SSLC Model Exam 2025 Biology - Answer Key

1. Choose the correct answer: (1 mark each)

1. **Which antigen and antibody are present in a person with A blood group?**
   Answer: (b) A antigen, b antibody
2. **How does the deficiency of vitamin A affect the function of the given cell?**
   Answer: Deficiency of vitamin A leads to **night blindness**, as it affects the functioning of **rod cells in the retina**.
3. **Correct the mistake in the given statements:**
   - (a) The **Panspermia theory** argues that life **originated from non-living molecules on Earth** (Correction).
   - (b) **Homologous organs** are **similar in structure but perform different functions** (Correct as it is).
   - (c) **Chimpanzees are the closest living creatures to humans in terms of evolution** (Correct as it is).
4. **Match the given statements with the correct genetic technology:**
   (d) (A)-(iii), (B)-(ii), (C)-(iv), (D)-(i)

   Explanation:

   (A) DNA profiling: Testing the arrangement of nucleotides.

   (B) Gene mapping: Identifying the location of a gene in DNA.

   (C) Genetic engineering: Controlling traits by changing genetic constitution.

   (D) Gene therapy: Replacing disease-causing genes with functional ones.
5. **Identify the blood component from the given range (70-110 mg/100 ml).**
   Answer: Glucose (Blood Sugar Level)
6. **Genetic cross of Round (Rr) and Wrinkled (rr) seeds:**

   (i) **RR, Rr**
   (ii) **rr**
   Explanation: When Rr (round-seeded) plants are self-pollinated, the second generation will have RR, Rr, and rr (wrinkled-seeded) plants in a 1:2:1 ratio.

2 Mark Questions

(Answer any 6 questions)

7. **Identify the disease and prevention methods based on symptoms:**
   - **(a) Symptoms: Thick white coating in the throat, swollen glands**
     - **Disease: Diphtheria**
     - **Prevention: DPT vaccine, maintaining hygiene**
   - **(b) Symptoms: Obstructed lymph flow, swelling in ducts**
     - **Disease: Filariasis**
     - **Prevention: Mosquito control, proper sanitation**

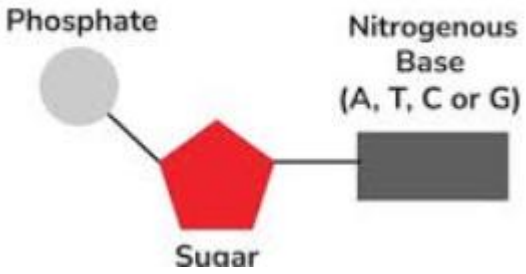
8. **Vaccines and Immunity**

- (a) **Match the diseases with their vaccines:**
  - **Tuberculosis → BCG**
  - **Polio → Polio vaccine**
  - **Mumps → MMR (Measles, Mumps, Rubella)**
  - **Tetanus → TT (Tetanus Toxoid)**
- (b) **How do vaccines provide immunity?**

Vaccines act as antigens that stimulate the defense mechanism of the body. Antibodies are formed in the body against them. These antibodies are retained in the body which later on protect the body from the pathogen responsible for the same disease.

9. **Evidence for Common Features in Microbes, Plants, and Animals**
   - (a) **Biochemical Evidence:**
     - DNA, RNA, and proteins have **similar structures** in all living organisms.
   - (b) **Physiological Evidence:**
     - Cellular respiration and enzyme functions are **common metabolic processes** in all living beings.

10.



A **DNA nucleotide** consists of:

- **Phosphate group**
- **Deoxyribose sugar**
- **Nitrogen base (Adenine, Thymine, Cytosine, or Guanine)**

11. **Illustration-based Question (X and Y in a diagram)**

- (a) **Identify X and Y:**
  - **X:** Dendrite
  - **Y:** Axon
- (b) **Difference in function:**
  - **Dendrites receive nerve impulses, while axons transmit them away from the cell body.**

12. **Cancer Awareness Presentation Indicators**

- **Cause of Cancer:** Uncontrolled cell division due to genetic mutations or environmental factors (e.g., smoking, radiation).

