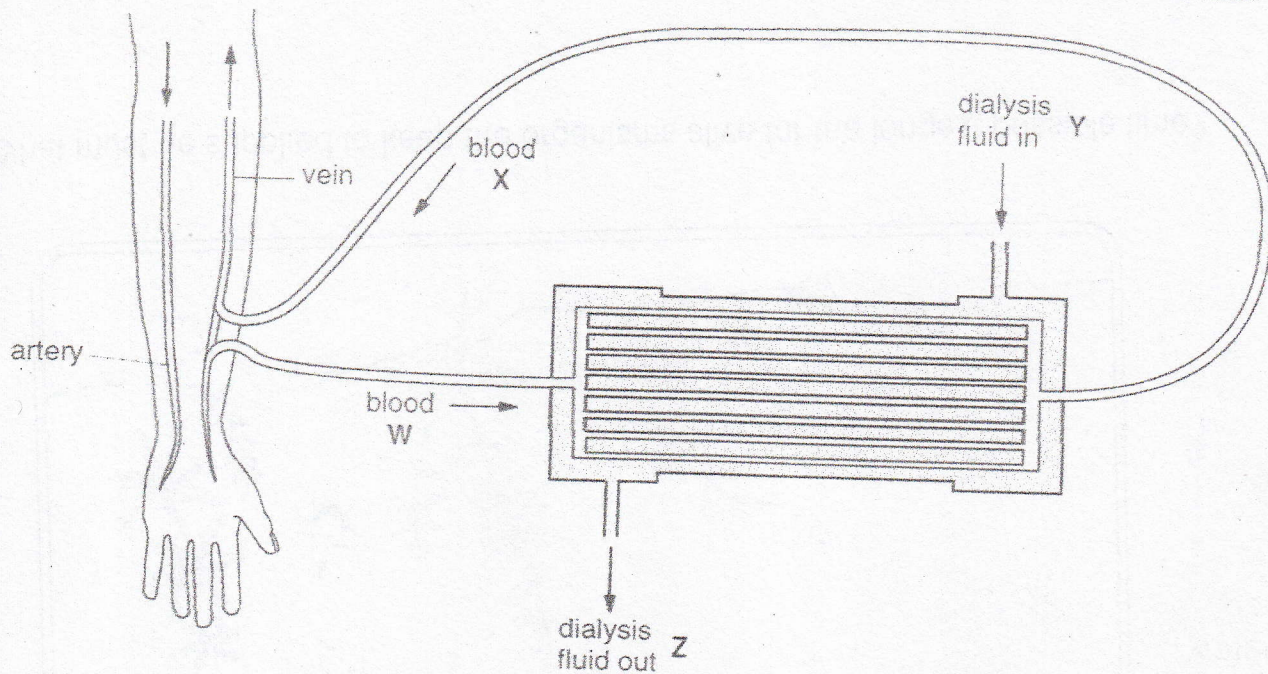


# O-LEVEL BIOLOGY PASSWORD

## FROM THE YEAR 2000 TO 2015

### O-LEVEL REB PAST PAPERS WITH ANSWERS

#### THE FLOW OF BLOOD AND DIALYSIS FLUID THROUGH A KIDNEY MACHINE



Where would the concentration of Urea be highest?

#### Education

*"Education is the great engine of personal development. It is through education that the daughter of a peasant can become a doctor, that a son of a mineworker can become the head of the mine, that a child of a farm worker can become the president of a nation."*—Nelson Mandela

