# Class XI Session 2025-26
# Subject - Biology
# Sample Question Paper - 6

**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. If both fatty acids and carbohydrates are available to muscles, which one is consumed first in respiration? **[1]**

   a) Carbohydrates b) Fatty acids

   c) Both Carbohydrates and Fatty acids d) Minerals

2. M - phase undergoes: **[1]**

   a) Cytokinesis b) Equational division

   c) Diakinesis d) Reductional division

3. Which organelle is also known as a **suicide bag** of the cell? **[1]**

   a) ER b) Vacuole

   c) Plastid d) Lysosome

4. The main seat of photosynthesis in the leaf is: **[1]**

   a) Cuticle b) Palisade parenchyma

   c) Spongy parenchyma d) Abaxial epidermis

5. The scientific name of organisms should be written as: **[1]**

   a) Genus species b) Species subspecies

   c) Species genus d) Subspecies species

6. The class of fungi in which mushroom is included is_____. **[1]**

   a) Phycomycetes b) Ascomycetes

   c) Basidiomycetes d) Deuteromycetes

7. Project tiger was launched in _____. **[1]**

a) 1971 b) 1980

c) 1973 d) 1982

8. Dicot leaves are also known as _____. **[1]**

a) Bilateral leaves b) Dorsal leaves

c) Isobilateral leaves d) Dorsiventral leaves

9. Pila globosa (apple snail): **[1]**

i. Is adapted to lead an amphibious life.
ii. Is both ureotelic and ammonotelic.
iii. Is both ammonotelic as well as uricotelic.
iv. Is both ureotelic and uricotelic.

a) Statement (i) and (ii) are correct b) Statement (i) and (iii) are correct

c) Statement (ii) and (iii) are correct d) Statement (i) and (iv) are correct

10. What is the function of mitosis? **[1]**

a) Growth b) Cell division

c) Transfer d) Growth and repair

11. Which is the possible region of respiration in bacteria? **[1]**

a) Mitochondria b) Nucleoid

c) Mesosome d) Cell wall

12. A group of plants with similar traits of any rank is _____. **[1]**

a) Species b) Taxon

c) Order d) Genus

13. **Assertion (A):** In racemose type of inflorescences the main axis continues to grow, the flowers are borne laterally in an acropetal succession. **[1]**

**Reason (R):** In cymose type of inflorescence the main axis terminates in a flower, hence is limited in growth, the flowers are borne in a basipetal order.

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):** The sorus of pteridium is of coenosorus type. **[1]**

**Reason (R):** Pteridium lacks sori.

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):** Consciousness and response to stimuli can be considered as defining properties of living organism. **[1]**

**Reason (R):** The external environmental stimuli can be physical, chemical or biological.

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):** Hypostracum is known as **mother of pearl**. **[1]**

**Reason (R):** From hypostracum, pearl formation begins.

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. Write the name of five diseases caused by viruses. **[2]**
18. Differentiate between pith in dicot root and monocot root. **[2]**
19. Tendrils of grapevine are homologous to tendrils of pumpkin, but analogous to those of pea. Justify the above statement. **[2]**
20. Match Column I with Column II : **[2]**

| Column I | Column II |
|---|---|
| (a) Eosinophils | (i) Coagulation |
| (b) RBC | (ii) Universal Recipient |
| (c) AB Group | (c) Resist infections |
| (d) Platelets | (d) Contraction of Heart |
| (e) Systole | (e) Gas transport |

21. What is the name of the opening through which the water moves out of the body of a sponge? **[2]**

OR

There has been an increase in the number of chambers in heart during evolution of vertebrates. Give the names of the class of vertebrates having two, three or four chambered heart.

**Section C**

22. Even though a very few cells in a $C_4$ plant carry out the biosynthetic - Calvin pathway, yet they are highly productive. Can you discuss why? **[3]**
23. What is $G_0$ (quiescent phase) of cell cycle? **[3]**
24. In general, how do steroid hormones affect changes in their target cells? **[3]**
25. What is morphology? **[3]**
26. Respiration requires $O_2$. How did the first cells on the earth manage to survive in an atmosphere that lacked $O_2$? **[3]**
27. State the major functions of Cerebral lobes. **[3]**

OR

Suppose for some reason ATP falls deficient in nerve fibre, how will it affect the conduction of nerve impulse through it?

