

231/2  
BIOLOGY  
PAPER 2  
THEORY  
Time: 2 Hours

**MANG'U HIGH SCHOOL  
MOCK EXAM**

**Instructions to candidate**

1. This paper consists of two sections A and B.
2. Answer **all** the questions in section A in the spaces provided after each question.
3. In Section B, answer question 6 (**Compulsory**) in the spaces provided and either question 7 or 8 in the spaces provided after questions 8.
4. Candidates will be penalized for incorrect spellings especially for biological terms.
5. All working must be clearly shown where necessary.

**For Examiner's use only**

Section	Questions	Maximum Score	Candidate's Score
A	1	08	
	2	11	
	3	07	
	4	10	
	5	04	
B	6	20	
	7	20	
	8	20	
TOTAL SCORE		80	

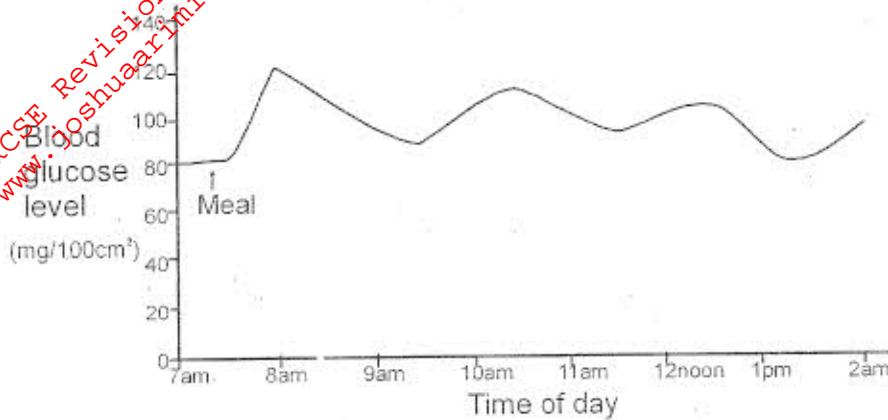
**This paper consists of 6 printed pages.**

**Candidates should check the question paper to ensure that all the pages are printed as indicated and that no questions are missing.**

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## SECTION A (40 Marks)

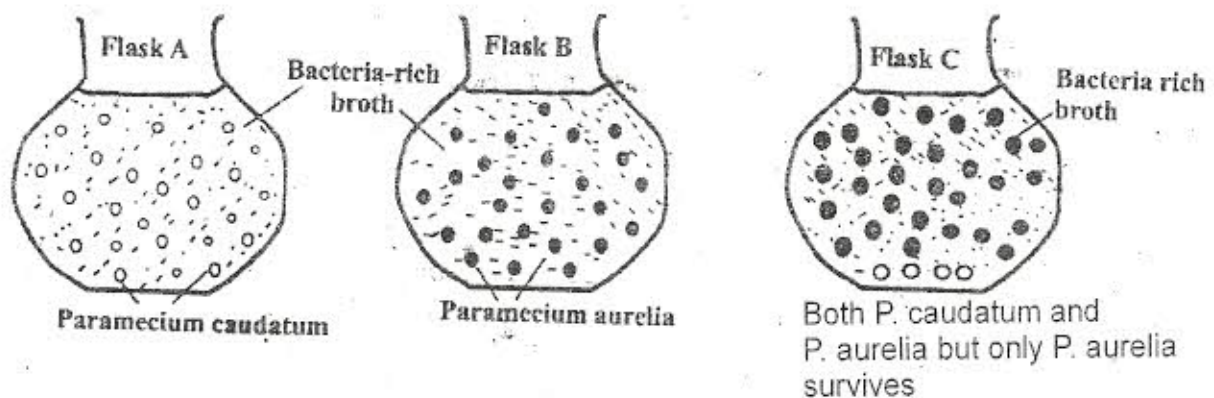
1. The graph below represents changes in blood glucose levels of a healthy person who had been starved for 24 hours then on the second day fed on a starchy meal.



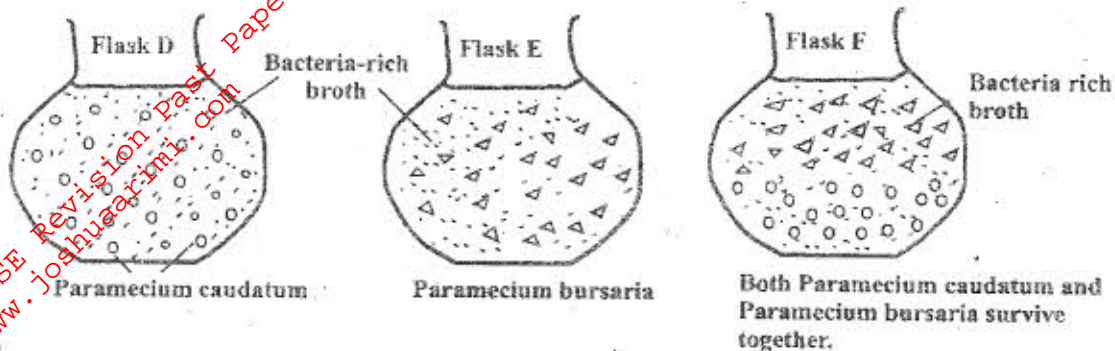
- (a) Explain the rise in blood glucose levels after the meal. (3 marks)
- (b) Explain the decrease in the blood glucose levels between 8 am and 9 am. (2 marks)
- (c) i) Sketch on the graph to show how the curve for a person suffering from diabetes mellitus would be like for the first two hours after the starchy meal. (2 marks)
- ii) One of the symptoms of diabetes mellitus is a glycosuria (presence of sugar in the urine). Explain how this condition comes about. (2 marks)

