

**BIOLOGY**  
**FORM THREE**  
**TERM 1 2025**  
**OPENER EXAMINATION**

**INSTRUCTIONS: Answer all the Questions**

**TIME: 1 HR 30 MIN**

1. Animals have complex excretory organs as compared to the plants. Explain. (2 marks)

- **Animals are more active hence fast accumulation of metabolic wastes;**
- **Animal waste is more/highly toxic;**
- **Most animal wastes are in liquid or solid form and cannot be excreted by simple diffusion;**

**Mark any 2 responses**

2. Name two parts in the kidney nephron where re-absorption of water takes place. (2 marks)

**Descending limb of the Loop of Henle; Distal convoluted tubule;**

3. a) What is meant by the term taxonomy? (1mark)

**Branch of Science that deals with classification of living organisms**

(b) The scientific name of a rat is *Rattus norvegicus* (2marks)

(i) Write the name correctly

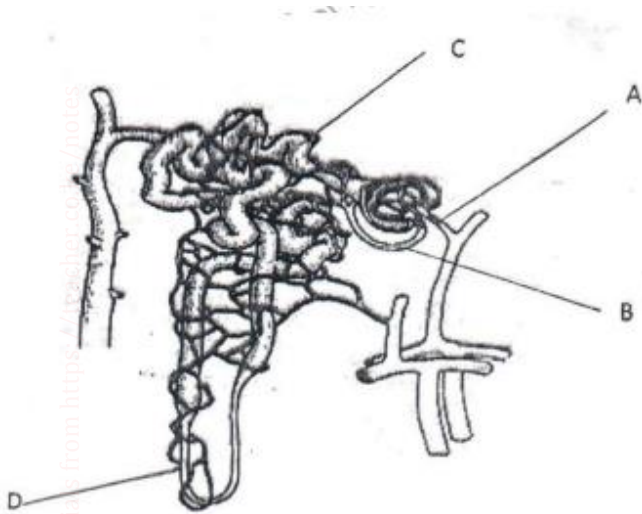
**Rattus norvegicus**

(ii) Identify the genus and species names

**Genus: Rattus**

**Species: norvegicus**

(5)The figure shown below represents a mammalian structure. Use it to answer the questions that follow



(a) Name parts labelled A,C, and D on the diagram (3 marks)

**A: Afferent arteriole**

**B: Efferent arteriole**

**C: Proximal convoluted tubule**

(b) (i) State structural difference between Part A and B (1mark)

**A has wider lumen than B**

(ii) State the importance of the above difference in (b) (i) above (1 mark)

**Increases pressure to cause ultra-filtration in the glomerulus.**

(c) Explain how part D is adapted to its function (2 marks)

**- Has counters current flow to enhance re-absorption;**

**- Long to increase surface area for re-absorption.**

(d) Name two materials found in B and absent in D (2 marks)

**Blood cells; plasma proteins; glucose; amino acids**

(7)State one way certain plants get rid of the following metabolic wastes: (2mks)

**a) Excess water: Transpiration/ evaporation/ guttation;**

**b) Caffeine: Store in fruits e.g. coffee berries/ store in leaves (and buds) e.g. in tea;**

(12) A certain organ K was surgically removed from a rat. It was later found that there was a drastic increase in glucose level in the blood. When substance Q was injected into the animal the glucose in the blood went back normal. Identify (2 marks)

**i) Organ K: Pancreas (1 mark)**

**ii) Substance Q: Insulin (1 mark)**

c) Explain why a person discharges urine more often when the environmental temperatures are low than when they are high. (2 marks)

**When environmental temperatures are low, water loss through sweating is reduced; leading to increase in urine output, in high temperature a lot of water to low urine output.**

(16) State three adaptations of the proximal convoluted tubule to its function. (3 marks)

**(i) Long and highly coiled to provide large surface area for efficient reabsorption;**

**(ii) Highly coiled to reduce the speed of flow for efficient re-absorption;**

**(iii) Numerous mitochondria in the cell lining of the tubule for energy production required for active reabsorption;**

**(iv) Microvilli to increase the surface area for re-absorption;**

**(v) Well supplied with blood vessels for transportation of reabsorbed materials;**

(20) Explain why a rat, though small eats more frequently than an elephant(2marks)

**A rat has a large surface area to volume ratio thus loses a lot of energy in form of heat therefore eats a lot to replace the lost energy;**

