P530/2
BIOLOGY
Paper 2
AUGUST.
2024
2½ hours

NATIONAL EDUCATION RESEARCH & EXAMINATIONS BUREAU

UACE NEREB NATIONAL MOCKS 2024
BIOLOGY
(THEORY)

PAPER 2

2 HOURS 30 MINUTES

INSTRUCTIONS TO CANDIDATES:

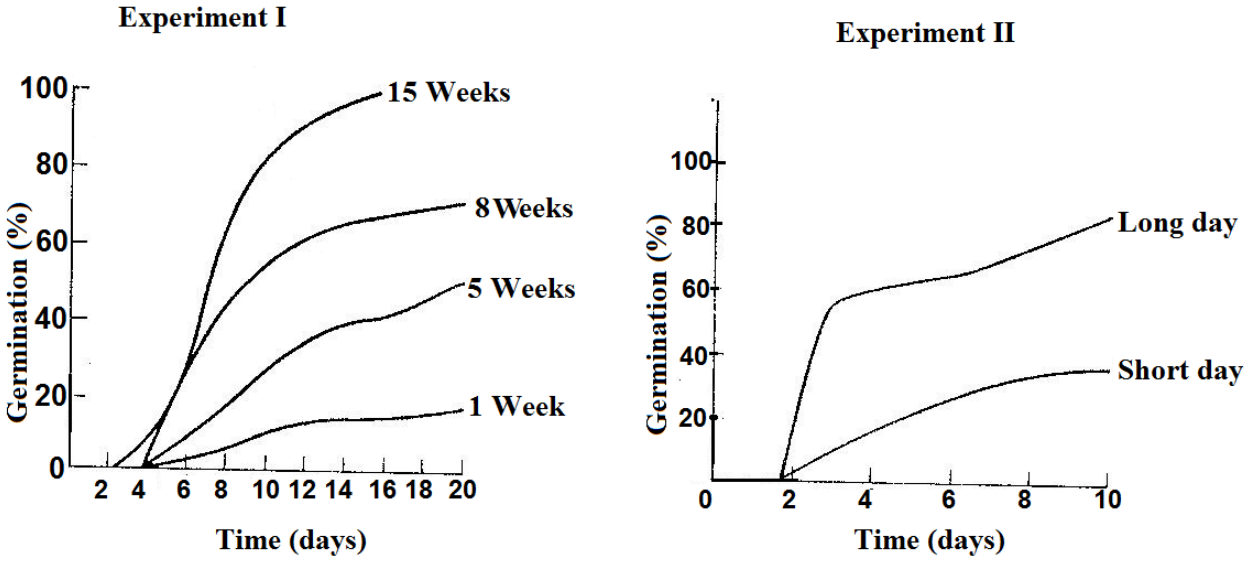
- *This paper consists of sections* **A** *and* **B**.
- *Answer question* one *in section* **A** *plus* **three** *questions from section* **B**.
- *Candidates are advised to read the questions carefully, organize their answers and present them precisely and logically, illustrating with well labelled diagrams where necessary.*

SECTION A: (40 MARKS)

Question **1** *is* compulsory.

1. Experiments were performed to investigate some of the factors which influence flowering of a short day plant species, and the onset of germination of seeds of the same species.

Experiment I was on the effect of increasing time of dry storage on the germination of the species seeds. All the seeds were kept at 15^0C. Each curve represents a germination test on a seed sample stored for the number of weeks indicated.
Experiment II was on the germination of seeds under long-day illumination cycles (20 hours light: 4 hours dark) and short day cycles (20 hours dark: 4 hours light) separately.



Experiment III was on the germination of seeds during an eight-day period. Before starting the investigation, some of the seeds and some of the intact fruits were treated as indicated in the table below:

Treatment	***Percentage germination by day***			
	2	**4**	**6**	**8**
Intact fruits in air	0	6	10	10
Fruits with pericarp cut	0	12	28	38
Naked seeds in air	0	14	30	42
Seeds with testa pricked	14	45	53	53
Seeds in oxygen	40	56	72	78
Pricked seeds in oxygen	25	62	70	84

(a) Compare the percentage germination of the two seed samples in **Experiment II.** **(03 marks)**

(b) Explain the effect of:

(i) Varying illumination cycles on seed germination in **Experiment II.** **(10 marks)**

(ii) Exposing a brief flash of light in the middle of the dark period in **Experiment II** on flowering of the plant. **(04 marks)**

(c) State what would be the effect of illumination on the flowering when the same treatment of the plant in **Experiment II** was subjected to:

(i) A long day plant. **(02 marks)**

(ii) A day neutral plant. **(01 mark)**

(d) Explain the effect of changing the period of day storage in **Experiment I** on seed germination. **(07 marks)**

(e) (i) Describe the effect of different seed treatments on seed germination in **Experiment III.** **(03 marks)**

(ii) Account for the observed influence in **Experiment III**. **(04 marks)**

(d) What are the advantages of spores over seeds in reproduction? **(06 marks)**

SECTION B (60 MARKS)

2. (a) What are the differences between the digestive systems of herbivorous and carnivorous mammals? **(08 marks)**

(b) Discuss the main advantages of a parasitic mode of life. **(05 marks)**

(c) Give an account of the principle adaptations shown by parasites, using examples from both plant and animal kingdoms. **(07 marks)**

3. Explain fully the:

(a) Role of the pituitary gland in the reproductive cycle of the female mammal. **(09 marks)**

(b) Functions of the placenta. **(06 marks)**

(c) Relationship between reproduction and population growth in animals. **(05 marks)**

4. Coat colour in rabbits is determined by multiple alleles. Chinchilla coat (c^{ch}) is dominant to Himalayan coat (c^{h}). The allele for full coat colour (C) is dominant to both these, whereas the albino allele (c) is recessive to all the others. The inheritance of coat colour follows normal Mendelian principles for autosomal genes.

(a) What is meant by multiple alleles? **(02 marks)**

(b) List all the possible genotypes for the following rabbits: **(03 marks)**

(i) Heterozygous for full coat.

(ii) Homozygous for Himalayan coat.

(iii) Heterozygous for chinchilla coat.

(c) What offspring phenotypic ratios would be obtained from these crosses:

(i) $c^{h}c^{ch}$ x $c^{h}c^{ch}$ **(03 marks)**

(ii) Cc x $c^{h}c^{ch}$ **(03 marks)**

(d) A breeder suspects his chinchilla buck is not homozygous at the C locus and so mates it with a pure-breeding Himalayan doe. He obtains a litter of 7 chinchilla rabbits only. How certain could he be that his buck is homozygous at the C locus? **(09 marks)**

5. (a) There are three stages in the release of energy from a molecule of glucose: glycolysis, Krebs cycle and the electron transfer system. What are the essential features of each of these processes? **(10 marks)**

(b) In what circumstances would you expect anaerobic respiration of glucose to occur in: (i) Yeast? **(02 marks)**

(ii) A flowering plant? **(04 marks)**

(iii) A mammal? **(04 marks)**

6. Discuss the impact of man on the environment, with reference to the use of pesticides, artificial fertilisers, overfishing and the disposal of radioactive materials. **(20 marks)**

END