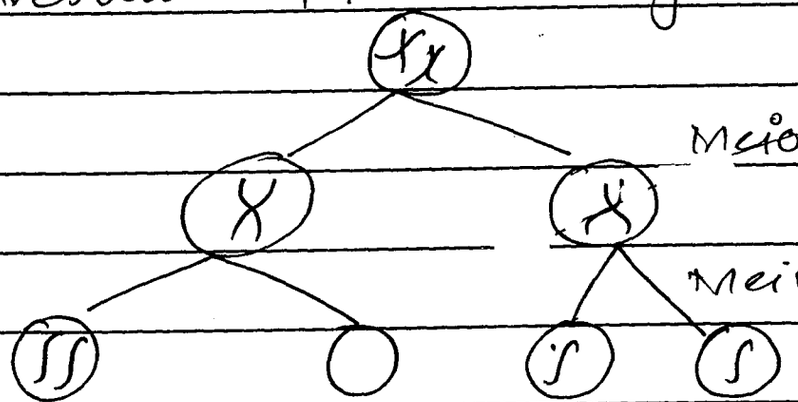
Homologous chromosome may increase in number or decrease in number.

Cause:- The cause of mutation is non-disjunction.

Non-disjunction:-

The chromosomes fail to

undergo accurate meiosis results in nondisjunction. During meiosis I, in prophase I the chromosome pairs length wise, size wise, etc and segregate when gametes are formed. Each gamete receives one of the pair of homologous chromosome. But if the chromosome fail to do so, i.e if some gamete receives one of two pair and other receive none, then it results in nondisjunction.



TYPES OF EUPLOIDY:-

Euploidy is further divided into three or more types. These are described below:-

1- **MONOPLOIDY:-**

The type of mutation in which organism fails to receive one set of chromosome.

Representation:- This defect is represented as (x). or n.

Generally one contains 2x or 2n number of chromosomes. Each chromosome has its pair. But if one lacks the pair of its homologue then it results in monoploidy.

HAPLOIDY:- This condition can be termed as haploidy, due to one set of

2-

the chromosome.

Examples: This defect is common in plants than in animals.

2- DIPLOIDY:-

If one receives an extra set of chromosome then condition is called as diploidy.

There is an increase in chromosomal number as compare to normal chromosome. An extra set of chromosome results in an mutation, called diploidy.

Representation: It is represented as (2x).

Example:

This defect occurs in chromosomes of plants and animals. In plants it is thought to be beneficial.

3- **POLYPLOIDY:-**

The condition in which there are many number of extra chromosomal sets in an individual specie, is termed as polyploidy.

Representation:-

It is represented as 3x, 4x, 5x, etc.

→ Triploidy:- "Occurence of three sets of chromosome". Represented as 3x.

→ Tetraploidy:- "Presence of four sets of chromosomes." Represented by the symbol (4x).

⇒ Pentaploidy:- "The presence of five extra chromosomal sets is called pentaploidy. It is represented as 5x.

→ Hexaploidy, etc.

Example:-

Polyploidy occurs in plants mostly. For example: (1) Grapes (2) Oranges (3) water melons, etc can The presence of many seeds in them indicate polyploidy.

In animals, polyploidy is not found or it is very rare.

2 ANEUPLOIDY:-

Statement = "The enumosomal abberation in which there is just one chromosome is different, missing or extra is called aneuploidy."

TYPES OF ANEUPLOIDY:

It has following types:-

1- MONOSOMY:-
The defect in which there is one less chromosome.
Representation:- 2n-1.
Example:- The example of this defect is Down's syndrome.
This mutation type has adverse effects on humans.

2- TRISOMY:-
One extra chromosome in an individual, compare to total chromosome results in Trisomy.
Representation = 2n+1
In humans:- 46 chromosomes are there. If one extra comes then their set is disturbed and they got 46+1=47.

is

Example :-
This defect or mutation occurs
fect in humans mostly, but its percentage
on human beings is also very less.
ffects Disorders :-
The defect cause by Trisomy
s/s Klinefelter Syndrome, in which
n an individual has one extra chromosome.
nosome Symptoms :-
Its symptoms are very adverse
that one can detect the infected individual
are very easily.
n TETRASOMY :-
47. The presence of two extra

chromosomes, is called tetrasomy. Representation It is represented as (2n+2). This mutation has adverse affects. There are other mutations than these also but it is out of our scope.

