SAMPLE QUESTION PAPER - 4
BIOLOGY (044)
CLASS XI

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

1. A group of closely related families is called _____. **[1]**

   a) Species b) Genus

   c) Order d) Class

2. The filtration fraction is the ratio of GFR to RPF where both the values are in ml/min and FF is expressed in percentage. Calculate FF for a normal adult human being, if RPF= 600ml/min: **[1]**

   a) 2.08% b) 10.38%

   c) 20.73% d) 20.83%

3. The primary structure of a protein molecule has: **[1]**

   a) No ends b) Two ends

   c) Three ends d) One end

4. Monocotyledonous leaves are_____. **[1]**

   a) Dorsiventral b) Round

   c) Pinnate d) Isobilateral

5. The regulatory centres for respiration are located in: **[1]**

   a) Diencephalon and pons b) Pons and cerebellum

c) Medulla oblongata and pons
d) Cerebellum and medulla oblongata

6. When CO_2 is added to PEP, the first stable product synthesized is: **[1]**

a) Glyceraldehyde-3-phosphate
b) Pyruvate
c) Phosphoglycerate
d) Oxaloacetate

7. Dialysing unit (artificial kidney) contains a fluid which is almost same as plasma except that it has: **[1]**

a) No urea
b) High uric acid
c) High urea
d) High glucose

8. Two animal cells are interconnected by: **[1]**

a) Plamodesmata
b) Desmosomes
c) Cell wall
d) Plasma membrane

9. Auxin was isolated from tips of coleoptiles of oat seedlings by: **[1]**

a) Miller
b) Skoog
c) F.W.Went
d) E.Kurosawa

10. In which pteridophytes, heterosporous is produced? **[1]**

a) Adiantum
b) Psilotum
c) Equisetum
d) Salvinia

11. The part of a nephron which adds some material to the filtrate is: **[1]**

a) Loop of Henle
b) Proximal convoluted tubule
c) Distal convoluted tubule
d) Bowman's capsule

12. Mark the incorrect statement in context to O_2 binding to Hb: **[1]**

a) Lower temperature
b) Higher pH
c) Lower pCO_2
d) Higher pO_2

13. **Assertion (A):** Yeast is a nonmycelial ascomycetes. **[1]**
Reason (R): It forms pseudomycelium.

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):** 500 ml air inspired or expired during a normal respiration per minute. **[1]**
Reason (R): Healthy man can inspire or expire approximately 6000 to 8000 ml of air per breathing.

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):** Starch gives blue colouration with iodine. **[1]**
Reason (R): Starch is a storage polysaccharide of plant.

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:** Respiratory part of the respiratory system transports the atmospheric air to the alveoli. **[1]**
Reason: This part, clears air from foreign particles, humidifies and also brings the air to body temperature.

a) Assertion and reason both are correct statements and reason is correct explanation for assertion.

b) Assertion and reason both are correct statements but reason is not correct explanation for assertion.

c) Assertion is true but reason is wrong.

d) Assertion and reason both are wrong.

Section B

17. How does cambium ring form in a dicot stem? **[2]**

18. How do different senses work in frog? Explain in brief. **[2]**

19. When does the secretion of Adrenocorticotropin take place in the body? What is the purpose of its secretion? **[2]**

20. Write the proper order of taxonomic categories starting from top to the bottom. **[2]**

21. State the law proposed by Blackman for various factors operative for photosynthesis. **[2]**

OR

Describe chemiosmosis.

Section C

22. Explain the main characteristics of pteridophytes. **[3]**

23. Give an example for each of the following: **[3]**
    a. A viviparous animal
    b. A fish possessing a poison sting
    c. A fish possessing an electric organ
    d. An organ, which regulates buoyancy
    e. Animal, which exhibits alternation of generation
    f. Oviparous animal with mammary gland

24. Describe the important properties of enzymes. **[3]**

25. Name one synthetic auxin that can be used as a herbicide. Give one more application of the same. **[3]**

26. Explain the initiation of muscle contraction. What is the role of Sarcoplasmic Reticulum, Myosin head and F-Actin during contraction in striated muscles? **[3]**

27. Predict what will happen to the body of an adult human being if his spleen is removed? List at least four functions of it also. **[3]**

OR

Write a short note on electrocardiogram (ECG).

