

Class XI Session 2025-26
Subject - Biology
Sample Question Paper - 10

Time Allowed: 3 hours

Maximum Marks: 70

General Instructions:

1. All questions are compulsory.
2. The question paper has five sections and 33 questions. All questions are compulsory.
3. Section–A has 16 questions of 1 mark each; Section–B has 5 questions of 2 marks each; Section– C has 7 questions of 3 marks each; Section– D has 2 case-based questions of 4 marks each; and Section–E has 3 questions of 5 marks each.
4. There is no overall choice. However, internal choices have been provided in some questions. A student has to attempt only one of the alternatives in such questions.
5. Wherever necessary, neat and properly labeled diagrams should be drawn.

Section A

- Which of the following pairs is wrong? [1]
 - Ureotelic - Insects
 - Ammonotelic - Tadpole
 - Uricotelic - Birds
 - Ureotelic - Elephant
- Frog shows which kind of excretion? [1]
 - Ammonotelic in water and ureotelic on land
 - Ammonotelic
 - Ureotelic
 - Uricotelic
- A group of plants with similar traits of any rank is _____. [1]
 - Species
 - Taxon
 - Order
 - Genus
- Dark fixation of CO_2 in CAM plants is called oxaloacetic acid fixation because it produces: [1]
 - Malic acid
 - Oxaloacetic acid
 - Formic acid
 - Tartaric acid
- Base pairs found in 5 turns of DNA spirals are _____. [1]
 - 20
 - 50
 - 10
 - 100
- What is the average amount of urine produced by a human in a day? [1]
 - 180 litres
 - 18 litres
 - 15 litres
 - 1.4 litres

7. pH of urine under healthy conditions is: [1]
 a) Slightly alkaline b) Neutral
 c) Highly alkaline d) Slightly acidic

8. Epiblema of roots is equivalent to: [1]
 a) Stele b) Epidermis
 c) Pericycle d) Endodermis

9. The oxygen - haemoglobin dissociation curve will show a right shift in case of: [1]
 a) High pO_2 b) Low pCO_2
 c) High pCO_2 d) Less H^+ concentration

10. In the wheat field, some broad-leaved weeds were seen by a farmer, which plant hormone would you suggest getting rid of the same? [1]
 a) 2 : 2-D and 2 : 4 : 6 T b) 2 : 5-D and 2 : 5 : 5 T
 c) 2 : 6-D and 2 : 2 : 5 T d) 2 : 4-D and 2 : 4 : 5 T

11. A Prothallus is: [1]
 a) A gametophyte free-living structure formed in pteridophytes. b) A structure in pteridophytes formed before the thallus develops.
 c) A primitive structure formed after fertilization in pteridophytes. d) A sporophytic free-living structure formed in pteridophytes.

12. An ORD found chiefly among stonecutters due to inhalation of fine stone particles is named_____. [1]
 a) Chalicosis b) Bronchitis
 c) Siderosis d) Asthma

13. **Assertion (A):** Malarial fever appear at merozoite stage of Plasmodium. [1]
Reason (R): The infective stage of Plasmodium is sporozoite.
 a) Both A and R are true and R is the correct explanation of A. b) Both A and R are true but R is not the correct explanation of A.
 c) A is true but R is false. d) A is false but R is true.

14. **Assertion (A):** Elemental analysis gives the elemental composition of living tissues in the form of hydrogen, oxygen, chlorine, carbon, etc. [1]
Reason (R): Wet weight is the weight of living tissue and the remains of living tissue after drying gives dry weight.
 a) Both A and R are true and R is the correct explanation of A. b) Both A and R are true but R is not the correct explanation of A.
 c) A is true but R is false. d) A is false but R is true.

15. **Assertion (A):** When P_{CO_2} is high and P_{O_2} is low as in the tissues, more binding of carbon dioxide occurs whereas, when the P_{CO_2} is low and P_{O_2} is high as in the alveoli, dissociation of CO_2 from carbamino-

hemoglobin takes place.

Reason (R): P_{O_2} is a major factor that could affect the binding of CO_2 with hemoglobin.

- a) Both A and R are true and R is the correct explanation of A.
- b) Both A and R are true but R is not the correct explanation of A.
- c) A is true but R is false.
- d) A is false but R is true.

