1408/314
BIOLOGY TECHNIQUES
Oct./Nov. 2017
Time: 3 hours

THE KENYA NATIONAL EXAMINATIONS COUNCIL

SCIENCE LABORATORY TECHNOLOGY CRAFT

BIOLOGY TECHNIQUES

3 hours

INSTRUCTIONS TO CANDIDATES

You should have the following for this examination:
Answer booklet;
Non-programmable scientific calculator.
*This paper consists of **TWO** sections; **A** and **B**.*
*Answer **ALL** the questions in section **A** and any **TWO** questions from section **B**.*
*Each question in section **A** carries **4** marks while each question in section **B** carries **20** marks.*
Maximum marks for each part of a question are indicated.
Candidates should answer the questions in English.

This question paper consists of 3 printed pages.

Candidates must check the question paper to ascertain that all the pages are printed and that no questions are missing.

SECTION A (60 marks)

*Answer **ALL** the questions in this section.*

1. (a) State the functions of the following parts of a light microscope:

   (i) draw tube;
   (ii) iris diaphragm. (2 marks)

   (b) Explain the use of immersion oil in a light microscope. (2 marks)

2. Distinguish between Smooth Endoplasmic Reticulum (SER) and Rough Endoplasmic Reticulum (RER). (4 marks)

3. A plasmolysed living plant cell is placed in a large volume of pure water. Explain the process that will take place. (4 marks)

4. Explain how the concentration of ascorbic acid in an unknown sample is determined. (4 marks)

5. (a) Name any **four** techniques of tissue isolation in histological techniques. (2 marks)

   (b) Explain the theory behind the appearance of a cloudy white suspension during lipid testing using the emulsion test. (2 marks)

6. Explain the preparation of the amino acid mixture in chromatographic analysis of proteins. (4 marks)

7. Compare and contrast prophase in mitosis and meiosis. (4 marks)

8. (a) Differentiate between defined and complex media. (2 marks)

   (b) Explain the sterilization of cleaned glass petri-dishes in the laboratory. (2 marks)

9. Describe the **two** types of pasteurization. (4 marks)

10. Explain the following methods of preservation in museum techniques:

    (a) dry skins; (2 marks)
    (b) stuffed skin. (2 marks)

11. Explain the maintenance of population equilibrium for species with:

    (a) high survival rate; (2 marks)
    (b) low survival rate. (2 marks)

12. Draw labelled diagrams of the following cells:

(a) eosinophil;
(b) neutrophil. (4 marks)

13. State **four** mechanisms through which atmospheric nitrogen is fixed to the usable form by plants. (4 marks)

14. Name any **four** classes of fixatives used in histological techniques. (4 marks)

15. Describe intravenous injection procedure on a rabbit. (4 marks)

SECTION B (40 marks)

*Answer any **TWO** questions from this section.*

16. (a) Explain the factors which must be taken into consideration to get maximum resolution from a lens system of a compound microscope. (12 marks)

(b) Outline the precautions taken into consideration before returning a microscope into the store after use in the laboratory. (8 marks)

17. (a) (i) Describe the structure and function of a pitfall trap used in collection of organisms for museum purpose. (10 marks)

(ii) Name two methods used in collection of flying insects. (2 marks)

(b) Explain how deforestation increases atmospheric carbon dioxide. (8 marks)

18. (a) Describe the characteristics of enzymes. (10 marks)

(b) Draw a labelled diagram of a generalized plant cell as seen under an electron microscope. (10 marks)

19. (a) Outline the characteristics of an ideal fixative. (10 marks)

(b) Describe, with the aid of an illustrational curve the typical growth characteristics of a bacteria grown in a fluid media. (10 marks)

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