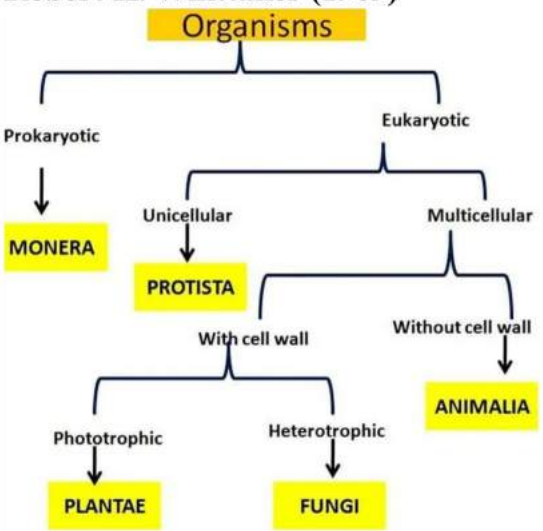
28. Differentiate between Mixed and Motor Nerves. **[3]**

Section D

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

R.H. Whittaker proposed a Five Kingdom Classification. The kingdoms defined by him were named Monera, Protista, Fungi, Plantae, and Animalia. The main criteria for classification used by him include cell structure, body organisation, mode of nutrition, reproduction and phylogenetic relationships. The three-domain system has also been proposed that divides the Kingdom Monera into two domains, leaving the remaining eukaryotic kingdoms in the third domain and there by a six kingdom classification. Earlier classification systems included bacteria, blue-green algae, fungi, mosses, ferns, gymnosperms and the angiosperms under 'Plants'. The character that unified this whole kingdom was that all the organisms included had a cell wall in their cells.

Robert H. Whittaker (1969)



(i) Observe Robert H. Whittaker (1969) flow chart of classification and mention what type of organisms were included in Kingdom Animalia?

OR

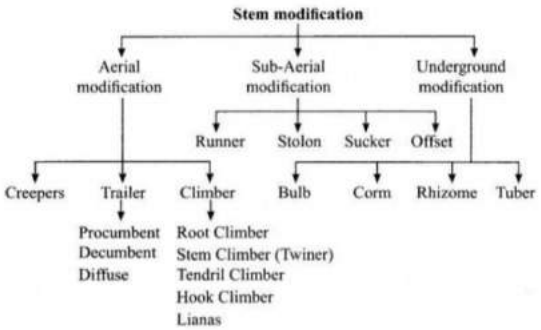
Is Fungi- Autotrophic (Photosynthetic) and Heterotrophic the correct match? Also, Mention the difference between the walls of fungi and green plants.

(ii) Mention two differences between prokaryotic and eukaryotic cells.

(iii) Linnaeus used which kingdom of classification? State two drawbacks of Linnaeus two kingdom classification.

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

Various parts of the plant such as stems leaves, and even fruits are modified into underground parts to perform various functions such as stems, leaves, and even fruits. The stems in ginger and banana are underground and swollen due to storage of food. They are called rhizome. Rhizome of ginger is a modification of stem because it bears nodes, internodes, terminal buds, scaly leaves and buds, which give rise to aerial shoots. It is not a root because root does not have nodes and internodes. Also, rhizome does not perform the function of roots i.e. anchorage and absorption, rather it serve as reservoir for storage of food. Similarly, corm is an underground stem in Colocasia (jimikand) The tips of the underground stem in potato become swollen due to accumulation of food and forms tuber.



(i) Observe the given flow chart and mention what are the four types of Underground stem modification also mention one example of each.

(ii) Ginger is an underground stem but why it is distinguished from a root?

(iii) Why do the tips of modified stems in potatoes become swollen?

OR

Are all underground parts of a plant roots?

Section E

31. Describe meiosis II with the help of suitable diagrams. **[5]**

OR

Describe prophase I of meiotic cell division. How is it different from prophase II of meiosis?

32. What happens to the acetyl group that enters the Kreb's cycle? Describe the steps of this cycle which follow. **[5]**

OR

Define and explain the process of fermentation in animals, yeast and bacteria.

