

## SECTION-A

- **Multiple choice questions-**

Q.1 When O<sub>2</sub> binds to RuBisCO the products is

- a) 2 Phosphoglycerate molecules
- b) 2 phosphoglycolate molecules
- c\*) one phosphoglycerate and one phosphoglycolate molecule
- d) 2 Phosphoglyceraldehyde molecules

Q.2 Excretion in flatworms is by?

- a) malpighian tubule
- b) nephridia
- c\*) flame cells
- d) nephrons

Q.3 The building blocks of proteins are?

- a) Nucleotides
- b\*) Amino acids
- c) Monosaccharides
- d) Fatty acids

Q.4 Which of the following are needed for clotting of blood?

- a\*) Fibrinogen
- b) Albumin
- c) Globulin
- d) Magnesium ions

Q.5 Which gland is responsible for producing melatonin, a hormone that regulates sleep and wake cycles?

- a) Thyroid gland
- b) Adrenal gland
- c\*) Pineal gland
- d) Pancreas

Q.6 Mushrooms belongs to which class of fungi?

- a) Phycomycetes
- b) Ascomycetes
- c\*) Basidiomycetes
- d) Deuteromycetes

Q.7 The pattern of arrangement of leaves on the stem or branch.

- a) Venation
- b) Inflorescence
- c\*) Phyllotaxy
- d) None of the above

Q.8 Glycolysis is also known as \_\_\_\_\_?

- a\*) EMP pathway
- b) TCA pathway
- c) carbon sequestration
- d) None of the above

Q.9 *Periplaneta* belongs to which phylum?

- a) Mollusca
- b\*) Arthropoda
- c) Annelida
- d) Echinodermata

Q.10 Chrysophytes, Euglenoids, Dinoflagellates and Slime moulds are included in the kingdom?

- (a) Monera
- (b\*) Protista
- (c) Fungi
- (d) Animalia

Q.11 What is the name of the valve located between the left atrium and the left ventricle?

- a\*) Bicuspid valve
- b) Tricuspid valve
- c) Pulmonary valve
- d) Aortic valve

Q.12 Which part of the seed gives nutrition to the growth embryo?

- a\*) Endosperm
- b) Hilum
- c) Testa
- d) Tegmen

Q.13 Photosynthetic pigments found in the chloroplasts occur in

- a) Chloroplast envelope
- b) Matrix
- c) Plastoglobules
- d\*) Thylakoid membranes

Q.14 Which of the following pigments acts as a reaction-centre during photosynthesis?  
a) Cytochrome                      b\*) P700                      c) Carotene                      d) Phytochrome

Q.15 In photosynthesis, energy from light reaction to dark reaction is transferred in the form of  
a) Chlorophyll                      b\*) ATP                      c) ADP                      d) RuDP

Q.16 In photosystem I, the first electron acceptor is  
a) Plastocyanin                      b) Cytochrome  
c) Ferredoxin                      d\*) An iron-sulphur protein

Q.17 Which class has the largest number of animals?  
a) Fishes                      b) Reptiles                      c\*) Insects                      d) Mammals

Q.18 Identify the characteristic of acoelomates  
a) Absence of mesoderm  
b) Absence of brain  
c) Coelom that is incompletely lined with a mesoderm  
d\*) Solid body without a cavity surrounding internal

Q.19 Salamander belongs to the class  
a) Pisces                      b) Aves                      c) Reptiles                      d\*) Amphibian

- **Question No. 20 to 23 consist of two statements – Assertion (A) and Reason (R). Answer these questions selecting the appropriate option given below:**  
**(a) both Assertion and Reason are true and Reason is the correct explanation of Assertion.**  
**(b) both Assertion and Reason are true but Reason is not the correct explanation of Assertion.**  
**(c) Assertion is true but Reason is false.**  
**(d) Both assertion and reason is false**

**Q.20 Assertion:** The incomplete oxidation of glucose into lactic acid or ethanol is fermentation.  
**Reason:** In only prokaryotes, it takes place under anaerobic condition.

