WAKISSHA JOINT MOCK EXAMINATIONS
MARKING GUIDE
Uganda Advanced Certificate of Education
UACE August 2016
BIOLOGY (Theory) P530/2

SECTION A: (40 MARKS)

1. (a) (i) From 10 to 23^0C, increase in temperature cause a rapid increase action potentials.
23 to 30^0C, increase in temperature cause a less rapid increase in action potentials up to a maximum.
30 to 39^0C, increase in temperature cause a rapid decrease in action potentials up to a minimum.

(ii) 22 to 35^0c, increase in temperature cause a gradual increase in action potentials.
35 to 40^0c, increase in temperature cause a rapid increase in action potential up to a maximum.
40 to 45^0c, increase in temperature cause a rapid decrease in action potentials.

(07marks)

(b) (i) 10 to 23^0c, increase in temperature is detected by cold receptors generator potentials increase to sufficient levels and action potentials are fired; many action potentials are fired due to increasing strength of stimulus. Still detected however some receptors are less stimulated maximum frequency of Action potential is fire by cold receptors.

30 to 39^0c, further increase in strength of stimulus result into adaptation of many receptors so frequency of firing action potential decrease.

(10 marks)

22 to 35^0c, warm receptors have a higher threshold so detected. Only stimulus at higher intensity. Fever receptors probably exist/fever receptors are stimulated by increasing intensity of stimulus.

35 to 40^0c, many warm receptors are stimulated/increasing strength of stimulus excite warm receptors to fire action potentials with increasing frequency to a maximum frequency.

40 to 45^0c, adaption of warm receptors occur/denaturing of proteins involved in moved of ions in the channels.

(07 marks)

(c) (i) In both receptors initially no action potential would be fired because as temperature increases, water on the surface of the organization evaporate cooling the animal maintaining its body temperature/environmental temperature will not be absorbed by the skin so receptors are not stimulated.

Once water completely evapourates the body would gain the heat, and both receptors are stimulated more than warm receptors. Eventually both receptors would get adapted. Cold receptors get easily adapted than warm receptors.

(06 marks)

(ii) Pattern of action potential potentials would be the same as in the graph provided, iced water has no effect on both receptors since they are found in the skin. Iced water only affect the thermo receptors in thehypothalamus.

(04 marks)

(d) - Sweating.
- Relaxation of erector pilte muscle.
- Vasodilation.
- Behavior means.
- Fall in metabolism.

(04 marks)

(e) - Survive in a wide range of habitat.
- Enzyme controlled reactions proceed faster. **(02 marks)**

SECTION B (60 MARKS)

2. (a) Lack a district nucleus (membrane)**;**
DNA in the cytoplasm**;**
No spindle forms at cell division**;**
Membrane bound organelles are absent/vice versa**;**
No large vacuole**;**
Possess a cell wall of protein and polysaccharides/ peptidoglycan**;**

@ 1 mark
(05 marks)

(b) Autotrophic farm e.g chemoautotrophs**;** derive energy from oxidation of inorganic compounds**;** photosynthetic**;** use carbondioxide and hydrogen sulphide as well as light**;** energy which is captured by photosynthetic pigments**;**

@ 1 mark

Heterophic forms e.g saprophytic bacteria**;** feed on decayed matter by releasing enzymes**;** and then absorb soluble products of digestion**;** mutualistic bacteria**;** utilize materials in the host but also provide useful substances to host**;** parasitic bacteria**;** release toxins/cause disease that harm the host**;**/obligate anaerobes**;** survive in environment where O_2 is absent**;** Aerobic survive in O_2 rich

environment; facultative survive in both O_2 rich and low or no O_2; some survive in hot springs, salty waters etc.

(10marks)

(c) Breakdown and recycle organic matter releasing nutrients; symbols e.g in human gut synthetize vitamin B, in numen release cellulose that breakdown allulose; Food production; dairy products, vinegar, coffee processing utilize; ceratain bacteria;

Some are a source of antibiotics;

Some are used for research since they have low growth required; pathogenic bacteria cause disease;

(05 marks)

3. (a) Similarities.
- Embryo sac enclosed in the ovule.
- Sporophyte dominant and gametophyte much reduced.
- Separate male and female spores.
- Pollen tube present.
- Fertilized embryo sac develops into a seed.
- Xylam and phloem present.

@ 1 mark
(10 marks)

Differences

Angiosperms	**Gymnosperms**
- Ovule protected ovary	- Ovule unprotected
- Stigma and style present	- Stigma and style absent
- Cones absent	- Cones present
- Fruits formed after fertilization	- No fruits formed
- Companion cells present in phloem	- No companion cells
- Xylem has tracheid's and vessels	- Only tracheids in Xylem, no vessels

Any five @ 1 mark
Total = 10 marks

(b) One cell of the nucellus becomes enlarged; and is known as the embryo sac mother cell; this divides meiotically; to give four cells; three of which are crushed; as the remaining one enlarges; to form the embryo sac; the single nucleus within the embryo sac divides mitotically; and the two nuclei move to opposite ends of the sac; Each of the two nuclei divides mitotically; twice; so that there are four haploid nuclei; at each end of the sac;

One nucleus from each end; moves to the center; and these fuse; to form the primary endosperm nucleus; (central fusion nucleus)(the three remaining at the micropyle end; form the egg apparatus; and the three at other end forming the antipodal cells;)

The remaining nuclei at the poles develop thin
Cell wall the (sesulive three cells/antipocial
Cells, degenerate white the other three at micropyle end, one develops into egg cell /ovum while the other two cells (synergids) degenerate.

