Class XI Session 2025-26
Subject - Biology
Sample Question Paper - 8

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. In a taxonomic hierarchy, the various categories are arranged in: **[1]**

   a) Ascending order b) Descending order

   c) Vertical order d) Horizontal order

2. Vasa recta is absent or reduced in: **[1]**

   a) Bowman's capsule b) PCT

   c) Cortical nephrons d) Juxtamedullary nephrons

3. Which one is the cofactor for the proteolytic enzyme carboxypeptidase? **[1]**

   a) Magnesium b) Copper

   c) Mercury d) Zinc

4. Vascular bundles in which cambium is present between xylem and phloem is called as: **[1]**

   a) Collateral b) Amphivesal

   c) Open d) Closed

5. Which of the following compound is made after haemoglobin associates with carbon dioxide? **[1]**

   a) Carboxyhaemoglobin b) Carbodihaemoglobin

   c) Carbaminohaemoglobin d) Carbohaemoglobin

6. C_4 photosynthetic efficiency is more than C_3 pathway because: **[1]**

   a) Photorespiration is fast in C_4 plants b) Photorespiration is present in both C_3 and

C_4

c) Photorespiration is present in C_3

d) Photorespiration is suppressed in C_4 plants

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. The lymph in frog lacks: **[1]**

a) RBCs and few proteins

b) WBCs and few proteins

c) Plasma and WBCs

d) RBC and plasma

9. Parthenocarpy can be induced to develop seedless fruit by application of: **[1]**

a) Ethylene and gibberellins

b) IBA and cytokinin

c) IAA and IBA

d) Zeatin and IAA

10. Plants of this group are diploid and well adapted to extreme conditions. They grow bearing sporophylls in compact structures called cones. The group in reference is: **[1]**

a) Dicots

b) Gymnosperms

c) Monocots

d) Pteridophytes

11. Which one of the following is also known as antidiuretic hormone? **[1]**

a) Calcitonin

b) Vasopressin

c) Oxytocin

d) Adrenaline

12. 70% of carbon dioxide is transported as bicarbonate by the enzyme_____. **[1]**

a) Carbonates

b) Carbonic anhydrase

c) Carbaminase

d) Carbonic hydrase

13. **Assertion (A):** Mushrooms are called fairy rings. **[1]**

Reason (R): Mushroom consists of two parts-stipe and pileus.

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):** In certain industries, especially those involving grinding or stone-breaking, so much dust is produced, a long exposure can give rise to occupational respiratory disorders. **[1]**

Reason (R): It produces inflammation leading to fibrosis and thus causing serious lung damage.

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):** Natural rubbers are polyterpene. **[1]**

Reason (R): Terpene is a lipid.

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):** 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. **[1]**

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.

Section B

17. Classify vascular bundles on the basis of the position of the protoxylem. **[2]**
18. How does a gap junction facilitate intercellular communication? **[2]**
19. Which hormone helps maintain the bone density in the body? **[2]**
20. What makes species a basic taxonomic category? **[2]**
21. Give comparison between cyclic and non-cyclic photophosphorylation. **[2]**

OR

What can we conclude from the statement that the action and absorption spectrum of photosynthesis overlap? At which wavelength do they show peaks?

Section C

22. Mention the ploidy of the following: **[3]**
    i. Protonemal cell of a moss
    ii. Primary endosperm nucleus in dicot
    iii. Leaf cell of a moss
    iv. Prothallus cell of a fern
    v. Gemma cell in Marchantia
    vi. Meristem cell of monocot
    vii. Ovum of a liverwort
    viii. Zygote of a fern
23. Distinguish between a Bird and Bat. **[3]**
24. Can you describe what happens when milk is converted into curd or yoghurt from your understanding of proteins? **[3]**
25. What is the nature of substances which control the growth in plants and animals? **[3]**
26. Write the difference between: Pectoral and Pelvic girdle **[3]**
27. Compare mitral valve and semilunar valve. **[3]**

OR

What is :
    i. blood,
    ii. Serum?

