Class XI Session 2025-26
Subject - Biology
Sample Question Paper - 4

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. As we go from species to kingdom in a taxonomic hierarchy, the number of common characteristics **[1]**

   a) Will decrease
   b) May increase or decrease
   c) Remain same
   d) Will increase

2. Dev consumes a large amount of alcohol and the result is polyuria and dehydration due to: **[1]**

   a) Decrease in the level of vasopressin
   b) Decrease in the level of ANF
   c) Increase in the level of vasopressin
   d) Decrease in the level of aldosterone

3. Anatomy of stem differs from the root in: **[1]**

   a) Xylem exarch, vascular bundle radial and narrow cortex
   b) Stem hairs, absence of chloroplast an broad cortex
   c) Cutinized epidermal wall, conjoint vascular bundle, and narrow cortex
   d) Secondary vascular growth and presence of stomata

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

   a) No ends
   b) One end
   c) Two ends
   d) Three ends

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

   a) Oesophagus
   b) Liver
   c) Gall bladder
   d) Pleura

6. Vasopressin is a hormone involved in the regulation of urine formation. It is secreted from: **[1]**

a) Adenohypophysis
b) Neurohypophysis
c) Hypothalamus
d) Kidney JGA

7. Chloroplast dimorphism is a characteristic feature of _____. **[1]**

a) C_4 plants
b) C_3 plants
c) All plants
d) Only in algae

8. Platelets are formed from the_____. **[1]**

a) Megakaryocytes
b) Haemocytes
c) Microkayocytes
d) Thrombocytes

9. A farmer wants to get a higher yield of grapes. Which Plant Growth Regulator (PGR) should he use on grape plants? **[1]**

a) Ethylene
b) Cytokinins
c) Gibberellins
d) Abscisic acid

10. Which of the following shows no segregation of plant parts? **[1]**

a) Pteridophyta
b) Algae
c) Gymnosperm
d) Bryophyta

11. Rahul is anaemic and a few days ago suffered from massive haemorrhage. Now, what problems he may face: **[1]**

a) No glomerular filteration
b) All of these
c) Accumulation of waste products in body
d) Very low blood pressure

12. The principle of exchange of gases at the lungs is: **[1]**

a) Filtration
b) Conditioning and facilitated transport
c) Diffusion
d) Both diffusion and filtration

13. **Assertion (A):** Tsetse fly is a causative agent of African sleeping sickness. **[1]**
Reason (R): The disease is also called trypanosomiasis.

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):** Vital capacity is higher in athletes than non - athletes. **[1]**
Reason (R): Vital capacity is about 3.5 - 4.5 litres in a normal adult person.

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):** Human diet should compulsorily contain glycine, serine and tyrosine. **[1]**
Reason (R): Essential amino acids can not be synthesized in the human body.

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):** Voice of women and children is high pitched whereas that of men is low pitched. **[1]**
Reason (R): Vocal cords of men are longer than of women and children.

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. Distinguish between Kinocilia and Stereocilia. **[2]**
18. How does cambium ring form in a dicot stem? **[2]**
19. Define the following: **[2]**
    a. Exocrine gland
    b. Endocrine gland
    c. Hormone
20. What makes species a basic taxonomic category? **[2]**
21. Explain the role of water in photosynthesis. **[2]**

OR

What is the basis for designating C_3 and C_4 pathways of photosynthesis?

Section C

22. List the main features of class Reptilia. **[3]**
23. Explain the main characteristics of pteridophytes. **[3]**
24. Describe the influence of temperature on enzyme action. **[3]**
25. State any three functions of indole acetic acid in plants. **[3]**
26. How many pairs of ribs are found in humans? How do you categories these on the basis of their attachment? Explain. **[3]**
27. Why is conduction in a nerve called on the electric phenomenon? **[3]**
28. What is meant by coronary artery disease? **[3]**