33. Singer and Nicolson proposed the model for membrane. Describe the composition of the membrane. **[5]**

OR

What is the difference between cell wall and ribosomes of a prokaryotic and a eukaryotic cell?

Solution

Section A

1. **(c)** Order
   Explanation: Class includes a group of related orders, Genus comprises a group of related species, species is a basic unit of classification. Hence, the correct option is Order.
2. **(d)** 20.83%
   Explanation: Filtration fraction is the ratio of glomerular filtration rate (GFR) to the renal plasma flow (RPF). GFR of a normal human is 120 ml/min. so,
   $FF = \frac{GFR}{RPF} \times 100$
   $= \frac{120}{600} \times 100 = 20\%$.
3. **(b)** Two ends
   Explanation: Two ends - the carboxyl and amino-terminal.
4. **(d)** Isobilateral
   Explanation: Monocotyledonous leaves are isobilateral as both the lower and upper sides of the leaves are the same.
5. **(c)** Medulla oblongata and pons
   Explanation: A specialized centre present in the medulla region of the brain called respiratory rhythm centre is primarily responsible for this regulation. In the pons region of the brain called pneumotaxic centre can moderate the functions of the respiratory rhythm centre.
6. **(d)** Oxaloacetate
   Explanation: Oxaloacetate is the first stable product formed during photosynthesis.
7. **(a)** No urea
   Explanation: The dialysing unit contains a coiled cellophane tube surrounded by a fluid (dialysing fluid) having the same composition as that of plasma except the nitrogenous wastes like urea.
8. **(b)** Desmosomes
   Explanation: Two animal cells are interconnected by desmosomes, through which the exchange of materials takes place between two cells. It is formed from protein plaques in the cell membranes linked by filaments.
9. **(c)** F.W.Went
   Explanation: Auxin was first collected by F.W. Went (1928) from the coleoptile tip of Avena. He also developed the Avena curvature test for the bioassay of auxin.

10.

(d) Salvinia

Explanation: Genera like Selaginella and Salvinia which produce two kinds of spores, macro (large) and micro (small) spores are known as heterosporous.

11.

(c) Distal convoluted tubule

Explanation: Each nephron consists of Bowman's cup, tubules, and loops of Henle's. The filtration of blood occurs in glomerulus cells present in Bowman's cup. Some materials are added to the initial filtrate in the distal convoluted tubule.

12.

(b) Higher pH

Explanation: In the alveoli, there is high pO_2, low pCO_2, lesser H^+ concentration and lower temperature, all these factors favour the formation of oxyhaemoglobin. However, higher pH is not a factor for the formation of oxyhaemoglobin.

13.

(b) Both A and R are true but R is not the correct explanation of A.

Explanation: Yeasts are basically unicellular. They may, however, form short temporary filamentous structure called pseudomycelium.

14.

(b) Both A and R are true but R is not the correct explanation of A.

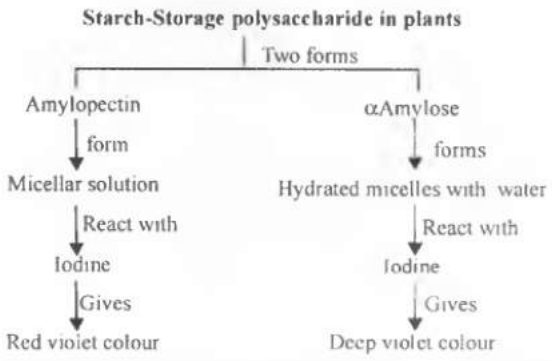
Explanation: A is false but R is true.

15.

(b) Both A and R are true but R is not the correct explanation of A.

Explanation:

Sugar is stored in the form of starch in plants. Starch occurs in two forms, a-amylose and amylopectin. Amylose is not truely soluble in water but forms hydrated micelles, which give a blue colour with iodine. Amylopectin, too, yields colloidal or micellar solutions, which give a red-violet colour with iodine.



16.

(d) Assertion and reason both are wrong.

Explanation: Assertion and reason both are wrong.

