ANSWERS TO BIOLOGY 2015 ENTRANCE

MAJOR: BIOLOGY

1.B	**2.C**	**3.A**	**4.B**	**5.D**	**6.A**	**7.D**	**8.A**	**9.C**	**10.B**
11.C	**12.A**	**13.B**	**14.C**	**15.B**	**16.D**	**17.C**	**18.B**	**19.B**	**20.D**
21.C	**22.B**	**23.A**	**24.C**	**25.D**	**26.B**	**27.C**	**28.D**	**29.A**	**30.B**
31.C	**32.C**	**33.B**	**34.C**	**35.D**	**36.D**	**37.D**	**38.B**	**39.A**	**40.A**

MINOR: GEOLOGY AND CHEMISTRY

ANSWERS TO BIOLOGY 2014 ENTRANCE

MAJOR: BIOLOGY

MINOR: CHEMISTRY

1.c	2.d	3.d	4.b	5.b	6.d	7.c	8.c	9.d	10.d
11.a	12.a	13.a	14.a	15.c	16.a	17.a	18.a	19.a	20.b
21.a	22.a	23.c	24.b	25.d					

2013/2012		2012/2013	
1.C	26.C	1.c	26.a
2.D	27.A	2.b	27.b
3.C	28.D	3.a	28.b
4.B	29.C	4.c	29.b
5.C	30.A	5.a	30.b
6.B	31.	6.d	31.c
7.A	32.A	7.	32.a
8.D	33.A	8.	33.c
9.D	34.B	9.b	34.e
10.B	35.C	10.d	35.b
11.A	36.D	11.a	36.b
12.D	37.	12.c	37.c
13.B	38.A	13.d	38.a
14.C	39.A	14.a	39.a
15.C	40.D	15.d	40.
16.A	41.B	16.b	41.a
17.D	42.B	17.a	42.a
18.A	43.C	18.c	43.a
19.D	44.A	19.b	44.
20.	45.C	20.	45.d
21.D	46.A	21.a	46.c
22.B	47.C	22.a	47.a
23.B	48.D	23.a	48.d
24.B	49.C	24.c	49.
25.D	50.D	25.c	50.

ANSWERS TO 2011 SESSION

QUESTION I

a) Diagram

b) Mechanism of water uptake by plants. Water is taken up from the soil by the root via the root hairs by process of osmosis which is the movement of water molecules from a hypotonic to hypertonic region or from a region of higher to a region of lower concentration via a selectively permeable membrane until an isotonic condition is maintained. The water then move from the epidermis of the root, cortex, endodermis, and finally to the xylem. The above process is enhanced by root pressure then the xylem also possesses another pressure called suction pressure that enables the water to move up toward the leaves via the stem. In addition to root pressure and suction pressure of xylem, there is another pressure called transpiration stream which increases the rate of water uptake via transpiration or evaporation of water via the leaves and stem during sunlight, hence increase transpiration increases the rate of water uptake. Therefore root pressure, suction pressure and transpiration stream all enhanced the rate of water uptake

c) Diagram

d) Cohesion force, this is the force of attraction between like molecules, that is the force holding water molecule together , it provide a force that hold up a column of water in the xylem tissue of plant without it breaking. Transpiration creates a tension that pull the water in the xylem upward as a single column held together by cohesive force.

- Adhesive force, this is the force of attraction between unlike molecule that is between the vessels and tracheid of the xylem and that of water, it equally help water to ascend a plant.

e)In the soil it dissolve minerals taken up by plants

Use in food manufacture

-it reduces the temperature of plant via transpiration. Roots to leaves and organic food from the leaves to all the plant part via the phloem.

-it is use in the process of photosynthesis

-it very useful in plant metabolism.

QUESTION 2

1) A named terrestrial insect e.g grasshopper.