OR

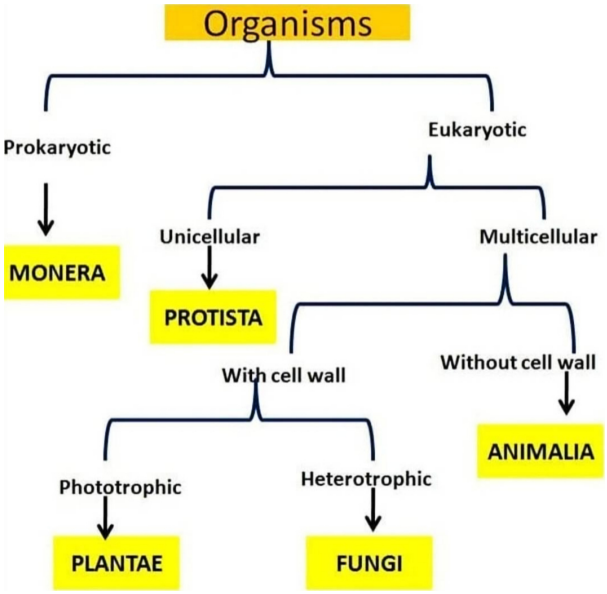
Differentiate between Tricuspid and Bicuspid valve.

Section D

29. **Read the following text carefully and answer the questions that follow:** **[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? (1)

ii. Mention two differences between prokaryotic and eukaryotic cells. (1)

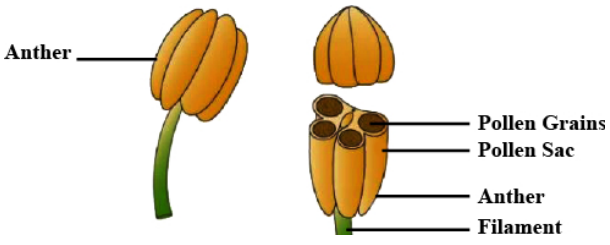
iii. Linnaeus used which kingdom of classification? State two drawbacks of Linnaeus two kingdom classification. (2)

OR

Is Fungi- Autotrophic (Photosynthetic) and Heterotrophic the correct match? Also, Mention the difference between the walls of fungi and green plants. (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. Describe the following: **[5]**

i. synapsis

ii. bivalent

iii. chiasmata

Draw a diagram to illustrate your anwer.

OR

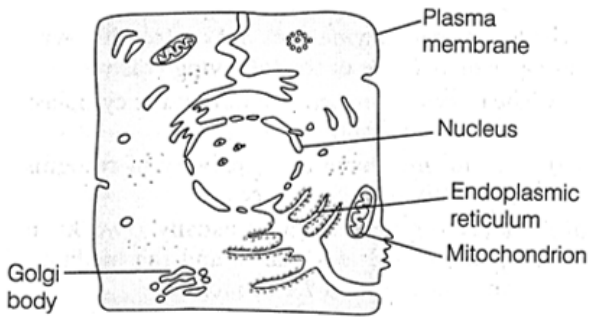
Distinguish anaphase of mitosis from anaphase I of meiosis.

32. Give an account of Glycolysis. Where does it occur? What is the end product? Trace the fate of these products in both aerobic and anaerobic respiration. **[5]**

OR

Explain various steps involved in cellular respiration.

33. The diagram shows some of the structures present in an animal cell. **[5]**



Which of these structures is responsible for

i. Manufacture of lipids and steroids

ii. Release of energy

iii. Manufacture of hormones and digestive enzymes

iv. Production of spindle fibres in cell division

v. Endo and exocytosis?

OR

Describe cilia and flagella of eukaryotic cell. How are flagella of eukaryotes different from those of prokaryotic cell?

Solution

Section A

1. **(a)** Will decrease
   Explanation:
   Number of common characters is maximum among members of a particular species. On the other hand, number of common characters is minimum among members of a particular kingdom.
2. **(a)** Decrease in the level of vasopressin
   Explanation:
   Polyuria is usually the result of drinking excessive amounts of fluids (polydipsia), particularly water and fluids that contain caffeine or alcohol. A person suffering from polyuria may develop excessive production of urea and suffer from dehydration due to a decrease in the level of antidiuretic hormone or vasopressin.
3. **(c)** Cutinized epidermal wall, conjoint vascular bundle, and narrow cortex
   Explanation:
   The stem shows the epidermis covered with a thin layer of cuticle, narrow cuticle, and each vascular bundle is conjoint, open, and is endarch protoxylem.
4. **(c)** Two ends
   Explanation:
   Two ends - the carboxyl and amino-terminal.
5. **(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.
6. **(b)** Neurohypophysis
   Explanation:
   An excessive loss of fluid from the body can activate receptors that stimulate the hypothalamus to release antidiuretic hormone (ADH) or vasopressin from the neurohypophysis.
7. **(a)** C_4 plants
   Explanation:
   Chloroplast dimorphism is a characteristic feature of C_4 plants. These plants contain two kinds of chloroplast in their leaves, bundles sheath cells contain chloroplast in which grana is absent and mesophyll cells without stroma.
8. **(a)** Megakaryocytes
   Explanation:
   Platelets are a little piece of blood cells that help wound healing and prevent bleeding by forming a blood clot. It is formed from the megakaryocytes.
9. **(c)** Gibberellins
   Explanation:
   Gibberellins are growth hormones that stimulate cell elongation and cause plants to grow taller. Gibberellins also have a role in other plant processes, such as stem elongation, germination, flowering, and fruit ripening.

