Class XI Session 2025-26
Subject - Biology
Sample Question Paper - 3

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. Which is the functional unit of kidneys? **[1]**

   a) Loop of Henle
   b) Nephron
   c) Glomerulus
   d) Bowman's capsule

2. Example of interspecific hybrid is: **[1]**

   a) Tigon and tiger
   b) Tigon and liger
   c) Liger and dog
   d) Cat and lion

3. Many elements are found in living organisms either free or in the form of compounds. Which of the following is not found in living organisms? **[1]**

   a) Sodium
   b) Silicon
   c) Magnesium
   d) Iron

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

   a) Round
   b) Isobilateral
   c) Dorsiventral
   d) Pinnate

5. In sugarcane, CO_2 is fixed in malic acid with the help of enzyme _____. **[1]**

   a) PEP carboxylase
   b) RuBP carboxylase
   c) Fructose phosphotase
   d) Ribulose phosphate kinase

6. What is the name of the membrane covering the lungs? **[1]**

   a) Oesophagus
   b) Liver

c) Gall bladder
d) Pleura

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

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

8. In water, frogs breathe through the skin. What is the name for such kind of respiration? **[1]**

a) Cutaneous respiration
b) Osmosis
c) Perfusion
d) Percutaneous respiration

9. Cycas is a gymnosperm as it has: **[1]**

a) Sieve tubes
b) Living fossil status
c) Naked seeds
d) Vessels

10. Auxins are mostly produced in: **[1]**

a) Meristematic region
b) Leaf buds
c) Shoot
d) Root

11. Filtration of the blood takes place at: **[1]**

a) Collecting ducts
b) Glomerulus
c) DCT
d) PCT

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

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

13. **Assertion (A):** Ascus mother cells are dikaryotic. **[1]**
Reason (R): Meiosis occur there without karyogamy.

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):** Exchange of O_2 and CO_2 in respiration mainly based on pressure/concentration gradient. **[1]**
Reason (R): Solubility of the gases as well as the thickness of the membranes involved in diffusion is also can affect the rate of diffusion.

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):** Monellin is the sweetest chemical. **[1]**
Reason (R): Monellin is a protein.

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):** Erythrocytes can carry out anaerobic metabolism only. **[1]**

Reason (R): In erythrocytes, carbon-dioxide is converted into bicarbonates.

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 out the functions of the ground tissue system. **[2]**
18. Difference between Somatostatin and Somatomedin. **[2]**
19. What is the difference between cutaneous and pulmonary respiration? **[2]**
20. What are the two basic functions of biological classification? **[2]**
21. How many molecules of carbondioxide, ATP and NADPH are required to make one molecule of glucose? **[2]**

OR

Can girdling experiments be done in monocots? If yes, How? If no, why not?

Section C

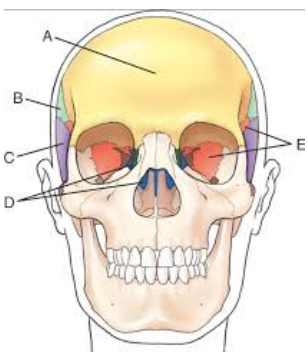
22. Comment upon the habitats and external features of animals belonging to class, amphibia. **[3]**
23. Describe the important characteristics of gymnosperms. **[3]**
24. It is known that some varieties of wheat are sown in autumn but are harvested around next mid summer. **[3]**

i. What could be the probable reason for this?

ii. What term is used for this promotion of flowering under low temperature?

iii. Which plant hormone can replace the cold treatment?