- **Importance of Early Detection:** Early diagnosis increases treatment success and survival rates.

13. **Nerve Impulse Transmission**

When a stimulus is detected, the polarity of the axon membrane changes, causing the **outer surface to become negatively charged** and the **inner surface to become positively charged**. This temporary charge difference, known as **depolarization**, triggers the opening of sodium (Na^+) channels, allowing Na^+ ions to flow inside. As this change occurs in one region of the axon, it stimulates adjacent regions, creating a **wave-like transmission** of the impulse along the axon. This sequential depolarization ensures that the nerve impulse moves efficiently from one end of the neuron to the other.

14. **Arrange Columns B and C according to Column A (Diseases, Causes, Symptoms)**

- **Disease:** Alzheimer's → **Cause:** Accumulation of an insoluble protein in the brain → **Symptom:** Memory loss
- **Disease:** Meningitis → **Cause:** Infection of meninges → **Symptom:** Headache, fever, neck stiffness
- **Disease:** Epilepsy → **Cause:** Irregular flow of electric charges in the brain → **Symptom:** Loss of balance, shivering

15. **Darwin's Theory of Evolution**

- **Overproduction:** Organisms produce more offspring than can survive.
- **Natural Selection:** Only the fittest organisms survive and reproduce.
- **Origin of New Species:** Favorable traits accumulate over generations, leading to new species.

16. **Gene Action and Protein Synthesis**

- (a) **Function of organelle X (Ribosome):** Protein synthesis
- (b) **Importance of the two RNAs:**
    - **mRNA** carries genetic code.
    - **tRNA** helps in amino acid assembly during translation.

17. (i) Decreased production of insulin
(ii) Increased appetite and thirst / Frequent urination
(iii) Acromegaly
(iv) Growth of the bones on face, jaws and fingers.
(v) Production of Somatotrophin/Growth hormone/GH/STH decreases during the growth phase.
(vi) Body become dwarfs due to stunted growth of bones.

18. (a) X: Oval window: It spreads the vibration of the ear ossicles to the inner ear.
(b) The movement of this fluid stimulate the sensory hair cells of the Organ of Corti in the cochlea and impulses are generated. These impulses reach the cerebrum through the auditory nerve and we sense the sound.

19. Nervous System: Smoking damages nerve cells, leading to reduced brain function and an increased risk of stroke.
Respiratory System: It causes lung damage, reduces oxygen intake, and increases the risk of chronic diseases like lung cancer and COPD.
Circulatory System: Smoking narrows blood vessels, raises blood pressure, and increases the risk of heart diseases and blood clots.

20. a) Human insulin gene is joined to bacterial DNA.
    b) Providing a favourable medium for the multiplication of bacteria.
    Bacteria produces inactive form of insulin.
    Active insulin is produced from this.

21. **Write appropriate reasons for the given statements:**
    1. (a) **Blood group compatibility:** Different blood groups have specific antigens and antibodies that can cause agglutination if mismatched.
    2. (b) **Antibiotics reduce vitamins:** Antibiotics kill gut bacteria that synthesize vitamins like B and K.
    3. (c) **Lymph's role in defense:** Lymph contains lymphocytes that fight infections.
    4. (d) **Inflammatory response:** It is a defense mechanism to isolate and eliminate pathogens.
22. **Observe the illustration and answer the questions:**
    1. (a) **Relationship:** Neurosecretory cells in the hypothalamus produce hormones that regulate the pituitary gland.
    2. (b) **Importance of the portal vein:** It transports hormones from the hypothalamus to the anterior pituitary.
    3. (c) **Hypothalamus as prime controller:** It regulates the pituitary gland, which in turn controls other endocrine glands.
23. **Redraw the diagram and label the parts:**
    1. (a) **Ciliary muscles:** Alter the curvature of the lens.
    2. (b) **Optic nerve:** Transmits impulses from photoreceptors to the brain.
    3. (c) **Aqueous humor:** Found in the anterior chamber; it maintains intraocular pressure.