**Ans. (c)**

**Q.21 Assertion:** The long protein chain folds upon itself like a hollow ball giving rise to the tertiary structure.

**Reason :** Tertiary structure gives a 3-dimensional view of a protein.

**Ans. (b)**

**Q.22 Assertion :** Symbiosis is furnished by mycorrhiza.

**Reason :** In mycorrhiza, symbiosis is established between fungus and alga.

**Ans. (c)**

**Q.23 Assertion :** Oxidative phosphorylation requires oxygen.

**Reason :** Oxidative photophosphorylation occurs in mitochondria.

**Ans. (b)**

## SECTION-B

- **Short questions-**

Q.24 Why are enzymes called biocatalysts?

**Ans.** Catalysts are chemicals that affect the rate of a chemical reaction without changing the equilibrium point of the reaction. Enzymes are the organism's catalysts, and they are created in the live cell. As a result, they are referred to as biocatalysts.

Q.25 Discuss the salient features of viruses with the help of a diagram?

**Ans.** Viruses have the following characteristics:

- (i) They are a fraction of the size of bacteria.
- (ii) They can be filtered
- (iii) They can reproduce in host cells by utilising the host cell's enzymes and metabolic machinery.
- (iv) Their genetic substance is DNA/RNA.
- (v) These organisms are obligate parasites, self-replicating, and non-cellular.
- (vi) They have a capsid protein covering that protects the nucleic acid.
- (vii) They produce plant diseases such as mosaic, leaf curling, leaf roll, vein clearing, and so on.

Q.26 What is inflorescence? What are its two types?

**Ans.** The arrangement of groups or clusters of flowers on the floral axis is called an inflorescence. Inflorescence are of two main types: -

**i. Racemose Inflorescence:** - In racemose inflorescence, the main axis continues to grow and produces flowers laterally. The flowers are arranged in an acropetal succession which means that older flowers are at the base and younger flowers are at the tip.

**ii. Cymose Inflorescence:** - The primary axis (floral axis) of a cymose inflorescence stops in a flower, limiting its expansion. The blooms are arranged in a basipetal pattern, with the elder flowers at the top and the younger flowers at the bottom.

Q.27 List the hormones secreted by:

(i)Hypothalamus (ii)Pituitary (iii)Thyroid (iv)Adrenal

**Ans.** Hypothalamus secretes the thyrotropin-releasing hormone, adrenocorticotropin-releasing hormone, gonadotropin-releasing hormone, somatotropin-releasing hormone, prolactin-releasing hormone and melanocyte-stimulating hormone.

The hormones secreted by the pituitary gland are:

- Anterior pituitary or Pars distalis secretes Growth Hormone, Prolactin, Thyroid Stimulating Hormone, Adrenocorticotropic Hormone, Luteinizing Hormone and Follicle Stimulating Hormone.
  - Pars intermedia secretes Melanocyte Stimulating Hormone.
  - Pars nervosa secretes oxytocin and vasopressin
1. The thyroid gland secretes Thyroxine and Triiodothyronine.
  2. The parathyroid gland secretes parathyroid hormone.
  3. The adrenal gland secretes:
    - Adrenal medulla secretes adrenaline and noradrenaline.

- Adrenal cortex secretes glucocorticoids, and mineralocorticoids.. Aldosterone is the main mineralocorticoid in our body.

Q.28 What is stroke volume? What is its relation to cardiac output?

**Ans.** The volume of blood pumped by the heart during one cardiac cycle or one heart\* beat is referred to as stroke volume. Normally, this is 70 mL. The heart beats about 72 times every minute, and cardiac output refers to how much blood is pumped each minute. This is normally in the range of 4900 mL or litres.

Q.29 On what basis is the C3 and C4 pathways of photosynthesis selected?

**Ans.** On the basis of carbon atoms in the first stable product of carbon dioxide fixation.

Q.30 Do photosynthetic reactions such as dark reactions require light? Explain.

**Ans.** Dark reactions are light-independent reactions. Through various processes, carbon dioxide is reduced to glucose which does not require light. However, they rely upon the products formed during the light reactions (NADPH<sub>2</sub> and ATP).

Q.31 Mention two similarities between Aves and Mammals.

**Ans.** Both Aves and Mammals are homeotherms, i.e., warm-blooded. They have a four-chambered heart.

Q.32 Give examples for the animal having canal system and spicules

**Ans.** Scypha and Euspongilla and other members of Porifera have spicules and canal system in their body.

Q.33 Which is the only hormone that is secreted by the pars intermedia of the pituitary gland?

