GATUNDU SUB COUNTY FORM FOUR 2015 EVALUTION EXAM

231/1
BIOLOGY
PAPER I
JULY/AUGUST 2015

MARKING SCHEME

1. a) Respiration: Process whose organism break down food to produce energy.

   b) Reproduction: Give rise to young ones of same ensuring continuity of the group.

2. Factors necessary for germination.

   (i) Water/moisture:- soften seed coat. Transport medics
   (ii) Enzymes: Breakdown insoluble food substances to soluble.
   (iii)Oxygen for respiration

3. (i) Identical twins :- fertilized eggs divides;

   (ii) Fraternal twins:- Two different eggs (ovum) are fertilized by two different sperms.

4. (i) Anaphase I

   (ii) Homologous chromosomes separate at the equator.
   (i) Chromosomes start migrating to opposites poles.
   (ii) Sister chromatids attached at the centromere.

   (iii) Spindle fibres

5. Roles of gibberellins

   (iii)stimulates flowering in plants
   (iv)elongation of internodes
   (v) break seed dormancy

   (any other correct)

6. (i) Cell size = $\frac{\text{Diameter of field view x 1000}}{\text{No of cells}}$

   $= \frac{6.5 \times 1000}{12}$ = 540µm

   (ii) The leaves exposes a smaller surface area to the sun, thus reducing transpiration/excessive water loss.

7.

Diffusion	Osmosis
- Involves movement of particles of molecules of liquid or gas - It may be through a membrane or air. - Not affected by PH changes.	- Involves movement of solvent molecules - It takes place through a semi-permeable membrane. - Rate affected by pH changes.

8. Action potential: When an impulses passes along the axon, the membrane of the axon becomes depolarized to sodium ions thus they diffuse into the axon; the inside of the axon, becomes positively charged relative to the outside and action potential is generated.

9. (i) Tracheoles
b) Adaptation of tracheoles
- Lack chitin and are thin walled to reduce distance of diffusion of gases.
- Have a liquid at the tip to dissolve the diffusing gases
- Highly branched/divided to increase surface area for diffusion of gases.
- They are in direct contact with tissue cells hence increasing rate of diffusion of gases.

10. (a) RQ ratio of carbon dioxide produced to oxygen used during breakdown of a food substrate.

(b) $R.Q = \frac{CO_2 \text{ produced}}{O_2 \text{ used up}}$

$RQ = \frac{102}{145} = 0.7$

(c) fat/lipid

11. Pinna: It collects and concentrates sound waves to the auditory meatus.

Tympanic membrane: thin tough membrane that transforms sound waves into vibrations.

Vestibule – Consists of utriculus & Sacculus that have sensory cells.
(vi)Maintains body balance & posture in relation to gravity.

12. Structural difference: the cell body in motor neurone is terminal (at the end) and inside the central nervous system. While the cell body in sensory neurone is not terminal but has axon on both end i.e. bipolar.
Functional difference: Motor neurone carries impulse from CNS to the effectors i.e. muscles while sensory neurone carry impulse form receptor to CNS.

13. (i) a) Community – It is the total number of plants and animals living together in an area of the number of organisms of different species living in a particular area.
Population – total number of organisms of a given/same species occupying an area at a certain tropic

level.

(ii) Controlling protozoa parasite:

- Improving sanitation to prevent infection by parasites.
- Insecticides to kill vector like mosquitoes or tsetse fly.
- Sleeping under Nets

14. (i) After 4 months of pregnancy the ovary stops secreting the hormones progesterone and the placenta takes over. The hormone progesterone helps maintain pregnancy.

(ii) Site of production of male gametes/sperms; site of secretion of hormone testosterone that enhances secondary sexual characteristics;.

15. a) Skeletal muscles adaptation

- Have actins and myosin which facilitate contraction & relaxation.
- Have high density of mitochondria to provide energy for contraction.
- Have elongated fibres to allow change in length.

b)

Biceps(skeletal muscles)	Gut muscles(smooth muscles)
Striated	Un-striated
Multi nucleated	Un-nucleated
Long fibre	Short fibre
cydrical	Spindle shaped

16. Why Lamarck's theory is not accepted

- Evidences does not support Lamarck's theory acquired characteristics are not inherited.
- Inherited characteristics are found in reproductive cells only.

b) Fossils, records, (Palaeontology)

- Geographical distribution comparative anatomy/taxonomy cell biology
- Comparative serology,
- Comparative embryology
- Comparative immunology

(any two)

17. (i) Dicotyledonae

(ii) Vascular bundles arranged in a ring around the pith.

- Presence of cambium in vascular bundles.

(iii) Importance of vascular bundles

Xylem transport water and mineral salts to photosynthesing cells.
Phloem: transport manufactured food from leaves
Veins: Support the leaf to be upright for the maximum absorption of light for photosynthesis.

18. The following is dental formula of a dog and rabbit.

Dog	Rabbit
- Presence of canine - Has more teeth	- Absence of canines/presence of diastema - Has few teeth.