16. **Assertion (A):** The amount of CO_2 that can diffuse through the diffusion membrane per unit difference in partial pressure is much higher compared to that of O_2 . [1]

Reason (R): The solubility of CO_2 is 20-25 times higher than that of O_2 .

- a) Both A and R are true and R is the correct explanation of A.
- b) Both A and R are true but R is not the correct explanation of A.
- c) A is true but R is false.
- d) A is false but R is true.

Section B

- 17. List any two difference between anabolism and catabolism. [2]
- 18. What is the difference between cutaneous and pulmonary respiration? [2]
- 19. What is the role of second messenger in protein hormone action? [2]
- 20. Write the equation to express Cornelius van Niel's findings. [2]

OR

State the law proposed by Blackman for various factors operative for photosynthesis.

21. List out the functions of the ground tissue system. [2]

Section C

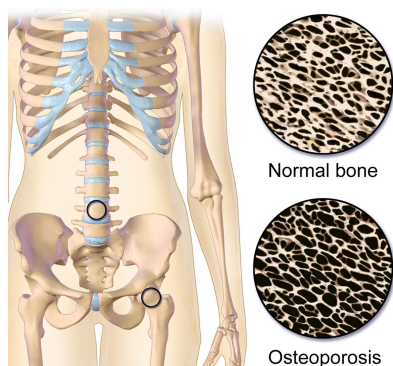
22. Write the differences between: [3]

- a. Blood and Lymph
- b. Open and Closed system of circulation
- c. Systole and Diastole
- d. P-wave and T-wave

OR

Why is there no mixing of deoxygenated and oxygenated blood in the human heart normally?

- 23. Briefly describe the structure of the Brain. [3]
- 24. Given below is a diagram of different types of muscles. Based on the diagram answer the following questions: [3]



- i. Mention the causes of osteoporosis.
- ii. Mention the preventive measures of osteoporosis.
- iii. Why osteoporosis is regarded as a silent disease.

25. The male and female reproductive organs of several pteridophytes and gymnosperms are comparable to floral [3]

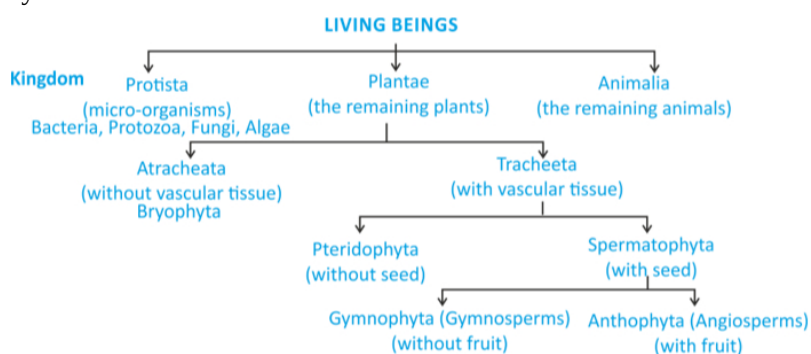
structures of angiosperms. Make an attempt to compare the various reproductive parts of pteridophytes and gymnosperms with reproductive structures of angiosperms.

26. Explain classification of enzymes. [3]
27. Differentiate between an Insect and Spider. [3]
28. Both animals and plants grow. Why do we say that growth and differentiation in plants is open and not so in animals? Does this statement hold true for sponges also? [3]

Section D

29. **Read the following text carefully and answer the questions that follow:** [4]

Linnaeus gave two kingdom classification/which consists of kingdom Plantae and kingdom Animalia. This classification was based on the mode of nutrition/ reproduction/ presence or absence of cell wall. However, this system had many drawbacks like there was no distinction between eukaryotes and prokaryotes. Then, came the three-kingdom classification in which single-celled bacteria and protozoans were kept in the kingdom Protista. This system also failed to classify all living organisms into appropriate categories. Finally a five Kingdom classification was proposed by dividing all the organisms into five kingdom and it will be accepted as modern system of classification.