10.

(b) Algae

Explanation:

Algae are chlorophyll-bearing, simple, thalloid, autotrophic plants with the simplest body organization. Their body is thallus like without true root, stem, and leaf differentiation.

11.

(b) All of these

Explanation:

If the anaemic person suffered from massive haemorrhage, the problem he may face includes very low blood pressure, accumulation of wastes products in the body, and no glomerular filtration in the kidney.

12.

(c) Diffusion

Explanation:

The main function of the respiratory system is the gaseous exchange. This refers to the process of Oxygen and Carbon Dioxide moving between the lungs and blood. Diffusion occurs when molecules move from an area of high concentration (of that molecule) to an area of low concentration. This occurs during the gaseous exchange as the blood in the capillaries surrounding the alveoli has a lower oxygen concentration of Oxygen than the air in the alveoli which has just been inhaled.

13.

(d) A is false but R is true.

Explanation:

Trypanosoma gambiense is a zooflagellate parasite which is a causative agent of African sleeping sickness. It is a digenetic i.e., it completes its life cycle in two hosts. The primary host is man and the secondary host is blood sucking insect tse tse fly which is zoologically called as Glossina palpalis. The disease is also called trypanosomiasis.

14.

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

Explanation:

If a person first inspires with his utmost effort and then expires also with maximum effort the volume of air breathed out is called the vital capacity. An athlete requires more oxygen during exercise on a regular basis. Due to this, amount of oxygen taken in and gases taken out by him is greater than others. This gradual effort of an athlete to meet his oxygen demand ultimately increases the vital capacity.

15.

(d) A is false but R is true.

Explanation:

Essential amino acids are those which are taken from food and not synthesized in the body whereas non-essential amino acids need not be supplied in the diet and are synthesized in the body. Glycine, serine and tyrosine are non-essential amino acids.

16. **(a)** Both A and R are true and R is the correct explanation of A.

Explanation:

Vocal cords are the folds of mucous membrane stretching across the lumen of larynx. They vibrate when air is blown through the larynx. This produces voice. In human beings, pharynx cavity, mouth cavity and nasal cavity work as resonators. The amplitude of vibrations and the volume and force of air current control the loudness and intensity of the voice, whereas, the length, tightness and frequency of vibration of the vocal cords control the pitch of the voice. The voice in women and children is generally high-pitched because the vocal cords are short. On the contrary, in men the vocal cords are longer (due to male sex hormones) and therefore their voice is lower-pitched and deeper.

Section B

17. Difference between Kinocilia and Stereocilia:

Kinocilia	**Stereocilia**
i.These are motile in nature.	These are non-motile in nature.
ii. These arise from a cytoplasmic basal granule.	These are evaginations of the plasma membrane.
iii. These are present on epithelial cells of respiratory and genital tracts.	These are present in the epithelial cells of epididymis and vasa deferentia of man.

18. 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.

19. a. **Exocrine glands.** These glands have ducts. They secrete their secretions through ducts.
    b. **Endocrine glands.** Endocrine glands do not have ducts. They directly secrete their secretions.
    c. **Hormone.** Hormones are non-nutrient chemicals which act as intercellular messengers and are produced in trace amounts.

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. **Role of H_2O in Photosynthesis:**

    i. It is a reactant in light reaction,
    ii. Water stress causes the closure of stomata,
    iii. It reduces the availability of CO_2.
    iv. Reduces the surface area of leaves.