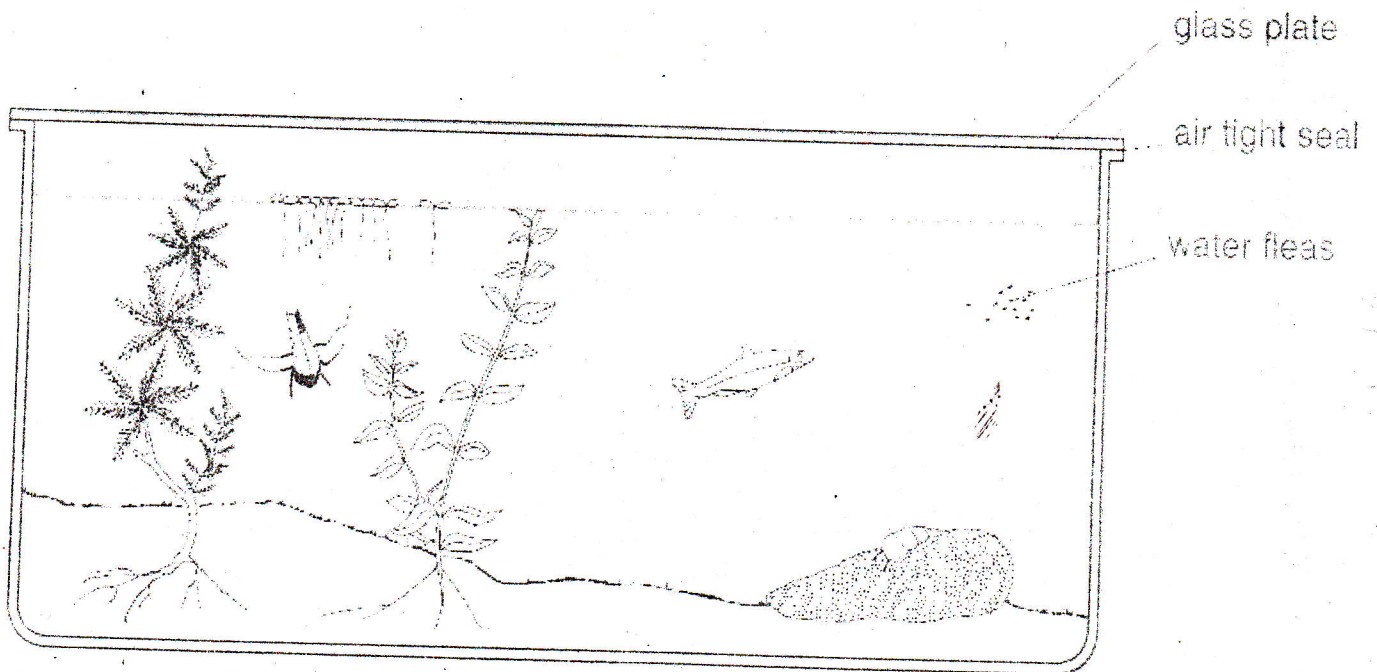
## BIBLIOGRAPHY

This REB past paper question and answer booklet has been compiled to enable the Rwandan child who is so much interested in Biology to practice constantly and get used to the way REB Biology questions are set.

Other O - level books containing past paper questions with answers include Physics, Chemistry, Mathematics and Geography.

For more copies of other subjects, consult your teacher

The diagram shows some animals and green plants sealed in an aquarium.

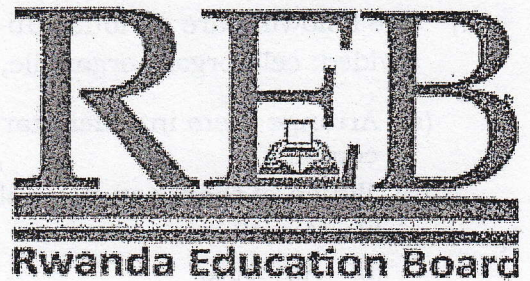


What must be supplied to keep the organisms alive for the longest possible time?

# Biology I

## 001

18/11/2015 08.30AM – 11.30AM



### ORDINARY LEVEL NATIONAL EXAMINATIONS, 2015

**SUBJECT: BIOLOGY I**

**DURATION : 3 HOURS**

#### INSTRUCTIONS:

1) Write your names and index number on the answer booklet as they appear on your registration form and **DO NOT** write your names and index number on additional answer sheets of paper if provided.

2) Do not open this question paper until you are told to do so.

3) This paper has **THREE** sections **A, B** and **C**.