- i. We know that Haeckel proposed the term Protista for unicellular organisms. Observe the given flowchart and mention what are advantages does the five-kingdom classification have over the two-kingdom classification? (1)
- ii. All eukaryotic unicellular organisms belong to which kingdom? Also, mention its two characteristics. (1)
- iii. What is heterotrophic? Is Euglena heterotrophic? (2)

OR

Who proposed the five-kingdom classification? And which criteria were used to classify organism in the 5-kingdom system? (2)

30. **Read the following text carefully and answer the questions that follow:** [4]

The flower is the reproductive unit in the angiosperms. It is meant for sexual reproduction. A typical flower has four different kinds of whorls arranged successively on the swollen end of the stalk or pedicel, called thalamus or receptacle. These are calyx, corolla, androecium and gynoecium. Calyx and corolla are accessory organs, while androecium and gynoecium are reproductive organs. In symmetry, the flower may be actinomorphic (radial symmetry) or zygomorphic (bilateral symmetry). Based on the position of calyx, corolla and androecium in respect of the ovary on the thalamus, the flowers are described as hypogynous, perigynous and epigynous. A flower may be trimerous, tetramerous or pentamerous when the floral appendages are in multiple of 3, 4 or 5,



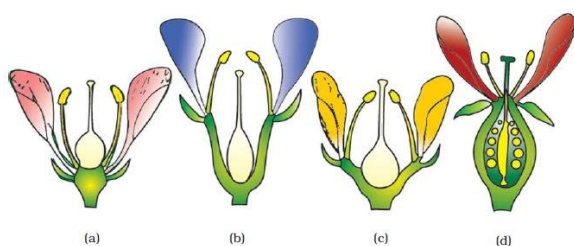
respectively.



- i. Observe the diagram given below. and mention what happens after the given stage. (1)
- ii. Is Actinomorphic - datura the incorrect match? (1)
- iii. When the ovary is superior it is called? (2)

OR

Which of the following represents epigynous? Also, mention what an epigynous flower is (2)



Section E

31. The cells of a unicellular organism are usually spherical whereas those of multicellular tend to be many-sided. [5]
Why?

OR

Discuss the basic structural organisation of a typical cell.

32. With the help of suitable diagrams describe mitosis. [5]

OR

Explain, why a pair of homologous chromosomes is genetically different, but a pair of sister chromatids is genetically identical before crossing over in meiosis.

33. Define and explain the process of fermentation in animals, yeast and bacteria. [5]

OR

Does pyruvic acid enter the Krebs' cycle directly?

Solution

Section A

1. (a) Ureotelic - Insects

Explanation:

Insects excrete uric acid so they are uricotelic organisms.

2.

- (c) Ureotelic

Explanation:

Excretion of urea as metabolic waste is known as Ureotelism. Animals secreting urea are called ureotelic. Frog is ureotelic.

3.

- (b) Taxon

Explanation:

Each category in the taxonomic hierarchy represents the rank and is commonly termed as a taxon. Hence, the correct option is Taxon.

4. (a) Malic acid

Explanation:

The dark reaction of Carbon dioxide fixation in CAM plants is called ossification because it produces Malic acid. These plants open their stomata during the night to prevent transpiration.

5.

- (b) 50

Explanation:

Each turn of DNA spirals contains 10 base pairs. So, in five turns of DNA total number of Base pair is $5 \times 10 = 50$ base pairs.

6.

- (d) 1.4 litres

Explanation:

The normal range for 24-hour urine volume is 800 to 2000 milliliters per day (with a normal fluid intake of about 2 liters per day). This is the range.

So average = $\frac{800+2000}{2} = 1400\text{ml} = 1.4 \text{ L}$

7.

- (d) Slightly acidic

Explanation:

The pH of urine under healthy conditions is slightly less than 7 so, slightly acidic in nature.

8.

- (b) Epidermis

Explanation:

Epiblema is found in root as single outermost layer through which root hairs arises.

9.

- (c) High pCO_2

Explanation:



The oxygen-haemoglobin curve is shifted to the right when there is high $p\text{CO}_2$, low $p\text{O}_2$, high H^+ concentration, and high temperature.

