Grade 10 Kerala Biology 2022

Time: 1.5 Hours **Total Score: 40**

General instructions:

- There is a 'cool-off time' of 1 5 minutes in addition to writing time. Use this time to get familiar with questions and to plan your answers.
- Questions with different scores are given as distinct parts.
- Read instructions carefully before answering the questions.
- Keep in mind the score and time while answering the questions.
- The maximum score for questions from 1 to 24 will be 40.

Part-I

A. Answer any 4 questions from 1 to 6. Each carries 1 score. **4×1=4**

Q1. Identify the given photoreceptor cell.

Solution:

Cone cell

Q2. If there is any mistake in the underlined part of the given statements, correct it.

(a) Chemical evolution theory was proposed by Oparin and Haldane.

(b) Organic molecules such as Nucleic acids are formed in Urey-Miller experiment.

Solution:

(b) Organic molecules such as **amino acids** are formed in the Urey-Miller experiment. Nucleic acids were not formed; instead, amino acids were synthesized in the experiment.

Q3. Find the genetic constitution of the sperm.

(a) $44 + X$ (b) $22 + XX$ (c) $44 + XX$ (d) $22 + Y$

Solution:

(d) 22+Y

Q4. Choose the correct pair.

- Dormancy of embryo : Cytokinin
- Sprouting of leaves : Abscisic acid
- Fruit formation : Gibberellin
- Ripening of leaves and fruits : Ethylene

Solution:

Ripening of leaves and fruits: Ethylene

Q5. Identify the blood group which has the following peculiarities.

Antigen A	Antigen B	Antigen D
Nil	Present	Nil

Solution:

The blood group with these peculiarities is B negative or B–ve.

- Antigen A: Nil → the blood group does not have A antigen, so it is not A or AB.
- Antigen B: Present → the blood group has B antigen, which means it belongs to blood group B.
- Antigen D: Nil → the absence of Antigen D indicates that the blood group is Rh-negative (Rh^-).

Q6. The vector used in genetic engineering is:

(a) Ligase (b) Plasmid (c) tRNA (d) rRNA

Solution:

(b) Plasmid

A plasmid is a small, circular DNA molecule used as a **vector** in genetic engineering to transfer foreign genes into a host cell for cloning or expression.

B. Answer all questions from 7 to 9. Each carries 1 score. **3x1=3**

Q7. Identify the word pair relationship and fill in the blanks.

Housefly: Ommatidia

Planaria: _____

Solution:

Eye spot

Planaria have **simple eyespots** called **ocelli** for detecting light.

Q8. Choose the action of sympathetic system from the following.

(a) Peristalsis becomes normal

(b) Heartbeat increases

(c) Gastric activities become normal

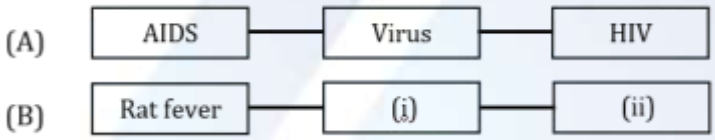
(d) Trachea contracts

Solution:

(b) Heartbeat increases.

The **sympathetic nervous system** activates the **"fight or flight"** response, which increases **heartbeat** to supply more oxygen and energy to the body during stress.

Q9. Based on the given model (A) complete (B).



Solution:

i. Bacteria

ii. *Leptospira*

Rat fever, also known as Leptospirosis, is an infectious disease caused by the bacterium Leptospira.

PART-II

A. Answer the following question. Carries 2 scores. 1x2=2

Q10. Analyse given statement and answer the following questions.

"Genetic engineering has made a great leap in the treatment of genetic diseases".

(a) Name the treatment method indicated.

(b) What is the specific peculiarity of this treatment method?