Q.NO6: Define Dictyosome. Discuss the structure and function of Golgi complex.

Answer:- **DICTYOSOME:-**

"The organelles present in plant cell which are formed by vesicles of endoplasmic reticulum combined together in flattened form, having the structure of stack and perform modification functions are called dictyosomes."

There are many organelles present in plant cell performing different functions. Each organelle has specific shape, structure, size and function. These allogeines perform various functions and allow the plant to carry its life cycle. The dictyosomes are one of these organelles and have the structure of stack like pies of coins. These are membrane bounded and contains space between unit membranes. Several functions are performed by dictyosomes. These are referred to as golgi complexes in animal cells.

GOLGI BODIES:-

Dictyosomes are compiled together forming golgi bodies.

STRUCTURE OF GOLGI COMPLEX:-

It has following features in its structure:-

1- Double Membrane:-

Golgi complex consists of two membranes, outer and inner.

Outer membrane: It is soft and flexible

Inner membrane: rough membrane.

2- Lumen:-

There is a fluid present between the outer and inner membranes of golgi bodies called lumen. It is mucous secretion.

3- CISTERNAE:-

The stacks of golgi complex is called cisternae. It is like flattened bodies lying over one another.

FACES OF GOLGI COMPLEX:-

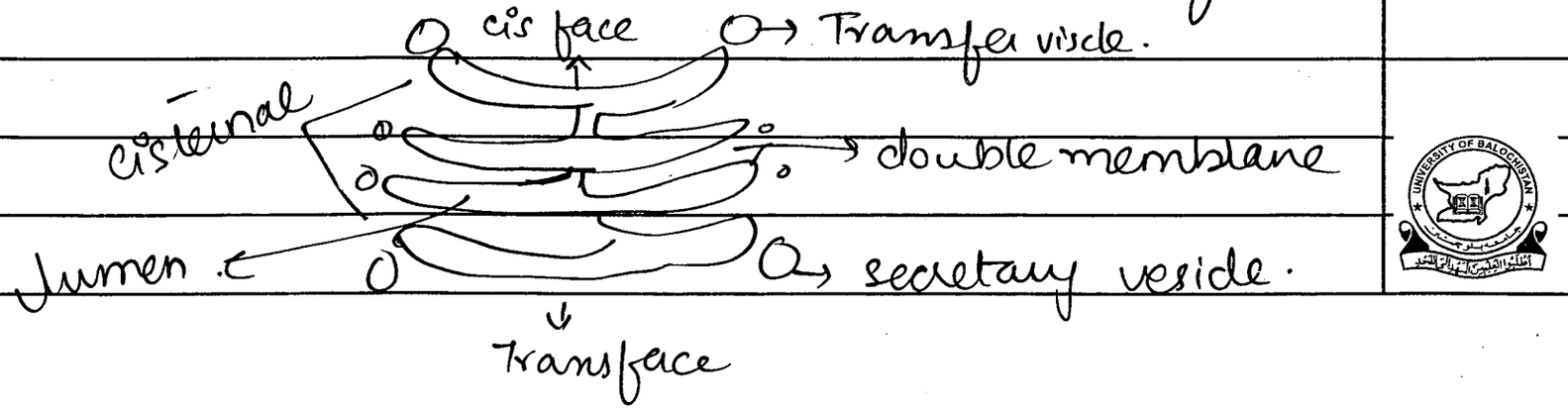
There are two faces /poles.

i) Immature face or Cis face:-

It is the receiving site of vesicle in golgi complex. It is convex shaped and immature.

ii) Trans face or Mature face:-

This face act as shipping site; the site from where vesicle cuts off after modification is called Trans face. This pole is concave shaped and is also called mature face.