25. Distinguish between Competitive and Allosteric inhibition. **[3]**
26. Given below is a diagram of the human cranial bones. Answer the following questions: **[3]**

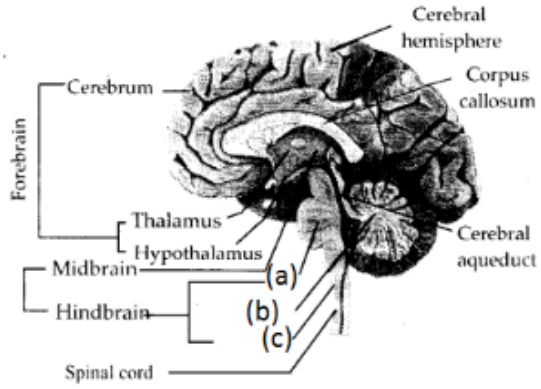


i. Identify the different parts labelled from A to E of cranial bones.

ii. Name the only movable bone in the skull of man?

iii. Due to the presence of which pigment skeletal muscles are categorised into red and white muscles?

27. Examine the following diagram of the sagittal section of the human brain and answer the following questions. **[3]**



i. Label (a), (b) and (c).

ii. What are the functions of (c)?

iii. Name the three major regions which make up the brain stem.

28. Write a note on regulation of cardiac activity. **[3]**

OR

What is hypertension? List its causative factors.

Section D

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

The morphology of the mycelium, mode of spore formation, and fruiting bodies form the basis for the division of the fungi kingdom into various classes which include four sub-division Phycomycetes, ascomycetes, basidiomycetes, Deuteromycetes. Members of Phycomycetes are found in aquatic habitats and on decaying wood in moist and damp places or as obligate parasites on plants, ascomycetes are mostly multicellular. The asexual spores are conidia produced exogenously on the special mycelium called conidiophores. Basidiomycetes are mushrooms, bracket fungi or puffballs. They grow in soil, on logs and tree stumps and in living plant bodies as parasites. The basidiospores are exogenously produced on the basidium.

Classification of Fungi			
Phycomycetes (Lower Fungi)	**Ascomycetes (Sac Fungi)**	**Basidiomycetes (Club Fungi)**	**Deuteromycetes (Fungi imperfecti)**
Saprolegnia	Yeast	Agaricus	Cercospora
Rhizopus	Aspergillus	Polyporus	Collectotrichum
Mucor	Pencillium	Puccinia	Trichoderma
Albugo	Neurospora	Ustilago	Pyricularia
Pythium	Peziza	Lycoperdon	Fusarium

i. Observed given table of Classification of Fungi and identify the class of fungi in which asexual spores are not found, vegetative reproduction occurs by fragmentation, and sexual organs are absent. (1)

ii. Where are Members of Phycomycetes found? (1)

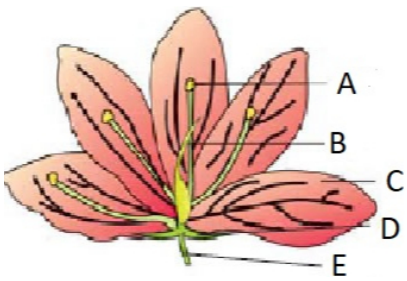
iii. What is ascomycetes? What is the characteristic feature of ascomycetes and basidiomycetes? (2)

OR

Identify the figure given below. Also, mention its characteristics. (2)

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

Each flower normally has four floral whorls, viz., calyx, corolla, androecium and gynoecium. The calyx is the outermost whorl of the flower and the members are called sepals. Corolla is composed of petals. Petals are usually brightly coloured to attract insects for pollination. The mode of arrangement of sepals or petals in floral bud with respect to the other members of the same whorl is known as aestivation. The main types of aestivation are valvate, twisted, imbricate. The shape and colour of corolla vary greatly in plants. Corolla may be tubular, bell- shaped, funnel-shaped or wheel-shaped and vexillary.