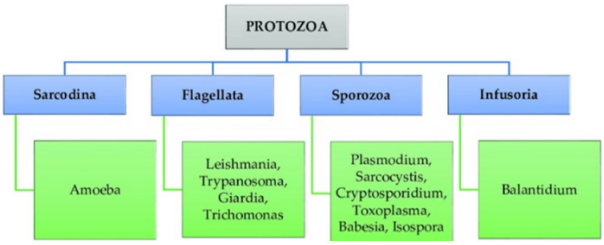
28. Describe the structure of Brain. **[3]**

Section D

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

Sarcodines are unicellular/jelly-like protozoa found in fresh or sea water and in moist soil. Their body lacks a

periplast. Therefore, they may be naked or covered by a calcareous shell. They usually lack flagella and have temporary protoplasmic outgrowths called pseudopodia. These pseudopodia or false feet help in movement and capturing prey. They include free-living forms such as Amoeba or parasitic forms such as Entamoeba. Zoo flagellates ciliates and I sporozoans are other groups of protozoan protists. They are all unicellular and heterotrophic. They may be holozoic, saprobic or parasitic.



i. Write two lines about flagellated protozoans and also mention some flagellated protozoans. (1)

ii. Observe the given protozoan classification and mention what is the basis of protozoan classification. (1)

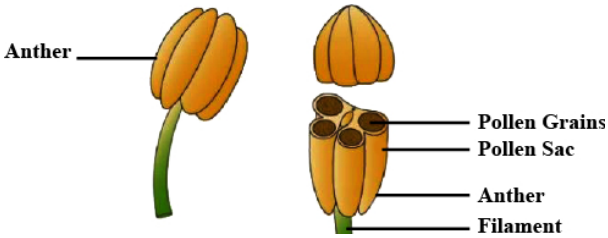
iii. Mention some locomotory organs of protozoa. (2)

OR

Which protozoan group has two nuclei, macronucleus, and micronucleus? Mention characteristics of it. (2)

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

The androecium is composed of stamens. Each stamen that represents the male reproductive organ consists of a stalk or a filament and an anther. Each anther is usually bilobed and each lobe has two chambers, the pollen-sacs. Stamens of flowers may be united with other members such as petals or among themselves. The stamens may be epipetalous or epiphyllous. A flower is a modified shoot wherein the shoot apical meristem changes to floral meristem. Internodes do not elongate and the axis gets condensed. The apex produces different kinds of floral appendages laterally at successive nodes instead of leaves. The arrangement of flowers on the floral axis is termed an inflorescence.



i. Observe the figure and mention what is androecium composed of. (1)

ii. The pollen grains are produced in pollen-sacs. What is a sterile stamen is called? (1)

iii. Is salvia and mustard show variation in the length of filaments within a flower? (2)

OR

Mention statement justifies that the given figure is racemose inflorescence. (2)

Section E

31. What are homologous chromosomes? What happens to homologous chromosomes during meiosis? **[5]**

OR

Explain meiosis-II in an animal cell.

32. What is the difference between cell wall and ribosomes of a prokaryotic and a eukaryotic cell? **[5]**

OR

With suitable diagram describe animal cell.

33. Explain the formation of NADH and ATP during glucolysis in aerobic respiration. **[5]**

OR

What is oxidative phosphorylation?

Solution

Section A

1.

(b) Descending order

Explanation:

Kingdom → Phylum/Division → Class → Order → Family → Genus → Species.

Hence, the correct option is Descending order.

2.

(c) Cortical nephrons

Explanation:

The efferent arteriole emerging from the glomerulus forms a fine capillary network around the renal tubule called the peritubular capillaries. A minute vessel of this network runs parallel to Henle's loop forming a 'U' shaped vasa recta. Vasa recta are absent or highly reduced in cortical nephrons.