FUNCTIONS OF GOLGI COMPLEX:-

The golgi apparatus has following function in cell:-

1- Modification of cell secretion.
2- Modification of sugars, proteins, etc.
3- Formation of secretary vesicles.
4- Formation of lysosomes.

STEPS INVOLVE IN FUNCTIONING OF GOLGI COMPLEX:-

Following steps are moved during the modification of secretions:-

1- Entrance of Transfer vesicle:

The entry of transfer vesicle, formed by endoplasmic reticulum in to golgi body ~~at~~ occurs at cis face. This transfer vesicle enters in golgi complex for

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x for

modification of its secretions.

1- Addition of sugars :-

The vesicle has certain secretions that need modifications. These include substitution of sugars or oligosaccharides. The oligosaccharides are substituted either by lipid to produce the product = glycolipid. This step is performed inside the membranes of golgi bodies.

2- formation of Secretary vesicle:

After modification the secretions are entered into cytoplasm. These secretions are packed in membrane formed by golgi complex's membrane - This membranous structure along with the modified secretion inside is called as

secretary vesicle.

4- Detachment of secretary vesicle:-

It is detached from the golgi complex at once at start roaming in cytoplasm. There are two methods or ways for the secretary vesicle :-

(i) Formation of lysosome:-

The secretary vesicles which accumulate in cell and cause aging is called lysosome.

(ii) Exocytosis :-

The secretary vesicle either leaves the cell by the procss of exocytosis. in which there is formation of vesicle inside cell and is excreted out by membrane.

Formation of Cell Membrane:-

It is another important and major function of golgi complex. The formation of cell membrane occurs by either endoplasmic reticulum or golgi bodies. These are formed by secretary vesicles. When these vesicles leaves the cell through exocytosis by cell membrane then they got packed by membrane components and instead gave their own membrane to the cell, to become a new cell membrane.

Q.NO8:- (i) Draw and describe structure of typical plant cell?

Answer:- PLANT CELL:-

Cell = "Cell is the structural and functional unit of life". It is present in all living species, either plants or animals. The plant cell has certain demarcations from animal cell. The full structure is described below:-

1- CELL WALL:-

The outermost layer of plant cell is called cell wall. It is the characteristic of plants that distinguish them from animal cells. The cell wall may be thick, thin, perforated or pitted, depending upon the cell in which it occurs.

Functions:-
Give strength to cell.
Give shape to the cell.
Provide protection.
Allow passage of contents.

CELL MEMBRANE:-

The layer next to cell wall is cell membrane. It is present in all cells and contains cytoplasm.

Composition:- The cell membrane is made up of certain sugars, lipids, proteins. Protein content is 40-60% and sugars are in glycoproteins or glycolipids form.

Functions:-
Give protection to cell contents.

2- Semi permeable : so allows passage of selective molecules.
3- Peforms endocytosis, exocytosis (pino & picocytosis).
4- Provide flexibility.

(3) CYTOPLASM :-
The region between the cell membrane and ~~ee~~ nuclear membrane is called cytoplasm."
Composition = It is composed of cytosol and cell organelles.
Cytosol :- The fluid portion of cell is called cytosol. It contains lipids, proteins, sugars, ATP, bases and other soluble components involved in the different reactions.

Cell organelles:-

These are major components of cell performing certain functions. The cell organelles may be membrane bounded (double or single membrane) or non-membranous organelles.

(4) NUCLEUS:-

The nucleus is present on one side in plant cell due to presence of large vacuole. The nucleus contains following components:-

→ Nucleosome =

The fluid portion of nucleus is nucleosome containing chromosome.

→ Nucleoli:-

Dense non-membranous organelle

inside the nucleus. It performs function of formation of RNA.

→ Chromatin :-

Chromatin material containing chromosome in compact / loose form present in nucleus. These contain DNA.

→ Nuclear Membrane :-

The membrane outside the nucleus is called nuclear membrane. It contains pores → nuclear pores.

(5) MITOCHONDRIA :-

. Double membrane bounded organelles.

Energy house of cell.

Contain cristae = folds.

Perform aerobic respiration.

