

051106T4APB

APPLIED BIOLOGY LEVEL 6

APB/OS/AB/CR/01/6/A

CARRY OUT CYTOLOGICAL AND HISTOLOGICAL TECHNIQUES

July /August 2024



**TVET CURRICULUM DEVELOPMENT, ASSESSMENT AND CERTIFICATION
COUNCIL (TVET CDACC)**

WRITTEN ASSESSMENT

TIME: 3 HOURS

INSTRUCTIONS TO CANDIDATE

1. This paper consists of two sections; **A** and **B**
2. Answer **ALL** the question as guided in each section
3. Marks for each question are as indicated in the brackets
4. You are provided with a separate answer booklet to answer the questions
5. Do not write in this question paper

**This paper consists of FOUR (4) printed pages
Candidates should check the question paper to ascertain that all pages are
printed as indicated and that no questions are missing**

SECTION A (40 MARKS)

(Attempt ALL Questions in this section)

1. A student was examining two different cells under an electron microscope and discovered that the cells were prokaryote and eukaryote. Describe the key structural difference between the two types of cells. (4 Marks)
2. Suppose a piece of potato is placed in a solution with a lower solute concentration than the potato cells. Describe the process, the direction of water movement and the resulting changes in the potato cells. (4 Marks)
3. Interphase is one of the stages of mitosis. State any other **FOUR** phases of this cell division. (4 Marks)
4. Students in a group discussion were studying different techniques of fresh tissue preparations. During the discussion, they were unable to distinguish between squashing and maceration techniques. Help them to distinguish those terms. (4 Marks)
5. In a histopathological practical set up, you have been asked to choose an ideal fixative before processing a tissue specimen sample. List any **FOUR** properties of an ideal fixative. (4 Marks)
6. Decalcification is an important technique for removing minerals from bone. Explain any **TWO** factors influencing its rate. (4 Marks)
7. In a histological experiment ribbon of sections were observed to be curved during section cutting. Suggest **FOUR** likely causes and their corresponding solution. (4 Marks)
8. A microtome is a machine used in sectioning tissues that have been processed. State any **FOUR** commonly used microtome in histopathology. (4 Marks)
9. Zenker's solution is a commonly used fixative in histology. Outline its composition and preparation. (4 Marks)
10. With specific examples differentiate between progressive and regressive staining. (4 Marks)

SECTION B (60 MARKS)

(Answer Any **THREE** Questions in this section)

11. a) You have been tasked to study the growth of a particular type of plant cell in the laboratory.

After observing the cells under a microscope, you are required to recoded the series of events which take place in and G2 phases of the cell cycle. Describe those series of events

that was to take place in those phases of the cell cycle. (9 Marks)

b) After the presentation of the study in (a) above, you are also asked to differentiate between mitosis and meiosis. What are the differences? (11 Marks)

12. Trainees at KNP institute were required to prepare permanent tissue slides.

a. Explain how each of the following steps can be achieved during the process

i. Dehydration (6 Marks)

ii. Clearing (4 Marks)

iii. Infiltration (4 Marks)

b. State TWO importance of each of the processes stated in (a) above (6 Marks)

13. a) A scientist was doing a *Papanicolaou* staining test in the laboratory. State the observations that would have been made from a successful positive test (11 Marks)

b) During tissue processing clearing is done after dehydration. Name FIVE chemicals used in tissue clearing. (5 Marks)

c) Staining technique can also be done by a machine known as automatic staining machine. Highlight FOUR advantages of using the machine in staining. (4 Marks)

14. a) Embedding is an important process in tissue processing. You have been chosen to do embedding technique in a practical set up;

i. List SIX types of embedding media you can use in preparation of permanent slide. (3 Marks)

- ii. THREE advantages and TWO disadvantage of plastic cassettes for embedding tissues. (5 Marks)
- b) Outline the characteristics of an ideal mounting media. (12 Marks)