THE UNITED REPUBLIC OF TANZANIA

NATIONAL EXAMINATIONS COUNCIL OF TANZANIA

CERTIFICATE OF SECONDARY EDUCATION EXAMINATION

071 BIOLOGY 2

ALTERNATIVE TO PRACTICAL

(For Both School and Private Candidates)

Time: 2:30 Hours **ANSWERS** **Year: 2011**

Instructions

1. This paper consists of sections Five questions. Answer all questions

2. Each question carries ten marks.

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1. Suppose you have been provided with Irish potato and Sugar cane. Then you are required to design and carry out an experiment to identify the food reserves present in the Irish potato and sugar cane.

(a) Explain how you will prepare the Irish potato and sugar cane for the experiment.

- Irish potato: Crush a small portion of the potato into a paste to release its contents.
- Sugar cane: Extract juice from the sugar cane by crushing or squeezing.
- Both samples will be used for food tests to determine the presence of starch and reducing sugars.

(b) Write down the experimental work which will lead to the identification of the food substances as shown in the table below.

Food tested	Procedure	Observation	Inference
Starch (in Irish potato)	Add iodine solution to the sample	Blue-black color appears	Starch is present
Reducing sugars (in sugar cane)	Add Benedict's solution and heat	Brick-red precipitate forms	Reducing sugars (glucose) are present

2. A healthy plant was kept in the dark for twenty-four hours; while still intact on the plant, four healthy leaves were treated as follows:

- The first leaf was smeared with Vaseline on both surfaces.
- The second leaf was smeared with Vaseline on the underside only.
- The third leaf was smeared with Vaseline on the upper surface only.
- The fourth leaf was left untreated.

The plant was then exposed to sunlight for some hours. The leaves were detached, boiled in water, and thereafter in alcohol. Each leaf was then treated with iodine solution.

(a) Suggest the possible aim of the experiment.

- To investigate the role of stomata in gas exchange and photosynthesis.

(b) What was the purpose of keeping the plant in the dark?

- To deplete stored starch so that any starch observed after the experiment is newly synthesized through photosynthesis.

(c) What was the purpose of boiling the leaves in:

(i) Water
- To kill the cells and soften the leaf tissues.

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(ii) Alcohol
- To remove chlorophyll, making the color change with iodine more visible.

(d) Which leaf or leaves did not turn blue-black when treated with iodine?

- The first leaf (Vaseline on both surfaces) did not turn blue-black since stomata were blocked, preventing carbon dioxide uptake for photosynthesis.

(e) Which leaf or leaves turned blue-black when treated with iodine?

- The fourth leaf (untreated) turned blue-black as it was fully exposed to light, allowing normal photosynthesis.

(f) Which leaf or leaves acted as a control?

- The fourth leaf (untreated) served as the control.

(g) Using your biological knowledge, interpret the results of this experiment.

- The results show that photosynthesis requires carbon dioxide, which is taken in through stomata.
- Blocking stomata with Vaseline prevents carbon dioxide uptake, leading to no starch formation.
- The presence of starch in untreated leaves confirms that photosynthesis occurred.

3. Observe the diagrams of different bones found in a mammalian body then answer the questions that follow.

(a) Name each of the bones.

- A: Atlas vertebra
- B: Scapula
- C: Humerus
- D: Pelvic girdle

(b) (i) What type of a joint does A and B form?

- A and B form a ball and socket joint (at the shoulder joint).

(ii) Describe the movement allowed by this joint.

- Allows rotational movement in multiple directions (up, down, forward, backward, and circular motion).

(c) (i) Name another type of joint and identify its location in the human body.

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- Hinge joint – Found in the knee and elbow.

(ii) Describe the kind of movement allowed by the joint named in (c)(i) above.

- Allows movement in only one direction (flexion and extension).

(d) (i) Name any two types of muscles.

- Skeletal muscles
- Smooth muscles

(ii) Mention part(s) of the body in which muscles in (d)(i) can be found.

- Skeletal muscles: Found in arms and legs.
- Smooth muscles: Found in the digestive tract and blood vessels.

4. Figure 1 shows parts found in a typical flower.

(a) Identify and label the parts of the carpel and the parts of the stamen.

- A: Stigma (part of the carpel)
- B: Style (part of the carpel)
- C: Ovary (part of the carpel)
- D: Anther (part of the stamen)
- E: Petal

(b) State the functions of each of the parts labeled in 4(a) above.

- Stigma: Receives pollen grains during pollination.
- Style: Connects the stigma to the ovary and allows pollen tubes to grow towards the ovules.
- Ovary: Contains ovules, which develop into seeds after fertilization.
- Anther: Produces and releases pollen grains for fertilization.
- Petal: Attracts pollinators with bright colors and scent.

(c) Based on the observable characteristics of the flower in 4(a), suggest the agents of pollination.

- The flower is most likely pollinated by insects or birds due to its large petals, bright color, and possible scent.

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5. Study the organisms below and then answer the questions that follow.

(a) (i) Place organisms M - Q in their respective class.

- M: Insecta
- N: Arachnida
- O: Crustacea
- P: Annelida
- Q: Insecta

(ii) Which organisms are placed in the same class? Give reasons.

- M and Q are in the same class, Insecta.
- They both have three pairs of legs, segmented bodies, and one or two pairs of wings.

(b) Provide at least one distinguishing characteristic of the class to which P, N, and O belong.

- P (Annelida): Has a segmented body and lacks jointed appendages.
- N (Arachnida): Has four pairs of legs and no antennae.
- O (Crustacea): Has a hard exoskeleton and more than four pairs of legs.

(c) (i) Where would you find organisms M and O?

- M (Insect): Found on land in various habitats such as plants, soil, and air.
- O (Crustacean): Found in aquatic environments such as oceans, rivers, and lakes.

(ii) Of what economic importance is organism O to man?

- Organism O (crab) is a source of food for humans.
- It contributes to the fishing and seafood industry.
- It helps in nutrient recycling in aquatic ecosystems.

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