6) PLASTIDS:-

- Present in plant cell.
- Occur in three forms
  - → Leucoplast
  - → Chloroplast
  - → Chromoplast.

CHLOROPLAST:-

These contain chloro phyll, performing function of photo-synthesis.

→ Certain pigments are also present.

→ have circular DNA and other structures like: Thallakoid.
Grana,
Stroma.

7) VACUOLE:-

Central portion of plant cell

is occupied by large vacuole.
→ Storage of food.
→ Have pigments.
→ Give colour to cell.
→ Have granules.
→ Contain chromatophores.

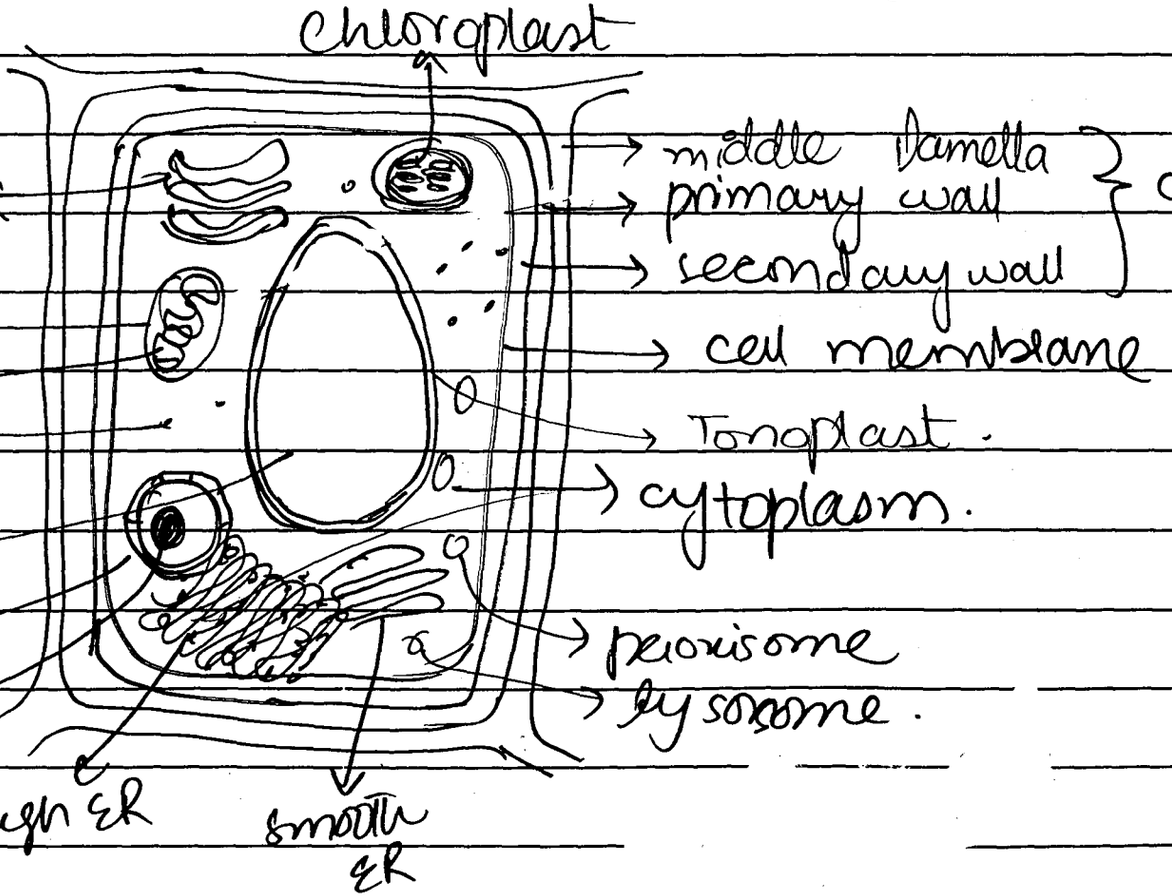
(8) ENDOPLASMIC RETICULUM:-

- Strands of double membranes extending from nucleus / nuclear membrane.
- Two types of ER are:-
  SER = smooth endoplasmic
  RER = Rough endoplasmic
  Smooth ER are without ribosomes. Rough ER contain ribosomes on their outer surface membrane.