10. **(d) 2 : 4-D and 2 : 4 : 5 T**
Explanation:
Plant hormone 2 : 4-D and 2 : 4 : 5 T have ability to kills the weeds in the crop field. Weeds are unwanted plants that grow along with crop plants and compete with the crop for nutrient and water.
11. **(a) A gametophyte free-living structure formed in pteridophytes.**
Explanation:
A gametophyte free-living structure formed in pteridophytes which is of short duration.
12. **(a) Chalicosis**
Explanation:
An ORD found mainly among the stonecutters due to inhalation of fine stone particles is called as Chalicosis. It causes inflammation of the bronchioles causing respiratory difficulties.
13. **(b) Both A and R are true but R is not the correct explanation of A.**
Explanation:
When the mosquito bites man, sporozoites present in the salivary gland of female Anopheles mosquito are injected into the blood of the man. The erythrocytic schizont gives rise merozoites. Malaria fever occurs when schizonts in red blood corpuscles burst and set free their contained merozoites and malarial pigment (haemozoin) in the blood plasma. Bursting of schizonts tends to be synchronous as they all burst at the same time. Haemozoin is said to be toxic and so includes high fever and shivering (Haemozoin is a unused hematin, which is produced by the breakdown of haemoglobin). It is yellow brown to blackish in colour.
14. **(b) Both A and R are true but R is not the correct explanation of A.**
Explanation:
Living organisms are made of only a small selection of these elements, four of which are carbon, hydrogen, nitrogen, and oxygen make up 96.5% of an organism's weight.
15. **(a) Both A and R are true and R is the correct explanation of A.**
Explanation:
Both A and R are true and R is the correct explanation of A.
16. **(a) Both A and R are true and R is the correct explanation of A.**
Explanation:
Both A and R are true and R is the correct explanation of A.

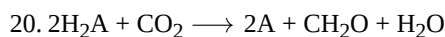
Section B

17. Difference between anabolism and catabolism are:

Anabolism	Catabolism
It is the sum total of constructive processes.	It is the sum total of destructive processes.
Energy is stored.	Energy is released.

18. When breathing takes place by diffusion through the skin, it is called cutaneous respiration. When breathing takes place through the lungs, it is called pulmonary respiration. When a frog is underwater, it breathes by cutaneous respiration. When a frog is on land, it breathes by pulmonary respiration.
19. Hormones which do not enter the target cells, interact with specific receptors located on the surface of the target cell membranes and generates second messengers (e.g., cAMP) on the inner side of the plasma membrane. The second messenger, in turn, carries out all the hormonal functions.





OR

Law of Limiting Factors: Proposed by **F.F. Blackman** (1905), this law states that “if a chemical process is affected by more than one factor, then its rate would be determined by a factor that is nearest to its minimal value; it is the factor that directly affects process if its quantity is changed”.

21. Functions of the ground tissue systems are as follows:

- It provides mechanical strength while showing bending.
- It has spaces to allow gaseous exchange between cortex and atmosphere.
- It carries out photosynthesis.

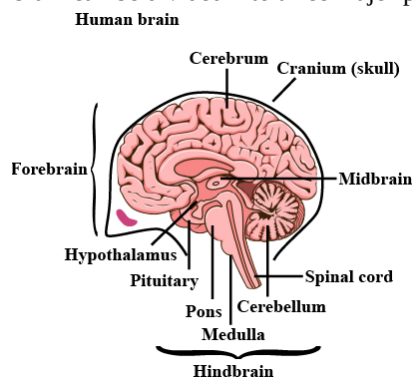
Section C

22. a. Blood contains RBCs and hence can transport gases. Lymph doesn't contain RBCs and cannot transport gases. Lymph mainly contains WBCs and play a role in the immune system of the body.
- b. The Open Circulatory System is a system in which fluid (called hemolymph) in a cavity called the hemocoel bathes the organs directly with oxygen and nutrients and there is no distinction between blood and interstitial fluid this combined fluid is called hemolymph or haemolymph. The cardiovascular systems of humans are closed, meaning that the blood never leaves the network of blood vessels.
- c. Systole is the contraction of heart muscle and diastole is the dilatation of the heart muscle.
- d. Each peak in the ECG is identified with a letter from P to T that corresponds to a specific electrical activity of the heart. The P-wave represents the electrical excitation (or depolarisation) of the atria, which leads to the contraction of both the atria. The QRS complex represents the depolarisation of the ventricles, which initiates the ventricular contraction. The contraction starts shortly after Q and marks the beginning of the systole. The T-wave represents the return of the ventricles from excited to normal state (repolarisation). The end of the T-wave marks the end of systole.

