CBSE Class 11 Biology

Sample Paper 05 (2020-21)

Maximum Marks: 70

Time Allowed: 3 hours

General Instructions:

i. All questions are compulsory.
ii. The question paper has four sections: Section A, Section B, Section C and Section D. There are 33 questions in the question paper.
iii. Section–A has 14 questions of 1 mark each and 02 case-based questions. Section–B has 9 questions of 2 marks each. Section–C has 5 questions of 3 marks each and Section–D has 3 questions of 5 marks each.
iv. 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.
v. Wherever necessary, neat and properly labeled diagrams should be drawn.

Section A

1. A ball of snow when rolled over snow increases in mass, volume and size. Is this comparable to growth as seen in living organisms? Why?
2. What is the function of cuboidal epithelium?
3. In the ocean life which plant is the major producer?
4. Which filaments are responsible for muscle contraction?
5. What is the difference between valvate and twisted aestivation?
6. What is the function of dendrites in a neuron?
7. Which cell in humans does not have capacity to repair through cell division?
8. What are the end products of alcoholic fermentation?
9. Which structure is formed from the ruptured follicle in females? What is its role?
10. Terrestrial animals are generally either ureotelic or uiricotelic, not ammonotelic, why?
11. **Assertion:** Two kingdom classification used for a long time was found inadequate.
    Reason: This system did not distinguish between the eukaryotes and prokaryotes, unicellular and multicellular organisms and photosynthetic and non-photosynthetic

organisms.

a. Assertion and reason both are correct statements and reason is correct explanation for assertion.
b. Assertion and reason both are correct statements but reason is not correct explanation for assertion.
c. Assertion is correct statement but reason is wrong statement.
d. Assertion is wrong statement but reason is correct statement.

OR

Assertion: Five kingdom classification includes Monera, Protista, Fungi, Plantae and Animalia.

Reason: They have different cell structure, thallus organisation, mode of nutrition and phylogenetic relationships.

a. Assertion and reason both are correct statements and reason is correct explanation for assertion.
b. Assertion and reason both are correct statements but reason is not correct explanation for assertion.
c. Assertion is correct statement but reason is wrong statement.
d. Assertion is wrong statement but reason is correct statement.

12. **Assertion:** A coenzyme or metal ion that is very tightly bound to enzyme protein is called a prosthetic group.

    Reason: A complete, catalytically active enzyme together with its bound prosthetic group is called apoenzyme.

    a. Assertion and reason both are correct statements and reason is correct explanation for assertion.
    b. Assertion and reason both are correct statements but reason is not correct explanation for assertion.
    c. Assertion is correct statement but reason is wrong statement.
    d. Assertion is wrong statement but reason is correct statement.

13. **Assertion:** A special membranous structure is a mesosome which is formed by the extensions of the plasma membrane into the cell.

    Reason: In some prokaryotes like cyanobacteria, there are other membranous extensions chromatophores present but mesosome absent.

a. Assertion and reason both are correct statements and reason is correct explanation for assertion.
b. Assertion and reason both are correct statements but reason is not correct explanation for assertion.
c. Assertion is correct statement but reason is wrong statement.
d. Assertion is wrong statement but reason is correct statement.

14. **Assertion:** When pure oxygen given to a patient for long time he will die.
Reason: The role of oxygen in the regulation of respiratory rhythm is quite insignificant.
a. Assertion and reason both are correct statements and reason is correct explanation for assertion.
b. Assertion and reason both are correct statements but reason is not correct explanation for assertion.
c. Assertion is correct statement but reason is wrong statement.
d. Assertion is wrong statement but reason is correct statement.

15. **Read the following and answer any four questions:**
Plastids are found in all plant cells and in euglenoids. These are easily observed under the microscope as they are large. They bear some specific pigments, thus imparting specific colours to the plants. Plastids consist of numerous membrane layers embedded in a material called the stroma. They have their own genome and ribosomes.
i. The _____ are the colourless plastids of varied shapes and sizes with stored nutrients.
a. Leucoplasts
b. Chloroplasts
c. Chromoplasts
d. Carotenoids
ii. The _____ store proteins in grains.
a. Amyloplasts
b. Aleuroplasts
c. Elaioplasts
d. Carotenoid
iii. Which type of plastid stores carbohydrates in potatoes?
a. Amyloplasts
b. Aleuroplasts

c. Elaioplasts
d. Carotenoid

iv. The space limited by the inner membrane of the chloroplast is called the stroma.
a. Matrix
b. Cytoplasm
c. Stroma
d. Lumen

v. **Assertion:** The chloroplasts contain chlorophyll and carotenoid pigments which are responsible for trapping light energy essential for photosynthesis.
Reason: They also impart colours to the parts of the plant as yellow, orange or red colour.
a. Both assertion and reason are true, and reason is the correct explanation of the assertion.
b. Both assertion and reason are true, and reason is not the correct explanation of the assertion.
c. Assertion is true but reason is false.
d. Both assertion and reason are false.