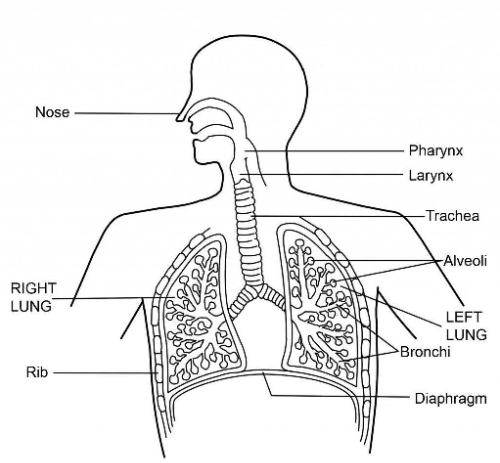
28. Discuss the role of chemical information in classification of plants. **[3]**

**Section D**

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

The respiratory system in human beings constitutes the following organs- nose, nasal passage, trachea, bronchi,

lungs and diaphragm. Human beings have a pair of external nostrils opening out above the upper lips which leads to a nasal chamber through the nasal passage. During the breathing cycle, when air is taken in and let out, the lungs always contain a residual volume of air so that there is sufficient time for oxygen to be absorbed and for the carbon dioxide to be released.




i. Observe the image and mention conclusions for the image shown. (1)

ii. Which cartilaginous box helps in sound production? (1)

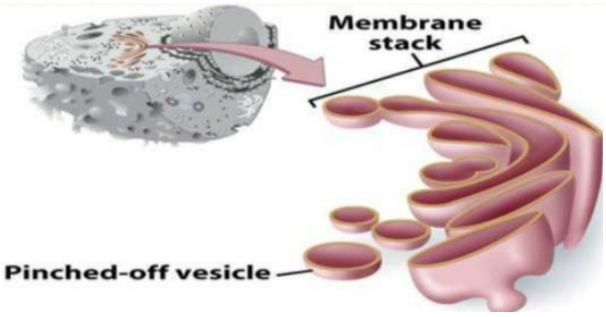
iii. What is Epiglottis? (2)

**OR**

The nasal chamber opens into which portion of the pharynx? (2)

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

Camillo Golgi (1898) first observed densely stained reticular structures near the nucleus. The Golgi apparatus was first described by Camillo Golgi. Golgi apparatus consists of a set of membrane-bounded, fluid-filled vesicles, vacuoles and flattened cisternae. The cisternae consist of many flat, disc-shaped sacs of 0.5$\mu$m to 1.0 $\mu$m diameter.




i. Observe the figure and mention which part is concentrically arranged near the Golgi cisternae. (1)

ii. Which is the important site of the formation of glycoproteins? (1)

iii. Is Golgi complex is single membrane bound? (2)

**OR**

What is Dictyosomes? (2)

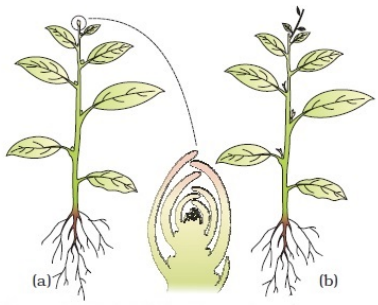
**Section E**

31. Explain sliding filament theory of muscle contraction with neat sketches. **[5]**

OR

Explain the structure of the contractile protein in skeletal muscle.

32. With reference to the diagram answer the following questions: **[5]**




(a) A plant with apical bud intact
(b) A plant with apical bud removed

i. Name the technique shown in the figure.

ii. What are the applications of this technique?

iii. Why is this technique used?

OR

Write Short Notes on:

i. Gibberellins

ii. Cytokinins

iii. Ethylene

iv. Abscisic Acid

33. Explain the composition of triglyceride. **[5]**

OR

Describe the mechanism of enzymatic action.

