



KENYATTA UNIVERSITY

UNIVERSITY EXAMINATIONS 2011/2012

**SECOND SEMESTER EXAMINATION FOR THE DEGREE OF BACHELOR OF
SCIENCE IN BIOCHEMISTRY AND BIOTECHNOLOGY**

SBC 309: ECOLOGICAL BIOCHEMISTRY

DATE: FRIDAY, 30TH MARCH 2012

TIME: 4.30 P.M. – 6.30 P.M.

Section A: ANSWER ALL QUESTIONS (Total Marks =20 marks).

1. In the spot test for HCN, the presence of the gas is confirmed when the picrate paper turns from ----- to -----.
 - A). Yellow to red.
 - B). Brown to red.
 - C). Red to brown.
 - D). Green to white.

2. Higher plants adapt to freezing by-----
 - A). Increasing sugar content in the cell sap.
 - B). Production of glycoproteins.
 - C). Increasing the amounts of saturated fatty acids.
 - D). All the choices are correct.

3. Azetidine 2-carboxylic acid is an analogue of
 - A). Arginine.
 - B). Proline.
 - C). Tyrosine.
 - D). Glycine.

4. Hydrophytes are adapted to their habitat by the following ways except?
- A). Complexing with organic compounds.
 - B). Development of adventitious roots.
 - C). By rapid development of shoots.
 - D). By enlargement of the diameter of their stem.
5. Choose the statement that is not true about bees.
- A). They prefer to pollinate blue or yellow flowers.
 - B). They are not sensitive to intensely UV absorbing flavones and flavonols.
 - C). Are insensitive to red colours but they visit some red flowers.
 - D). They visit other flowers when nectar is in short supply.
6. In the calvin cycle, sucrose is produced from -----
- A). 1,3-biphosphate.
 - B). Pyruvate.
 - C). Oxaloacetate.
 - D). Glyceraldehyde 3- phosphate.
7. In the bundle sheath cells, NAD^+ malic enzyme is localized in -----
- A). Chloroplast.
 - B). Mitochondria.
 - C). Cytoplasm.
 - D). Mesophyll cells.
8. Which of the following is not a major constituent of aminoid scent in flowers.
- A). Putrescines.
 - B). Isobutyric acid.
 - C). Limonene.
 - D). Skatole.

9. The three common sugars of nectar are-----
- A). Mannose, glucose and sucrose.
 - B). Glucose , fructose and sucrose.
 - C). Raffinose, trehalose and melibiose.
 - D). Maltose, dextrose and mannose.
10. -----toxin causes convulsion and death in mammals.
- A). β - cyanoalanine.
 - B). Azetidine -2- carboxylic acid.
 - C). L-Dopa
 - D). Glucosinolates.
11. Phytohaemagglutinins -----
- A). Do not provide protection against insect attacks.
 - B). Coagulate the platelets of human blood .
 - C). Used in identification of human blood group.
 - D). Are toxic peptides of non- nitrogenous origin.
12. In control of stomatal closure, abscisic acid is replaced by -----in sorghum.
- A). Phaseic acid
 - B). Isosalipurposide
 - C). Xanthoxin
 - D). EE fersenol
13. The toxicity of pyrrolizidines lies in-----
- A). Their structural organization.
 - B). The minor metabolic products produced in the plant.
 - C). The major in vivo metabolites they are converted to in the mammals.
 - D). All the choices are correct.
14. The regeneration of PEP from pyruvate is catalyzed by -----in the -----.
- A). Pyruvate decarboxylase, cytosol.
 - B). Pyruvate-pi dikinase, mesophyll cell.
 - C). PEP carboxylase, bundle sheath cells.
 - D). Malate enzyme, mitochondria.

15. Mild selenium toxicity in sheep is manifested by-----
- A). Falling out of limbs.
 - B). Diarrhoea.
 - C). Production of bald patches.
 - D). Convulsions.
16. Humming birds as pollinators of angiosperms prefer-----colours.
- A). Drab colours.
 - B). Yellow colours.
 - C). Red or orange red colours.
 - D). Green colours.
17. Polyhydroxy alkaloids are-----
- A). Molecules in which the oxygen molecule is replaced by nitrogen and thus are sugar weapons.
 - B). Molecules that resemble simple sugars and are used as food preservatives in animal feeds.
 - C). Are metabolic by products in animals.
 - D). Are synthetic products that are used in beauty products.
18. Yellow colours in angiosperms are due to the presence of -----pigments.
- A). Pelargonidin and auronones.
 - B). Carotenoids and luteolin.
 - C). Chalcones and auronones.
 - D). Gossypetin and peonidin.
19. In *Digitalis purpurea*, visible honey guides are as a result of concentration of ----- pigment.
- A). Cyanidin.
 - B). Quinones.
 - C). Chlorophyll.
 - D). Apigenidin.
20. Sesquiterpene lactones are-----
- A). Not toxic to insects.
 - B). Repellent and have allergic skin effects in animals.
 - C). Non- poisonous to farm animals.
 - D). Are sweet tasting.

Section B: ANSWER ALL QUESTIONS (Total marks = 30)

1. A). Define the term cyanogenesis (1 mark)
B). Cyanogenesis does not confer a reduced physiological fitness to plants during unfavourable weather. State if this statement is **false** or **true** and justifies your answer (4 marks).
2. You have been employed in a herbarium. You are supposed to categorize plants materials either as C 3 or C 4. Explain how you will complete the task (5 marks).
3. A). Define the term adaptation (1 mark)
B). Chemical toxicity is a relative term. State five factors it depends on (2 ½ marks).
C). List 3 physical defences used by plants against herbivore feeding (1½ marks).
4. Briefly write about methylation of cyanic colour of flowers (5 marks).
5. Nectar is highly nutritious but can also be toxic. Justify this statement (5 marks).
6. A). Explain briefly why hydrogen cyanide is normally toxic to a wide range of organisms
(1 mark).
B). Using a reaction scheme, illustrate the hydrolysis of glycosides (4 marks).

Section C. Answer any two (Total marks =20).

1. Clearly explain how sugarcane is adapted to live in hot climates (10 marks).
2. Insect behaviour is controlled by chemical signals. Using two specific examples, describe how the insect behaviour is interwoven with organic compounds from plants (10 marks).
3. Most of the plants produce chemical compounds for defence purposes. Most of these chemical compounds are toxic to animal life, including that of mammals. Since plants are the sole source of food for mammals, explain how the mammals are adapted to their food material (10 marks).