16. **Read the following and answer any four questions:**
Human beings have a significant ability to maintain and moderate the respiratory rhythm to suit the demands of the body tissues. This is done by the neural system. A specialised centre present in the medulla region of the brain called respiratory rhythm centre is primarily responsible for this regulation. The disorders of the respiratory system can lead to asthma, emphysema and occupational respiratory disorders.

i. The respiratory rhythm centre is present in the _____ region of the brain.
a. Pons
b. Medulla
c. Cerebellum
d. Cerebrum

ii. _____ is a difficulty in breathing that causes wheezing.
a. Asthma
b. Emphysema
c. Bronchitis
d. Whooping cough

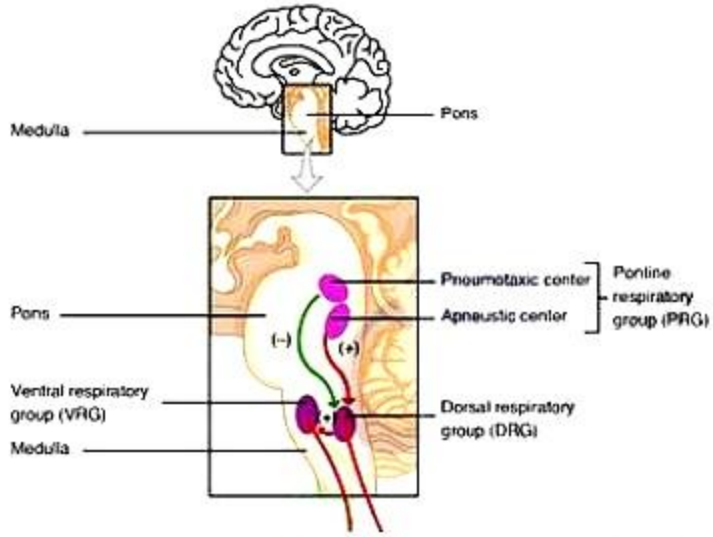
iii. A chemosensitive area situated adjacent to the rhythm centre, is highly sensitive to CO2 and _____ ions.

a. Bicarbonate
b. Oxygen
c. Hydrogen
d. Sodium

iv. One of the major causes of _____ is cigarette smoking.

a. Asthma
b. Emphysema
c. Bronchitis
d. Whooping cough

v. The following statements are drawn as conclusions for the image shown.



I. A centre present in the pons region of the brain called pneumotaxic centre can moderate the functions of the respiratory rhythm centre.
II. There are two specialised respiratory centres in the brain.
III. Receptors associated with aortic arch and carotid artery also can recognise changes in CO_2 and H^+ concentration and send necessary signals to the rhythm centre for remedial actions.
IV. The role of oxygen in the regulation of respiratory rhythm is quite significant.

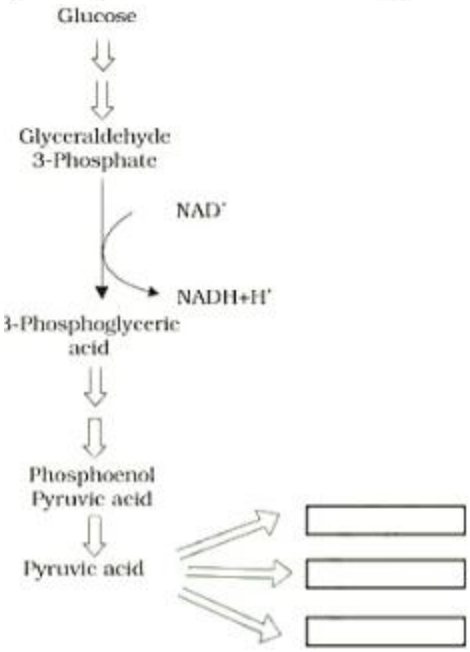
Choose from below the correct alternative.

a. Only I is true
b. I and III are true
c. II and IV are true

d. I and III are true

Section B

17. Pyruvic acid is the end product of glycolysis. What are the three metabolic products of pyruvic acid produced under aerobic and anaerobic conditions? Write their name in the space provided in the diagram.



