THE UNITED REPUBLIC OF TANZANIA

NATIONAL EXAMINATION COUNCIL

DIPLOMA IN SECONDARY EDUCATION EXAMINATION

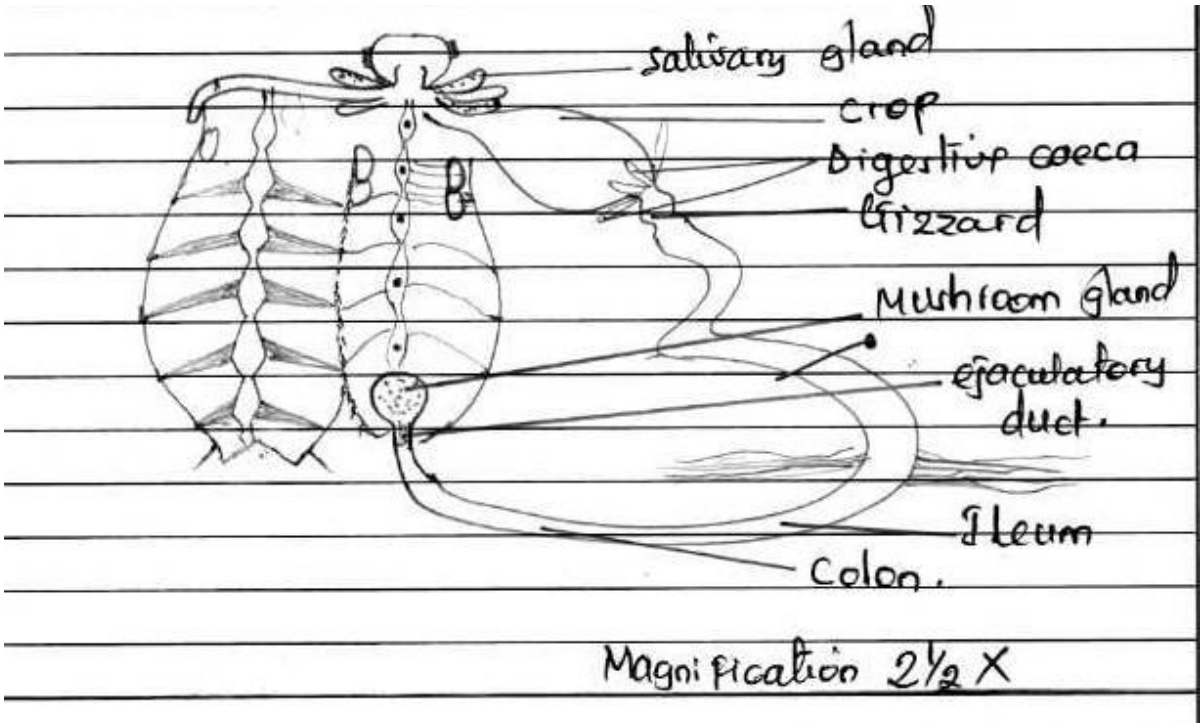
733/2A **BIOLOGY 2A**

Time: 3 Hour. **ANSWERS** **Year: 2017**

Instructions

1. This paper has three papers.
2. Answer **all** questions.
3. Question **1** contains 30 marks while question 2 and 3 have 10 marks each.
4. Mobile phones are not allowed inside the examination room.
5. Write your Examination Number on every page of your answer booklet.

1. Dissect the specimen labelled J (a cockroach — male or female) to display the digestive and reproductive systems.
(a) Draw a well-labelled diagram showing six parts of the digestive system and two parts of the reproductive system.



(b) Name three major parts forming the alimentary canal in specimen J.

The crop is one of the major parts of the alimentary canal. It acts as a temporary storage site for food before it proceeds to the next stage of digestion.

The gizzard is another important part. It contains chitinous plates that grind food into smaller particles for easier digestion.

The midgut is the site of enzymatic digestion and absorption of nutrients. It follows the gizzard and performs the actual chemical breakdown of food.

(c) State three functions of the reproductive organs observed in specimen J.

The testes in male cockroaches produce sperm cells. These are the male gametes required for fertilisation of female eggs.

The vas deferens transports the sperm from the testes to the seminal vesicle and then to the external reproductive opening during mating.

In females, the ovaries produce eggs. These are the female gametes, which when fertilised, develop into embryos. The oviducts carry eggs from the ovaries to the outside or to storage organs like spermatheca.

2. You are provided with specimen M1 and M2. Perform the following steps:
(i) Cut M1 into two halves.
(ii) Drop iodine solution on one half and observe after five minutes.
(iii) On the other half, add Benedict's solution and observe after heating.
(iv) For M2, rub it on paper, heat, and observe the result.

(a) Record the observations from all three tests.

When iodine is added to the first half of M1, the surface changes to a blue-black colour, indicating the presence of starch.

When Benedict's solution is added to the second half of M1 and heated, the solution turns from blue to orange, showing the presence of reducing sugars.

For M2, rubbing it on paper and heating produces a permanent translucent spot, indicating the presence of lipids (fats or oils).

(b) Identify the food substances present in M1 and M2.

M1 contains both starch and reducing sugars. These are carbohydrates, with starch being a polysaccharide and reducing sugars like glucose being monosaccharides.

M2 contains lipids. These are fats or oils commonly stored in plant tissues and seeds.

(c) State the enzymes responsible for digesting the identified food substances and their end products.

Starch in M1 is digested by amylase (salivary or pancreatic), which breaks it down into maltose and eventually into glucose.

Reducing sugars like glucose do not need further digestion but are absorbed directly in the small intestine.

Lipids in M2 are digested by lipase, which breaks them down into fatty acids and glycerol in the small intestine.

(d) Give three functions of the food substance from M2 to desert animals.

Lipids provide a dense source of energy, more than twice that of carbohydrates, which is important for animals in environments with scarce food.

Fats also act as insulation, helping desert animals regulate body temperature by reducing heat loss.

Lipids are a source of metabolic water, which is formed during cellular respiration. This is especially valuable for animals living in arid regions where water is limited.

3. Observe specimens F (Fish), G (Housefly), H (Maize plant), and I (Bean plant).
(a) List four observable differences between specimens F and G.

Specimen F has fins for locomotion in water, while specimen G has wings adapted for flying in air.

Fish breathe through gills located on the sides of their head, while houseflies use spiracles and tracheal tubes for gas exchange.

Specimen F has a scaly, elongated body adapted to swimming, whereas specimen G has a segmented body with a head, thorax, and abdomen.

The eyes of the fish are simple and located laterally, while the housefly has large compound eyes that provide a wide field of vision.

(b) Give three similarities between specimens H and I.

Both specimens H and I are flowering plants, meaning they produce seeds enclosed in fruits after fertilization.

They are green due to chlorophyll and perform photosynthesis to manufacture food using sunlight, water, and carbon dioxide.

Both have similar parts like roots, stems, and leaves, which support the plant and facilitate nutrient transport and photosynthesis.

(c) Draw specimen G and label five parts.

To be done practically. Suggested parts to label include: antenna, compound eye, head, thorax, abdomen, wings, and legs.