**SECTION A:** Attempt **all** question. (55 marks)

**SECTION B:** Attempt any **three** questions (30 marks)

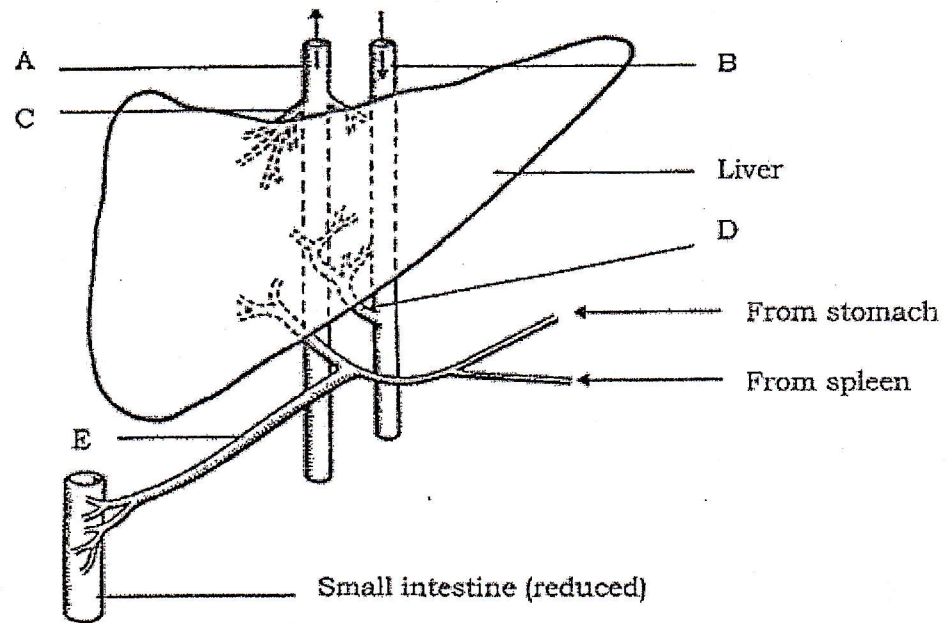
**SECTION C:** This section is **compulsory** (15 marks)

4) Use only a blue or black pen

**SECTION A: ATTEMPT ALL QUESTIONS. (55 MARKS)**

- 1) The following are various sub-units into which species of plants or animals can be divided: cell, organ, organelle, organism, tissue, organ system.
- (a) Arrange them in order starting with the simplest and ending with the most complex. **(3 marks)**
  - (b) Which of them can be applied to the following:
    - (i) A cat? **(1 mark)**
    - (ii) Amoeba? **(1 mark)**
    - (iii) Leaf? **(1 mark)**
    - (iv) Chloroplast? **(1 mark)**
    - (v) Alimentary canal? **(1 mark)**
- 2) Name the cells in a mammal that:
- (a) Are sensitive to their environment. **(1 mark)**
  - (b) Receive messages from sensory cells. **(1 mark)**
  - (c) Transmit messages to effectors. **(1 mark)**
- 3) Name the stage in the life of flies and butterflies at which:
- (a) Ecdysis occurs. **(1 mark)**
  - (b) Feeding for growth occurs. **(1 mark)**
  - (c) Wings appear **(1 mark)**
  - (d) A period of immobility occurs. **(1 mark)**
- 4) Cholera is transmitted by food and water that is contaminated with faecal matter. Suggest three measures that might be used to limit the spread of this disease. **(3 marks)**
- 5) (a) Define photosynthesis. **(3 marks)**  
(b) What conditions are necessary for photosynthesis to occur in a green plant? **(4 marks)**
- 6) (a) List two chemical elements other than carbon, hydrogen, oxygen and nitrogen which are required by both plants and animals. **(4 marks)**  
(b) For each of the elements you have listed, give one reason why it is required:
  - (i) In green plants. **(1 mark)**
  - (ii) In mammals. **(1 mark)**
- 7) Match the following ecological terms with their definitions.
- (a) Community – A place where an organism lives.
  - (b) Ecosystem – A number of species interacting in a locality
  - (c) Food web – A nutritional interrelationship of organisms
  - (d) Habit – Interaction of organisms with each other and with their abiotic environment. **(3 marks)**
- 8) (a) Why are enzymes frequently referred to as “biological catalysts?” **(3 marks)**  
(b) What would be the effect of changing:
  - (i) pH?
  - (ii) Temperature upon the rate of action any named enzyme? **(2 marks)**

- 9) The diagram below shows blood supply through the liver.