18. Many discoveries in science have been accidental. This is true for plant hormones also. Can you justify this statement by giving an example? Also what term is used for such accidental findings?
19. Give a brief description of the neural system.
20. It is known that red muscle fibres in animals can work for longer periods of time continuously. How is this possible?

OR

Give a diagrammatic representation of the ATP synthesis process.

21. $2H_2O \rightarrow 2H^+ + 4e^- + O_2\uparrow$ Based on the above equation, answer the following questions
    i. Where does this reaction take place in plants?
    ii. What is the significance of this reaction?
22. How many molecules of carbondioxide, ATP and NADPH are required to make one molecule of glucose?

OR

What is photorespiration?

23. Describe the inflorescence type of Solanaceae family.
24. Write short notes on the functions of the following hormones. Thymosins
25. How do the appendages support the bird's body?

Section C

26. Name the site (s) of pyruvate synthesis. Also, write the chemical reaction, wherein pyruvic acid dehydrogenase acts as a catalyst.
27. What is the symmetry of a flower?
28. In what kind of plants do you come across Kranz anatomy? To which conditions are those plants better adapted? How are these plants better adapted than the plants, which lack this anatomy?
29. **Differentiate between**
    i. Chromatin and Chromatid
    ii. Interphase and Prophase
30. What are the inadequacies of two kingdom system of classification?

OR

Define the term mycorrhiza. How are these associations affect a plant? Explain with examples.

Section D

31. What are basis of classification of Animal Kingdom? Give detail on levels organisation.

OR

What are the keg features of Mollusca?

32. Describe various forms of lipid with a few examples.

OR

Formation of enzyme-substrate complex (ES) is the first step in catalysed reactions. Describe the other steps till the formation of product.

33. Why is the closed circulatory system more efficient than the open system?

OR

Why is it necessary to check the Rh factor of the blood in a pregnant woman?

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Solution

Section A

1. No, this is not growth, as an increase in the size of the ball of snow is just because of the addition of similar material externally.
   In living organisms, growth is due to an increase in body material from inside.
2. Cuboidal epithelium helps in secretion and absorption.
3. Algae.
4. Actin and myosin filaments are responsible for muscle contraction.
5. In valvate aestivation sepals or petals don't overlap, while in twisted activations sepals or petals slightly overlap.
6. Dendrites receive electrical impulses from the axons of neurons.Dendrites that receive these nerve signals can communicate them to other neurons in order to cause action potentials and communication signals to propagate or to dissolve.
7. Neuron cell.
8. Ethyl alcohol and CO_2 are the end products of alcoholic fermentation.
9. Corpus luteum is formed from the ruptured follicle in females which secretes progesterone.
10. Ammonia is the most toxic amongst all excretory products and needs lots of water to be removed from the body. In terrestrial animals availability of water is not as much as in aquatic animals. So a mechanism needed to be developed to ensure less wastage of water during removal of excretory substances. This became possible by using ureotelic and urecotelic mode of excretion.
11. (a) Assertion and reason both are correct statements and reason is correct explanation for assertion.
    Explanation: Two kingdom classification was accepted for a long time but it did not distinguish between the eukaryotes and prokaryotes, unicellular and multicellular organisms and photosynthetic and non-photosynthetic organisms. It classifies the organisms into two categories - plants and animals. However, a large number of organisms did not fall into these two categories so the two kingdom classification used for

a long time was found inadequate.

OR

(a) Assertion and reason both are correct statements and reason is correct explanation for assertion.

Explanation: The five-kingdom system was developed by Robert H. Whittaker in 1969 which includes five major Kingdoms - Monera, Protista, Fungi, Plantae, and Animalia. The main criteria of the five-kingdom classification were cell structure, body organization, mode of nutrition and reproduction, and phylogenetic relationships.

12. (c) Assertion is correct statement but reason is wrong statement.

    Explanation: Coenzyme or metal ion that is tightly bound to enzyme protein is called prosthetic group. A complete catalytic active enzyme with its bound prosthetic group is called holoenzyme.

13. (b) Assertion and reason both are correct statements but reason is not correct explanation for assertion.

    Explanation: Assertion and reason both are correct statements but reason is not correct explanation for assertion.

14. (a) Assertion and reason both are correct statements and reason is correct explanation for assertion.