Section B

17. In dicot stems, the cells of cambium present between the primary xylem and primary phloem are the intrafascicular cambium. The cells of medullary rays, adjoining this intrafascicular cambium become meristematic and form the interfascicular cambium.

Interfascicular and intrafascicular cambium together form a ring of cambium called cambium ring.

18. **Sense Organs in Frog:**
Frog has different types of sense organs which are as follows:
(a) Sensory papillae or organs of touch,
(b) Taste buds.
(c) Nasal epithelium for the sense of smell,
(d) Eyes for vision and
(e) Tympanum with internal ears for hearing.
Out of these, eyes and internal ears are well-organised structures and the rest are cellular aggregations around nerve endings. Eyes in a frog are a pair of spherical structures situated in the orbit in skull. These are simple eyes. External ear is absent in frogs and only tympanum can be seen externally. The ear is an organ of hearing as well as balancing.
19. Adrenocorticotropin is secreted when adrenocorticotropin Releasing Hormone (ACRH) stimulates the corticotroph cells of the anterior lobe of the pituitary gland. It is released because its stimulation is responsible for the synthesis and secretion of glucocorticoid steroid hormone from the adrenal cortex of adrenal gland.
20. Kingdom, Phylum, Class, Order, Family, Genus and Species.
21. **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".

OR

Chemiosmosis requires a membrane, a proton pump, a proton gradient and ATPase. Energy is used to pump protons across a membrane, to create a gradient or a high concentration of protons within the thylakoid lumen. ATPase has a channel that allows diffusion of protons back across the membrane this releases enough energy to activate ATPase enzyme that catalyses the formation of ATP. Along with the NADPH produced by the movement of electrons, the ATP will be used immediately in the biosynthetic reaction taking place in the stroma, responsible for fixing CO_2 and synthesis of sugars.

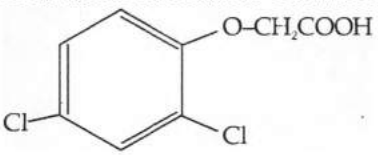
Section C

22. Main characteristics of pteridophytes:
i. Fern plant is a **sporophyte.**
ii. It is divided into **root, stem, and leaves.**
iii. They have **vascular tissues** xylem and phloem.
iv. Sporangia are formed in the leaves. The **sporangia** bear **spores** which are haploid.
v. Spores germinate and form gametophyte which is known as **prothallus.**
vi. Prothallus possesses sex organs archegonia and antheridia.
vii. They do not form seeds.
viii. **Alternation of generation** is an important feature.
ix. **Examples** are Ferns,Dryopteris (a garden fern), Pteris and Nephrolepis, etc.
23. a. Chimpanzee
b. Torpedo
c. Electric ray

d. Air bladder
e. Obelia
f. Platypus

24. Properties of enzymes are as follows:
- Enzymes are proteinaceous in nature. Enzymatic proteins are commonly globular in nature.
- Lowering the energy of the transition state
- Enzymes are generally hydrophobic colloids.
- Reducing the reaction entropy change
- Increases in temperatures speed up reactions
- Unique enzyme for unique substance
- Small quantity is enough to facilitate faster biochemical change.
- Enzymes generally have high molecular weight.
- Each enzyme has got specific turnover number.

25. Various types of auxins are used in agriculture for economic gain. Some of the synthetic auxins are used as a herbicide. 2, 4- dichloro phenoxy acetic acid (2, 4-D) is a dicotyledonous weed killer. 2,4-D is used to kill broad-leaved weeds.
It is used to induce flowering in pineapple and litchi.



The chemical formula of 2,4-D

26. A nerve impulse arriving at neuromuscular junction i**nitiates a contractile response.** This impulse spreads rapidly due to depolariZation of the surface of sarcomeres. The inflow of Na+ inside sarcomeres generates an action potential in muscle fibre which travels all along the length of muscle fibre. **Sarcoplasmic reticulum** releases stored Ca^{++} which binds with specific sites on troponin. Changes occur in it and active sites of **F-actin** are exposed.
These sites are specific to **Myosin head** that show Mg^{++} dependent ATPase activity.

