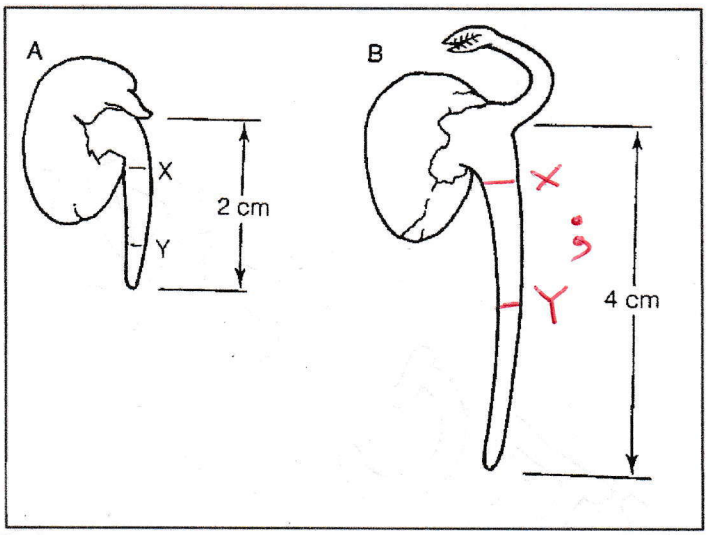
SPMEC PP1 Biology 2026

M/S

1. The illustrations below show a germinating bean seed at the start (A) and after 3 days (B). Use it to answer questions that follow.



(a) Mark on B the positions of X and Y (1 mark)

(b) State *two* roles of water in germination (2 marks)

- Provides a medium for enzymatic reactions;
- Activates enzymes;
- Hydrolyses food substances;

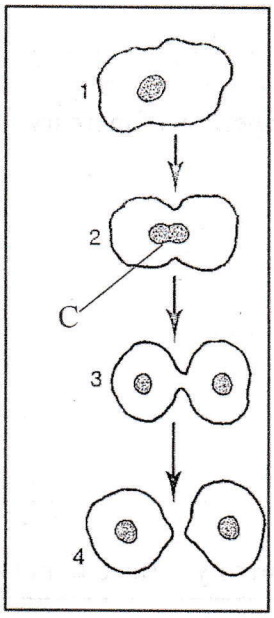
2. (a) Explain why the number of red blood cells reduce when placed in distilled water but remains the same in salt solution (3 marks)

Distilled water is hypotonic; the cells gain water and burst, thus reduce in number; In salt solution the cells lose water, shrink but their number remains the same;

(b) state any change that would be expected on the red blood cells placed in salt solution. (1 mark)

Decrease in size; (OWTTE)

3. The illustration shows a kind of reproduction occurring in an organism



(a) Name the type of asexual reproduction shown by the illustration shown. (1 mark)

Binary fission; Rej. Wrong spellings.

(b) Give a ***reason*** for your answer in (a) above (1 mark)

Daughter cells/offsprings are formed without fusion of gametes;

(c) What name is given to the division of structure C in the illustration above. (1 mark)

Karyogamy; Rej. Wrong spellings

(d) Apart from amoeba, name any other kind of organism that reproduces by a similar method as the one shown in the illustration. (1 mark)

Plasmodium; Rej. Wrong spellings

4. Students wanted to estimate the populations of elephants and squirrels in a 100m-by-100m piece of land.

(a) What method would be suitable to estimate the population of:

(i) Elephants (1 mark)

Head count;

(ii) Squirrels (1 mark)

Capture-recapture;

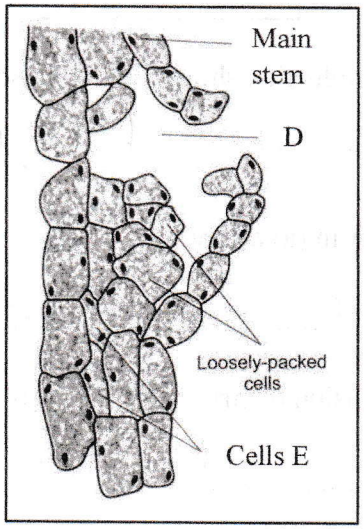
(b) State any event that makes the estimated population of squirrels inaccurate (1 mark)

- Some squirrels may move out of the study area;
- Some squirrels may move into the study area;

5. Briefly describe why excessive ingestion of mercury or silver – arsenic compounds may lead to death of an animal. (3 marks)

Silver - arsenic compounds are non-competitive inhibitors; which destroy active sites of enzymes; making it difficult for substrates to bind thus slowing down important physiological reactions;

6. Below is an illustration of a respiratory surface found on the stem of woody plants



(a) Identify opening D (1 mark)

Lenticel; Rej. lenticels.