3.

(d) Zinc

Explanation:

Zinc is a cofactor for the proteolytic enzyme carboxypeptidase and forms coordination bonds with the side chains of two histidines and one glutamic acid residue at the active site. A fourth bond is formed between zinc and the a-carboxyl group of the substrate amino acids, and it is here that the cleavage of the peptide occurs.

4.

(c) Open

Explanation:

Vascular bundles in which cambium is present between xylem and phloem are called open vascular bundles and those in which cambium is absent are called closed vascular bundles.

5.

(c) Carbaminohaemoglobin

Explanation:

Carbaminohemoglobin is a compound of haemoglobin and carbon dioxide and is one of the forms in which carbon dioxide exists in the blood. 30% of carbon dioxide is carried in blood this way (60% carried in the blood as bicarbonate [hydrogen carbonate], 10% carried as free CO_2, in solution, or plasma).

6.

(d) Photorespiration is suppressed in C_4 plants

Explanation:

C_4 plants are more efficient than C_3 plants because in C_4 plants there is no photorespiration in which fixed carbon is oxidized in the presence of sunlight due to the presence of Kranz Anatomy. There is also a double fixation of CO_2.

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)** RBCs and few proteins
Explanation:
The lymph is different from the blood. It is known as tissue fluid. Lymph is yellowish in colour as it lacks RBCs and few proteins.

9. **(c)** IAA and IBA
Explanation:
Auxins (IAA, IBA) also induce parthenocarpy, (Seed fewer fruits) e.g., in tomatoes.

10. **(b)** Gymnosperms
Explanation:
Gymnosperms have reproductive structure as cones i.e. Male and female.

11. **(b)** Vasopressin
Explanation:
Vasopressin is called ADH or anti-diuretic hormone.

12. **(b)** Carbonic anhydrase
Explanation:
An enzyme present in red blood cells, carbonic anhydrase, aids in the conversion of carbon dioxide to carbonic acid and bicarbonate ions. When red blood cells reach the lungs, the same enzyme helps to convert the bicarbonate ions back to carbon dioxide, which we breathe out. It transports nearly 70% of carbon dioxide as bicarbonate.

13. **(b)** Both A and R are true but R is not the correct explanation of A.
Explanation:
The basidiocarps or mushrooms often lie in rings. Therefore, these are also known as fairy rings. Each basidiocarp consists of two parts-stipe and pileus. The stipe or stalk is fleshy while, the pileus is an umbrella-like cap of the mushroom.

14. **(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.

15. **(b)** Both A and R are true but R is not the correct explanation of A.
Explanation:
Terpene are among the minor lipid components of cells. These are constructed of multiples of the 5-carbon hydrocarbon isoprene. Natural rubber is a polyterpene as it contains thousands of isoprene units arranged in linear fashion.

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. Vascular bundles on the basis of the position of protoxylem
    i. Endarch Protoxylem faces the centre of the plant organ.
    ii. Exarch Protoxylem faces periphery of the plant.
18. Gap junctions are fine hydrophilic channels between two adjacent animal cells. These are formed with the help of two protein cylinders; called connexions. Gap junctions allow small signaling molecules to pass from one cell to another and thus they facilitate intercellular communication. Movement through gap junctions is controlled by pH and Ca^{2+} concentration.

19. The sole purpose of the parathyroid glands is to control calcium within the blood in a very tight range between 9.0 and 10.1 . In doing so, parathyroids also control how much calcium is in the bones, and therefore, how strong and dense the bones are.
20. Species is the lowest of a population or basic taxonomic category which consists of one or more individuals that resemble one another more closely than individuals of other species The members of a species interbreed freely and are reproductively isolated from members of other species. These features make the species basic taxonomic category.
21.

Cyclic photo phosphorylation	Non-cyclic photo phosphorylation
Reaction centre P_{700} is the electron emitter and also electron acceptor.	Reaction centre P_{680} is the electron emitter and P_{700} is the electron acceptor.
It synthesises the only ATP.	It forms both ATP and $NADPH_2$.