**Ans.** Melanocyte Stimulating Hormone (MSH).

Q.34 What is the product of the following? a) Aerobic glycolysis in skeletal muscle b) Anaerobic fermentation in yeast

**Ans.** a) Pyruvic acid.

b) C<sub>2</sub>H<sub>5</sub>OH + CO<sub>2</sub>

Q.35 Where is the electron transport system – ETS is located in mitochondria of a cell?

**Ans.** Inter membrane space – It is the site of oxidative phosphorylation.

Q.36 Which hormone is responsible for normal sleep cycle

**Ans.** There are a variety of hormones, which are responsible for sleep-wake cycles. This hormone includes– cortisol, melatonin, prolactin and thyroid-stimulating hormone- TSH.

Q.37 Name the eukaryotic kingdoms in the five-kingdom classification proposed by Whittaker.

**Ans.** The eukaryotic kingdoms in the five-kingdom classification are:

- Protista
- Fungi
- Animalia
- Plantae

Q.38 What is the nature of the cell wall in diatoms?

**Ans.** The cell wall of diatoms forms two thin overlapping cells. It is made up of silica.

Q.39 Who proposed the five-kingdom classification?

**Ans.** Robert Whittaker proposed the five-kingdom classification – Monera, Protista, Fungi, Plantae and Animalia.

Q.40 How do the roots of the plants growing in swamps and marshes obtain their oxygen?

**Ans.** The roots of the plants growing in swamps and marshes grow vertically upwards and respire. They become negatively geotropic.

Q.41 What are Adventitious roots?

**Ans.** The roots developed from different parts of the plant other than radicle are called as the Adventitious roots.

### SECTION-C

- **Answer in brief-**

Q.42 “Mammals are the most successful & dominant animals today” Give evidence.

**Ans.** Mammals are the most successful and dominant animals on the planet today. They thrive in the majority of the world's environments. The unique characteristics of mammals are: -

- (i) Body covered with hair.
- (ii) Presence of sweat and sebaceous glands in the skin.
- (iii) Presence of mammary glands in females that produce milk.
- (iv) Presence of a pair of external ears and three ear ossicles i.e., malleus, incus and stapes.
- (v) The heart has four chambers.
- (vi) RBCs are biconcave and lack a nucleus (enucleated).
- (vii) The testis is located outside the abdomen in a special pouch called the scrotum.
- (viii) Mostly viviparous (produces young ones).
- (ix) The embryo is attached to the uterine wall with the help of the placenta.
- (x) The skull is dicondylic, i.e., it has two occipital condyles.

Q.43 Describe Co-factors and its types.

**Ans.** A cofactor is a non-protein chemical compound or metallic ion that is required for an enzyme's activity. Cofactors can be considered "helper molecules" that assist in biochemical transformations. The rates at which these happen are characterized by enzyme kinetics. Cofactors can be subclassified as either inorganic ions or complex organic molecules called coenzymes, the latter of which is mostly derived from vitamins and other organic essential nutrients in small amounts.

Cofactors, mostly metal ions or coenzymes, are inorganic and organic chemicals that assist enzymes during the catalysis of reactions. Coenzymes are non-protein organic molecules that are mostly derivatives of vitamins soluble in water by phosphorylation; they bind apoenzyme to proteins to produce an active holoenzyme. Apoenzymes are enzymes that lack their necessary cofactor(s) for proper functioning; the binding of the enzyme to a coenzyme forms a holoenzyme. Holoenzymes are the active form of an apoenzyme.

holoenzyme Cofactors can be metals or coenzymes, and their primary function is to assist in enzyme activity. They are able to assist in performing certain, necessary, reactions the enzyme cannot perform alone. They are divided into coenzymes and prosthetic groups. A holoenzyme refers to a catalytically active enzyme that consists of both apoenzyme (enzyme without its cofactor(s)) and cofactor.

Q.44 Write distinct characteristics of fungi.

**Ans.** The distinct characteristics of fungi are as follows:

1. They are predominantly multicellular (except Yeasts), non-chlorophyllous eukaryotic organisms.
2. Due to absence of chlorophyll the modes of nutrition in fungi are heterotrophic and absorptive. The mode of nutrition may be saprophytic or parasitic.
3. Cell wall composed of chitin is found in fungi. In some forms of fungi cell wall also contains fungal cellulose.
4. Fungi has double envelope cellular organization.
5. Fungi reproduce asexually as well as sexually. Sexual reproduction involves
  - plasmogamy (fusion of cytoplasm)
  - karyogamy (fusion of gametic nuclei) and
  - meiosis.
6. Fungi are mainly the decomposers and mineralisers of the biosphere. They play an important role in nutrients recycling.