27. If the spleen is removed from the body then the filtration of dead RBCs will not take place. **Spleen** is regarded as "the birthplace of the WBCs and graveyard of the RBCs."
Functions of the spleen are as follows:
i. Production of lymphocytes.
ii. The destruction of erythrocytes.
iii. The destruction of blood platelets.
iv. The production of antibodies.

OR

It is a graphical representation of the electrical activity of the heart during a single cardiac cycle. The electrocardiogram is obtained by a machine known as an electrocardiograph. The study or the process of recording of the electrocardiogram is called **electrocardiography.**
Einthoven (1903) is known as 'father of electrocardiography'.
The impulse generated by the SA node causes contraction and relaxation of heart chambers. To obtain an ECG, a patient is connected to the machine with **three electrical leads** (i.e.,

one to each wrist and one to the left ankle), monitoring the activity of the heart continuously and heart's functioning is evaluated by attaching multiple leads to the chest region.

28.

Mixed Nerve	Motor Nerve
Has motor and sensory both neurons.	Has only motor neurons.
Sensory carry impulses to CNS for some receptors and simultaneously motor fibres conduct impulses from CNS to muscles and glands. Arise from the spinal cord.	It conducts nerve impulses from CNS to some muscle or gland to control their activities. Arise from spinal cord or brain (CNS).

Section D

29. **Read the text carefully and answer the questions:**

R.H. Whittaker proposed a Five Kingdom Classification. The kingdoms defined by him were named Monera, Protista, Fungi, Plantae, and Animalia. The main criteria for classification used by him include cell structure, body organisation, mode of nutrition, reproduction and phylogenetic relationships. The three-domain system has also been proposed that divides the Kingdom Monera into two domains, leaving the remaining eukaryotic kingdoms in the third domain and there by a six kingdom classification. Earlier classification systems included bacteria, blue-green algae, fungi, mosses, ferns, gymnosperms and the angiosperms under 'Plants'. The character that unified this whole kingdom was that all the organisms included had a cell wall in their cells.

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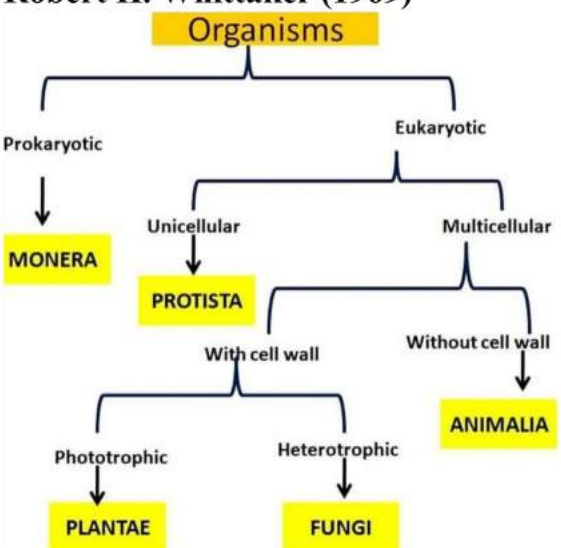


(i) All organisms are multicellular, eukaryotes with heterotrophic mode of nutrition.

OR

No, Fungi-Autotrophic (Photosynthetic) and Heterotrophic is not correct match. The walls of the fungi were made of chitin, whereas the green plants had a cellulose cell wall.

(ii)

Prokaryotic cell	Eukaryotic cell
Genetic material is not enclosed in a nuclear envelope and is	Genetic material is enclosed within the nucleus by a

present suspended in the cytoplasm in a region called nucleoid.	nuclear envelope and is not present in direct contact with cytoplasm.
Cell wall is made up of peptidoglycan.	Cell wall is made up of chitin in fungi and cellulose in plants.
Nucleolus is absent.	Nucleolus is present.

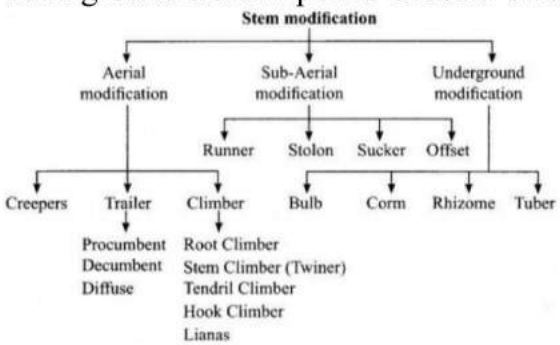
(iii) Linnaeus used artificial system kingdom of classification.