OR

Chlorophyll 'a' and chlorophyll ‘b’ absorb lights of different wavelengths. Chlorophyll ‘a’ is the main pigment related to photosynthesis. The absorbance of light by chlorophyll pigments shows the overlap between the absorption spectrum and the action spectrum (both are curves).
The blue and red regions of the spectrum, they show peaks.

Section C

22. i. Protonemal cell of a Moss- It is haploid (N).
ii. Primary endosperm nucleus (PEN) in dicot- It is triploid (3N).
iii. Leaf cell of a Moss- It is haploid (N).
iv. Prothallus cell of a fern- It is haploid (N).
v. Gemma cell in Marchantia- It is haploid (N).
vi. Meristem cell of Monoco-. It is diploid (2N).
vii. Ovum of a Liverwort- It is haploid (N).
viii. Zygote of a Fern- It is diploid (2N).
23.

A Bat	A Bird
It possesses hairs over the body.	It possesses feathers over the body.
Wings are made by a fold of skin. The patagium in between digits of forelimbs.	Wings are modified forelimbs and provided with feathers.
An external ear is present,	No external ear is present.
The muscular diaphragm separates the thoracic cavity and abdominal cavity.	No diaphragm and the body cavity is not separated also.
A bat is viviparous.	A bird is oviparous.

24. Milk is converted into curd or yogurt by the process of fermentation. Milk consists of globular proteins. During fermentation, the milk sugar (lactose) produces lactic acid. Lactic acid acts on the globular proteins present in the milk and denatures them. This denaturation destroys the tertiary and quaternary structures of proteins and the globular proteins are converted into fibrous proteins thus giving a thick texture to the milk due to coagulation of the proteins.is also called fermentation.
25. In plants and animals, growth and differentiation are controlled by chemical substances called the **hormones.** These occur in extremely small quantities. They are transported from the site of their synthesis to the place of action. In animals, these are produced in endocrine glands.
26. **Pectoral and Pelvic Girdle.** Pectoral girdle is situated in the pectoral region of the body. Each half of pectoral girdle consists of a clavicle and a scapula. Scapula is a large triangular flat bone situated in the dorsal part of the thorax between the second and the seventh ribs. The dorsal, flat, triangular body of scapula has a slightly elevated ridge called the spine which projects as a flat, expanded process called the acromion. The clavicle articulates with this. Below the acromion is a depression called the glenoid cavity which articulates with the head of the humorous to form the shoulder joint. Each clavicle is a long slender bone with two curvatures. This bone is commonly called the collar bone.
Pelvic girdle is situated in the pelvic region of the body. Pelvic girdle consists of two coxal bones. Each coxal bone is formed by the fusion of three bones - ilium, ischium and pubis. At the point of fusion of the above bones is a cavity called acetabulum to which the thigh bone articulates. The two halves of the pelvic girdle meet ventrally to form the pubic symphysis containing fibrous cartilage.

27. **Mitral Valve:** It is situated at the atrioventricular septa. It consists of two flaps which allow the blood to flow from the left atrium to left ventricle but prevents blood flowing from flowing in the reverse direction.
Semilunar Valve: It guards the openings of the aorta in the left ventricle. Each semilunar valve is formed of semilunar cusps which pump blood to the aorta on the contraction of ventricle but prevents the backflow of blood.

OR

i. **Blood:** It is specialised kind of living fluid connective tissue of opaque red colour of alkaline reaction and salty in taste. Its specific gravity is 1.050-1.060. The blood contains a fluid part of the plasma, and the solid part the corpuscles.
ii. **Serum:** is the name given to blood plasma which has its protein fibrinogen removed. In this form, the plasma cannot clot, so it can be stored in hospital blood banks for transfusions in emergencies.