    Explanation: Assertion and reason both are correct statements and reason is correct explanation for assertion.

15. i. (a) The leucoplasts are the colourless plastids of varied shapes and sizes with stored nutrients.
    ii. (b) The aleuroplasts store proteins in grains.
    iii. (a) Amyloplasts are leucoplasts store carbohydrates (starch) in potato.
    iv. (c) The space limited by the inner membrane of the chloroplast is called the stroma.
    v. (c) The chloroplasts contain chlorophyll and carotenoid pigments which are responsible for trapping light energy essential for photosynthesis. The chromoplasts impart colours to the parts of the plant as yellow, orange or red colour. Hence, Assertion is true but reason is false.

16. i. (b) The respiratory rhythm centre is present in the medulla region of brain.
    ii. (a) Asthma is a difficulty in breathing causing wheezing due to inflammation of bronchi and bronchioles.

iii. (c) A chemosensitive area is situated adjacent to the rhythm centre which is highly sensitive to CO_2 and hydrogen ions.

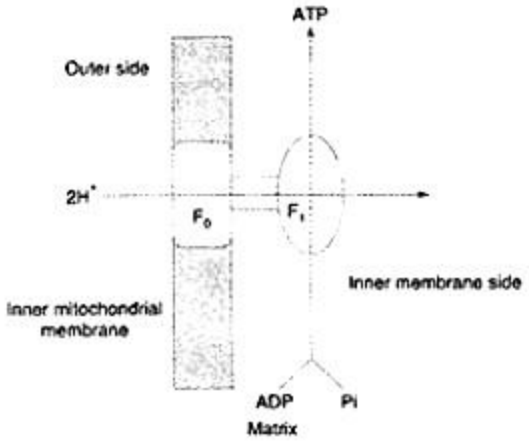
iv. (b) Emphysema is a chronic disorder in which alveolar walls are damaged due to which respiratory surface is decreased. One of the major causes of emphysema is cigarette smoking.

v. (b) A centre present in the pons region of the brain called pneumotaxic centre can moderate the functions of the respiratory rhythm centre. There are three specialized respiratory centres in the brain. Receptors associated with the aortic arch and carotid artery also can recognize changes in CO_2 and H^+ concentration and send necessary signals to the rhythm centre for remedial actions. The role of oxygen in the regulation of respiratory rhythm is quite insignificant. Hence, option b. is correct.

Section B

17. The three metabolic products of pyruvic acid produced under aerobic and anaerobic conditions are:
    i. Lactic acid
    ii. Ethanol
    iii. Acetyl CoA
18. This is true that all the five plant hormones have been discovered accidentally. For example; auxin was accidentally discovered by Charles Darwin and his son Francis Darwin. They observed that coleoptiles of canary grass responded to unilateral illumination by growing towards the source of light. Auxin was later isolated from coleoptiles of oat seedlings F.W. Went.
    The term used for accidental discovery is 'serendipity'.
19. The neural system is composed of specialized cells called neurons. It detects stimuli and transmits neural signals. The neural system of complex animals is composed of two parts, viz. central neural system and peripheral neural system. The brain and nerve cord comprise the central neural system and other nerves comprise the peripheral neural system.
20. Red or dark muscles store myoglobin and hence, oxygen for meeting the gap between supply and consumption during continuous activity. Therefore, these muscles can continuously work and respire aerobically for long periods. The high proportion of these muscles allow athletes to participate in long-duration events like cycling, swimming and distance running, etc.

OR



ATP synthesis in Mitochondria

21. i. Lumen of the thylakoids.
    ii. O_2 is evolved during this reaction, moreover electrons are made available to PS-II continuously.
22. (i) Carbondioxide 6 molecules
    (ii) ATP 18 molecules
    (iii) NADPH 12 molecules.

OR

In C_3 plants some O_2 does bind to RuBisCO, and hence CO_2 fixation is decreased. Here the RuBP instead of being converted to 2 molecules of PGA binds with O_2 to form one molecule and phosphoglycolate in a pathway called photorespiration. In the photorespiratory pathway, there is neither synthesis of sugars, nor of ATP. Rather it results in the release of CO_2 with the utilization of ATP. In the photorespiratory pathway, there is no synthesis of ATP or NADPH. Therefore, photorespiration is a wasteful process.