2. Two sets of experiments were carried out to investigate a certain concept of population ecology. In each experiment, two different species of the protozoa *paramecium* were placed in flasks containing bacteria-rich broth. The paramecia feed on bacteria.

### Experiment 1



## Experiment 2



a) Account for the results in:-

(i) Flask C.

(3 marks)

(ii) Flask F.

(3 marks)

b) Describe briefly the principle that was being investigated in the two experiments. (2 marks)

3. In fruit flies *Drosophila*, the gene for the eye colour is sex-linked. The allele for red eyes (R) is dominant to the allele for white eyes (r).

When a red-eyed female is crossed with white-eyed male, all the offspring have red eyes.

In a second breeding, a white-eyed female was crossed with a red-eyed male and all the male offspring had white eyes.

a) Given that in the fruit flies, the male is the heterogametic individual:-

(i) Explain the term heterogametic individual.

(1 mark)

(ii) Give the genotype of the red-eyed male.

(1 mark)

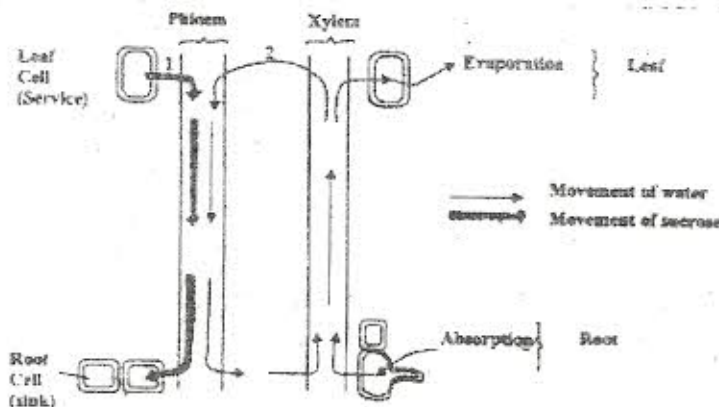
(b) Work out the possible genotypes of the offspring from the second cross.

(4 marks)

(c) In a randomly picked population of white-eyed fruit flies, it was found that 92% were male and only 8% were females. Explain.

(2 marks)

4. The diagram below illustrates movement of water and sucrose through a flowering plant.



(a) Name and explain how each of the process labeled 1 and 2 come about.

(i) Process 1.

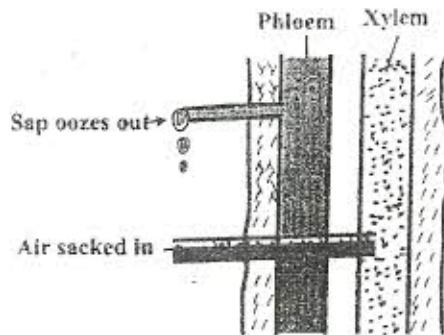
(2 marks)

(ii) Process 2.

(2 marks)

(b) When the phloem and xylem were both punctured with a hollow tube, the observations made were as shown below.

Explain the observation in each case.



(i) Phloem.

(1 mark)

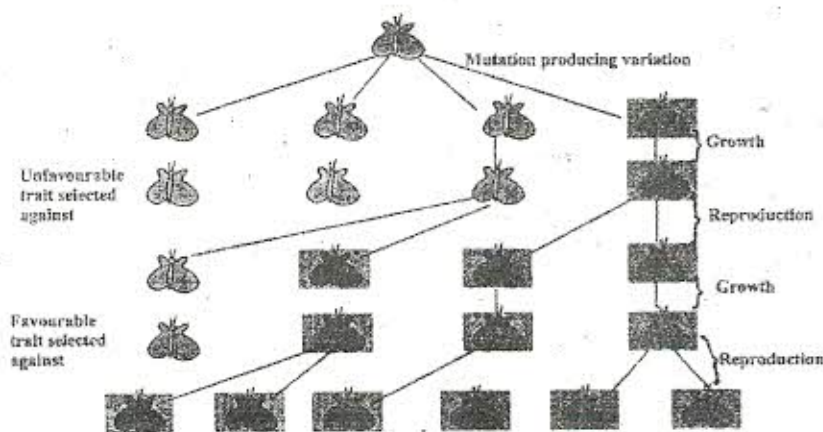
(ii) Xylem.