OR

In case of C_3 pathways, carbon is fixed into a 3-carbon compound, i.e. 3-PGA. On the other hand, in case of C_4 pathways, carbon is fixed into a 4-carbon compound, i.e. oxaloacetic acid. Thus, a number of carbon atoms in the end product are the basis for designating C_3 and C_4 pathways of photosynthesis.

Section C

22. **Main features of class reptilia are:**

    i. They are the **first truly terrestrial vertebrates.**
    ii. They have **dry skin** covered with scales.
    iii. They are **tetrapods** and **pentadactyl.**
    iv. The hands and feet **have claws.**
    v. **Lungs** are well-developed and reptiles never breathe by gills.
    vi. There is vo larval stage in its development.
    vii. The ventricle of the heart is partially divided into two by an incomplete septum but this division is complete in the crocodiles.

23. 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.

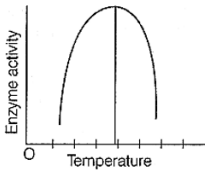
24. 

Figure: The influence of temperature on enzyme action.

Enzymes generally function at a narrow range of temperature. The temperature at which the enzyme shows its maximum activity

is called its optimum temperature. The enzyme activity decreases at temperatures below and above the optimum temperature. At low temperatures, the enzyme is inactive, while at high temperature, the enzyme is denatured and so it loses its activity.

25. i. It promotes **growth and elongation of roots and stems** and **many fruits.**
    ii. In many plants, indole acetic acid **promotes cell division** and **induces apical dominance.**
    iii. It also induces **parthenocarpy.**

26. **Ribs in Humans:** There are 12 pairs of ribs in humans. They support the sides of the thoracic cavity. They fall into 3 groups.
    i. **True ribs:** Upper 7 pairs of ribs attached directly to the sternum.
    ii. **False ribs (Vertebrochondral ribs):** Next three pairs of ribs joined to the ribs above. They are 8th, 9th and 10th ribs.
    iii. **Floating ribs:** Lower two pairs of ribs free in front (11th and 12th) are called floating ribs.

    Thoracic vertebrae, ribs as well as sternum form rib cage. **Vertebral** and **sternal** are two parts of the rib.

27. It is called so because it can be compared to the transmission of a message through a telephone cable. It travels **very fast** just like an electric current. Though its speed is not as much fast as that of electric current through a wire. Thus the passage of a stimulus in a nerve is an electrical process.

28. It is the hardening of **arteries** and **arterioles** due to the thickening of the fibres tissue and the consequent loss of elasticity. It is often referred to as **atherosclerosis**. This mainly affects the vessels, which are mainly responsible for supplying blood to the heart muscle. It seems to occur due to deposition of calcium, fat cholesterol, and fibrous tissues, making the lumen of arteries narrower.

OR

Tricuspid valve	Bicuspid valve
There are no extra flaps in it.	Called Mitral valve, maybe many small flaps in it.
It is guarded by 3-flaps that are different in size.	It is guarded by two flaps only almost equal in size.
Right AV aperture is guarded by tricuspid valve, it checks backflow of deoxygenated blood into the right auricle.	Left AV aperture is guarded by a bicuspid valve, it checks backflow of oxygenated blood into the left auricle.

Section D

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

    ii.

Prokaryotic cell	Eukaryotic cell
Genetic material is not enclosed in a nuclear envelope and is present suspended in the cytoplasm in a region called nucleoid.	Genetic material is enclosed within the nucleus by a 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.

      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.

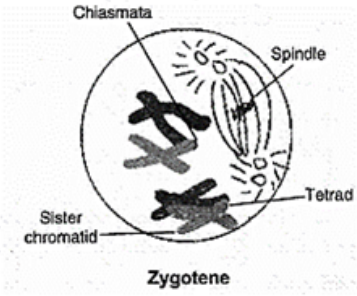
30. i. An androecium is the male part of the flower which is composed of a long filament and an anther attached to its tip.
    ii. Sterile stamen is called staminode.
    iii. Yes, salvia and mustard show variation in the length of filaments within a flower.

    OR

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

Section E

31. i. During zygotene of prophase I of meiosis homologous chromosomes pair together. This pairing is called synapsis.



ii. **Bivalent:** The complex formed by homologous chromosomes during zygotene is called a bivalent. They are also known as tetrad

iii. **Chiasmata:** During diplotene, the paired chromosomes make a X-shaped structure. This is called chiasmata. It is a site where two non-sister chromatids of homologous chromosomes have crossed over.