RIBOSOMES:-

- Small granular structures.
- concerned with protein synthesis.

DIAGRAM



Q.NO9:- Write short notes:

(a) CELL WALL:-

The cell wall has following features:

* Outer most layer of cell (plant cell).
* Give protection to cell contents.
* Have rigid structure.
* Composed of cellulose, mucin, etc.
* Have many major functions.

STRUCTURE:-

Cell wall has three layers:

1- Primary wall.
2- Middle lamella.
3- Secondary wall.

Middle Lamella:-

The portion which joins the

two cells together by sticky secretion is called middle lamella.

Primary cell wall:-

Present beneath the middle lamella. It is the wall of cell that is present outside the secondary wall and have Transmission functions.

Secondary cell wall:-

The cell wall next to cytoplasm is called secondary cell wall. It is innermost wall. But in some cases it secretes another wall.

Tertiary cell wall:-

Secreted by secondary wall in some plants.

COMPOSITION OF CELL WALL:-

The cell wall is composed of:

1- Cellulose:-
- Form of sugar.
- Polysaccharide (C-C-C-C)
- Give rigidity to cell wall.

2- Hemicellulose-
- Form of sugar.
- Give strength.
- Remnants of cellulose.

3- Mucin:-
- Secreted by membrane.
- Protects cell.
- Keep cell hydrated.
- prevent dessication.

- Lignin: form of lipid.

Other contents are:-

5- pectin.

6- Agar, etc.

(b) MUTATION:-

"Any change in gene of chromosome is called mutation."

Cause of Mutation =

→ Biological causes.

→ Chemical causes.

→ Radiational causes.

These factors defect the sequence of genes on chromosomes.

MUTAGENS:-

"Agents causing mutation"

TYPES OF MUTATION:-

Following are types of mutation on two basis:-

→ ON BASIS OF OCCURENCE:-

These may occur at genetic or at chromosomal level.

Such division is represented as:-

- Chromosomal Mutation
  - Change In Number
  - Change In Structure.
- Genetic Mutation
  - ↓ Due To changes in bases.

CHROMOSOMAL MUTATION:-

- Structural change
  - Four Types.
    1) Deletion
    2) Duplication
    3) Inversion.
    4) Translocation.
- Number change.
  - Two Main Types
    - Aneuploidy
      - Hypoploidy
        - Monosomy
        - Nullisomy
      - Hyperploidy
        - Tetrasomy
        - Trisomy
    - Euploidy
      - Triploidy
      - Monoploidy
      - Polyploidy.

GENETIC MUTATION:-

Change in base sequence

(1) Point Mutation

(2) Frame shift Mutation

Missence mutation

Non sense mutation

Sense mutation.

ON BASIS OF INDUCTION:-

There are two types.

1) Spontaneous Mutation:-

Occur by chance.

2) Induced Mutation:-

Induced in organism consciously for advantage purpose.

* * *

energy in the form of ATP is called glycolysis.

Substrate level production of ATP in glycolysis:-

During glycolysis two molecules of ATP are released directly (at substrate level). Those steps are:-

1- When Glyceraldenyde-3-phosphate is phosphorylated to 1-3, phosphoglycerate.

2- The step when phosphoenol pyruvate is converted to pyruvate, then energy or ATP molecule is released.

$$ADP + Pi \longrightarrow ATP$$

$$AMP + Pi \longrightarrow ADP + Pi \longrightarrow ATP$$

* Destruction of ATP releases enogy:-

$$ATP \longrightarrow ADP + Pi + 7.3 \text{ kcal of enogy.}$$

Krebs Cycle :- "The cycle in which oxaloacetate is converted to citric acid, and by several reactions citric acid is again converted back to oxaloacetate is called Krebs cycle", introduced by scientist 'Kreb'. During this cycle ATP is released, along with NADP and FAD.

Substrate level production of ATP in Krebs cycle :-

During Krebs cycle two molecules of ATP are generated. One is generated in each one cycle, and as Krebs cycle occurs twice so there is total production of Two ATP molecules on substrate level.