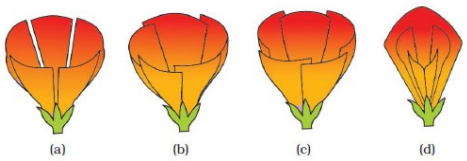
i. Observe the given figure mentioned A, B, C and D. Also mention its function. Identify D and mention its example. (1)

ii. Ganosepalous, Ganopetalous, Polysepalous, Polypetalous, Imbricate. (1)

iii. What is Valvate and twisted aestivation? (2)

OR

Which of the following shows imbricate? Explain imbricate aestivation? (2)



Section E

31. Mitosis results in producing two cells that are similar to each other. What would be the consequence if each of the following irregularities occur during mitosis? **[5]**

i. Nuclear membrane fails to disintegrate

ii. Duplication of DNA does not occur

iii. Centromeres do not divide

iv. Cytokinesis does not occur.

OR

Comment on the statement - Meiosis enables the conservation of specific chromosome number of each species even though the process per se, results in reduction of chromosome number.

32. What are nuclear pores? State their function. **[5]**

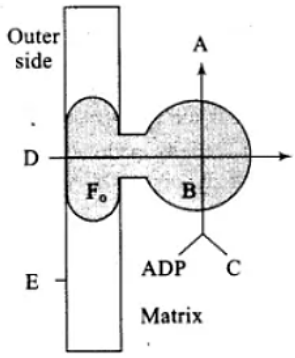
OR

What are the characteristics of prokaryotic cells?

33. Where is the electron transport system operative in mitochondria? Explain the system highlighting the role of oxygen. **[5]**

OR

Given below is a diagram showing ATP synthesis during aerobic respiration, replace the symbols A, B, C, D and E by appropriate terms given in the box.



F1, Particle, Pi, $2H^+$, Inner mitochondrial membrane, ATP, Fo particle, ADP

Solution

Section A

1.

(b) Nephron

Explanation:

The nephronil is the basic structural and functional unit of the kidney. Its chief function is to regulate the concentration of water and soluble substances like sodium salts by filtering the blood, reabsorbing what is needed and excreting the rest as urine.

2.

(b) Tigon and liger

Explanation:

Tigon and liger are produced by hybridization of tow interspecific species. Although hybridization generally takes place between the same species.

3.

(b) Silicon

Explanation:

Silicon is not found freely in nature, but it does occur in the bounded form as oxides and silicates, whereas magnesium, sodium, and iron are present in living organisms as ions.

4.

(b) Isobilateral

Explanation:

Monocotyledonous leaves are isobilateral as both the lower and upper sides of the leaves are the same.

5. **(a)** PEP carboxylase

Explanation:

In C_4 plants, Carbon dioxide is fixed in malic acid with the help of enzyme phosphoenolpyruvate (PEP). Malic acid is a four-carbon compound that later changes into oxaloacetic acid.

6.

(d) Pleura

Explanation:

The pleural membrane is thin, moist, slippery, and has two layers. The outer, or parietal, pleura lines the inside of the rib cage and the diaphragm while the inner, visceral or pulmonary, layer covers the lungs.

7.

(d) 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. **(a)** Cutaneous respiration

Explanation:

In Cutaneous respiration, the exchange of gases occurs through the skin. Animals undergoing cutaneous respiration usually have moist skin.

9.

(c) Naked seeds

Explanation:
The gymnosperms (Gymnos: naked, Sperma: seeds) are plants in which the ovules are not enclosed by any ovary wall and remain exposed, both before and after fertilization. The seeds that develop post-fertilization, are not covered, i.e., are naked. Since Cycas has naked seeds, it belongs to gymnosperms.

10. **(a)** Meristematic region
Explanation:
Auxins are generally produced in growing apices of shoot and root. These two regions are the meristematic cells that are actively taken part in cell division.

11. **(b)** Glomerulus
Explanation:
The first step in urine formation is the filtration of blood, which is carried out by the glomerulus and is called glomerular filtration.

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. **(c)** A is true but R is false.
Explanation:
Some dikaryotic cells of Ascomycetes function as ascus mother cells. The latter act as the seats of both karyogamy (fusion of nucleus) and meiosis.

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

15. **(b)** Both A and R are true but R is not the correct explanation of A.
Explanation:
Monellin is the sweetest chemical which is actually a protein obtained from an African berry. The protein is 2000 times as sweet as sucrose.