19. (i) Deletion

A	B	Q	R

(ii) Inversion

A	B	S	C	Q	R

(iii) Duplication

A	B	C	S	C	S	Q	R

20. (i) Diabetes mellitus
(ii) Diabetes inspidus

21. a) To increase surface area for enzymatic action. (1 mark)

b) Contain bacteria that produce cellulase enzyme to digest cellulose. (1 mark)

22. Lactic acid (1 mark)

23. Oxygen (gas y) dissolves into moisture layer and diffuses across the thin epithelium;(1) then across the thin epithelium of capillary; (1) combines with haemoglobin in red blood cells to form oxyhaemoglobin; (1 mk)

24. The cell sap is hypertonic to soil solution/soil water; water is drawn into the root hair cell across the cell membrane by osmosis;. (1mk)

25. Hydrogen carbonates ions/carbonic acid.

26. Parenchyma (1mk)

27. - Exoskeleton (1mk)
- Jointed appendages (1mk)
- Segmented bodies (1mk)
Reject answers relating to characteristics of living things like growth and development, reproduction etc.

28.- Genetic material/chromosomes are enclosed within a nuclear membrane (1mk)

Have membrane bound organelles. (1mk)

29. For Metochondiria its – matrix (1mk)
Chloroplast its– stroma

30. a) Thigmotropism/haptotropism
b) The part of the stem in contact with the tree trunk has lower auxin content than the outer part; High concentration of auxin on the outer part away from the plant promotes faster growth of this side causing the stem of the plant to grow or coil round the tree trunk.

GATUNDU SUB COUNTY FORM FOUR 2015 EVALUATION EXAM

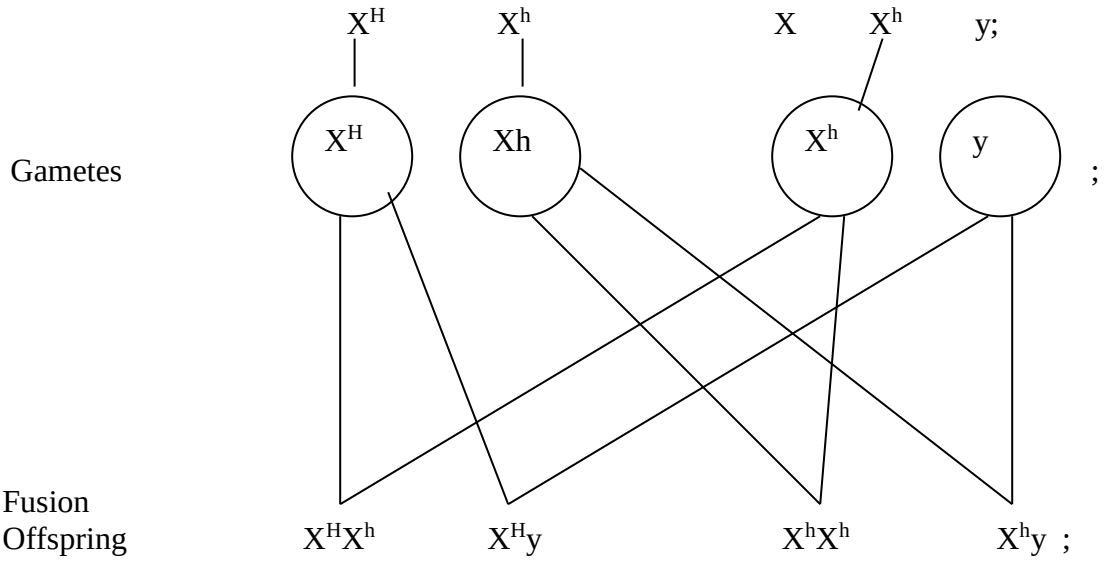
231/2
BIOLOGY
PAPER 2
JULY/AUGUST 2015

MARKING SCHEME

1. a) (i) Man
X^hy; (2 marks)

Woman
X^HX^h ;

(ii) Parental genotype



b) ¼ x ¼ ; = $^1/_{16}$ (2 marks)

c) y chromosomes does not have the corresponding allele for the gene that determine or cause haemophilia/y chromosome is almost genetically empty; (1 mark)

2. a) A – trachea; (1 mark)
B – Bronchus; (1 mark)
b) (Pleural membrane) secretes pleural fluid; that lubricates the lungs; (2 marks)
c) – Sac-like/round to provide large surface area for maximum diffusion of gases;
- Moist to dissolve gases;
- Thin membrane for rapid/faster diffusion of gases;
- Well vascularised/has numerous blood capillaries to transport the gases; (2 marks)

d) i) cell membrane(1mrk)
ii) gill (1mrk)

3 a)x-took the color of iodine;
Y-turn blue black; (2mrks)
b)(i) starch was present in leaf y but absent in leaf x;(1mrk)
(ii) No photosynthesis occurred in x due to lack of carbon (iv) oxide (2mrks)
(iii) Photosynthesis occurred in y due to presence of carbon (iv) oxide; (2 marks)
c)To destarch the leaf /ensure all starch was used up(1mrk)
d) Presence of stomata to allow gaseous exchange/passage of gases;
- Thin broad and flat to reduce diffusion distance;
- Presence of intercellular spaces for free circulation of gases; (Any 2 (2 marks)