(1 mark)

c) Other than the process illustrated in the above diagrams, give two other processes by which translocation occurs in plants.

(2 marks)

5. The flow chart below shows natural selection acting on the peppered moth population.



(a) Name two causes of variation / new trait in the moth population.

(2 marks)

(b) Explain how the:-

(i) unfavourable trait was selected against.

(3 marks)

(ii) favourable trait was selected for.

(3 marks)



## SECTION B (40 marks)

Answer question 6 (compulsory) and either question 7 or 8 in the spaces provided after question 8.

6. An experiment was carried out to investigate the effect of auxins concentration on the growth of oat coleoptiles.

Ten batches of 20 coleoptiles, each 1.5cm long were obtained.

In the first nine batches, 3mm of the apical tips were removed from all the coleoptiles and their lengths measured. The batches were then placed in different petri-dishes with different auxins concentrations plus 2% sucrose.

In the tenth batch the apical tips of the coleoptiles were left intact, their lengths measured and then placed in plain petri-dish containing 2% sucrose solution.

The auxins concentrations of the petri - dishes were as shown below.

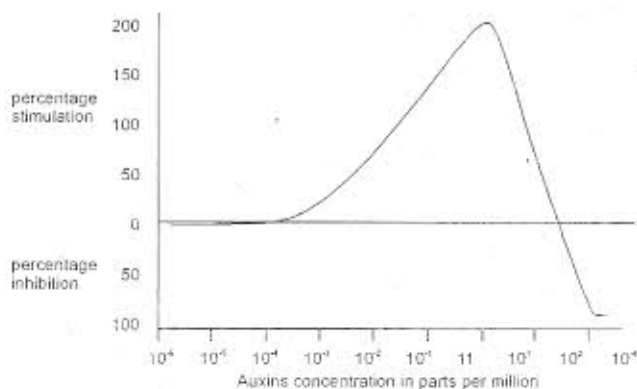
Batch No.	1	2	3	4	5	6	7	8	9	10
Auxins concentration (ppm) in petri-dish	$10^2$	$10^1$	$10^0$	$10^{-1}$	$10^{-2}$	$10^{-3}$	$10^{-4}$	$10^{-5}$	$10^{-6}$	0

All the petri-dishes were covered and incubated at 25°C in the dark for three days.

After three days, the coleoptiles in each petri-dish were remeasured and average lengths worked out.

The average length of each batch was compared to the average length in batch number 10 and the difference expressed as either percentage stimulation or inhibition in growth.

The results were as shown in the graph below.




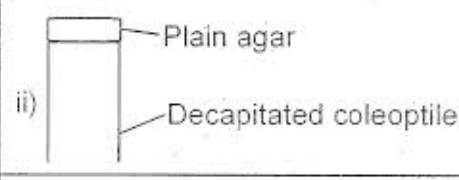
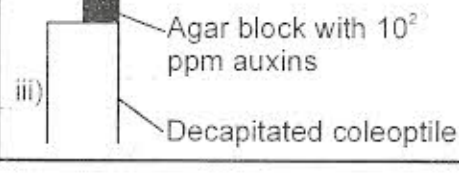
- (a) Describe the effect of auxins on growth of coleoptiles.. (2 marks)
- (b) Explain how auxins bring about stimulation in growth. (3 marks)
- (c) Suggest why:-
- (i) the petri-dishes were incubated at 25°C? (2 marks)
  - (ii) the coleoptiles were placed in 2% sucrose solution. (2 marks)
  - (iii) the petri-dishes were placed in darkness. (2 marks)
  - (iv) the apical tips of the coleoptiles were removed in the first nine batches. (2 marks)

(d) State the advantage of using many coleoptiles per petri-dish.

(1 mark)

(e) Based on the results shown on the graph, draw the expected response of each of the decapitated coleoptile below, treated as shown and then incubated at 25°C in the dark for three days.

(3 marks)

Coleoptile at the beginning	Coleoptile after three days
 <p>i) Agar block with <math>10^0</math> part per million auxins Decapitated coleoptile</p>	
 <p>ii) Plain agar Decapitated coleoptile</p>	
 <p>iii) Agar block with <math>10^2</math> ppm auxins Decapitated coleoptile</p>	

(g) State the survival value in each of the following tropic responses.

(i) coleoptile negatively geotropic.

(1 mark)

(ii) pollen tubes negatively aerotropic.

(1 mark)

(iii) hyphae of some fungi positively chemotropic.

(1 mark)

7. With reference to the leaf only, discuss the adaptations of xerophytic plants that enable them survive in their habitat. (20 marks)

8. (a) Describe the events that take place in the eye when a person sitting under a tree shade reading a book shifts his focus to a sunlit aeroplane in the sky, and then back to the book. (16 marks)

(b) Describe four structural adaptations in the eye of nocturnal animals.

(4 marks)