Q.45 What is aestivation? What are its different types and give examples?

**Ans.** Aestivation is the positional arrangement of sepals or petals in a floral bud. Different types of aestivations are: -

**(a) Valvate Aestivation:** - Petals or sepals meet each other at the edge. They are arranged without overlapping. Example: - Guava and mustard.

**(b) Twisted Aestivation:** - The overlapping of petals or sepals is done by one margin of each petal over the margin of adjacent petals. Example: - China Rose and cotton.

**(c). Imbricate Aestivation:** -The margins of sepals and petals overlap. They do not overlap in a specific direction. Example: - Cassia and Gulmohar.

**(d). Quincuncial Aestivation:** - The arrangement in which out of five parts of the flower, two petals or sepals are positioned internally, two petals or sepals are positioned externally, and the fifth part is situated externally at the margin. Example: - Guava.

**(e).Vexillary Aestivation:** - There are five petals. The largest petal overlaps the 2 lateral petals which successively overlap the 2 smallest anterior petals. Example: - Bean and pea.

Q.46 Briefly explain the chemi-osmotic hypothesis with suitable diagram.

**Ans.** The mechanism of ATP synthesis in chloroplasts was explained by the chemiosmotic hypothesis. ATP generation in photosynthesis is tied to the formation of a proton gradient across a membrane. These are thylakoids membranes. The proton accumulation is toward the membrane's interior (in the lumen).

The mechanisms that happen during electron activation and transit to establish the steps that lead to the formation of a proton gradient. The establishment of a proton gradient is linked to the synthesis of ATP.

Q.47 Explain the mechanism of hormone action.

**Ans.** Mechanism of Hormone Action: - The mechanism of hormone action in the human body is grouped into two categories:

- A. Fixed membrane receptor mechanism
- B. Mobile receptor mechanism

**A. Fixed membrane receptor mechanism:**

- i. This type of mechanism is exhibited by the water-soluble hormones such as the growth hormone, oxytocin, ADH, etc., made up of amines or proteins.
- ii. These hormones are unable to penetrate through the lipid membrane. These hormones bind to their target receptor present on the cell membrane.
- iii. The enzyme adenyl cyclase in the cell membrane is activated when the hormone binds to the specific target receptor. This aids in the synthesis of cyclic AMP (cAMP).
- iv. Cyclic AMP (cAMP) acts as a secondary messenger. It diffuses through the cell membrane and causes biochemical changes by activating various enzyme activities.

**B. Mobile Receptor Mechanism:**

- i. Lipid soluble hormones, such as fatty acids and steroids, exhibit this type of mechanism because they can easily pass through the plasma membrane.
- ii. They have intracellular receptors. Hormones bind to the target receptor, which activates the enzymatic activity of cells and causes biochemical changes.
- iii. The hormone-receptor complex initiates DNA transcription.
- iv. The mRNA is converted into protein. This protein alters the biochemistry of the cell.

**OR**

Describe the physiological functions and disorders of the thyroid gland.

**Ans.** The thyroid gland is a ductless endocrine gland that is situated in the front part of the neck. It has a butterfly-like shape. The main function of the thyroid gland is to produce two hormones-

(i) Tri-iodothyronine ( $T_3$ ) hormone and (ii) Tetra-iodothyronine or Thyroxine hormone ( $T_4$ ). Both hormones play a very important role in the body stimulating all metabolic activities.

**A. Physiological functions of the thyroid gland: -**

- The thyroid gland is essential for growth and development.
- Thyroid hormones control the oxidation of food substances (mainly carbohydrates and proteins).
- Thyroid hormones are also responsible for controlling the basal metabolic rate (BMR).
- The thyroid gland also secretes thyrocalcitonin (TCT), a protein hormone, which regulates the  $Ca^{++}$  level in the blood.
- It promotes the differentiation of tissues.
- It enhances protein synthesis in almost all tissues of the body.
- It promotes the metamorphosis of tadpoles into adult frogs.