Drawbacks of Linnaeus two kingdom classification:

- Linnaeus developed a Two Kingdom system of classification with Plantae and Animalia kingdoms.
- This system did not distinguish between eukaryotes and prokaryotes, unicellular and multicellular organisms, photosynthetic (green algae) and non-photosynthetic (fungi) organisms.

30. **Read the text carefully and answer the questions:**

Various parts of the plant such as stems leaves, and even fruits are modified into underground parts to perform various functions such as stems, leaves, and even fruits. The stems in ginger and banana are underground and swollen due to storage of food. They are called rhizome. Rhizome of ginger is a modification of stem because it bears nodes, internodes, terminal buds, scaly leaves and buds, which give rise to aerial shoots. It is not a root because root does not have nodes and internodes. Also, rhizome does not perform the function of roots i.e. anchorage and absorption, rather it serve as reservoir for storage of food. Similarly, corm is an underground stem in Colocasia (jimikand) The tips of the underground stem in potato become swollen due to accumulation of food and forms tuber.



(i)
- Rhizome - Ginger, turmeric.Banana
- Bulb - Tulips, Lilies, Daffodils, Onion, Garlic
- Corm - Colocasia, Yam, Saffron
- Tuber – Potato, Artichokes

(ii) It has nodes and internodes. Such nodes and internodes are not found in the roots.

(iii) Modified stem in the potato is underground and it becomes swollen because food gets accumulated to form tubers.

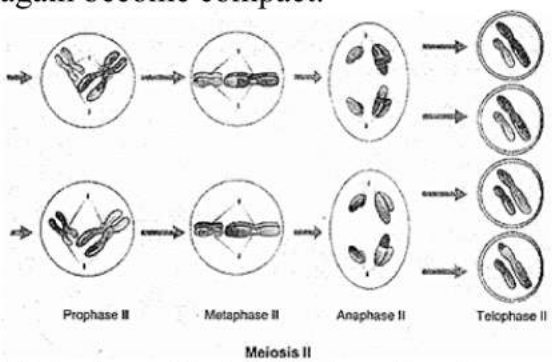
OR

No. Many different parts of plants, like the stem, leaves and fruits, get modified to act as underground structures that can perform functions other than those of roots.

Section E

31. **Meiosis II**

i. **Prophase II:** Meiosis II is initiated immediately after cytokinesis, usually before the chromosomes have fully elongated. In contrast to meiosis I, meiosis II resembles normal mitosis. The nuclear membrane disappears by the end of prophase II. The chromosomes again become compact.



ii. **Metaphase II:** At this stage the chromosomes align at the equator and the microtubules from opposite poles of the spindle get attached to the kinetochores of sister chromatids.

iii. **Anaphase II:** It begins with the simultaneous splitting of the centromere of each chromosome (which was holding the sister chromatids together), allowing them to move toward opposite poles of the cell.

iv. **Telophase II:** Meiosis ends with telophase II, in which the two groups of chromosomes once again get enclosed by a nuclear envelope.
Cytokinesis follows resulting in the formation of tetrad of cells i.e., four haploid daughter cells.

OR

Prophase I. Prophase of the first meiotic division is typically longer and more complex. It has been further subdivided into the following five phases based on chromosomal behaviour:
- Leptotene
- Zygotene
- Pachytene
- Diplotene and
- Diakinesis.

Leptotene. During leptotene stage the chromosomes become gradually visible under the light microscope. The compaction of chromosomes continues throughout leptotene.

Zygotene:
- During this stage chromosomes start pairing together and this process of association is called synapses. Such paired chromosomes are called homologous chromosomes.
- The chromosome synapses is accompanied by the formation of complex structure called synaptonemal complex.
- The complex formed by a pair of synapsed homologous chromosomes is called a bivalent or a tetrad.
- The first two stages of prophase I are relatively short-lived compared to the next stage that is pachytene.