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

Section B

17. Functions of the ground tissue systems are as follows:
i. It provides mechanical strength while showing bending.
ii. It has spaces to allow gaseous exchange between cortex and atmosphere.
iii. It carries out photosynthesis.

18.

Somatostatin	Somatomedin
Secreted by the thalamus.	Called growth mediators.

Inhibits the secretion of growth hormone from the anterior pituitary gland.	Secreted by the r but their production is stimulated by growth hormone.
It is called a growth-inhibiting hormone (GHIH).	Mediators can regulate the growth of somebody components like the bones etc.

19. 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.
20. Biological classification performs two basic functions :
    i. Recognition and description of the species,
    ii. Grouping the species on the basis of similarities and relationships.
21. (i) Carbondioxide 6 molecules
    (ii) ATP 18 molecules
    (iii) NADPH 12 molecules.

    OR

    Girdling experiments cannot be done in monocots. The stem of monocot has vascular bundles scatter all over the width of the stem. Hence, we cannot reach a specific band of phloem for girdling.

Section C

22. The **amphibians** are adapted to dual/ double mode of life that is on land as well as in water called **amphibians** animals. Adults move on land by the limbs and breath by lungs. There are no marine forms. **Aquatic** forms e.g. Newt and Salamanders have gills. Frogs and toads are terrestrial. Toad occurs on dry land but the **frog** is found near water in marshy zones. **Tree** frogs like Hyla and Rhacophorus are **arboreal** (live on the trees). They do not have a tail but **adhesive discs** on toes and web, frog produces in water.
23. **Characteristics of Gymnosperms:**
    The gymnosperms (gymnos: naked, sperma: seeds) are plants in which the ovules are not enclosed by any ovary wall and remain exposed, both before and after fertilization. The seeds that develop post-fertilization are not covered, i.e. are naked.
    Gymnosperms include medium-sized trees or tall trees and shrubs.
    The roots are generally tap roots. Roots in some genera have a fungal association in the form of mycorrhiza while in some others small specialized roots called coralloid roots are associated with N_2 fixing cyanobacteria.

    The stems are unbranched (Cycas) or branched (Pinus, Cedrus).
    The leaves may be simple or compound. In Cycas, the pinnate leaves persist for a few years. The leaves in gymnosperms are well adapted to withstand extremes of temperature, humidity and wind. In conifers, the needle-like leaves reduce the surface area. Their thick cuticle and sunken stomata also help to reduce water loss.
24. i. Some varieties of wheat are planted in autumn. They germinate, and overwinter come out as small seedlings, resume growth in the spring, and are harvested usually around mid-summer.
    ii. This process is called vernalization.
    iii. Gibberellic acid can replace cold treatments to induce vernalization in all plants.
25.

Competitive inhibition	Allosteric inhibition
No regulatory function.	Regulation of the metabolic activity by stopping the excess formation of the product.
Binds with the active site.	Binds with some other site except active site.
Inhibitor shows a very close resemblance to the substrate in the structural organization.	Inhibitor shows no resemblance to the substrate.
Inhibitor - not a product of a metabolic pathway.	Inhibitor-produce of the metabolic pathway.

26. 1. The different parts of cranial bones are as follows:
        1. A- FRONTAL
        2. B-PARIETAL
        3. C-TEMPORAL
        4. D-OCCIPITAL
        5. E-ETHMOID
    2. The mandible is the only movable bone in the skull of the man.

3. On the basis of the presence or absence of a red pigment called myoglobin, the skeletal muscles are classified into red and white muscles.

27. i. (a) is Pons, (b) is Cerebellum and (c) is Medulla.
    ii. Medulla contains different centers which control respiration, cardiovascular reflexes and gastric secretions.
    iii. The three major regions which make up the brain stem are Midbrain, Pons and Medulla oblongata.