**B. Disorders of the thyroid gland: -**

- Goiter:-** The under secretion (hyposecretion) of the thyroid leads to the enlargement of thyroid tissues. The neck protrudes in front as a collar known as endemic goiter.
- Hyperthyroidism:-** It is a condition in which the thyroid gland produces excess thyroid hormones.
- Cretinism:-** It is caused by extreme hypothyroidism in childhood and infancy. The symptoms include delayed growth (mental, bodily, and sexual), thickening of the skin and subcutaneous tissues, a potbelly, and a protruding tongue.
- Myxoedema (mucous swelling):-** A condition caused by under secretion of the thyroid at the adult stage. The symptoms include dry, coarse skin, loss of hair, swelling of the face, slowed heart rate, and lack of alertness.

Q.48 Briefly describe the following:

(i) Anaemia      (ii) Angina pectoris      (iii) Hypertension

**Ans.**

- Anaemia is the decrease in the amount of haemoglobin. Various types of anaemia are:  
Nutritional anaemia is due to iron deficiency in the blood.  
Vitamin B12 and folic acid deficiency cause megaloblastic anaemia.  
Pernicious anaemia is due to the deficiency of B12. In this type of anaemia, neurons disturb the myelin sheath formation of neurons. Also, it is fatal.  
Sickle cell anaemia is a hereditary autosomal recessive disorder. The anaemia is characterised by the presence of sickle haemoglobin in which RBC are sickle-shaped. The RBCs are not capable of carrying enough oxygen to the tissues.  
Thalassaemia is an autosomal recessive disorder. In which either the alpha or beta chain of haemoglobin is not synthesised.
- Angina pectoris can occur in men and women of any age but is more common in early and middle-aged individuals. In this, enough oxygen does not reach the heart muscles. Due to the affected blood flow, the individual experiences acute chest pain. No problem is encountered during routine work, but pain may develop due to exertion or exercise.
- High blood pressure is called hypertension. The pressure exerted by blood flow on the elastic walls of arteries is known as blood pressure. The usual range of blood pressure is 120/80 mm



Hg. 120 mm Hg is the systolic pressure or pumping pressure. 80 mm Hg is the diastolic pressure or resting pressure. When this range is higher and above 140/90 mm Hg, it is called Hypertension. The condition affects vital organs of the body like the heart, brain and kidney.

Q.49 How are co-factors different from prosthetic groups?

**Ans.** Prosthetic groups are organic compounds whereas cofactors can be organic or inorganic (metal ions). Prosthetics are distinguished from cofactors as they are tightly bound to the apoenzyme.

Q.50 What are Biomolecules?

**Ans.** Biomolecules are the essential organic molecules, primarily involved in the maintenance and metabolic processes of living organisms.

Q.51 What are the main functions of carbohydrates?

**Ans.** The main function of carbohydrates are:

- 1 Regulation of blood glucose.
- 2 Involved in fat metabolism and prevents ketosis.
- 3 Provide energy and food to the body and to the nervous system.
- 4 Functions as the basic component of food including fibre, starch, and sugars.
- 5 They are the primary source of energy. Therefore involved in the breakdown of starch into glucose, and proteins to produce energy for metabolism.

Q.52 What happens if the blood does not coagulate?

**Ans.** Blood coagulates or clots whenever there is an injury or trauma. Coagulation limits unnecessary blood (<https://byjus.com/biology/blood/>) loss from the body. Its absence can cause huge blood loss and can be fatal.

Q.53 Give examples of warm and cold-blooded animals?

**Ans.** All birds and mammals are examples of warm-blooded animals.

All amphibians -frogs, toads, and salamanders, aquatic animals, such as alligators, crocodiles, sharks, lizards, fish, snakes, turtles, tortoises, and some insects such as the dragonflies and bees are all examples of cold-blooded animals.

## SECTION-D

- **Long questions-**

Q.54 Explain double circulation with the help of a diagram.

**Ans.** The heart is the organ that pumps blood around the body. It circulates blood through closed channels to numerous body organs. Blood flows from the left ventricle to the aorta, which transports it to the arteries that nourish the body's organs. The superior and inferior vena cava veins return blood from the bodily tissues to the right atrium. Systemic circulation is the term for this sort of circulation.