OR

The human heart is a four-chambered organ two atria and two ventricles. The two auricles are partitioned by a septum into a right auricle receiving only deoxygenated blood and a left auricle receiving only oxygenated blood. Due to further advancement in the human heart, the ventricle is **completely partitioned** into the right ventricle and left ventricle to prevent mixing of deoxygenated and oxygenated blood.

23. Structure of brain. The human brain is well protected by the skull. Inside the skull, the brain is covered by cranial meninges consisting of an outer layer called dura mater, a very thin middle layer called arachnoid and an inner layer called pia mater. The brain can be divided into three major parts. (i) Forebrain (ii) Midbrain and (iii) Hindbrain.



24. i. The causes of osteoporosis are as follows:
- Low calcium diet
 - Lack of physical activity
 - Family history
 - Ethnicity- White and Asian people are more likely to be affected by osteoporosis.
- ii. The preventive measures of osteoporosis are as follows:
- Increase calcium intake in the diet
 - Increase Vitamin D in the diet.
 - Exercise regularly to create stronger and healthier bones.
- iii. Osteoporosis is called a silent disease because most people don't even realize they have osteoporosis until one of the bone is fractured.

25.	Structure	Pteridophyte	Gymnosperm	Angiosperm
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Main reproductive part	Gametophyte bears antheridia and archegonia	Microsporophylls and megasporophylls represent the gametophyte.	Flower bears antheridium and gynoecium.
Male reproductive part	Antheridia produce male gamete.	The male cone is highly reduced in size.	Antheridia are composed of an anther and a slender stalk. Anther produces the pollen grains, i.e. male gametes.
Female reproductive part	Archegonia produce the female gamete.	The megasporophyll is large in size and is easily apparent as the female cone.	The gynoecium contains the ovary, style and stigma. The fertilised egg develops inside the ovary and eventually, seeds are produced.

26. Classification and Nomenclature of Enzymes

Thousands of enzymes have been discovered, isolated and studied. Most of these enzymes have been classified into different groups based on the type of reactions they catalyze. Enzymes are divided into 6 classes each with 4-13 subclasses and named accordingly by a four-digit number.

Oxidoreductases/dehydrogenases. Enzymes which catalyze oxidoreduction between two substrates S and S'.

Transferases. Enzymes catalyzing the transfer of a group, G (other than hydrogen) between a pair of substrates S and S'.

Hydrolases. Enzymes catalyzing the hydrolysis of ester, ether, peptide, glycosidic, C-C, C-halide or P-N bonds.

Lyases. Enzymes that catalyze the removal of groups from substrates by mechanisms other than hydrolysis leaving double bonds.

Isomerases. Includes all enzymes catalyzing the interconversion of optical, geometric or positional isomers.

Ligases. Enzymes catalyzing the linking together of 2 compounds, e.g. enzymes which catalyse the joining of C-O, C-S, C-N, P-O etc. bonds.

27.	An Insect	A Spider
	The body is divided into head, thorax and abdomen.	The body is divided into cephalothorax and abdomen.
	Have three pairs of jointed legs.	Has four pairs of jointed legs.
	Spinning organs absent.	The abdomen bears spinning organs.
	No carapace.	Cephalothorax covered by a carapace.
	Generally, have simple eyes.	Compound eyes are lacking.
	It has varieties of feeding habits.	It is a predator.

28. In animals, once a particular type of tissue is formed it cannot change to any other tissue. Moreover, growth in all the organs stop after a certain age of the animal. On the contrary, growth in the plant is indeterminate because plants retain the capacity for unlimited growth throughout their life. A senescent part is usually replaced in plants. Differentiated cells undergo dedifferentiation in plants if a need arises.

Sponges are exceptions in the animal kingdom. A sponge shows an open type of growth.

Section D

29. i. The advantages of five-kingdom classification over two-kingdom classification are as follows:

- It is based on cell structure
- It is based on the body structure
- Nutrition
- Way of living
- Phylogenetic relationship

ii. Protista

Characteristic of protists:

- Most of them live in water while some inhabit moist places.
- They have a membrane-bound nucleus and other cellular organelles

iii. Heterotrophs are those organisms that cannot prepare their own food and depend on other organisms (plants and animals) for food.