# Solution

## Section A

1. **(a)** Carbohydrates
   **Explanation:**
   Carbohydrates are the chief respiratory material. Starch and sucrose are the most important respiratory substrate. The reserve carbohydrates like starch are first transformed into simple carbohydrates. Then they are consumed in respiration. Fats: Fats are respiratory substrate in oily seeds. Fats are first converted into sugars. Then they are used in the respiratory process.
2. **(b)** Equational division
   **Explanation:**
   Since in mitosis the number of chromosomes in the parent and progeny cells is the same, it is also called an equational division.
3. **(d)** Lysosome
   **Explanation:**
   Lysosomes are membrane-enclosed organelles that contain an array of enzymes capable of breaking down all types of biological polymers. One of its functions is to digest materials taken up from outside the cell. That process is called endocytosis. That's why it is called the **Suicidal Bag** of the cell.
4. **(b)** Palisade parenchyma
   **Explanation:**
   The palisade parenchymatous cell in the mesophyll region has numerous chloroplasts. Hence, it is the main seat of photosynthesis in leaf.
5. **(a)** Genus species
   **Explanation:**
   *Mangifera Indica*. Here, Mangifera is a generic name while Indica is a specific name. Hence, the correct option is the Genus species.
6. **(c)** Basidiomycetes
   **Explanation:**
   Commonly known forms of basidiomycetes are mushrooms, bracket fungi, or puffballs.
7. **(c)** 1973
   **Explanation:**
   Project tiger is a tiger conservation programme launched in 1973 by the Government of India to maintain the rapidly decreasing number of tigers in India.
8. **(d)** Dorsiventral leaves
   **Explanation:**
   A dicot leaf is also known as dorsiventral as its upper and lower sides are different in structure. The transverse section of a dicot leaf has three main parts - epidermis, mesophyll, and the vascular system.

9. **(a)** Statement (i) and (ii) are correct

**Explanation:**

**Pila globosa (apple snail)** is an amphibious gastropod, meaning it can live both in water and on land. It has **adaptations for terrestrial and aquatic life**, including a **pulmonary sac** (for breathing on land) and **gills** (for breathing in water).

10.

**(d)** Growth and repair

**Explanation:**

One of the key aspects of mitosis is to bring about an increase in cell numbers leading to the growth of the organs and replacement of the injured cells with the newly formed ones.

11.

**(c)** Mesosome

**Explanation:**

Bacteria belong to the kingdom Monera in which organisms are unicellular and prokaryotic. Prokaryotic organisms lack membrane-bounded organelles like mitochondria where respiration occurs. In bacteria, respiration occurs in the mesosome.

12.

**(b)** Taxon

**Explanation:**

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

13.

**(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.

14.

**(c)** A is true but R is false.

**Explanation:**

In the sproangia of Pteridium are not grouped together in small seprate sori, but the sorus is continuous along the under margin of the pinnules, often for considerable distances. This type of sorus is known as continuous linear sours (coenosorus).

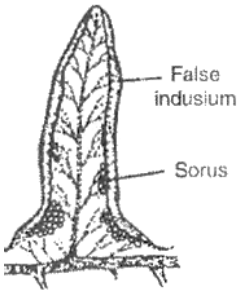



**Fig. Pinnule of Pteridium acquilirtum with continuous sorus and false indusium**

15.

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

**Explanation:**

All organisms, from primitive prokaryotes to the most advanced and complex eukaryotes, are able to sense and respond to environmental factors. The stimuli are perceived by sense organs in higher animals through sensory receptors e.g. eyes, ears, nose. Plants do not possess such sense organs. However, they do respond to external factors such as light, water, temperature, pollutants, another organism, etc. Human beings have an additional facility of self-consciousness (awareness of self). Consciousness and response to stimuli are said to be the defining properties of living organisms.

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

**Explanation:**

Hypostracum is the inner most layer of pearl oyster made up of plates (consisting of fibrils) of calcium carbonate that run parallel to the margin of aperture. This hypostracum or nacreous layer is secreted by the entire outer surface of the mantle. Pearl formation generally begins from the injury or irritation in the pearl oyster. Irritation stimulates the mantle epithelium to secrete nacre-thin concentric layers of mother of pearl all around the foreign body.