23. Solitary, axillary or terminal, umbellate or occasionally helicoid and scorpoid cyme.
24. **Functions of Thymosins.** Thymosins play a major role in the differentiation of T-lymphocytes, which provide cell mediated immunity. In addition, thymosins also promote production of antibodies to provide humoral immunity.
25. Birds have two pairs of limbs, forelimbs are modified into wings for flight. The wings are powered by the powerful flight or breast muscles attached to the large sternum of the

breast bone. Hindlimbs support the body and used for grasping, perching, wading, and swimming.

Section C

26. Pyruvate synthesis takes place in the cytoplasm by the process of glycolysis.
The chemical reaction, wherein pyruvic acid dehydrogenase acts as a catalyst is as follows:
The reactions catalysed by pyruvic dehydrogenase require the participation of several coenzymes, including NAD^+ and Co-A.

$$\text{Pyruvic acid} + \text{Co-A} + NAD^+ \xrightarrow[\textit{Pyruvate dehydrogenase}]{Mg^{2+}} \text{Acetyl Co-A} + NADH + H^+$$

27. **Symmetry of flowers:**
Actinomorphic. When a flower can be divided into two equal radial halves in any radial plane passing through the centre, it is said to be actinomorphic, e.g. mustard, datura, chilli.
- **Zygomorphic** . When it can be divided into two similar halves only in one particular vertical plane, it is zygomorphic, e.g. pea, gulmohur, bean, Cassia.
- **asymmetric.** If it cannot be divided into two similar halves by any vertical plane passing through the centre, as in canna.
28. Kranz anatomy is found in C_4 plants; such as maize, sugarcane, etc. These plants can tolerate high temperature and high intensity of light. These plants are also adapted to live in the limited supply of nitrogen and carbon dioxide. These plants do not carry photorespiration; unlike C_3 plants. This helps in making the optimum amount of glucose. Hence, C_4 plants produce more biomass compared to C_3 plants.
29. **Difference between Chromatin and Chromatid:**

Chromatin	Chromatid
Chromatins are “minute thread-like staining heredity material found in the nucleus of a cell. ”	A chromatid is defined “as longitudinal half of each chromosome found during prophase.”

Difference between Interphase and Prophase:

Interphase	Prophase

It is called the resting phase of the cell in which the cell is not engaged in the division but DNA synthesis occurs.	Starting stage of cell division where condensation of chromatin occurs into chromosomes. The nuclear membrane is dissolved at late prophase.

30. The two Kindom systems of classification are inadequate due to new developments and information about the organisms.

Some of the inadequacies of these systems are:

i. It is difficult to identify and distinguish the lower animals or plants because a few of them have common characters. Example - Euglena, a single-celled organism, possesses a mixture of animal and plant characteristics. It has chlorophyll but it is a heterotroph also.

ii. Bacteria are microscopic organisms having a cell wall. They have prokaryotic cellular organisation lacking a nuclear membrane. They seem to be plants rather than animals because some of them are able to synthesize food.

iii. The position of slime moulds, Chlamydomonas, sponges, lichens and diatoms is not clear in this system.

OR

Mycorrhiza is a mutually beneficial or symbiotic association of fungi with roots of higher plants. Orchids grow as an epiphyte on plants, have their roots associated with fungi right from the seedling stage. Many orchids cannot survive without mycorrhizae associations. Many forest trees such as pines appear stunted if mycorrhizal associations are absent. In the presence of these associations, these plants absorb 2-3 times more nitrogen, potassium, and phosphorus compared to without them.

Section D

31. Basis of Classification is as follows:

- Level of Organisation
- Symmetry
- Layers of Cells
- Presence or Absence of Coelom
- Segmentation
- Presence or Absence of Notochord

Levels of Organisation

- **Cellular Level.** In some multicellular animals, the cell is responsible for all the metabolic activities in the animal body. This type of organization of function is termed as cellular level of organisation.
- **Tissue Level.** In certain animals cells performing the same function are arranged in a group. Example: Coelenterates.
- **Organ Level.** Some animals form specialized organs for specific functions. Example: Platyhelminthes.
- **Organ System Level.** In higher and complex animals various organs group to form a complex organ system to perform specific function. Example:Molluscs, Chordata.

OR

Key Features of Mollusca:

Mollusca are terrestrial or aquatic (marine or fresh water) having an organ-system level of organisation. They are bilaterally symmetrical, triploblastic arld coelomate animals. **Structure.** Body is covered by a calcareous shell and is unsegmented with a distinct head, muscular foot and visceral hump. A soft and spongy layer of skin forms a mantle over the visceral hump. The space between the hump and the mant1e is called the mantle cavity in which feather like gills are present. They have respiratory and excretory functions. The anterior head region has sensory tentacles. The mouth contains a file-like rasping organ for feeding, called radula. They are usually dioecious and oviparous with indirect development.