Blood is pumped from the right ventricle into the pulmonary trunk, which is divided into pulmonary arteries, each of which leads to the lung. Here the blood is oxygenated. The oxygenated blood is returned to the left atrium through pulmonary veins. This is called pulmonary circulation.

Q.55 Give the various steps involved in Glycolysis.

**Ans.** The steps are as follows

1. Glucose is phosphorylated in the presence of ATP, catalyzed by the enzyme hexokinase.
2. Glucose – 6 – phosphate is changed into fructose – 6 – phosphate catalyzed by phosphohexose isomers.
3. Fructose – 6 – phosphate is phosphorylated in the presence of ATP to form Fructose 1, 6 biphosphates.
4. Fructose 1, 6 biphosphates is split into two molecules of triose phosphate one of 3 – phosphoglycerate dehyde and one of dihydroxyacetone phosphate, which is interconvertible. This reaction is catalyzed by phosphofruktokinase.
5. 3 – phosphoglyceraldehyde is oxidized to 1,3 biphosphoglycerate, with the reduction of NAD to NADH.
6. Phosphoglycerate kinase catalyzes the formation of 3-phosphoglycerate to 1,3 biphosphoglycerate and 1 molecule of ATP is produced directly (substrate phosphorylation).
7. 3-phosphoglycerate is converted into 2-phosphoglycerate and then into phosphoenolpyruvate (PEP)
8. PEP is converted into pyruvate along with the formation of one molecule of ATP directly. The enzyme pyruvate kinase catalyzes this step.

Q.56 Enlist the main features of Aschelminthes and give examples with suitable diagram.

**Ans.** The main features of Aschelminthes are: -

- (i) They are called roundworms as they appear circular in C.S.
- (ii) Free-living, aquatic, terrestrial or parasitic.
- (iii) The organization of the body is organ level.
- (iv) Bilaterally symmetrical animals.
- (v) They are triploblastic and pseudocoelomate.
- (vi) Alimentation is complete with the muscular or pharynx.
- (vii) Sexes are Separate.
- (viii) The body is covered by a cuticle.
- (ix) Fertilization is internal.

**(x)** Example: - Filarial worm (Wuchereria), Ascaris, Pinworm (Enterobius) and Hookworm (Ancylostoma).

**OR**

What is a flower? Describe the parts of typical angiosperm plants with the help of a diagram.

**Ans.** The flower is a modified shoot with nodes and modified floral leaves. The parts of typical angiosperm plants are: -

**i. Calyx (Sepals):** - It is the green outer whorl of the flower. The members of the calyx are termed sepals. It is a leaf-like structure. It performs an important role in the protection of the flower in the bud stage. It may be 'polysepalous' i.e., sepals free or 'gamosepalous' i.e., sepals united.

**ii. Corolla (Petals):** - It is the second whorl of the flower situated inside the sepals. The petals are usually bright and colourful. The insects are attracted to the brightly coloured petals so they add in pollination. The lower, stalk-like portion of the petal is known as a claw. The upper, extended portion is known as a limb.

**iii. Androecium (male reproductive part):** - Androecium, a male reproductive part of a flower, consists of the stamen. Each stamen is made up of two parts: Filament and Anther.

**a) Anther:** - It is a bilobed structure. Each anther lobe contains two pollen sacs. Pollen sacs produce pollen grains.

**b) Filament:** - It is a stalk-like structure by which anther lobes are attached is called a filament.

**iv. Gynoecium (female reproductive part):** - It is made up of one or more carpels. A carpel consists of 3 parts: - Stigma, Style and Ovary.

**a) Stigma:** - Stigma is the uppermost part of the pistil and is the receptive surface for pollen grains.

**b) Style:** - It is a stalk-like structure that connects the stigma to the ovary.

**c) Ovary:** - The basal part that bears one or more ovules attached to a flattened cushion-like placenta.

Q.57 Describe the Rh-incompatibility in humans.