* Krebs cycle occur in matrix of mitochondria, and Glycolysis in cytoplasm. These are major sources of ATP production.

"SECTION - II"

Q.NO.3 (a) Differentiate between homologous and analogous structures?

Answer:- HOMOLOGOUS STRUCTURES:-

"The structures having similar appearance / structure but different functions are called homologous structures."

Features or characteristics:-

1- Such structures which are similar in appearance or bone arrangement are thought to have same ancestory.

2- These are studied under comparative anatomy, which discusses about structure of various organs of organisms.

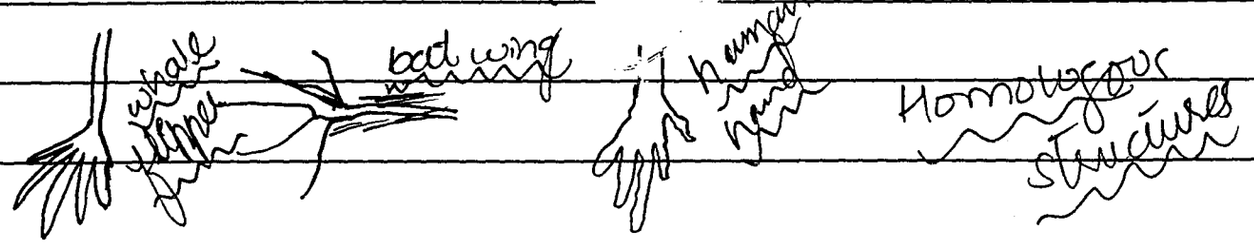
3- These gave the example of convergent evolution, which shows that many species arived from different dimeages in similar ancestary.

1 EXAMPLES OF HOMOLOGOUS STRUCTURES :-

"Arm of human" "flipper of whale" and "wing of bat", all have similar arangement of bones but they perform different functions e.g

- arm of man :- used for working
- flipper of whale :- functions in swimming
- wing of Bat :- help in flying.

These all are supposed to derived from common ancestors.



ANALOGOUS STRUCTURES :-

"The organs or structures having different arrangement or ~~same~~ structural appearance is different, but perform same functions are refered to as analogous structures."

Features or Characteristics :-

1- The analogous structures donot support the common ancestory.

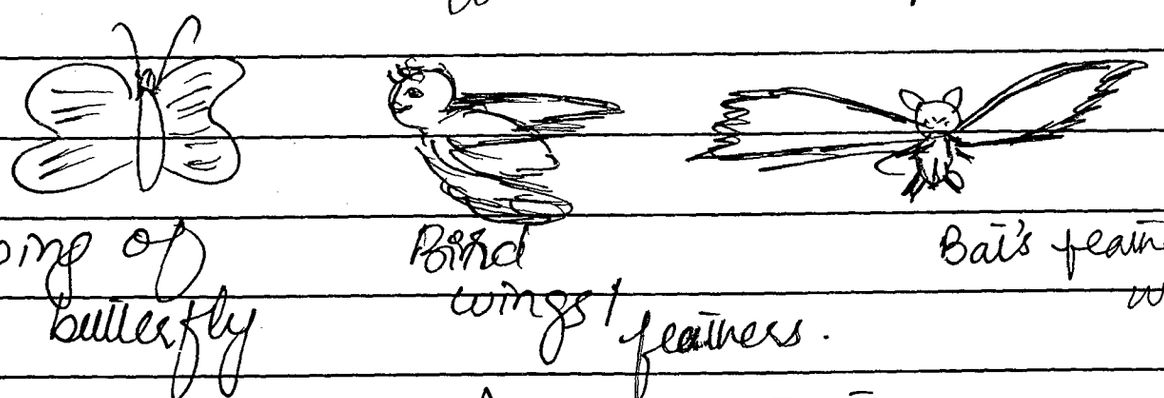
2- These are example of divergent evolution because different structures with same functions are supposed to arrage from different ancestary, and then diverged.

3 Analogous structures are also studied under heading of comparative anatomy (study of different structures of organisms).