Solution:

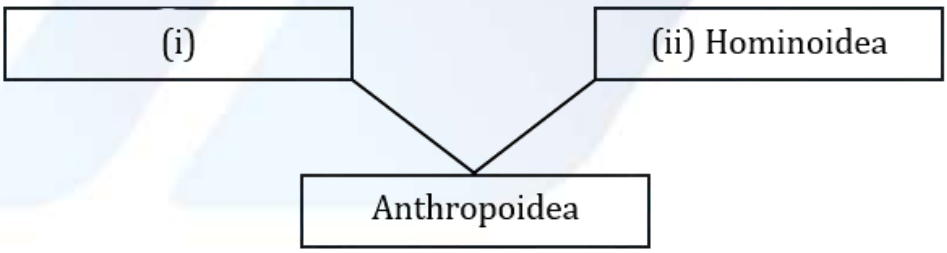
(a) Gene therapy is a technique used in genetic engineering to treat genetic disorders by replacing, repairing, or modifying faulty genes. It helps in treating diseases like cystic fibrosis, sickle cell anemia, and hemophilia by introducing healthy genes into the patient's cells.

(b) Genes that are responsible for diseases are removed and normal functional genes are inserted in their place.

Unlike conventional treatments that only manage symptoms, gene therapy permanently corrects genetic defects at the molecular level, offering a long-term or permanent cure for inherited disorders.

B. Answer any 1 of the question from 11 and 12. Each carries 2 scores. 1x2=2

Q11. Observe the illustration and answer the following questions.



(a) Fill (i).

(b) What are the characteristics of organisms belong to (ii)?

Solution:

(i) Cercopithecoidea.

(ii) Hominoidea (apes and humans) are tailless primates with large developed brains, upright posture, and highly flexible freely movable limbs. They exhibit advanced social behavior, tool use, and complex communication skills.

Q12. Analyse the given genetic makeup and answer the questions.

44 + XX

(a) Give the number of somatic chromosomes.

(b) Is the individual with this genetic makeup male or female? Why?

Solution:

(a) There are 44 number of somatic chromosomes in the given genetic makeup.

(b) The individual is a female, because XX denote female sex chromosomes.

PART-III

A. Answer any 3 questions from 13 to 16. Each carries 3 scores. 3x3=9

Q13. Analyse the given table and arrange Columns B and C according to Column A. 3

A	B	C
Cornea	The part of the retina where plenty of photoreceptors are present	Transmits impulses from photoreceptors to the visual centre in the brain
Pupil	The projected transparent anterior part of the sclera	Regulates the amount of light falling on the eyes
Yellow spot	The part of the retina from where the optic nerve begins	Refracts light rays to focus on the retina
	The aperture seen at the centre of the iris	Point of maximum visual clarity

Solution:

A	B	C
Cornea	The projected transparent anterior part of the sclera	Refracts light rays to focus on the retina
Pupil	The aperture seen at the centre of the iris	Regulates the amount of light falling on the eyes
Yellow spot	The part of the retina from where the optic nerve begins	Point of maximum visual clarity

Q14. Evaluate the statement and answer the questions.

"Ants moving in a line along a particular trail by the production of certain chemical substances".

(a) Such chemicals are known as _____.

(b) Write two examples for these chemical substances.

(c) Write other two uses of these chemicals' substances.

Solution:

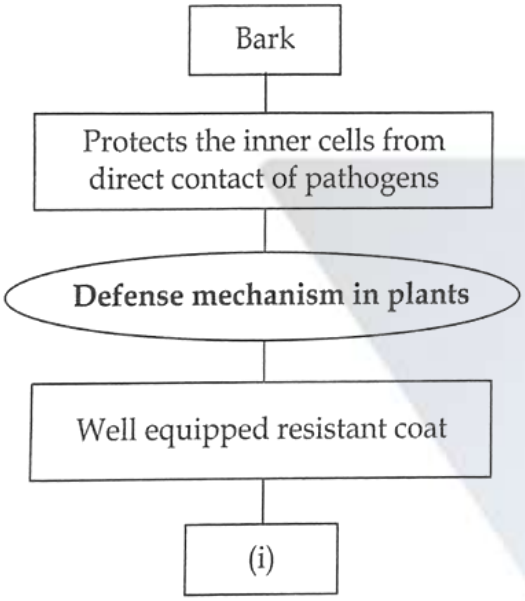
(a) Pheromones.