@ ½ mark.
Total = 10 marks

4 (a)
- Have large surface to volume ratio to speed up rate of exchange.
- They are thin to keep the diffusion pathway short and so allow materials to cross rapidly.
- They are partially permeable to allow selected materials to diffuse easily.
- There is movement of the environmental medium e.g air to maintain a diffusion gradient.
- There is movement of the international medium e.g blood to maintain a diffusion gradient.
- Moist surface with dissolved o_2 respiratory gases, hence faster rate of diffusion.

(05 marks)

(b) Co_2 is produced as a product of aerobic respiration, due to high Co_2 gradient; it diffuses from the tissues; into the blood stream where it is transported via 3 ways.

Most of it reacts with water; to form carbonic acid; which dissociate to produce hydrogen ions; and bicarbonate ions; are pumped out; of the RBC_S in exchange for the chloride ions; (chloride shift) into the plasma, to maintain ionic neutrality; the Hydrogen ions then combine with oxyhaemoglobin to from Haemoglobinic acid (HHb) buffering the intracellular RBC PH.

Some Co_2 birds; to amino groups of proteins; to form carboamino compounds or carboaminohaemoglobin;

The remaining Co_2 is transported in blood plasma; as dissolved carbon dioxide;

On reaching the alveoli; the carboaminohaemoglobin dissociates; to release Co_2 and haemoglobin; where the carbondioxide diffuses; out of the RBCs into blood plasma; and later into the alveolar space; via the alveolar membrane; together with the Co_2 carried as dissolved gas;

Also the HCO_3 diffuses into; the RBC_s in exchange for the chloride ions; (Reverse chloride shift) which then combines with hydrogen ions; to form carbonic acid; Under the influence of carbonic anhydrase; the carbonic acid dissociates; into free Co_2; and water; which diffuses out of the RBC; into the plasma; and finally diffuses into the alveolar space;

@ ½ mark
Total = 17 marks
Max = (15 marks)

5 (a) Both auxins and criberethins promote cell division in apical meristems; induce parthenocarpy; stimulate fruit growth; bring about cell enlargement in return growth; stimulate followering in long Day plants;cytokinins promote cell division in presence of auxins; Both criberethins and cytokinins promote lateral bud growth;

Auxins promote apical dominance while hiberethins stimulate auxiliary hoot growth;
Auxins promote following in short day plants while hiberellins inhibit flowering in short day plants;

Auxius promote femaleness in flowers while criberellins promote maleness;
Auxins promote root initiation from stem/leaf cuttings while ciberellinsinihibit development of advantages roots;

Cytokinins promote lateral bud development while auxinsinihibit it;
Phytochrome red Pr inhibits to stem elongation while phytochrome far red P_{fr} stimulates following in long Day plants but inhibits it in short day plants;

Pr stimulates flowering in SDP's but inhibits it in LDP's;
Ethylene/ethane inhibits cell elongation while hiberellins promote cell elongation;
Abscissic Acid stimulates bud dormany while hoberellins break bud dormancy;

Lateral root growth inhibited by Pr. And stimulated by P_{fr};

Total = 16 marks
Max = 12 marks

(b) Auxins are used as selective weed killer in cereal crops grown on lawns and conifer plantations;

Auxins are used to stimulate growth of adventitions roots;

Auxins are used to delay flowering until an appropriate time;

Absassic acid / ABA is used to delay fruit fall;

Ethene is sprayed to promote fruit ripening;

Cytokinins are used to prolong the life of flesh leafy crops such as cabbages, lettuce etc;

Auxins are used to increase fruit size;
Some Auxins are used to inhibit sprouting of stored potato;

Total = 9 marks
Max = 08

6 (a) Within a population organisms show variation; due to heritable traits;

Presence of selection pressure in the environment;
Results into better adapted organisms being selected for;

While the poorly adapted organisms are selected against; and thus eliminated;
The organisms better adapted breed and pass on their characteristics to subsequent generation;

Overtime the organisms dominate the next generation;

Total = 05

(b) (i) Biased mating promotes alleles which are considered to be desirable; and eliminates those that are undesirable for a particular trait; leading to a change in the frequency of alleles in a population;

= 05 marks

(ii) Disrupture selection favours individuals with the extreme phenotype;
Given sufficient time, it splits the population into two subpopulations/groups;

If gene flow between the sub population is prevented; natural selection acts independently giving rise to new species; leading to a change in gene frequency;

= 05 marks

(iii) Mutation leads to variation; and the varieties / forms arising are selected upon by environmental pressures; the better adapted organisms survive; while the least adapted are eliminated;

These that survive reproduce passing on their traits/ genes to the subsequent generation; leading to a change in gene frequency;

Total = 6 marks
Max = 05

END