Yes, Euglena is heterotrophic and also possess chlorophyll like plants to synthesize their food.

OR

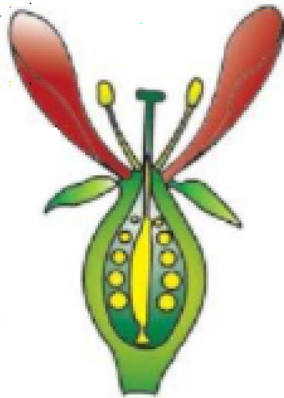
R. H. Whittaker proposed the five-kingdom classification.



R.H. Whittaker's primary classification criteria include cell structure, body organization, mode of nutrition, reproduction, and phylogenetic relationships.

30. i. Ovary develops into a fruit and ovules into seeds.
ii. Mustard, datura, and chili are the actinomorphic flowers as they are divided into two half from any plane.
iii. When the gynoecium is present in the topmost position of the thalamus, the ovary is known as: superior.

OR



Epigynous flower: The margin of the thalamus grows over and encloses the ovary completely. The margins of the flower get fused with the other parts of the flower which rise above the ovary.

Section E

31. It is true that the cells of unicellular organisms tend to be spherical. It is because of the following reasons:
- Surface tension:** Surface tension shapes the spherical way as in the case in air-borne soap bubbles.
 - The free-floating cells with thin membranes tend to be spherical as it is the most economical shape that can confine a given mass of protoplasm. The shape and the size of the cell depend upon the place where they are present and the functions they have to perform. In multicellular animals, the cells tend to become faceted as they come in contact with each other in the same way as the spherical soap bubbles become flattened when they are jammed together in a small space.

OR

The basic structural organisation of a typical cell is as follows:

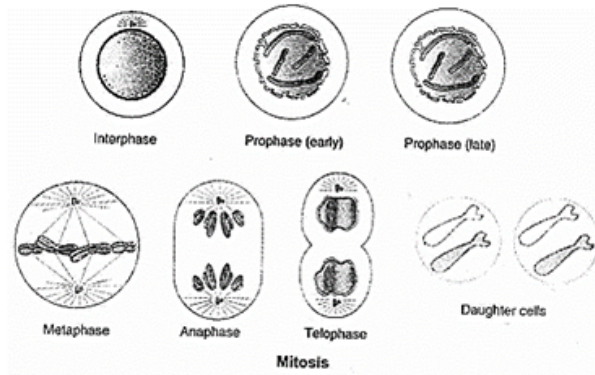
- Nucleus**, the central part, and brain of the cell, which is spherical in shape. Its number can be one or more per cell. It is denser than the surrounding cytoplasm. The nucleus is composed of chromosomes (contains the genetic material, i.e., DNA), nuclear membrane and centrioles (non-membrane bound organelle present in only animal cells, which helps in cell division).
- Cytoplasm**, a semi-fluid matrix that occupies the volume of the cell. It is mainly composed of water with free-floating molecules. Inside the cytoplasm, all cellular activities like a gaseous exchange, elimination of wastes, hereditary mechanisms, etc., occur.
Eukaryotic cells also contain another cell membrane-bound distinct structures called **cell organelles**, like mitochondria, vacuoles, Endoplasmic Reticulum (ER), Golgi complex, etc.
The prokaryotic cells lack all these **membrane-bound organelles**. It is to be noted that as ribosomes are not bounded by a membrane and are found in all cells. Ribosomes are also found in chloroplasts (in plants) and mitochondria and on rough ER other than the cytoplasm. Animal cells contain another non-membrane bound organelle called **centriole**, which helps in cell division.
- Outer membrane**, the boundary of the cell, which provides protection to the cell and controls the exchange of ions, molecules and other components in and out of the cell. The outer membrane of a cell contains cell wall (only in plant cells) and **plasma membrane**.

32. Mitosis is divided into the following four stages:

i. **Prophase**

- Condensation of chromosomal material starts. The chromosomal material becomes untangled during the process of chromatin condensation.
- The centriole, which had undergone duplication during S phase of interphase now begins to move towards opposite poles of the cell.