(b) A few examples of pheromones are Civetone, Muscone (musk), Bombycol, etc.

(c) The other uses of pheromones are:

- Help in attracting mates
- Informing about food
- Determining the path of travel
- Signalling dangers
- Help honeybees and termites to live in colonies.

Q15. Observe the illustration and answer the questions.



(a) Identify the part indicated (i).

(b) Name any two chemicals which provide rigidity to the part indicated (i).

(c) How do-the germs that have crossed (i) are prevented from entering the cell?

Solution:

(a) (i). Cell wall.

(b) Lignin, Cutine, Suberin

(c) Callose, a polysaccharide, is deposited at the cell membrane to prevent germs from entering the cell. It acts as a physical barrier, reinforcing the cell wall and blocking pathogen entry.

Q16. Analyse the informations related to Tuberculosis and Malaria.

Classity them in the given table.

- Spread through air
- Bacteria is the pathogen
- High fever with shivering and profuse sweating
- Spread through Anopheles mosquito
- Loss of body weight, fatigue, persistent cough
- Protozoa is the pathogen

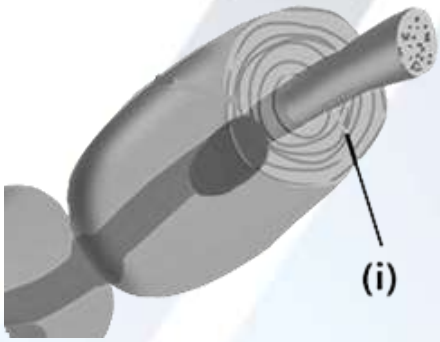
Tuberculosis	Malaria
• • •	• • •

Solution:

Tuberculosis	Malaria
• Spread through air.	• High fever with shivering and profuse sweating
• Bacteria are the pathogen.	• Spread through anopheles' mosquito.
• Loss of body weight, fatigue.	• Protozoa are the pathogen.

B. Answer the following questions. Carries 3 scores. **1x3=3**

Q17. Analyse the picture given below and answer the questions.



(a) Identify (i).

(b) Write any two functions of this part.

Solution:

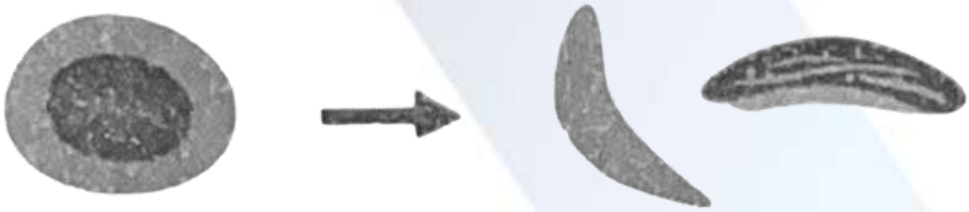
(a) i. Myelin sheath

(b) Myelin sheath formed by Schwann cells provides nutrients and oxygen to the axon, accelerate impulse, act as an electric insulator, and protects the axon from external shocks.

PART-IV

A. Answer any 2 questions from 18 to 20. Each carries 4 scores. 2x4=8

Q18. Change in the shape of red blood cells in a genetic disease is given below. Analyse it and answer the questions.



(a) Name the disease indicated.

(b) Why do the shape of Red Blood Cells change?

(c) How does the deformity of red blood cells affect the body?