28. The normal activities of the heart are intrinsically regulated, i.e., autoregulated by the specialised muscles, (nodal tissue). Thus, the heart is known as a **myogenic heart.**

    The neurogenic heartbeat is initiated by a nerve impulse, e.g., annelids and most arthropods.

    The rate of its formation and conduction is regulated by the following

    i. **Neural Regulation:** In medulla oblongata, a special neural centre is present, which can moderate, the cardiac function through the Autonomic Nervous System (ANS).
    ii. **Hormonal Regulation:** Adrenaline and noradrenaline hormones secreted by the medulla of adrenal gland has a significant role in regulating heartbeat and thus increasing the cardiac output. The noradrenaline accelerates the heartbeat, while adrenaline does this function at the time of emergency.

OR

Hypertension is another name for high blood pressure which is the force exerted by the blood against the walls of the blood vessels. The pressure depends on the work being done by the heart and the resistance of the blood vessels.

Some of its Causative factors are:

i. **Age:** The risk of high blood pressure increases as a person becomes older because the blood vessels become less flexible.
ii. **Ethnic background:** African-American people have a higher risk of developing hypertension than other people. Hypertension also presents more severely in African-American people and is less responsive to certain medications.
iii. **Obesity and being overweight:** People who are overweight or have obesity are more likely to develop high blood pressure.

Section D

29. i. In basidiomycetes asexual spores are not found, vegetative reproduction occurs by fragmentation, and sexual organs are absent.

    ii. i. Aquatic habitats
        ii. On decaying wood

    iii.
    - Ascomycetes are commonly known as sac-fungi as they are produced in a sac-like structure known as ascus.
    - Dikaryon formation is the characteristic feature of ascomycetes and basidiomycetes.

    OR

    - Agaricus
    - Agaricus is a fleshy saprophytic fungus with over 300 species and contains both edible and poisonous species. It is found in wet and damp climates. It grows on wood and in humus-rich soil.

30. i. **A-androecium, B-gynoecium, C-corolla, D-calyx**

    Androecium: It contains pollen grains, which are responsible for reproduction in the male part of the plant.

    Gynoecium: It holds ovary, which is transformed into fruit after fertilization.

    Corolla: The corolla promotes pollination and protects the reproductive organs.

    Calyx: The main function of the calyx is to protect the floral shoot during the bud stage.

    ii.
    - **Ganosepalous:** Plants with many fused sepals are known as Gamosepalous. Eg, Hibiscus, Periwinkle, etc.
    - **Polypetalous**: Polysepalous plants are also categorized based on sepals. Eg, Rose, Southern magnolia, etc.

    iii.
    - When the margins of the petals are in contact with each other without overlapping, it is called **valvate aestivation**. For example, Calotropis.
    - Contoured or **twisted estivation** occurs when the margin of one petal overlaps the margin of the next. Example - Hibiscus.

    OR

    Figure (c), Imbricate aestivation occurs when the margins of sepals or petals overlap without a clear direction. There is an irregular overlapping of petals by each other in this type of aestivation.

Section E

31. i. If the nuclear membrane fails to disintegrate, then the spindle fibres would not be able to reach chromosomes. As a result, the chromosomes would not be able to reach the opposite poles of the cell.
    ii. If DNA duplication does not take place, then the cell may not be able to reach the M phase. This will result in the cessation of the cell cycle.

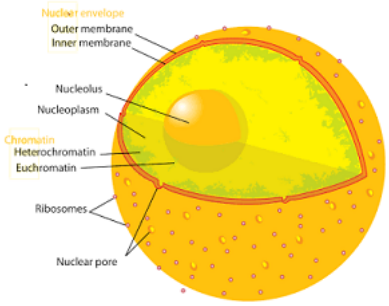
iii. If the division of centromeres does not take place, then one of the daughter cells will get a complete pair of chromosomes and another daughter cell will get none. This may result in trisomy. Trisomy is a type of the abnormal number of chromosomes, i.e. aneuploidy.

iv. If cytokinesis does not occur, then a cell with multinucleate condition would be formed.