These processes or structures do not support process of evolution in good manner.

EXAMPLE OF ANALOGOUS STRUCTURES:-

"Wing of bat", "Wing of butterfly" and "wing of bird": all have similar functions but their structures or arangement of bones are different. These all help in flight of animal, but all these structures are different in appearance.



wing of butterfly

Bird wings/ feathers.

Bat's feathers/ wings

Analogous structures

Q.NO7 (b) Describe theory of natural selection?

Different theories are formulated or given by different scientists on concept of evolution. The main scientists who worked on evolution are Lamarck, Darwin and Alfred Rusel Wallac. They wrote different books to expres their views about evolution. One of such theories is natural selection.

THEORY OF NATURAL SELECTION:-

Background:- This theory was given by charles Darwin. He worked very hard to get knowledge about the procers of evolution. He was sent on voyage to Galapagos Islands where he collected his major ideas on concept of evolution. Darwin formulated the theory of natural selection based on

several aspects.

Natural Selection :- "Natural selection can be described "as the process of evolution in which organisms with more adaptive characters are able to survive in the changing environmental conditions".

MAIN POINTS :-

The theory of natural selection is based on following points :-

1- Over production of population.
2- Survival of fittest!
3- Survival of
4- Genetic Diversity.
5- Natural selection (selection of Nature that which speci would survive).

Following is their detailed note :-

1

OVER POPULATION:-

The population of earth is increasing continuously in an exponential form. This dangerous rate of increase in the growth of population cause over production. Due to over production the resources become depleted as same species use same resources, so this effect is causing harm to the world.

Example:- The ostrich female gave about 100 eggs. If all hatched and each embryo grows and again give rise to other 100 embryos, then population of ostrich is not able to control. Their resources such as

food, shelter, etc become depleted.

Control Measure :- There should be different laws implied to control over population, as it has hazardous effects on natural environment.

2- SURVIVAL OF FITTEST :-

In the changing conditions of environment, the organism which contain genes of special trait that can overwhelm the changing condition, will survive only. Those species which lack specific genes for changing environmental conditions are supposed to die quickly.

Example :- According to Lamarck, giraffes with long necks survived when trees grasses are turned to ~~gra~~ trees. Short neck girraffes died because they do not fit in changing

conditions of environment.

3- GENETIC DIVERSITY:- OR GENETIC VARIABILITY:-

Due to evolution, genes undergo certain changes that are very minute and cannot be seen clearly. These such changes in genes cause genetic variability or diversity. This genetic variability causes the organisms to live in the conditions of changing environment.

Example:- Genes of birds are adapted to fly over high areas. These birds are better adapted to air environment. On the other hand human have genes that cause them to walk on land. These genes gave adaptability to limbs for walking, running, jumping, etc.

Q: SELECTION By NATURE:-

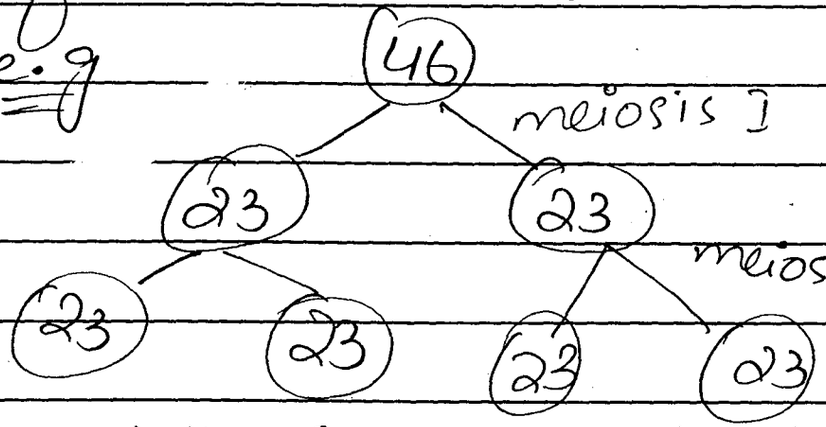
Nature plays major role in selecting the organisms which can fit better in its surrounding. Nature selects those organisms which are most fittest to its environment and that have considerable genetic variability. The species which are capable of reproducing organisms by transferring the selected genes into them are preferred more by nature, than those which have no ability or less ability to reproduce.