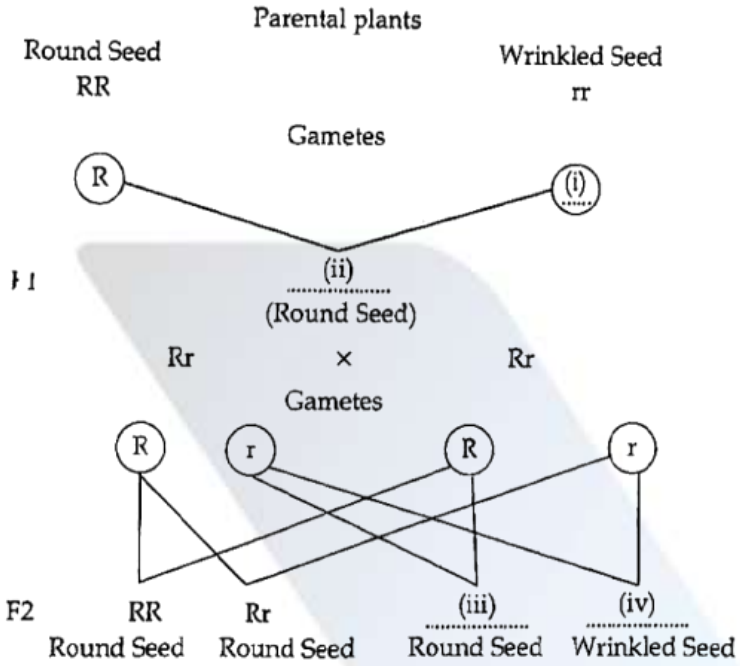
Solution:

(a) Sickle Cell Anaemia is a genetic disorder that affects the shape and function of red blood cells (RBCs).

(b) Defect in Genes: A mutation in the HBB gene leads to an abnormal sequencing of amino acids, which affects the structure of haemoglobin, the oxygen-carrying protein in RBCs.

(c) Impact on RBCs: The oxygen-carrying capacity of RBCs decreases, and the sickle-shaped RBCs clump together, blocking blood flow in vessels, causing pain and organ damage.

Q19. Observe the illustration given below and answer the questions.



(a) Fill (i), (ii), (iii), (iv).

(b) Which is the dominant character?

(c) Why does the recessive trait in the first generation appear in the second generation?

Solution:

(a) i – r (gamete for wrinkled seed)

ii – Rr (F1 offspring - Round seed)

iii – Rr (F2 offspring - Round seed)

iv – rr (F2 offspring - Wrinkled seed)

(b) Round – dominant

(c) During gamete formation, the factors responsible for a specific trait separate independently without blending.

Q20. The following are the main concepts of a theory of evolution. Analyse it and answer the following questions.

(i) Accumulation of variations inherited through generations.

(ii) Origin of new species.

(iii) Struggle for existence.

(iv) Favourable variations are transferred to the next generation.

(v) Those with no favourable variations are destroyed and survival of others.

(vi) Over production.

(a) Name of the evolutionary theory.

(b) Rearrange the concepts given above in sequential order.

Solution:

(a) Theory of Natural Selection / Darwinism.

(b) The sequential order as per evolution concept is as follows.

(vi) Over production

(iii) Struggle for existence

(v) Those with no favourable variations are destroyed and survival of others.

(iv) Favourable variations are transferred to the next generation.

(i) Accumulation of variations inherited through generations.

(ii) Origin of new species.

B. Answer any 1 question from 21 and 22. Each carries 4 scores. 1x4=4

Q21. The feature of a fluid in the eye is given below. Analyse it and answer the following questions.

It is formed from blood and is reabsorbed into blood.

(a) Name the fluid.

(b) What is its function?

(c) Name the eye disease associated with this fluid.

(d) How does these diseases can be rectified?

Solution:

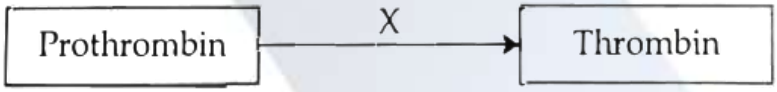
(a) Aqueous humor

(b) Its function is to maintain intraocular pressure, provide nutrients to the avascular structures of the eye (such as the cornea and lens), and remove metabolic wastes.

(c) The eye disease associated with this fluid is glaucoma.

(d) This disease can be rectified through laser surgery and medications such as eye drops to reduce intraocular pressure.

Q22. Analyse the illustration related to the process of blood clotting and answer the following questions.



(a) Name the enzyme indicated as " *X* ".