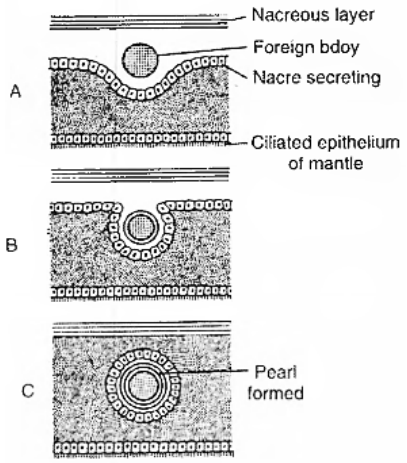



Fig. Stages in pearl formation

A - Primary stage.

B - Progressive stages.

C - Final stage.

**Section B**

17. (a) AIDS

(b) Small pox

(c) Swine flue

(d) Bird flue

(e) Common cold

18.

| Pith in Monocot Root | Pith in Dicot Root |
|---|---|
| The centre of the root is occupied by the pith. | It is often absent. When present, it is very small. |
| Intercellular spaces are present between pith cells. | Intercellular spaces are absent. |
| Pith cells store food. | The pith cells store food as well as waste materials. |

19. Tendrils of grapevine and pumpkin are stem structures, while those of pea are foliar in nature. Hence, the tendrils of grapevine and pea are analogous structures.

20.

| Column I | Column II |
|---|---|
| Eosinophils | Resist infections |
| RBC | Gas transport |
| AB Group | Universal Recipient |
| Platelets | Coagulation |
| Systole | Contraction of Heart |

21. Osculum the water enters through ostia and moves out through osculum.

OR

The two-chambered heart is found in Pisces. Amphibians and Reptiles have the three-chambered heart but crocodiles have a four-chambered heart. Birds and Mammals have a four-chambered hearts.

**Section C**

22. $C_4$ plants chemically fix carbon dioxide in the cells of the mesophyll by adding it to the three-carbon molecule phosphoenolpyruvate (PEP), a reaction catalyzed by an enzyme called PEP carboxylase and which creates the four-carbon organic acid, oxaloacetic acid. Oxaloacetic acid or malate synthesized by this process is then translocated to specialized bundle sheath

cells where the enzyme, Rubisco, and other Calvin cycle enzymes are located, and where $CO_2$ released by decarboxylation of the four-carbon acids is then fixed by rubisco activity to the three-carbon sugar
3-Phosphoglyceric acids.
The physical separation of RuBisCO from the oxygen-generating light reactions reduces photorespiration and increases $CO_2$ fixation and thus the photosynthetic capacity of the leaf.
$C_4$ plants can produce more sugar than C3 plants in conditions of high light and temperature. Many important crop plants are $C_4$ plants including maize, sorghum, sugarcane, and millet.

23. Some cells in the adult animals do not appear to exhibit division (e.g., heart cells) and many other cells divide only occasionally, as needed to replace cells that have been lost because of injury or cell death. These cells that do not divide further exit $G_1$ phase to enter an inactive stage called quiescent stage ($G_0$) of the cell cycle. Cells in this stage remain metabolically active. However, they do not proliferate unless called on to do so depending on the requirement of the organism.
24. Steroid hormones are lipid-soluble hence they quickly pass through the plasma membrane of a target cell into the cytoplasm. There they bind to intercellular receptor proteins and form a complex. This complex enters the nucleus and binds itself to the specific regulatory sites on the chromosomes. This binding changes **gene** expression and stimulates the **transcription** of **some genes.** It may repress the transcription of some other genes. Finally, RNA acts for protein synthesis. The lipid-soluble hormones are slow in their action. They are **last longer hormones.**
25. Morphology is the study of the form, structure and configuration of an organism.
26. During the process of respiration, oxygen is utilised, and carbon dioxide, water and energy are released as products. The combustion reaction requires oxygen. But some cells live where oxygen may or may not be available. There are sufficient reasons to believe that the first cells on this planet lived in an atmosphere that lacked oxygen. Even among present-day living organisms, we know of several that are adapted to anaerobic conditions.
27.