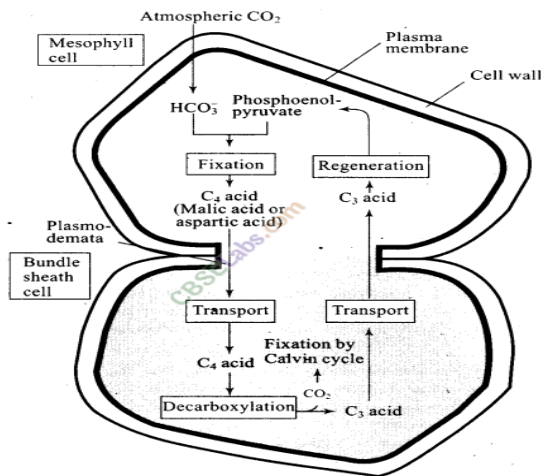
**Ans.** Rh antigen is seen on the RBC surface of majority humans, these are called Rh-positive individuals and when the antigen is absent they are Rh-negative individuals. Both these individuals are phenotypically normal individuals. However, in these individuals, a problem emerges during pregnancy or transfusion of blood. The first blood transfusion from Rh-positive blood to the Rh-negative individual leads to no harm as the Rh-negative person acquires antibodies or Rh factors in their blood. During the second transfusion of blood, from Rh-positive blood to the Rh-negative individual, the antibodies already formed attack to destruct the RBC of the donor. In pregnancy, if the father's blood is Rh-positive and the mother's blood is Rh-negative, the blood of the fetus will be Rh-positive, which leads to serious issues. The Rh antigens of the fetus are not exposed to the Rh-positive blood of the mother during the first pregnancy, as they are separated from the placenta. But in the succeeding Rh-positive fetus, the anti-Rh factors from the mother destruct the RBCs of the fetus as the blood mixes which causes hemolytic disease in

the newborn(HDN) known as erythroblastosis fetalis. This can be prevented through the administration of anti-Rh antibodies to the mother after the delivery of the first child.

## SECTION-E

- **Case based question**

**Q.58 Observe the diagram and answer the following questions(i to iv) given below:**



- Which group of plants exhibits these two types of cells?
- What is the first product of C<sub>4</sub> cycle?
- Which enzyme is there in bundle sheath cells and mesophyll cells?
- What are the advantages of this pathway?

**Ans.** (i) C<sub>4</sub> plants

(ii) OAA (Oxaloacetic acid)

(iii) Phosphoenolpyruvate (PEP) is present in the mesophyll cells. Enzyme Ribulose biphosphate carboxylase-oxygenase (RuBisCO) is present in bundle sheath cells.

(iv) The C<sub>4</sub> cycle works in plants that are suited to high light intensity, high temperature, and low water availability.

**Q.59 case based questions-(Read the following and answer (i to iv))**

Pancreas is a composite gland which acts as both exocrine and endocrine gland. The endocrine pancreas consists of 'Islets of Langerhans'. The two main types of cells in the Islet of Langerhans are called α-cells and β-cells. The α-cells secrete a hormone called glucagon, while the β-cells secrete insulin. Glucagon is a peptide hormone, and plays an important role in maintaining the normal blood glucose levels. Insulin is a peptide hormone, which plays a major role in the regulation of glucose homeostasis.

- (i) Enlist the name of hormones secreted by  $\alpha$ -cells and  $\beta$ -cells.
- (ii) Name the hormone which involves in regulation of glucose homeostasis.
- (iii) What is main difference between hyperglycemia and hypoglycemia?
- (iv) Name the disease caused by the deficiency of insulin hormone in the body.

**Ans.**

- (i) The  $\alpha$ -cells secrete a hormone called glucagon, while the  $\beta$ -cells secrete insulin.
- (ii) The glucose homeostasis in blood is thus maintained jointly by the two – insulin and glucagons. Insulin is a peptide hormone, which plays a major role in the regulation of glucose homeostasis. Insulin acts mainly on hepatocytes and adipocytes (cells of adipose tissue), and enhances cellular glucose uptake and utilisation.
- (iii) Hyperglycemia is the condition in which sugar level in blood is increased. While hypoglycemia is the condition in which sugar level in blood is decreased.
- (iv) Diabetes is caused by the deficiency of a hormone known as insulin.

Q.60 Name the floral parts of an angiosperm.

**Ans.** Following are the floral parts of a typical angiosperm:

- Calyx- Outermost whorl of the flower. It comprises of sepals. They are usually green and protective.
- Corolla- It comprises of petals. These are bright in colour.
- Androecium- It is made up of stamens which is the male reproductive organ. It consists of a filament and anther.
- Gynoecium- It is the female reproductive part of the flower and is made up of one or more carpels. Each carpel comprises of stigma, style, and ovary.