OR

Anaphase of mitosis	Anaphase I of meiosis
The centromere of every chromosome divides.	The centromere does not divide.
Separation of sister chromatids takes place.	Homologous chromosomes are separated.
Only one chromatid of every chromosome moves to the pole. The number and types of chromosomes at each pole is the same as in the parent nucleus. Chromosomes are single-stranded	Each homologous pair of chromosomes moves to the pole with both the chromatids.chromosomes are double-stranded
The chromatids moving to one pole are genetically identical to those moving to the opposite pole.	The chromosomes moving to one pole are not genetically identical to those moving to the opposite pole.

32. Glycolysis occurs in the cytoplasm of the cell and is present in all living organisms. In this process, glucose undergoes partial oxidation to form two molecules of pyruvic acid. The following are the important step of glycolysis.
    - Glucose undergoes phosphorylation to produce glucose- 6 -phosphate.
    - Fructose-6-phosphate is then converted into PGAL. (Phosphoglyceraldehyde).
    - Each molecule of PGAL then undergoes several steps to produce Pyruvic Acid.
    - There is a net gain of two molecules of ATP during glycolysis of one molecule of glucose.

Fate of Pyruvate: Aerobic Respiration: Pyruvic acid is completely oxidized to produce carbon dioxide and energy.
Anaerobic Respiration: Depending upon the availability of oxygen in some organisms. pyruvic acid is converted into ethanol and carbon dioxide when there is a complete absence of oxygen. In some other organisms, pyruvic acid is converted into lactic acid when there is an incomplete oxygen supply.

OR

Steps of cellular respiration:

i. Glycolysis: Glycolysis is the first step in cellular respiration. During glycolysis, glucose undergoes partial oxidation to form pyruvic acid. From 1 molecule of glucose, 2 molecules of pyruvic acid is formed.

ii. Aerobic or Anaerobic respiration**:**
    - In the absence of oxygen pyruvic acid is converted into lactic acid or ethanol.
    - Citric Acid Cycle: Under aerobic conditions, the pyruvic acid enters citric acid cycle NADH + H^+ and FADH2 which enter into the ETS.

      Pyruvic acid + CoA + $NAD^+ \xrightarrow{Mg^{2+}}$ Acetyl CoA + NADH + H^+

iii. Electron Transport System (ETS) and Oxidative Phosphorylation
    - Energy stored in NADH+H^+ and FADH2 is utilised to form ATP. This is accomplished when they are oxidised through the electron transport system and the electrons are passed on to O_2 resulting in the formation of H_2O.
    - When the electrons pass from one carrier to another in the electron transport chain, they are coupled to ATP synthase for the production of ATP from ADP and inorganic phosphate.

33. Structures responsible are

i. **Smooth endoplasmic Reticulim (SER)** is responsible for the manufacture of lipids and steroids.

ii. **Mitochondrion** is responsible for the release of energy.

iii. **Ribosomes** are responsible for the production of hormones and digestive enzymes.
iv. **Centrioles** are responsible for production of spindle fibres.
v. **Plasma membrane** is responsible for endo and exocytosis.

OR

Cilia and flagella are hair like outgrowths of the cell membrane. Cilia are small structures which work like cars, causing the movement of either the cell or the surrounding fluid. Flagella are comparatively longer and responsible for cell movement.

Structure:

- The electron microscopic study of a cilium or the flagellum shows that they are covered with plasma membrane.
- Their core called the axoneme, possesses a number of microtubules running parallel to the long axis. The axoneme has nine pairs of doublets of radially arranged peripheral microtubules, and a pair of centrally located microtubules.
- Such an arrangement of axonemal microtubules is referred to as the 9 + 2 array.
- The central tubules are connected by bridges and are also enclosed by a central sheath, which is connected to one of the tubules of each peripheral couplet by a radial spoke. Thus, there are nine radial spokes The peripheral doublets are also interconnected by linkers.
- Both the cilium and flagellum emerge from centriole like structure called the basal bodies.

Difference between Flagella of Prokryotes and Eukaryotes

- Flagella of prokryotes are arising from the plasma membrane, while those of eukaryotes are arising from centrioles.
- Flagella of prokaryotes are not membrane bound, while those of eukaryotes are membrane bound.
- Flagella of prokaryotes are simple in structures, while those of eukaryotes are complex in structure.