| Cerebral lobe | Major functions |
|---|---|
| **Frontal lobe** | The reasoning will power, inner **monitoring** of thoughts and actions, creative ideas, **translation of perceptions** and **memories** into plans, of muscle movement, reality testing by judgment, intellectual insight, ability to abstract, expression of emission, and personality and decision making, etc. |
| **Temporal lobe** | Memory, smell, as well as emotions. |
| **Occipital lobe** | Decoding and interpretation of visual information: colour and shape. |
| **Parietal lobe** | Taking information from the environment, organising it and communicating it to rest part of the brain, registration of sensory perception called the feelings about touch, pains, heat, and cold; knowledge about the position in space. |

OR

Each neuron has a million or so **ATP powered $Na^+$- $K^+$ exchange pumps** built into the plasma membrane which enables it to keep conducting action potentials indefinitely. If for some reason ATP falls deficient in nerve fibre, the conduction of nerve impulse is greatly affected. It will affect the amplitude and frequency of nerve impulse and action potential.

28. **The Role of Chemical Information in Classification of Plants:** Biochemical taxonomy is an important aspect and improved technique for classification of organisms. The biochemical techniques molecular biology serology along with the use of computers to evaluate differences and similarities between the organisms are of much help in systematics. **Biochemical taxonomy** is called **Chemotaxonomy.** The chemical constituents of plant species are stable. They can be collected from plant parts. The sequencing of DNA, RNA, and protein establish similarities in organisms.

**Section D**

29. i.
    - Each bronchi undergoes repeated divisions to form the secondary and tertiary bronchi.
    - The branching network of bronchi, bronchioles and alveoli comprise the lungs.

    ii. Larynx is a cartilaginous box which helps in sound production and hence called the sound box.
    iii. During swallowing glottis can be covered by a thin elastic cartilaginous flap called epiglottis to prevent the entry of food into the larynx.
    **OR**
    The nasal chamber opens into the nasopharynx, which is a portion of the pharynx, the common passage for food and air.
30. i. The Golgi cisternae are concentrically arranged near the nucleus with distinct convex cis or the forming face and concave trans or the maturing face.

ii. Golgi apparatus is an important site for the formation of glycoproteins and glycolipids.

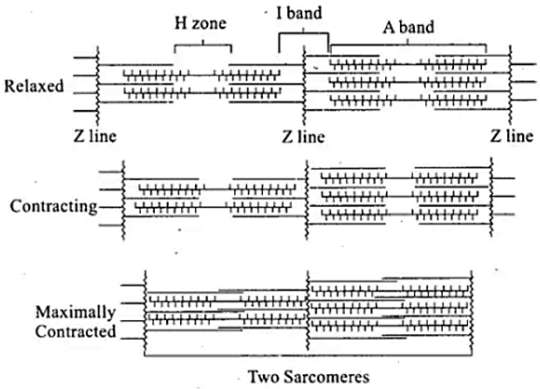
iii. Endoplasmic reticulum, peroxisome, Golgi apparatus and vacuole are single membrane-bound organelles.

**OR**

The plant cells contain many freely distributed subunits of Golgi apparatus, called dictyosomes.

**Section E**

31. Mechanism of muscle contraction is best explained by the sliding filament theory which states that contraction of a muscle fibre takes place by the sliding of the thin filaments over the thick filaments. It was first introduced in 1954. According to this theory, when actin and myosin filaments slide towards each other; muscle contraction takes place.
    - A neural signal reaching to neuromuscular junction releases a neurotransmitter (Acetylcholine) which generates an action potential in the sarcolemma.
    - Once the action potential is generated, calcium channels in the muscle cells open and allow the entry of calcium ions.
    - Increase of $Ca^{2+}$ levels result in binding of calcium to troponin on the actin filament and bring about conformational changes. This removes the masking of active sites on myosin filaments.
    - Myosin a polymer of meromyosins has a head, arm and tail as its important parts. The head also called heavy meromyosin(HMM) utilizes the energy from ATP hydrolysis and binds with the active site on actin. This results in the formation of a cross-bridge between actin and myosin. This pulls the attached actin filaments towards the centre of 'A' band. The Z-line attached to actin are also pulled inwards and contraction of muscle fibre happens.