(b) Explain one characteristic feature of cells E that adapt them to their function (1 mark)

They are moist;

(c) What is the significance of the cells being loosely packed? (1 mark)

To allow easy circulation of gases;

7. (a) ***Distinguish*** between the roles of messenger RNA (mRNA) and transfer RNA (tRNA) in protein Synthesis. (2 marks)

mRNA carries information from the nucleus to the cytoplasm/ribosome while tRNA assembles the amino acids to form the polypeptide chain;;

(b) State ***two*** advantages of genetically modified plants (2 marks)

- Mature faster;
- Produce more yields;
- Resistant to harsh environmental conditions;

8. (a) Jaundice is a liver disorder characterized by yellowing of the membranes and skin. Describe how the yellowing comes about. (2 marks)

The liver's inability to extract bile from blood; causes bile to be deposited under membranes and skin bringing about the yellowing;

(b) How does liver cirrhosis lead to;

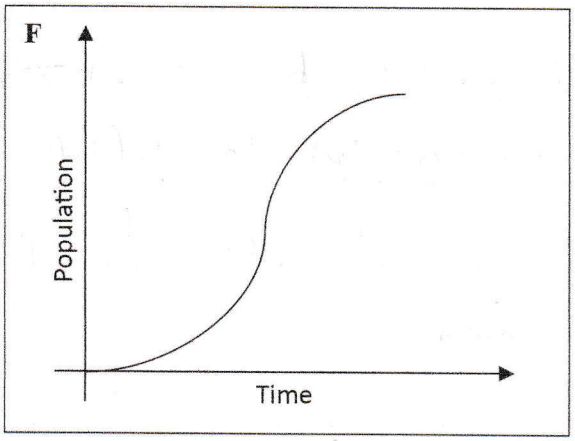
(i) **Jaundice** (1 mark)

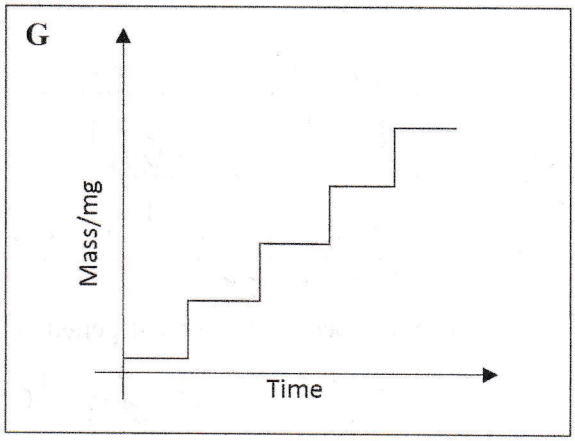
Liver cirrhosis damages the liver and the bile duct preventing passage of bile hence bile is absorbed into the blood; (@WTTE)

(ii) **Indigestion** (1 mark)

It blocks bile duct preventing passage of bile thus hindering digestion of fats;

9. The illustrations below show two curves obtained after studying growth in arthropods and bacteria.





With a reason, which curve shows growth in:

(i) Arthropods G; (2 marks)

Growth is not continous due to the presence of the exoskeleton;

(ii) Bacteria F; Growth is continous showing all the phases; (2 marks)

(OWTTE)

10. (a) State *two* reasons why colostrum is important for the baby (2 marks)

- Contains nutrients required for the baby's growth;
- Contains antibodies which protect the baby from infections;

(b) Milk let – down by lactating mothers is a reflex action, explain (1 mark)

It can be triggered by the conditions near the mother eg cry of the baby;

11. Given the following; a glass slide, cover slip, pair of forceps, onion leaf, iodine solution and distilled water, describe ***three*** steps to be followed before viewing onion cells on a microscope. (3 marks)

- Peel off the epidermis from the onion leaf; using a pair of forceps.
- Place the epidermis on the slide and add a drop of iodine solution; Remove excess iodine solution & add a drop of water. Cover with a cover slip
- Mount the slide on the stage and clip it in position;

12. Briefly state the importance of anaerobic respiration in:

(a) **Baking industry** (1 mark)

Yeast respires anaerobically producing CO_2 that makes dough to swell;

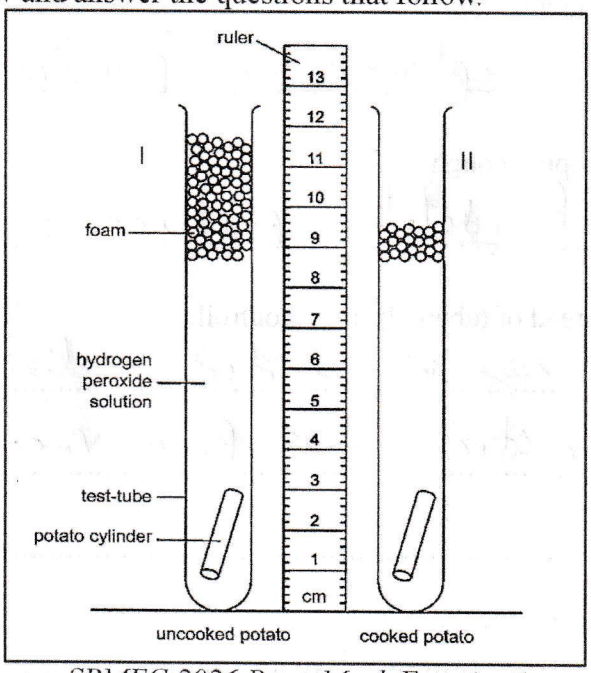
(b) **Agriculture** (1 mark)

