K.C.S.E BIOLOGY PAPER 231/1
MARKING SCHEME 2002

SECTION A (20 Marks)

Answer all the questions in this section in the space provided.

1. Beside the abdomen, name the other body part of members of Arachnida
Cephalothorax; prosoma (1mark)

2 (a) Name the bacteria found in the root nodules of leguminous plants
Rhizobium Nitrogen fixing bacteria. (1mark)

(b) State the association of the bacteria named in (a) above with the leguminous plants.
Symbiosis/mutualism. (1 mark)

3. (a) State the function of co-factors in cell metabolism. (1 mark)
Substances that activate enzymes.

(b) Give one example of a metallic co-factor
Metallic ions e.g. iron/mg/zn/cu/ (accept correct iron forms) Fe^{2+}, Mg^{2+}, Ca^{2+}, mn^{2+}, Co^{2+}, Cu^{2+}, K^{+}, mg^{2+} (reject wrong charges)

4. During germination and early growth, the dry weight of endosperm decreases while that of the embryo increases. Explain (2 marks)

Endosperm material was being oxidized/converted / hydrolyzed into new cytoplasm/ new material for growth/food used for growth.

5. State two characteristics that researchers select in breeding programme (2 marks)
High yielding/highbrid vigons / heterosis; resistance to decrease early maturity; Resistance to drought/salinity.

6. In what from is oxygen transported from the lungs to the tissues? (1 mark)
Oxyhaemoglobin acc Hbo /Hbo

7. Explain why the carrying for wild animals is higher than that for cattle in a given piece of land

Cattle are mainly grazers while others are browsers,

8. Which type of joint is found at the articulations of:
(a) Pelvic girdle and femur (1mark)
(b) Humerus and ulna?
Hinge (1mark)

9. Name the two gaseous exchange structures in higher plants (2 marks)
Stomata, lenticells; (reject cuticle)

10. What happens to excess fatty acids and glycerol in the body (2 marks)
Converted into fats and stored beneath skin (adipose tissue)

11. Give an example of a sex-linked trait in humans on : (1 mark)

Y Chromosome
Tuft and hair sprouting from pinna baldness; *hairy pinna:*

X Chromosome
Colorblindness/ hemophilia.

SECTION B (40 MARKS)

Answer all the questions in this section in the spaces provided.

12. The chart below represents a simplified carbon cycle.

(a) Name the processes labeled A, B and C
A. Photosynthesis
B. Decomposition/decay
C. Respiration. (3 marks)

(b) Name the organisms X and Y.
X Bacteria
Y Fungi. (2 marks)

(c) State the importance of carbon cycle in nature. (1 mark)
Regulate Co_2 in the atmosphere

13. The chart below shows the number of chromosomes before and after cell division and fertilization in mammal.

(a) What type of cell division takes place at Z? (1 mark)
Meiosis

(b) Where in the body of a female do the process Z occur? (1 mark)
Ovary

(c) On the char, indicate the position of parents and gamete (2 marks)
Parent must be the 2n on top, any "n" is a gamete.

(d) Name the process that leads to addition or loss of one or more chromosomes.
Non –disfunctions (1 mark)

(c) State three benefits of polyploidy in plants to a farmer. (2 marks)
Increased yields Highbrid Vigor, Resistance to diseases,
Resistance to drought

14. (a) What is organic evolution 1 mark)
Emergence of present fauna and flora new life term species organisms from Preexisting from gradually over a long period of time.

(b) State two ways in which Homo sapiens differs from Homo habilis (2 marks)
Standing upright/erect posture, higher intellectual Capacity/ higher brain/Bigger brain capacity; communication through language/speech.

(c) Distinguish between divergent and convergent evolution giving an example in each case.
Divergent basic structural form is modified to serve different functions; e.g. Vertebrate forelimbs, beak structure in birds feet in birds, convergent different Structures are modified to pass or similar functions e.g. wings and birds and insects eye of human and octopus., Vertebraies for humans e.g. squil., legs of Verterbrare and insect.

15. Ascaris lumbricoides is an example of an Endo-parasite. (1 mark)

(a) The name Ascaris refer to
Genus

(b) State the habit of the organism.
Heum/colon/deodenum/intestines of humans or intestines of pigs. (1 mark)

(c) State three ways in which the organism is adapted to living in its habitat.

(3marks)

Lack of elaborate elementary canal (simple guts) can tolerate raw cone
Thick cuticle pellicle, reject the outer covering
Lays many eggs
Mouthparts for sucking partly digested food.

16. The diagram below represents part of phloem tissue
(a) Name the structure labeled R and S and the cell labelled T. (3 marks)
R Sieve pore
S Cytoplasmic strand, cytoplasmic filaments (reject proto plasmic trand)
Cell labelled T (1 mark)

(b) State the function of the structure labelled S.
Translocation (L is tied with structures)

(c) Explain why Xylem is a mechanical tissue (2 marks)
Thickened and lignified.

17. (a) What structures are produced by sisal for vegetative propagation? (2mks)
Bulbul suckers. Aerial tubers

(b) Give a reason for grafting in plants. (2 marks)

Plant with desired qualities is able to grow on an established root system which lack desired qualities.

(c) State four advantages of vegetative propagation (4 marks)
Early maturity short life span
Good qualities of parents are retained.
Independent of fertilization pollination /dispersal
Large areas covered in a short time have a large store of food.

SECTION C (40 Marks)

Answer question 18 (compulsory) in the spaces provided and one other question from Section C in the spaces provided after question 20.