Pachytene:

- During this stage bivalent chromosomes now clearly appear as tetrads.
- This stage is characterized by the appearance of recombination nodules, the sites at which crossing over occurs between non-sister chromatids of the homologous chromosomes.
- Crossing over is the exchange of genetic material between two chromosomes. Crossing over is also an enzyme-mediated process and the enzyme involved is called recombinase.
- Crossing over leads to recombination of genetic material on the two chromosomes.
- Recombination between homologous chromosomes is completed by the end of pachytene, leaving the chromosomes linked at the sites of crossing over.

Diplotene. The beginning of diplotene is recognized by the dissolution of the synaptonemal complex and the tendency of the recombined homologous chromosomes of the bivalents to separate from each other except at the sites of crossovers. These X-shaped structures are called chiasmata.

Diakinesis. The final stage of meiotic prophase I is diakinesis. This is marked by terminalisation of chiasmata. During this phase the chromosomes are fully condensed and the meiotic spindle is assembled to prepare the homologous chromosomes for separation. By the end of diakinesis, the nucleolus disappears and the nuclear envelope also breaks down. Diakinesis represents transition to metaphase.

Difference between prophase I and prophase II. During prophase I recombination of genes takes place, while in prophase II no such event happens. Prophase I is longer and more complicated compared to prophase II.

32. The pyruvic acid is decarboxylated and oxidised to form acetyl that is accepted by coenzyme A (Co-A). It enters into a reaction to form citric add.

Various steps of Kreb's cycle:

i. One mol. of acetyl CoA unites with OAA (oxaloacetic acid). It forms citric acid (6C). CoA is released. This reaction occurs in the presence of **citrate synthetase,**
ii. The isomerisation of citrate to Isocitrate.
iii. It follows two steps of decarboxylation and a-ketoglutaric acid, as well as succinyl-CoA, is formed.
iv. Succinyl CoA is oxidised to OAA and it allows the cycle to continue again.
v. During this cycle 9 mols. of NAD and one molecule of FAD are reduced to NADH and FADH2 respectively.
vi. They pass on H atoms to O_2 by E.T.S.
vii. One mol. of NADH yields 3 mols. of ATP and one ol of FADH will yield 2 mols. of ATP after the electron transport.

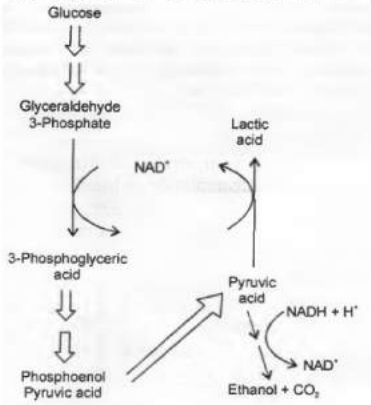
OR

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%.



33. Nicholson and Singer in 1972 proposed this model. The name of this model was fluid mosaic model.

According to this model, each phospholipid layer is bimolecular and their hydrophilic ends are pointed towards top and bottom respectively. In this, protein are of two categories :

i. Peripheral (extrinsic) and

ii. integral (intrinsic)

The integral proteins are tightly held in place by strong hydrophilic or hydrophobic interactions or both and are difficult to remove from the membranes. The peripheral proteins are superficially arranged on either side and can be easily separated. These proteins have enzymatic properties and also make membranes selectively permeable. These proteins are referred to as permeases. This is a widely accepted model.

OR

Difference between Cell wall and Ribosomes of a prokaryotic and a Eukaryotic cell:

The cell wall of a prokaryotic and eukaryotic cell	**Ribosomes of a Prokaryotic and Eukaryotic cell**
The cell wall of a prokaryote is rigid due to peptidoglycan or murein. The well defined rigid cell wall is found in plant cells and fungi. It is composed of either chitin or cellulose, glycans, Galatians, mannans, and minerals ($CaCO_3$), etc. In higher plants (eukaryotes), it consists of primary, secondary and tertiary walls.	These are granular organelles not enclosed by any membrane. They lie freely in cytoplasm or attached to the ER. They may be found in the mitochondrial matrix and chloroplast stroma. They are sites of protein synthesis. They are composed of RNA and proteins. Eukaryotic cells have larger ribosomes (80 S) than prokaryotic cells (70 S).