Making of compost manure to use in farms is an anaerobic process;

(c) **Dairy industry** (1 mark)

Making of yoghurt, cheese e.t.c is done through anaerobic respiration;

13. Study the set ups below and answer the questions that follow.



(a) ***Account*** for the difference in the height of foam in test tubes I and II (3 marks)

Test tube I has more foam than test-tube II; cooking denatured the catalase enzyme in II; thus less amount of hydrogen peroxide was converted to oxygen/bubbles of oxygen;

(b) State the importance of the reaction occurring in the set ups above in the human body (1 mark)

Facilitates removal of harmful substances;

14. State ***three*** adaptations of xerophytes that enable them conserve water (3 marks)

- Some have thick/fleshy stem;
- Some have their leaves modified into thorns;
- Some have thick waxy cuticle; sunken stomata; to reduce the amount of water lost by transpiration;

15. (a) Name the *causative agent* of

(i) Pneumonia (1 mark)

Streptococcus pneumoniae;

Rej. if all nub of B/N are not followed.

(ii) Whooping cough (1 mark)

Bordetella pertussis;

(b) How can the spread of tuberculosis be controlled? (2 marks)

- Isolating infected individuals;
- Administration of BCG vaccine;

16. ***Fill in*** the table below appropriately (4 marks)

Type of waste excreted	Amount of water required	Habitat of organism
Uric acid;	little;	Arid
Urea	Less	Terrestrial;
Ammonia;	More	Aquatic

17. (a) State a difference between a housefly's wing and a bat's wing (1 mark)

Housefly's wing	Bat's wing
Membraneous/without bones;	Has bones/bony;

(b) What name is given to structure like the wings in (a) above (1 mark)

Analogous structure;

(c) Name the evidence of evolution that explains the origin of the differences of the wings (1 mark)

Comparative anatomy;

* 18. (a) Proteins have both acidic and basic properties, hence are referred to as Amphoteric; This property enables them to react with non-proteinous compounds to form conjugated; proteins (2 marks)

(b) Explain why it is advisable to eat eggs when one has wounds (1 mark)

Eggs are proteinous/contains proteins; which are digested to watd amino acids which promote repair of worn out tissues;/wounds.

19. Explain the significance of the following parts of the nephron with respect to habitats; (4mks)

Part	Aquatic	Desert
Loop of Henle	Long; to increase the S.A for re-absorption of water;	short; to reduce the S.A for reabsorption of water;
Glomeruli	Many and small to facilitate more ultrafiltration;	Small and large to reduce the rate of ultrafiltration;

20. How is gaseous exchange important to:

(i) Respiration (2 marks)

Gaseous exchange facilitates intake of Oxygen which is used in respiration; and removal of carbon (IV) oxide produced;

(ii) Photosynthesis (1 mark)

It enables the plants to take in carbon (IV) oxide; which is used in dark stage of photosynthesis;

21. What do you understand by the term *heterozygous advantage* in relation to sickle – cell anaemia (2 marks)

Having genotype Hb^AHb^S / sickle-cell trait; with red blood cells that cannot all development of plasmodium spp. hence they are not affected by malaria;

22. What is the ***role*** of the following parts of the male reproductive system:

(a) Epididymis (1 mark)

- Stores sperms temporarily;

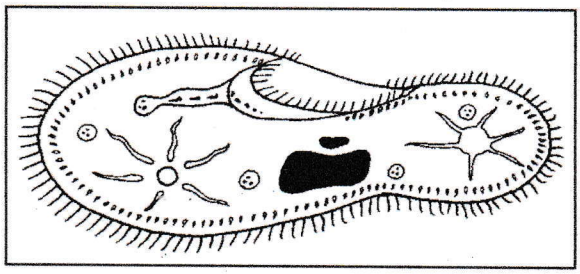
(b) Cowper's glands (1 mark)

- Produces an alkaline fluid that neutralizes the acidity of the urethra;

(c) Glans – penis (1 mark)

- Has nerve endings which increases the sensitivity of the penis;

23. The microorganism below was observed through a microscope on a drop of pond water



(a) Classify the organism into its kingdom (1 mark)

Protoctista; Rej. protoctista.

(b) Give a ***reason*** for your answer in (a) above (1 mark)

Has cilia / Has contractile;

24. How does geographical distribution of organisms lead to speciation? (3 marks)

Separates organisms that were originally together; making them to evolve along different evolutionary lines; (OWTTE) thus leading formation of new species / speciation;

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