- They used terrestrial tube (tracheae) for gaseous exchange found in the thorax and abdomen.
- The trachea tube is open externally by round spiracles of which lead to trachea and tracheoles with moisture which lead finally reaches the cells.
- Diffusion occurs along a concentration gradient O_2 moves from outside to spiracles, trachea, tracheoles and cells where as CO_2 moves in the reverse route.
- O_2 dissolves in the water found in tracheoles.
- During flight of an insect fermentation produces lactic acid(hypertonic solution in muscles)
- Causes water to move out of tracheoles by osmosis in to cells.
- This allows for easy passage of air from tracheoles to cells.

2) <u>A named bony fish e.g tilapia.</u>

- The fish uses the gills for gaseous exchange to take place in dissolved o_2.
- There are 4 pairs of gills lamella containing gill filament with blood capillaries.
- The fish lowers the floor of the mouth during inspiration so that water with dissolved O_2 enters the mouth as the operculum closes .Pressure inside reduces as the volume increases due to concentration of hypobranchial muscle.

- O_2diffuses from water in the mouth to the blood where CO_2 diffuses from the mouth along a diffusion gradient .Blood and water moves in opposite direction (counter current) to obtain 80% O_2.
- During expiration ,the fish raises the floor of the mouth and the operculum opens so that water containing CO_2 moves out .The pressure in the mouth increases as volume reduces due relaxation of the hypobranchial muscle.

3) A name mammal e,g man

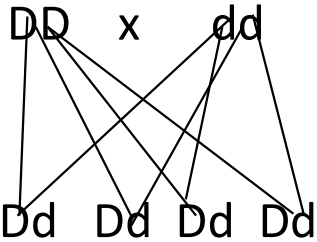
- Inspiration (inhalation-taking in air)
- Contraction of the external intercostals muscle.
- Ribs are raised outward and upwards.
- Muscle of diaphragm contract.
- Diaphragm changes from dome –shape to flatten position.
- Volume of chest cavity increases.
- Pressure of lungs decreases.
- Atmospheric pressure becomes greater than lungs pressure.
- Air is then force in via nostril.
- Inspiration is a passive process.
- Its high amount of CO_2in blood, which induces inspiration by stimulating the respiratory centre of the medulla oblongata.
- Expiration (exhalation-breathing out).
- During expiration the opposite or the reverse of the inspiration occur.

QUESTION 3

a)No it's not possible because looking at the final result or offerings we discover that the result gives a 1:2:1 at the $f_2$generation, this is usually obtain from a co-dominant gene which is a gene which does not suppress the expression of the other gene that is non is receive nor dominant. b) The double lines signified fertilization or fusion. c) Iii-1 and iii-2 are now characters produce from the crossbreed between co-dominant genes and there are neither of the original parents.

d) P. DD x dd

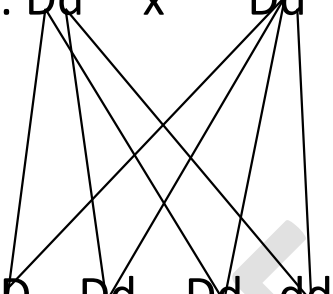
G. DD x dd



f_1. Dd Dd Dd Dd 4:0

p. Dd x Dd

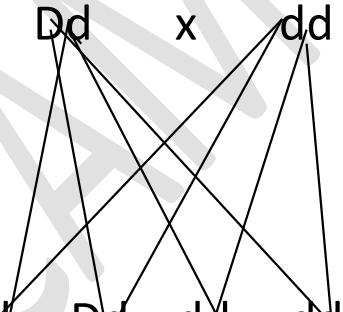
G. Dd x Dd



DD Dd Dd dd 3:1

P Dd x dd

G. Dd x dd



Dd Dd dd dd 2:2

ANSWERS TO 2010 SESSION.

QUESTION 1.

Transpiration is the loss of water by plants in the form of water vapor to the atmosphere, it occurs mainly from the leaves through pores (stomata) and also

through the cuticles and lenticels known as stomata transpiration. Curticular transpiration and lenticular transpiration respectively.