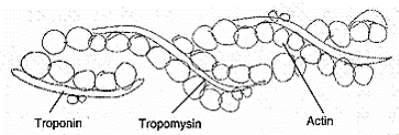



**Sliding-filament theory of muscle contraction (movement of the thin) filaments and the relative size of the I band and H zones)**

OR

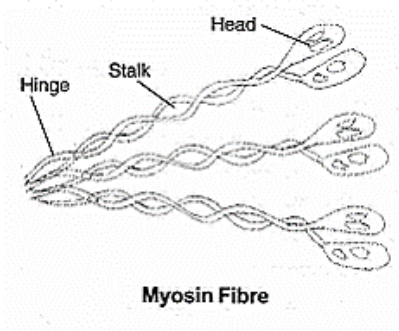
**Structure of Contractile Proteins**

- Each actin (thin) filament is made of two 'F' (filamentous) actins helically wound to each other. Each 'F' actin is a polymer of monomeric 'G' (Globular) actins.
- Two filaments of another protein, tropomyosin also run close to the 'F' actins throughout its length.
- - A complex protein Troponin is distributed at regular intervals on the tropomyosin. In the resting state a subunit of troponin masks the active binding sites for myosin on the actin filaments.




**Actin Fibre**

Each myosin (thick) filament is also a polymerised protein. Many monomeric proteins called Meromyosins constitute one thick filament. Each meromyosin has two important parts, a globular head with a short arm and a tail, the former being called the heavy meromyosin (HMM) and the latter, the light meromyosin(LMM).




**Myosin Fibre**

- The HMM component, i.e. the head and short arm projects outwards at regular distance and angle from each other from the surface of a polymerised myosin filament and is known as cross arm. The globular head is an active ATPase enzyme and has binding sites for ATP and active sites for actin.

32. i. Decapitation.
    ii. It is used in tea plantations and hedge-making.
    iii. This technique is used to overcome apical dominance(the growth of apical bud inhibits the growth of lateral buds).

OR

i. **Gibberellins:** Gibberellins are another kind of promoters PGR. There are more than 100 gibberellins reported from organisms such as fungi and higher plants. They are denoted as $GA_1$, $GA_2$, $GA_3$ and so on. Gibberellic acid (GA.) was one of the first gibberellins to be discovered and remains the most intensively studied form. All GAs are acidic.
They produce a wide range of physiological responses in the plants. Their ability to cause an increase in the length of axis is used to increase the length of grapes stalks. Gibberellins, cause fruits like apple to elongate and improve its shape. They also delay senescence. Thus, the fruits can be left on the tree longer so as to extend the market period. $GA_3$ is used to speed up the malting process in the brewing industry.
Sugarcane stores carbohydrate as sugar in their stems. Spraying sugarcane crop with gibberellins increases the length of the stem, thus increasing the yield by as much as 20 tonnes per acre.
Spraying juvenile conifers with GAs hastens the maturity period, thus leading to early seed production. Gibberellins also promote bolting in beet, cabbages and many plants with rosette habit.

ii. **Cytokinins:** Cytokinins have specific effects on cytokinesis, and were discovered as kinetin (a modified form of adenine, a purine) from the autoclaved herring sperm DNA. Kinetin does not occur naturally in plants. Search for natural substances with cytokinin-like activities led to the isolation of zeatin from corn-kernels and coconut milk. Since the discovery of zeatin, several naturally occurring cytokinins, and some synthetic compounds with cell division promoting activity have been identified.
Natural cytokinins are synthesized in regions where rapid cell division occurs, for example, root apices, developing shoot buds, young fruits etc. It helps to produce new leaves, chloroplasts in leaves, lateral shoot growth and adventitious shoot formation. Cytokinins help overcome apical dominance. They promote nutrient mobilization which helps in the delay of leaf senescence.