28. **Structure of brain.** The human brain is well protected by the skull. Inside the skull, the brain is covered by cranial meanings consisting of an outer layer called dura mater, a very thin middle layer called archnoid and an inner layer (which is in contact with the brain tissue) called pia mater. The brain can be divided into three major parts.
(i) Forebrain (ii) Midbrain and (iii) Hindbrain

Section D

29. i. Flagellated protozoans are either free-living or parasitic protozoans that have flagella. Sleeping sickness is caused by parasitic versions of the parasite. Trypanosoma is a good example.
ii.
- Locomotion
- Protozoan are eukaryotic having different shapes and sizes. Some are ciliated flagellated or both may be absent.

iii. a. Cilia
b. Flagella
c. Pseudopodia

OR

Ciliata has two nuclei, macronucleus, and micronucleus.
Ciliates are characterized as organisms propelled by rows of cilia and possessing two types of nuclei. They are a large macronucleus involved in vegetative functions of the organism, and a small micronucleus involved in sexuality.

30. i. An androecium is the male part of the flower which is composed of a long filament and an anther attached to its tip.
ii. Sterile stamen is called staminode.
iii. Yes, salvia and mustard show variation in the length of filaments within a flower.

OR

a. The main axis continues to grow.
b. The flowers are borne laterally in an acropetal succession.

Section E

31. **Homologous Chromosomes:** These are pairs of similar chromosomes having corresponding genes governing the same set of traits.
During the heterotypic division of **meiosis** in leptotene, chromosomes are thread shaped and coiled. During **zygotene**, the homologous chromosomes start pairing. Here morphologically and genetically chromosomes similar are called homologous chromosomes. In pachytenes, the chromosomes show thickening and shortening. **Diplotene** is marked by the **cessation of attraction force** between two homologous chromosomes. Uncoiling of homologous chromosome tends to separate them from each other but remains attached at chiasmata. During **diakinesis,** the separation of homologous chromosomes is complete. Exchange of parts between chromatids of homologous chromosomes may occur.
During **Anaphase** I, the centromere of homologous compounds of bivalents repel each other. After separation of centromeres, the homologous chromosomes begin to move apart towards the spindle. In telophase I, the chromosomes reach **poles** and become shortened. The two cells have a reduced number of chromosome and then second meiosis begins.

OR

All these happen in the two haploid nuclei simultaneously.

i. **Prophase-II** takes a short time. Spindle formation begins and the chromosomes become short. Two chromatids are joined to a single centromere. Nuclear membrane and nucleolus disintegrate.
ii. **Metaphase-II** At the equator, the chromosomes align at the equator and spindle is formed. The centromere of every chromosome is joined to the spindle fibre and centromere also divides.
iii. **Anaphase-II** The daughter chromosomes are formed. Chromatids move towards their poles with the spindle fibres.
iv. **Telophase-II** Reaching the poles, chromosomes from nuclei which are haploid (n) daughter nuclei. Again nuclear membrane is constructed. Nucleolus now becomes clearly visible.

v. **Cytokinesis** Occurs and four daughter cells are formed which are haploid (n). It may occur once or twice (i.e., in meiosis-I and II) or only after the meiosis-II cell division.

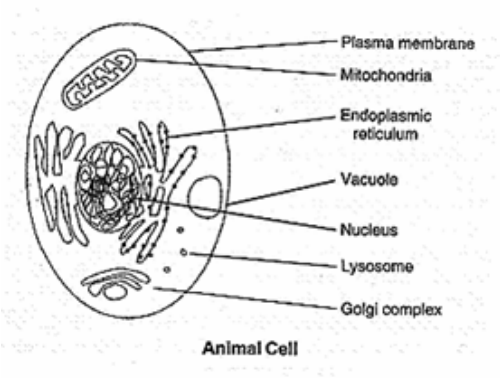
32. Difference between Cell wall and Ribosomes of a prokaryotic and a Eukaryotic cell:

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).