(b) How does this enzyme form?

(c) Write the subsequent steps involved in this process.

Solution:

(a) X is thrombokinase or thromboplastin

(b) This enzyme is formed when platelets and damaged tissues release clotting factors, which activate a cascade of reactions leading to the formation of thrombokinase.

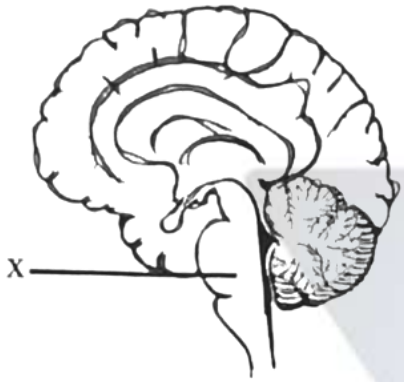
(c) The subsequent steps in the blood clotting process are:

- Thrombin converts fibrinogen (a soluble plasma protein) into fibrin (an insoluble protein).
- Fibrin forms a mesh-like network, trapping blood cells and platelets to form a stable clot.
- This clot prevents further bleeding and helps in wound healing.

PART-V

A. Answer any 2 questions from 23 and 24. Each carries 4 scores. 2x4=8

Q23. Redraw the diagram and answer the following questions.



Redrawing diagram

(a) Identify and label the parts with their names.

(i) Maintains equilibrium of the body

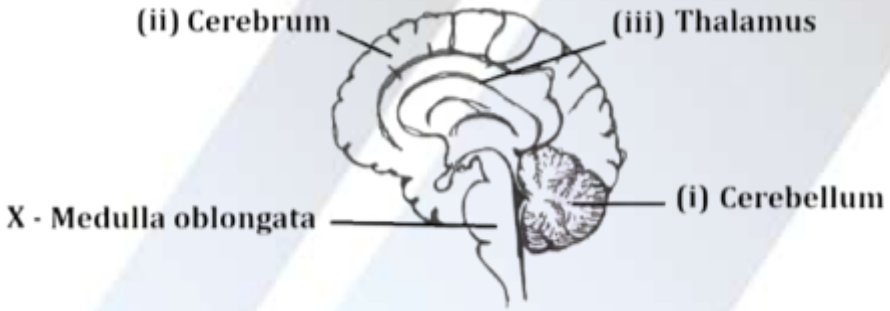
(ii) Controls voluntary movements

(iii) Acts as relay station of impulses

(b) Name the part labelled "X" and write its function.

Solution:

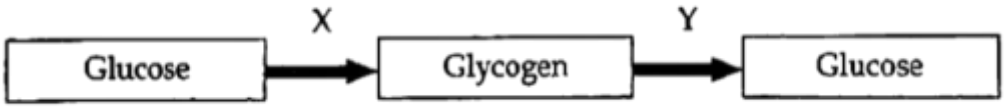
(a)



(b) X is the Medulla oblongata.

The medulla oblongata controls involuntary functions such as breathing, heartbeat, blood pressure, and digestion. It also regulates reflex actions like swallowing, coughing, sneezing, and vomiting to maintain vital body functions.

Q24. Analyse the process related to the regulation of blood glucose level and answer the questions.



(a) Identify the hormones indicated as X and Y.

(b) Name the gland which produces these hormones.

(c) Name the disease caused due to the reduced production of the hormone X.

(d) Write the symptoms of this disease.

(e) Write another action of the hormone Y in regulating the level of glucose in blood.

Solution:

(a) The hormone indicated as X is insulin, and the hormone indicated as Y is glucagon.

(b) The gland that secretes these hormones is the pancreas. Insulin is secreted by the beta cells, while glucagon is secreted by the alpha cells of the Islets of Langerhans.

(c) The disease caused due to the reduction in these hormones is Diabetes mellitus.

(d) Increased appetite and thirst and frequent urination.

(e) The action of the hormone Y-glucagon is stimulating gluconeogenesis—the process of synthesizing glucose from non-carbohydrate sources such as amino acids and fatty acids in the liver.