4a (i) –to create a moist environment ;(1mrk)
(ii)-Absorb water and create a dry environment ;(1mrk)
(iii)-make apparatus air tight (1mrk)
b) Majority were found in the chamber with moist cotton wool (1mrk)
c)-The termite have moved to the chamber with moist to avoid dehydration (1mrk)
d)-Tactic response (1mrk)
e)-silica gel;
-cotton wool (2mrks)

5 (a) (i) embryo sac (1mrk)
(ii)m-polar nuclei;(1mrk)
N-egg cell ;(1mrk)
b)It brings variation ;which enable plant to survive better (2mrks)
c)Double fertilization is the process by which one male nucleus fuses with the functional egg; to form double zygote ;and the other male nucleus fuses with the polar nuclei ;to form the primary triploid /endosperm nucleus;.(3mrks)

SECTION B

6 a (i) on a graph paper (6mrks)
(Ii) 0.40±0.001(1mrk)
(iii) 10.5±0.5 ;(1mrk)
B (i)-The salt solution is hypotonic /has a lower conc./more dilute than cell cytoplasm ;water drawn into the cell by osmosis and eventually bursting (2mrks)

(ii)-Concentration of the salt solution is the same as concentration of cytoplasm /isotonic; hence no net movement of water; therefore no haemolysis ;(2mrks)

(iii)Percentage of haemolysed cell wound still be zero but the cells wound shrink by the process of crenation (2mrks)

C(i)

Lymphocytes	phagocytes
-Lack granules in the cytoplasm. -Nucleus is spherical/bean shape	-Has granules in the cytoplasm ; -Nucleus is lobed (2mrks)

(ii)-By engulfing /phagocytosis, the disease causing micro-organism;

-Lymphocytes produce antibodies which inactive pathogens;
d)-Lack nucleus to create more room for package of haemoglobin
-Are flexible hence can squeezes in narrow capillaries;
-Biconcave in shape to increase surface are for gaseous exchange;
-Thin cell membrane for rapid diffusion of gases;
-Has carbonic anhydrase for fast loading and offloading of gases;
-Has haemoglobin that has high affinity for gases (any 2 (2mrks)

7 (a) (i)-Water (moisture)
-Activate germination enzymes/breaks seed dormancy
-Provides medium for enzyme to act;
-Softens seed coat, which burst open to allow emergency of radical and plumule;
-Hydrolysis of food during germination;
(ii) Oxygen;
-Oxidation of food during respiration to provide energy for germination/cell division and formation of new tissues.
(iii) Optimum temperature
-Suitable for action of germination enzymes which hydrolise stored food;
-Low temperature below 0^{o}.c inactivate germination enzymes slowing down germination rate ;
-High temperature above 40^{o}c denatures germination enzymes stooping germination;
(iv)-Enzymes
Break down food by oxidation;
(v) Viability
-Refers to percentage change that a seed will germinate when planted;
Only seeds with live and healthy embryo will germinate and grow;
-Seeds stored for long time lose their viability;

(vi)Hormones
-These stimulate certain metabolic pathways in the germination process;
Max x12
Every condition identified 1mx6=6mrks
Every explanation indentified 1mkx6=6mrks total 12 marks

b(i)Anxins
-Promote cell division /elongation /influences tropical movement'
-Promote fruit formation /Parthenology;
-Promote formation of abscission layer /brings leaf fall;
-Causes apical dominance;
-Promotes growth of adventitious root and lateral branches
-IAA and cytokins induce formation callus tissue during healing of wounds;
Any four (maxx4mrk)

(ii)Gibberellins /giberelic acid
-Promotes cell division /elongation in dwaft varieties;
-Parthenocarpy /initiate formation of fruits;
-Formation of side branch /end dormancy in buds;
-Inhibit growth of adventitious roots;
-Activates enzymes during germination //breaks dormancy

-Affects leaf expansion and shape /retard leaf abscission
Any four (max 4mrks)

8 Are long and forded to provide large surface area for secretion of digestive juices;
-They are long, coiled and folded which allows more time for digestion and absorption;
-Their inner lining has villi and microvilli, which increase the surface area for absorption;
-Have opening of ducts though which pancreatic juice and bile get into lumen;
-Have goblet cell and Bruner's glands that secretes mucus for lubrication of food and protection of wall from digestion enzyme;
-Bruner's gland also secretes alkaline fluid which maintains a pH of 7-8 which is optimum pH for action of intestinal enzymes;
-Has intestinal gland that secrete digestive enzyme;
-Has rich network of blood capillaries that supplies oxygen and removes metabolic wastes from the intestinal tissue and transports digested food and offer nutrients;
-The walls have circular and longitudinal muscles whose peristaltic contraction causes movements of food in the gut and mixing of food with digestive enzyme;
-Intestine have a thin epithelium that allows soluble food material to pass through rapidly into the blood stream'
-The villi have numerous blood vessels to transport absorbed nutrients and lacteals to transport absorbed lipids;