OR

An animal cell has the following cell structures:

- Plasma membrane
- Endoplasmic reticulum
- Mitochondria
- Golgi body
- Lysosomes
- Ribosomes
- Vacuoles
- Nucleus
- Centriole



i. **Plasma Membrane:** This is also known as cell membrane. Plasma membrane is made up of lipid and protein. It is semi-permeable in nature. Certain substances are transported through plasma membrane by passive transport. Some substances get transported by osmosis and some by active transport. Active transport involves use of some carrier to facilitate transport. Apart from transport of materials, plasma membrane gives a shape and size to the animal cell.

ii. **Endoplasmic Reticulum:** These are networks of fine tubules extending from plasma membrane to nucleus. They work like pipelines and facilitate transport of substances from outside the cell to nucleus and cytoplasm. Depending on presence or absence of ribosomes ER can be either rough or smooth.

iii. **Golgi Body:** This is composed of many sack like structures stacked one over another. The function of golgi body is to package different materials, like carbohydrate, protein and lipid.

iv. **Lysosome:** Lysosome is a small spherical structure filled with digestive enzymes. The digestive enzyme helps in digesting foreign materials and waste products. Sometimes the lysosome digests the contents of cytoplasm which in turn kills the cell itself. That is why lysosome is also known as 'suicide bag of the cell'.

v. **Ribosome:** Ribosomes are small dot-like structures. They are made of two subunits. The function of the ribosome is to synthesize protein.

vi. **Vacuoles:** These are small fluid-filled structures. Vacuoles help in maintaining osmotic pressure inside the cell.

vii. **Mitochondria:** Mitochondria is a double membrane structure. The inner membrane is projected in finger-like structures, called cristae. The presence of cristae helps in increasing the inner surface are of mitochondria. Aerobic respiration takes place in the mitochondria and energy released is stored in the form of ATP (Adenosine triphosphate).

viii. **Nucleus:** Nucleus is covered by a nuclear membrane. The nucleus contains chromosomes which are genetic materials. Nucleus also controls various functions of the cell.

ix. **Centriole:** These are spindle-like structures. During cell division, they form spindle fibres.

33. **NADH = Nicotinamide Adenine Dinucleotide Hydrogen:** It is formed by the reduction of NAD. NAD plays an important role during glycolysis, where 3-phosphoglyceraldehyde is converted into 1, 3-diphosphoglycerate in the presence of inorganic phosphate and the enzyme glyceraldehyde phosphate dehydrogenase.

    ATP = Adenosine 4riphosphate: It is a high energy compound present in the living cells. During the formation of ATP, energy is stored and during hydrolysis, energy is released. 2 molecules of ATP are formed from ADP when 1, 3-diphosphoglycerate is converted into 3- phosphoglycerate. Two molecules of ATP are formed from ADP when phosphoenolpyruvate is converted into pyruvic acid at the end of glycolysis. In this way, four molecules of ATP are formed and two molecules are used during the conversion of glucose into glucose-6- phosphate and later fructose-1,6-phosphate. So there is a net gain of two ATP molecules during glycolysis.

    OR

    - Oxidative phosphorylation is a metabolic pathway that uses energy released by the oxidation of nutrients to produce adenosine triphosphate (ATP).
    - Although the many forms of life on earth use a range of different nutrients, almost all carry out oxidative phosphorylation to produce ATP, the molecule that supplies energy to metabolism.
    - This pathway is an efficient way of releasing energy, compared to alternative fermentation processes such as anaerobic glycolysis.
    - During oxidative phosphorylation, electrons are transferred from electron donors to electron acceptors such as oxygen, in redox reactions. These redox reactions release energy, which is used to form ATP.
    - In eukaryotes, these redox reactions are carried out by a series of protein complexes within mitochondria, whereas, in prokaryotes, these proteins are located in the cells' inner membranes. These linked sets of enzymes are called electron transport chains.