Time (minutes)	Glucose level in Blood (mg/100cm³)	
	X	Y
0	87	84
15	112	123
30	136	170
45	116	188
60	109	208
90	95	202
120	92	144
150	88	123

18. Two persons X and Y drunk volumes of concentrated solution of glucose. The amount of glucose in their food was determined at intervals. The result are shown in the table Below:

(a) On the grid provided, plot graphs of glucose level in blood against time on the Same axes.

(7 marks)

For exchanged axis award maximum 3 marks for points x identity.

The scale must however be correct for graphs on separate axis mark both and award the highest mark.

(a) Axis 2
(s) Scale 1
(p) (plottin) 1
(c) (Curves) 1
Max 5 for separate curves.

(b) What was the concentration of glucose in the blood of X and Y at the 20th Minute? (2marks)
X 120 + 3
Y 140 + 3

(c) Suggest why the glucose level in person X stopped rising after 30 minutes while it continued rising in person Y (2marks)
Person X is capable of regulating glucose while person Y is likely to be diabetic
X - Insulin

(d) Account for the decrease in glucose level in person X after 30 minutes and person Y after 60 minutes. (3 marks)

X Insulin released, excess glucose is converted into glycogen (in Liver) must be mentioned if insulin is not mentioned.

Y Insulin not released; thus the decline is due to glucose being Released in urine.

(e) Name the compound that stores energy release during Oxidation of Glucose. (1mark)

A.T.P. /Adenosine triphospate

(f) Explain what happens to excess amino acids in the body. (5marks)

Deaminated; resulting in formation of ammonia
Ammonia combines with CO_2, form urea (and H_2O): urea is passed out
In urine, carbohydrate group is oxidized stored as glycogen.

19. Describe the role of hormones in the growth and development of plants. (20 marks)

- Ido acetic acid/IAA/ Auxins
- Promote cell division/ influences tropic responses, (accept cell division in (Cambium)
- Promote formation of obsession layers/bring abrupt leaf-fall
- Promote fruit formation (parthenocarpy)
- Promotes cell differentiation (of vascular tissue)

- Cause apical dominance / inhibit growth and development of lateral buds
- promote growth of adventitious roots (on stems)
- IAA + cytokinins induce formation of callus tissue (during healing of Wounds) N.B.if this point is given for cytokinins should be marked once)

(8 marks)

Gibbecettins (accept GA3)

- Promotes cell division / cell elongation in dwait varieties.
- Parthenocarpy/initiating formation of IAA/ setting of fruits after fertilization
- Formation of side branches (of stems) and dormancy (in buds); inhibit growth of adventitious roots;
- Activates (hydrolytic) enzymes during germination/promotes germination of seeds/breaks seed dormancy.
- Affects leaf expansion and shapes/retard leaf abscission. (7 marks)

Cytokinins' accept any correct example kenetion 8 zeatin

- Breaks dormancy (in some species); promotes flowering in some species
- Promotes cell division (in presence of IAA)
- Stabilizes proteins and chlorophyll
- Promotes root formation
- Low concentration encourages leaf senescence/high concentration protein
- Increased cell enlargement in leaves
- Promotes flowering (in some species)

Ethylene/Ethene /C_2H_4 (reject ethane)

- Stimulate lateral bud development
- Ripening of bananas/fruits
- Induces thickening of stem/inhibits stem elongation
- Promote germination of certain seed/acc promotes flowering in pineapples
- Causes abscission of leaves/ fruits/leaf fall.

Abscisic acid/ABA

- High concentration of ABA cause stomata closure (by interfering with uptake of potassium ions)
- Inhibits seed germination / growth of embryo/cause seed dormancy
- Causes abscission of leaves/ fruits /leaf fall
- Inhibit stem elongation/growth, inhibit sprouting of buds/induces dormancy In buds; (accept Dormin causes/ dormancy in buds/seeds)

Traumatin

Heal wounds by callus tissue formation;

Florigens
- Promote flowering (20 marks)

20. (a) Name the three types of skeletons found in multicellular animals
Hydrostatic
Exoskeleton
Endoskeleton (3 marks)

(b) Describe how the cervical, lumbar and sacral vertebrae are suited to their Functions. (17 marks)

Cervical vertebrae

- Vertebrarterial canals' for passage of (vertebral) artery; Atlas has (broad) Surfaces, for articulation with condyles of skulls' to permit nodding (Movement)

- Axis has adenoid process/projection Centrum to permit rotary /turning /act as a pivot for Atlas/skull/movement of Atlas/
Branched / forked/short/broad transverse processes, for attachment of (neck) Muscles; ace zygopophysis, poster prezypophysis, for articulation between Vertebrae (acc vertibraterical canals and zygopophogen if shown on A diagram of the vertebrae)

- Has a short reduce neural spine, for attachment of (neck) muscles, Has Wide /larger neural canal; for passage of spinal cord/alternatively has wide Neural arch for protection of spinal cord;

Lumbar

- Broad/long/neural spine for attachment of (powerful back) muscles,
Long/ large/ well developed / transverse processes' for attachment of muscles (that maintain posture and flex the spine)

- Has metamorphosis and hypothesis for muscle attachment, large thick Centrums for support.
- prezygapophysis/post/zygapophysis for articulation between vertebrae' (acc. Napophysis for hypophses)

Sacral vertebrae

- Anterior vertebrae has a well developed transverse processes, which are Fused to the pelvis girdle/articulate with pelvic girdle;
- Vertebrae fused, for strength transmit weight of the stationary animal to the Rest of the body.
- Sacrum has a broad base/ short neural spine; for attachment of (back) Muscles.