

Candidate Name

Candidate Number

Centre Name

Centre Number

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Paper 1:

Model Paper V3 Marking Scheme

(2 hours)

It is necessary to respond on the answer sheets provided alongside this question paper. Additionally, you must have a soft pencil (preferably of type B or HB), a clean eraser and a dark blue or black pen.

INSTRUCTIONS:

- You must write your name, candidate number, centre name and centre number on the answer sheets in the designated spaces.
- Objective section consists of 25 questions, and it is essential that you attempt all of them.
- Each question has four options labelled A, B, C, and D. Select the option that you think is correct. Mark it on the multiple-choice answer sheet using a soft pencil.
- Attempt all the questions from subjective section using a dark blue or black pen.
- It is important to follow the instructions provided on the answer sheets.
- Do not use correction fluid.
- Avoid writing on any bar codes.

INFORMATION:

- This paper has a total of 100 marks.
- In objective section there are 25 questions, each carries one mark. There is no negative marking for incorrect responses.
- In subjective section, 45 marks are for extended theory and 30 marks for practical component.
- The number of marks assigned for every question or its parts is indicated within brackets [].

OBJECTIVES PORTION:**[Total 25 marks]**

- | | |
|-------|-------|
| 1. D | 14. A |
| 2. B | 15. D |
| 3. C | 16. A |
| 4. C | 17. B |
| 5. D | 18. C |
| 6. A | 19. B |
| 7. C | 20. A |
| 8. B | 21. C |
| 9. B | 22. D |
| 10. D | 23. C |
| 11. D | 24. A |
| 12. C | 25. A |
| 13. C | |

THEORY PORTION:**[Total 45 marks]****1.****(i)**

- Progesterone maintains the uterine lining during the menstrual cycle and thickens it to prepare for pregnancy.
- Its level rises after ovulation for embryo implantation and its level drops if fertilization doesn't occur leading to menstruation.

(ii)

Testosterone improves athletic performance by increasing muscle mass, strength, bone density, and oxygen delivery to muscles. It promotes motivation and aggression to improve athletic performance.

(iii)

Adrenal glands.

(iv)

Synthetic estrogen, typically ethinyl estradiol.

2.**(i)**

Monoclonal antibodies bind to cancer cells and reduce damage and side effects to healthy tissues. They have:

- low toxicity
- enhanced specificity
- immunotherapeutic potential

(ii)

Hybridoma cells

(iii)

- a. Physical Exercise
- b. Neurotrophic Factors (brain-derived neurotrophic factor)

3.

(i)

| Blood on the Left Side | Blood on the Right Side |
|--------------------------------------|--------------------------------------|
| Oxygenated blood | Deoxygenated blood |
| Thick muscular walls | Thin muscular walls |
| Requires more pressure to pump blood | Requires less pressure to pump blood |

(ii)

A. Mitochondria

(iii)

- Isolation of spleen cells from the mouse and fusion with myeloma cells.
- Cloning and culturing the selected hybridoma cells.
- Purification of monoclonal antibodies.
- Formulation of antibodies for injection.

4.

(i)

E. Cortex

F. Medulla

G. Ureter

(ii)

In the presence of a poison inhibiting respiration, the ATP-producing ability of plants is compromised which reduces the efficiency of active transport mechanisms. Consequently, ion absorption becomes limited despite water uptake being passive.

(iii)

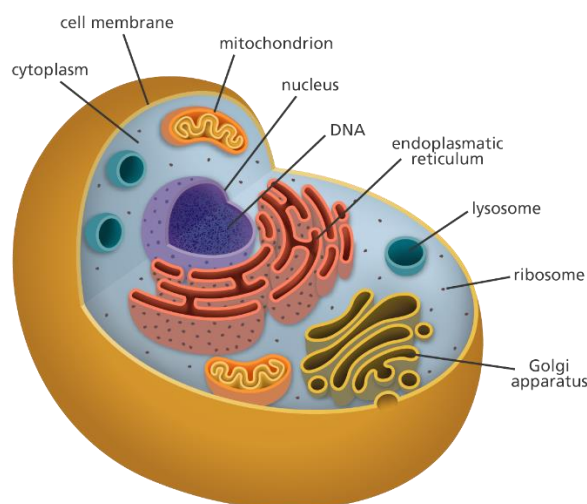
It undergoes plasmolysis where water exits the cell through osmosis. Hence, the cell membrane detaches from the cell wall, preventing cell burst to structural integrity.

(iv)

| Bacteria | Virus |
|---|--|
| Complex cells with organelles e.g. ribosomes, cell walls, genetic material (DNA or RNA), etc. | Lack cellular structures and are composed of genetic material (DNA or RNA) |
| Large size about 0.2 to 8 micrometers | Small size about 20 to 400 nanometers |

PRACTICAL PORTION:**[Total 30 marks]****1.****(a)**

37°C is chosen because of the optimal body temperature of mammals, including humans. Crucial for growth and replication of bacterial cells used in experiments. It stimulates physiological conditions, ensuring that the experimental results are relevant to biological systems.

(b)**2.****(a)**

- (i)** Place a thistle funnel between two solutions of different concentrations. Measure the change in solution level over time to observe the direction and rate of osmosis.
- (ii)** An osmometer measures the osmotic pressure of a solution by immersing a semipermeable membrane in the solution to measure the pressure.
- (iii)** Visking tubing allows the passage of water but not larger solute molecules. Place solutions of different concentrations inside and outside the tubing, to measure the movement and changes in water potential.
- (iv)** Place potato slices in solutions of different concentrations to measure changes in mass or volume. It determines the direction and magnitude of osmotic movement across the cell membrane.

(b)

- Prepare a sample containing starch.
- Prepare iodine solution by mixing iodine crystals in potassium iodide.
- Apply a few drops of iodine solution to the sample.
- Observe any color change. The blue-black color indicates the presence of starch.
- Record the result.