iii. **Ethylene:** Ethylene is a simple gaseous PGR. It is synthesized in large amounts by tissues undergoing senescence and ripening fruits. Influences of ethylene on plants include horizontal growth of seedlings, swelling of the axis and apical hook formation in dicot seedlings.
Ethylene promotes senescence and abscission of plant organs, especially of leaves and flowers. Ethylene is highly effective in fruit ripening. It enhances the respiration rate during the ripening of the fruits. This rise in the rate of respiration is called respiratory climactic.
Ethylene breaks seed and bud dormancy, initiates germination in peanut seeds, sprouting of potato tubers. Ethylene promotes rapid internode/ petiole elongation in deep water rice plants. It helps leaves / upper parts of the shoot to remain above water. Ethylene also promotes root growth and root hair formation, thus helping the plants to increase their absorption surface. Ethylene is used to initiate flowering and for synchronizing fruit-set in pineapples. Since ethylene regulates so many physiological processes, it is one of the most widely used PGR in agriculture. The most widely used compound as a source of ethylene is ethephon.
Ethephon in an aqueous solution is readily absorbed and transported within the plant and releases ethylene slowly. Ethephon hastens fruit ripening in tomatoes and apples and accelerates abscission in flowers and fruits (thinning of cotton, cherry, walnut). It promotes female flowers in cucumbers thereby increasing the yield.

iv. **Abscisic Acid:** It acts as a general plant growth inhibitor and an inhibitor of plant metabolism. ABA inhibits seed germination. ABA stimulates the closure of stomata in the epidermis and increases the tolerance of plants to various kinds of stresses. Therefore, it is also called the stress hormone.
ABA plays an important role in seed development, maturation and dormancy. By inducing dormancy, ABA helps seeds to withstand desiccation and other factors unfavourable for growth. In most situations, ABA acts as an antagonist to GAs.

33. Triglycerides are the predominant component of most food fats and oils. The minor components include mono- and diglycerides, free fatty acids, phosphatides, sterols, fatty alcohols, fat-soluble vitamins, and other substances. A triglyceride is composed of glycerol and three fatty acids. Ester bonds form between each fatty acid and the glycerol molecule. General structure of a triglyceride is shown below---
Chemical formula

RCOO - $CH_2CH$(-OOCR) $CH_2$ - OOCR"

where R, R', and R" are longer alkyl chains. The three fatty acids RCOOH, R'COOH and R"COOH can be or same.
Chain lengths of the fatty acids in naturally occurring triglycerides can be of varying lengths, but chains consisting of 16, 18 and 20 carbons are the most common. Natural fatty acids found in plants and animals are typically composed only of even number of carbon atoms due to the way they are biosynthesized from acetyl CoA. Bacteria, however, possess the ability to synthesize odd - and branched-chain fatty acids. Consequently, ruminant animal fat contains odd-numbered fatty acids, such as 15, due to the action of bacteria in the rumen.

OR

**Mechanism of Enzymatic Action**

i. Enzymes act by lowering the activation energy of reactions by creating an environment in which the transition state is stabilized (e.g. straining the shape of a substrate by binding the transition-state conformation of the substrate/ product molecules, the enzyme distorts the bound substrate(s) into their transition state form, thereby reducing the amount of energy required to complete the transition).
ii. Lowering the energy of the transition state, but without distorting the substrate, by creating an environment with the opposite charge distribution to that of the transition state.
iii. Providing an alternative pathway: For example, temporarily reacting with the substrate to form an intermediate ES complex, which would be impossible in the absence of the enzyme.
iv. Reducing the reaction entropy change by bringing substrates together in the correct orientation to react. Considering $\Delta H^{\ddagger}$ alone overlooks this effect.
v. Increase in temperature speeds up reactions. Thus, temperature increase helps the enzymes function and develop the end product even faster. However, if heated too much, the enzyme's shape deteriorates and only when the temperature comes back to normal does the enzyme regains its original shape. Some enzymes like thermolabile enzymes work best at low temperatures.

The catalytic cycle of an enzyme action can be described in the following steps:

i. First, the substrate binds to the active site of the enzyme.
ii. The binding of the substrate induces the enzyme to alter its shape (conformational change), fitting more tightly around the substrate.
iii. The active site of the enzyme, now in close proximity of the substrate breaks the chemical bonds of the substrate and the new enzyme - product complex is formed.
iv. The enzyme releases the products of the reaction and the free enzyme is ready to bind to another molecule of the substrate and run through the catalytic cycle once again.