Q NO 8:- Write short notes on following:-

a) SIGNIFICANCE OF MEIOSIS:-

"Meiosis is a type of cell division in which number of chromosomes is reduced to half in the daughter cells." As a result of meiosis four daughter cells are produced with half number of chromosomes as in parental cells.

e.g



There are following important aspects or significance of meiosis:-

1- SAME CHROMOSOMAL NUMBER IN GENERATIONS:-

"Due to meiosis the number of chromosomes remain same in same species generation after generation." It is also known as reduction devision.

e.g If number of chromosomes donot reduced in humans (actually having 46 chromosomes) then next generation will receive double chromosome (say 46+46 = 92) due to combination of gametes.

2- GAMETE FORMATION:-

Meiosis is type of cell cycle that occurs in gametes. So it is the main source of production of gamete cells with half of the chromosome number than somatic cell.

3- GENE VARIABILITY:-

Meiosis causes changes or adaptations in genes. Therefore genes in daughter cell are some how different from parents They are combination of both of the genes of parents.

4- CROSSING OVER:-

It is the main step during which the chromosome exchange their segments (homologous chromosomes) and form x-shaped chiasmata → region where exchanging occurs. Thus crossing over is the main cause of genetic variability.

5- RECOMBINANT CHROMOSOMES:-

The chromosome which contain a part of gene exchanged from

other chromosome is called recombinant chromosome. It produces recombinant DNA. Meiosis is main cause of recombination.

(b) **IMPRINTING:-**

It is a type of behaviour present in different animals. It can be defined as:-

"The behaviour which is adapted by youngs by following any other object or organism is called imprinting."

Explanation:-

Konrad Lorenz was the scientist or ethologist who discovered this type of behaviour. He performed experiment to show this behaviour:

Experiments:- Lorenz trained many youngs of gosslings. He trained them as he is their mother. After some days he use to identify their behaviour. In search attempt he cause their actual mother to walk in front of them, and he himself also walked in front of gosslings. He wanted to examine that whom the gosling will follow. The gossling followed Konred Lorenz, instead of their actual mother. This is because they took him as their guider, as he nourished them. So this experiment reveals that; certain behaviour are adaped

by organisms in their young age and they cannot be changed. Such behaviours are called imprinting.

c) ALTRUISM:-

"The speciation in which an animal reduces his own reproductive potential to benefit other organisms is called altruism."

Explanation:-

Some organisms are there who have reproductive potential, they lay down their offspring but donot nourish them well. These organisms benefit others more than their own generation. This benefiting to other species or organisms of same species instead of own is known as altruism.

Example of Honeybees:-

Honey bees have workers and queens which are diploid. The drones are male honeybees and are haploid. Such drone, queen and workers show an association in which they benefit their sister species more. Their this kind of behaviour is useful in their progression. So they show altruism.

d) NON-SENSE MUTATION:-

Mutation can be of various types. It may be at gene level or chromosomal level. The any change in structure or number of chromosome is called chromosomal mutation" AND

"The change in base sequence in genes causes genetic Mutation."

Gene Mutation: It can be divided into Two types:

(1) Frame shift mutation.

(2) Point Mutation.

Nonsense mutation	Missence mutation	Sense mutation
↓	↓	↓
Stop the protein synthesis	change base sequence ⇒ cause diseases.	same gene produced even after altering base.

NON-SENSE MUTATION:-

"The genetic mutation (point mutation) which causes the substitution of gene which carries

stop- codon, is called non-sense mutation."

STOP CODON / Termination codon:-

There are three stop codons.

(1) UAG (2) UAA (3) UGA.

If any one of these come in way of protein synthesis then synthesis stop. In mutation, no complete product is formed. So non-sense mutation cause stoppage of protein in mid way. So half or incomplete product is formed.

Example:-

If the gene code is UAC, if G occupies C then it becomes "UAG" which cause mutation.