- At the end of prophase, Golgi complexes, endoplasmic reticulum, nucleolus and the nuclear envelope disappear.



ii. Metaphase

- The metaphase is characterized by all the chromosomes coming to lie at the equator.
- One chromatid of each chromosome connected by its kinetochore to spindle fibres from one pole and its sister chromatid connected by its kinetochore to spindle fibres from the opposite pole.
- The plane of alignment of the chromosomes at metaphase is referred to as the metaphase plate.

iii. Anaphase

- At the onset of anaphase, each chromosome arranged at the metaphase plate is split simultaneously and make the two daughter chromatids.
- They are now referred to as chromosomes of the future daughter nuclei and begin their migration towards the two opposite poles.
- As each chromosome moves away from the equatorial plate, the centromere of each chromosome is towards the pole and hence at the leading edge, with the arms of the chromosome trailing behind.

iv. Telophase

This is the stage which shows the following key events:

- Chromosomes cluster at opposite spindle poles and their identity is lost as discrete elements.
- Nuclear envelope assembles around the chromosome clusters.
- Nucleolus, Golgi complex and ER reform.

v. Cytokinesis

Karyokinesis is followed by cell division to form two daughter cells. This process is called cytokinesis at the end of which cell division is complete.

OR

A pair of homologous chromosomes are genetically different because in a set of homologous chromosomes, one of the chromosomes belongs to the male parent and the other comes from the female parent. Therefore, one of a pair will contain paternal genes and the other will contain maternal genes.

However, a pair of sister chromatids are genetically identical before crossing over as the chromatids are formed from the replication of DNA during the 'S' phase of interphase. DNA replication ensures that the DNA content is doubled with identical genes being copied from the original DNA. Therefore, there is no genetic variation because there is no exchange of genetic material between sister chromatids.

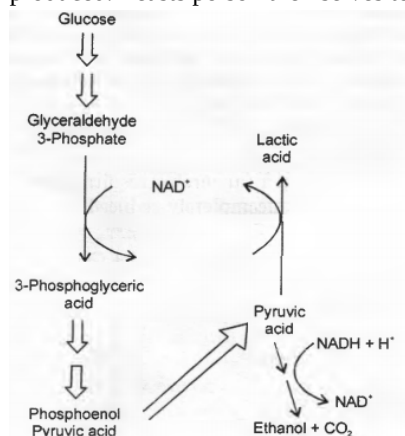
If crossing over occurs, then it would be possible for some genes to be exchanged between the chromatids of homologous chromosomes that have chiasmata, thus leading to genetic variation.

33. **Fermentation:** It occurs in some organisms like some **bacteria** that produce lactic acid from pyruvic acid.

In animal cells, such as muscles during exercise, when O_2 is inadequate for cellular exercise, the pyruvic acid is reduced to lactic acid by **lactate dehydrogenase**. **Reducing agent** is $NADH + H^+$ that is reoxidized to NAD^+ in both processes.

In both **lactic acid** and **alcohol fermentation** not much energy is released; less than seven percent of the energy in glucose released and not all of it is trapped as high energy bonds of ATP. The processes are hazardous: either the acid or alcohol is

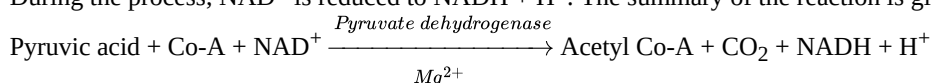
produced. Yeasts poison themselves to death when the concentration of alcohol reaches the app. 13%.



OR

No, before pyruvic acid as such does not enter Krebs' cycle, pyruvate is first decarboxylated, and then oxidized by the enzyme pyruvate dehydrogenase to form acetyl Co-A. This molecule enters the mitochondria for a further oxidation reaction. This is the connecting link between glycolysis and Krebs' cycle.

During the process, NAD^+ is reduced to $\text{NADH} + \text{H}^+$. The summary of the reaction is given below



During this process, two molecules of NADH are produced (from the metabolism of two molecules of pyruvic acid produced during glycolysis), and thus, it results in a net gain of 6 ATP molecules ($2 \text{ NADH} \times 3 = 6 \text{ ATP}$).