32. Lipids can be divided into three main types, viz. simple, compound and derived lipids.
    I. **Simple Lipids:** Esters of fatty acids are called simple lipids. They can be further divided into the following:
        i. **Fats:** Esters of higher fatty acids with glycerol are called fats.
        ii. **Waxes:** Esters of higher fatty acids with alcohol are called waxes.
    II. **Compound Lipids:** When esters of fatty acids with glycerol and alcohol contain other groups also; they are called compound lipids. These can be further divided into the following:
        i. **Glycerophospholipids:** As the name suggests, they contain phosphorus group. They are also called phospholipids. Examples: Lecithin, cephalin, etc.
        ii. **Sphingo Lipids:** When phospholipids contain

iii. **Glycolipids:** As the name suggests, these contain monosaccharides. Examples: cerebrosides and gangliosides.

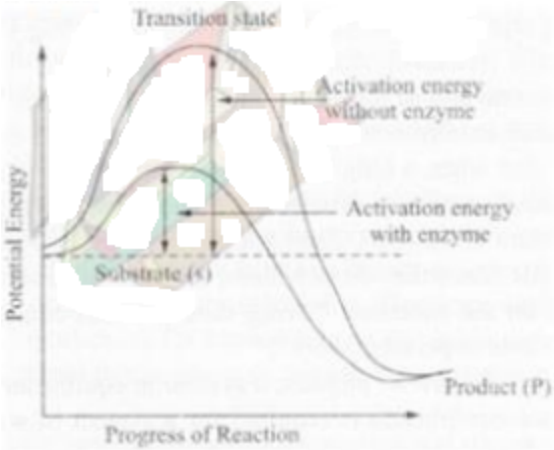
III. **Derived Lipids:** When lipid is composed of a hydrocarbon ring and a long hydrocarbon chain, it is called derived lipid. Example: Cholesterol.

OR

An enzyme catalyses a reaction, it means it hastens the rate of reaction.Thus, if under normal circumstances a particular number of units of product is formed; one can get many times more units in the same time when the reaction is enzyme mediated.
An enzyme-mediated reaction can be broken into three main steps, which are as follows:

I. Formation of enzyme-substrate complex (ES)
II. Transient Stage
III. Formation of Product

In the first step, the enzyme binds to the substrate at 'active site'. This results in formation of enzyme-substrate complex.
Transient Phase: This is the altered structure state of the substrate. This is the unstable stage. Had there been no enzyme, the required activation energy would have been much higher. But because of the presence of enzyme, the reaction takes place with a less amount of energy.
Formation of Product: Once the transient phase is over, final product is formed. With this the potential energy of the system also comes down drastically. This can be shown by the following graph. Once the product is formed, the enzyme becomes free to bind with another substrate.



33. In open circulation, the blood is pumped into a set of arteries from where it flows into the

large body spaces and bathes the various organs. It takes place in snails (molluscs) and insects (arthropods). In closed circulation, the blood remains enclosed in the tubes-arteries, capillaries, veins and heart. It is found in higher animals and is more efficient because the blood flows far more rapidly in closed vessels than in wide and open channels and body cavities, it takes a much shorter time to circulate through the closed system and return to the heart. This quickens the supply and removal of materials to and from the tissues by the blood. In the closed system, the arteriolar diameter can be regulated to alter the blood flow through them; so, the volume of blood flowing through tissue or organ may be regulated according to its needs by controlling the contractions and relaxations of smooth muscles on its arterioles. No such regulation is possible in the open circulatory system.

OR

Rh-antigen is present on the surface of erythrocytes in about 80-85% of the human beings. The individuals, who possess this antigen are called Rh^{+}(Rh-positive) and those, who do not have it are called Rh^{-}(Rh-negative). A person when exposed to Rh+ blood, develops anti-Rh-antibodies. Pregnant women who are Rh^{-}, if bears an Rh+ foetus, will develop anti-Rh-antibodies during the first delivery when the foetal blood comes in contact with her blood. These antibodies linger in the blood for sufficiently long periods. If she carries a second foetus, that is Rh+, the anti-Rh-antibodies in her blood enter the foetal circulation and cause damage to the foetal RBCs. This could become fatal. This condition is called erythroblastosis foetalis.