530/2
BIOLOGY
Paper 2
July/Aug. 2023
2 ½ hours

AITEL JOINT MOCK EXAMINATION

Uganda Advanced Certificate of Education
BIOLOGY
(Theory)
P530/2
Paper 2

Instructions to the Candidates:

- ✓ *Answer question **One** in section A plus **three** others 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 wherever necessary.

SECTION A: (40 MARKS)

1. An experiment was carried out to compare the uptake of nitrogen in Soya bean seedlings grown in an atmosphere enriched with carbon dioxide with that of seedlings grown in a normal atmosphere (control plants).Soya beans belong to Papilionaceae (legumes) and all the experimental plants had root nodules containing Rhizobium. The results of the experiment are shown in the table I. Table II shows mean values of primary productivity for four ecosystems: temperate deciduous forest; tropical forest, temperate grassland and intensively cultivated land in temperate region.

Mean mass of nitrogen incorporated into compounds in a plant grown in an atmosphere enriched with carbon dioxide/mg	0	20	50	130	250	540	800	840
Mean mass of nitrogen incorporated into compounds in a plant grown in a normal atmosphere (control plants)/mg	0	20	20	30	50	110	120	140
Age/days	25	36	50	60	70	80	90	100

Table II

Ecosystem	Primary productivity/kJm $^{-2}$ yr $^{-1}$
Temperate deciduous forest	26000
Tropical forest	40000
Temperate grassland	15000
Intensively cultivated land in a temperate region	30000

(a) (i) Present the information in table I graphically (11 marks)

(ii) Of the nitrogen incorporated into compounds in the control plants, 75% was taken up from the soil. State the form in which this nitrogen was taken up by plants (1 mark)

(iii) Explain how the control plants obtained the remaining 25% of their nitrogen(2 marks)

(iv) Compare the effect of the atmosphere enriched with carbon dioxide with that of the normal atmosphere on the mass of nitrogen incorporated into the seedlings (3 marks)

(v) Suggest one reason for any differences you observe in a (iv) (1 mark)

(b) (i) From table II, how does primary productivity of a tropical forest differ from that of a temperate forest? (1 mark)

(ii) Account for the difference in b (i) above (8 marks)

(iii) Suggest explanations for the difference in primary productivity between temperate grassland and intensively cultivated land. (4 marks)

(iv) Describe how you would estimate the fresh biomass of the producers in a grassland ecosystem (5 marks)

(v) Suggest why productivity of an ecosystem is measured in units of energy rather than units of biomass (2 marks)

SECTION B (60 MARKS)

ANSWER ANY THREE QUESTIONS

1. (a) Define 'organic evolution'
   (b) (i) Name six evidences used to support the theory of evolution
   (ii) Briefly explain how each of the evidences you have named in (b) (i) above is used to support the theory of evolution

2. (a) Briefly describe how protein molecules are formed from poly peptide chains after protein synthesis
   (b) Explain how
   (i) temperature affects enzyme activity
   (ii) inhibitors alter the rate of enzyme catalysed reactions

3. (a) State three ways in which water has similar functions in both plants and animals
   (b) Explain the ways in which desert mammals minimize water loss through the following:
   (i) structural means (5 marks)
   (ii) physiological means (5 marks)
   (iii) behavioural means (7 marks)

4. (a) How are gas exchange surfaces adapted to their function in terrestrial mammals? (8 marks)
   (b) Give an account of the gas exchange mechanisms in a bony fish such as Tilapia. How do these mechanisms differ from those of terrestrial mammals? (12 marks)

5. (a) What are carbohydrates? (5 marks)
   (b) Account for the fact that carbohydrates form a wide variety of polysaccharides. (15 marks)

END