OR

Meiosis is called reduction division because the number of chromosomes in daughter cells becomes half of the number of chromosomes in mother cells. In spite of this, meiosis enables the conservation of specific chromosome number of each species. In fact, has there been no meiosis, organisms would not have been able to evolve to sexual mode of reproduction. We know that fertilization involves fusion of male and female gametes. Thus, zygote gets the chromosome pool from two cells and the number of chromosomes in a zygote becomes double that of the gametes. To ensure conservation of specific chromosome number after fertilization, it is necessary that the gametes should have half the number of chromosomes compared to what it is in somatic cells.

32. Nuclear pores are large protein complexes that cross the nuclear envelope, which is the double membrane surrounding the eukaryotic cell nucleus. These are formed by the fusion of its two membranes. These nuclear pores are the passages through which the movement of RNA and protein molecules takes place in both directions between the nucleus and the cytoplasm.



OR

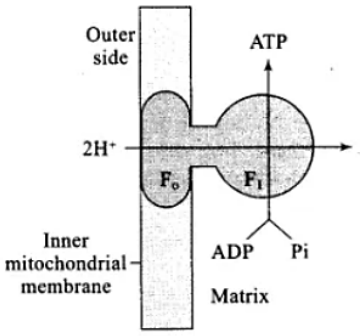
Prokaryotic Cells. In prokaryotic cells nuclear membrane is absent. It means that genetic materials are without an envelope. Cell lumen is filled with a fluid called cytoplasm. Cytoplasm contains ribosomes as well. Bacteria, and blue green algae are prime examples of prokaryotes.

Cell Envelope. Most prokaryotic cells, particularly the bacterial cells, have a chemically complex cell envelope. The cell envelope consists of a tightly bound three layered structure i.e., the outermost glycocalyx followed by the cell wall and then the plasma membrane. Although each layer of the envelope performs distinct function, they act together as a single protective unit. The plasma membrane is semi-permeable in nature and interacts with the outside world. This membrane is similar structurally to that of the eukaryotes. A special membranous structure is the mesosome which is formed by the extensions of plasma membrane into the cell. These extensions are in the form of vesicles, tubules and lamellae. They help in cell wall formation, DNA replication and distribution to daughter cells. They also help in respiration, secretion processes, to increase the surface area of the plasma membrane and enzymatic content. In some prokaryotes like cyanobacteria, there are other membranous extensions into the cytoplasm called chromatophores which contain pigments.

33. **Electron Transport System (ETS):** The metabolic pathway by which the electrons passes from one carrier to another is known as the **electron transport system.** It is operative in the inner mitochondrial membrane of mitochondria. The electrons from NADH produced in the mitochondrial matrix during the citric acid cycle are oxidised by an **NADH dehydrogenase** (Complex I). Electrons are then transferred to Ubiquinone that receives reducing equivalents via FADH, {generated during oxidation of succinate) by the activity of **Succinic dehydrogenase** (Complex II) in TCA. Reduced ubiquinone is oxidised with the transfer of electrons to cytochrome V via Cytochrome V complex (complex III). Cytochrome V acts carrier for transfer of electrons between complex III and complex IV. Complex IV refers to cytochrome c oxidase complex having cytochromes a and α_3 and two copper centres.

OR

The energy released during the electron transport system is utilized in synthesizing ATP with the help of ATP synthase (complex V). This complex consists of two major components, F1 and F0. The F1 headpiece is a peripheral membrane protein complex and contains the site for synthesis of ATP from ADP and inorganic phosphate. F0 is an integral membrane protein complex that forms the channel through which protons across the inner membrane. The passage of protons through the channel is coupled to the catalytic site of the F1 component for the production of ATP. For each ATP produced, $2H^+$ passes through F0 from the intermembrane space to the matrix down the electrochemical proton gradient.



Diagrammatic presentation of ATP synthesis in mitochondria