(22) (a) State two functions of the kidney (2marks)

**– Excretion;**

**- Osmo-regulation;**

(b) Name two substances that are not found in urine of a healthy person(2marks)

**– Glucose**

**- Amino acids;**

(c) Name two diseases that affect the kidney(2marks)

– Nephritis;

- Kidney stones /Gall stones;

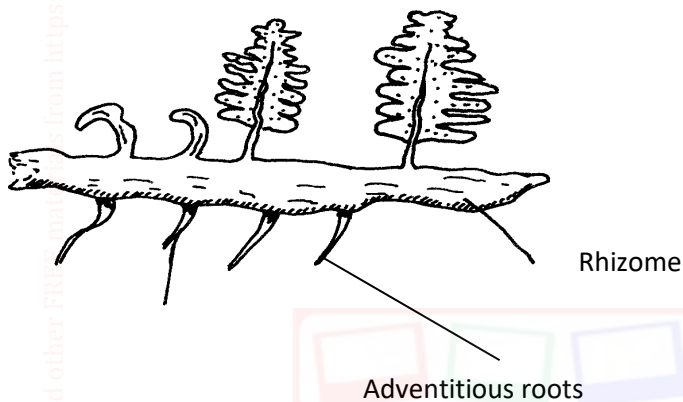
- Hepatitis A and B;

(23) (a) State two structural modifications of the kidneys of deserts animals like kangaroo rat. (2marks)

- Extra long loop of Henle to maximize water reabsorption back to the blood;

- Have fewer and smaller glomeruli to reduce ultrafiltration;

(24) Below is an organism, study it and answer questions that follow:



(a) With reasons identify the division into which the students classified the plant.(2marks)

Division :**Pteridophyta**

Reasons: **Presence of compound leaf rachis**

**Presence of rhizomes**

b) (i) Name the structure that produces spores in this plant. (1mark)

**sorus**

c) State the features of this plant that made the student classify it in the kingdom Plantae. (2marks)

**Presence of leaves**

**Presence of root structure**

16. In summary, describe structure and function of the skin. (10marks)

**Is the largest organ in the body**

**Roles of the skin:**

➤ **Protect underlying tissues from:**

**a. entry of microorganisms**

**b. damage by ultra violet rays from the sun**

**c. physical damage**

➤ **regulate body temperature (thermoregulation)**

➤ **excretion of salts, excess water and traces of urea**

➤ **reception of stimuli such as pain, heat, cold, pressure and touch**

➤ **synthesis of vitamin D**

➤ **Storage of fats.**

**The skin has two layers:**

➤ **Epidermis**

➤ **Dermis**

**The epidermis has:**

**a. Cornified layer – made up of dead cells that have keratin which:**

• **Protect against mechanical injury and entry of bacteria**

• **Reduce loss of water by evaporation**

**b. Granular layer**

• **Consist of living cells that gives rise to the cornified layer**

**c. The malpighian layer**

• **Has actively dividing cells which gives rise to new epidermis.**

• **Contain melanin pigment which gives blood its colour and also protect the skin from ultraviolet rays from the**

**sun**

**The dermis**

**Comprise of:**

• **Blood vessels**

- Nerve endings
  - Lymphatic blood vessels
  - Sweat glands
  - Hair follicle
- The blood vessels are numerous to supply nutrients and oxygen to skin tissues and also remove waste products. The blood also regulates body temperature
- Lymphatic vessels drains excess tissue fluid
- The nerve endings are sensitive to stimuli thus detect changes in the external environment
- Sweat glands secrete sweat that evaporates; carrying away the latent heat of vaporization; brings about cooling of the body. The sweat also contains water, salts, uric acid, lactic acid, traces of urea and carbon IV oxide, thus the skin is an excretory organ.
- ‘Growth of hair’ is due to continuous addition of new dead cells at the base of the hair. The hair arise from epidermis, and is supplied with:
- Nerve endings that increase the sensitivity of the skin to stimuli
  - Blood vessels that supply nutrients and remove wastes
- Sebaceous glands in the skin secrete sebum which:
- Keeps the hair and epidermis supple, flexible and waterproof
  - Contain antiseptic which protect skin against harmful bacteria
- The sub- cutaneous layer is a layer of fat below the dermis and it functions to:
- Store fats
  - Insulate against heat loss