The lose water is replaced by continuous column of water (and dissolved solution) moving upward from the root within the system vessels known as transpiration stream which is maintained by root pressure and a combination of cohesive and adhesive forces in the system vessels.

The factors affecting the factors of transpiration are divided into both internal and external factors.

External factors include;

Temperature, Light, Air movement (wind), humidity and vapor pressure, atmospheric pressure.

1. **Temperature:** High temperature provides latent heat of vaporization and therefore encourage rapid lost of water by plants.
2. **Light:** Increase light intensity increases the rate of stomata opening hence, increases water lost of water from spongy mesophyll cell.
3. **Air movement:** In a windy day, the rate of transpiration is high since water is easily lost in the form of droplets.
4. **Humidity and water vapor:** It is the degree to which the atmosphere is saturated with water vapor; increase in humidity decrease the rate of transpiration.
5. **Atmospheric pressure:** The lower the atmospheric pressure the greater the rate of transpiration.

Internal factors include;

1. **Stomata:** The number, size, distribution and how open the stomata is, affect the rate of transpiration.
2. **Cuticle:** The thinner the cuticle, the greater the rate of curticular transpiration**.**
3. **Leaf surface area:** The large the surface area of the leaf, the greater the rate of transpiration.

Generally, the rate of root pressure and transpiration stream i.e. increase the rate of movement of water through the system to the leaf.

QUESTION 2.

The following factors affect the rate of enzyme reaction;

Temperature, enzymes concentration, substrate concentration and PH.

1. **Temperature:** Increase in temperature of an enzyme increases the rate of the reaction it catatalyses or the probability of the action occurrence. Below 40^0C a temperature of 10^0C doubles the rate of reaction, above 40^0C the temperature decreases until about 60^0C when the reaction stops. This denotes the facts that enzymes are protein in nature hence are denatured by heart. Maximum velocity (V max) occurs at optimum temperature. Temperature coefficient (Q_{10}) = (rate of reaction at x +10^0C)/ (rate of reaction at X^{0}C.Where x= initial temperature. N.B: diagram.
2. **Enzymes concentration:** The rate of reaction is directly proportional to enzymes concentration at constant temperature and PH. N.B: diagram.
3. **Substrate concentration:** The rate of enzymes reaction increases with increasing substrate concentration with a given enzyme. The theoretical maximum rate or velocity maximum is never obtained. The active point of the enzyme is the point where further increase in the rate of substrate concentration produces no significant increase in the rate of reaction. It has to wait until the enzyme substrate completely releases it product before it may enter the active site. Michaels constant (Km) is the point in which the substrate concentration enables the reaction to go half its maximum rate. i.e., Km =1/2V max
4. **PH:** Enzymes function much efficiently at particular PH rang under condition of constant temperature .Every enzyme has a particular PH rang in which it works rapidly. Optimum PH is the PH at maximum reaction .Some enzymes work well in either neutral acidic or alkaline medium. N.B diagram. Enzymes inhibition is the reduction in the rate of enzymes-catalyzed reaction by substances called inhibitors.

QUESTION 2.

1 Genetic engineering also called recombinant DNA technology, it's the technique involved in altering the character of an organism by inserting genes from almoners organism into its DNA. This altered DNA recombinant is usually produced by gene cloning.

- ❖ Stages of genetic engineering in bacteria.

1. Obtain a copy of the required gene from among all other in the donor organism.
2. Place the gene in a vector.
3. Use the vector to introduce the gene into the lost cell.
4. Select the cells which have taken up the foreign DNA, the DNA of the donor.
5. Clone the gene.

N.B: Stages in the Eukaryotic cells.

Genetic engineering is applied in the following fields.

-vaccine production

-foods production

-wine production

-Gene cloning

-production of agricultural products

-use in growth hormones production

-Applied in eukaryotic cells

-used in insulin production

-production of bovine somatotrophin BST

-used in cleaning up of oil split

-production of insecticides; used in transgenic plants and animals.