- (a) Label the parts indicated A, B, C, D, E. (5 marks)
- (b) Which two substances would be present in greater concentrations in vessel E after a meal? (2 marks)
- 10) Give at least four functions of a human brain. (4 marks)
- 11) When a person's hand accidentally touches a hot object it is quickly withdrawn. Explain what causes this response. (3 marks)
- 12) (a) Define a gamete. (1 mark)
- (b) What are the male and female gametes in an animal (mammal)? (2 marks)

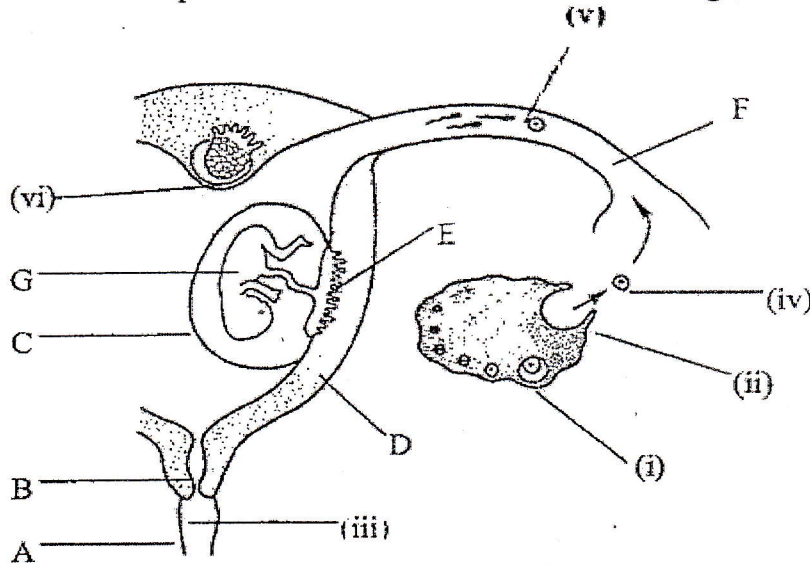
16) The diagram below represents the events leading up to fertilization implantation and development in human beings.

(a) Name the structures labeled A, B, C, D, E, F and G.

(4 marks)

(b) Briefly describe the process of fertilization in human beings, from (i) to (v).

(6 marks)



17) (a) State one function of each of the following parts of a flower:

(i) Petal

(1 mark)

(ii) Sepal

(1 mark)

(b) What is the difference between self-pollination and cross-pollination?

(2 marks)

(c) Some species of plants are strongly adapted to pollination by certain insects. State four characteristics which are regarded as adaptations to pollination by bees.

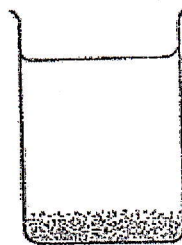
(4 marks)

(d) In dicotyledonous plants, the early stages of germination take place in the soil where there is little or no light for photosynthesis. How does the seedling obtain materials for its growth and energy during this time?

(2 marks)

**SECTION C: THIS SECTION IS COMPULSORY. (15 marks)**

18) (a) The diagram below represents molecules of a salt dissolved in the bottom layer of water in a beaker.



Make two similar diagrams to the distribution of salt molecules:

(i) After a few minutes.

(2 marks)

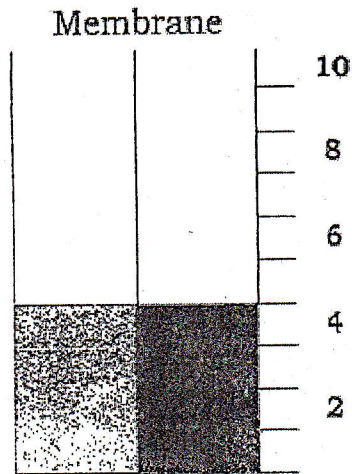
(ii) After several hours.

(2 marks)

(iii) By which transport mechanism (process) will the salt molecules move?

(1 mark)

- (b) The diagram below shows a vessel which contains a concentrated (right) and a dilute (left) solution separated by a partially permeable membrane.



- i) Draw a similar diagram to show the liquid levels after an hour or two hours. (2 marks)
- ii) Explain what has happened. (4 marks)
- iii) Name the process which is being investigated. (1 mark)
- iv) Define the process named in (iii) above. (3 marks)

**END**

**SECTION B: ATTEMPT ANY THREE QUESTIONS. (30 MARKS)**

13) (a) Explain the following terms that are used in genetics:

(i) Allele.

(1 mark)

(ii) Heterozygous

(1 mark)

(iii) Phenotype

(1 mark)

(b) In humans, brown eye (B) is dominant to blue eye (b). Two parents, one heterozygous for eye color and the other blue eyes, start a family.

(i) What is the genotype of the brown-eyed parent?

(1 mark)

(ii) What are the possible gametes that each parent can produce?

(2 marks)

(iii) Show the possible genotypes of their children.

(4 marks)

14) (a) Explain the following terms that are used in ecology.

(i) Biosphere

(1 mark)

(ii) Habitat

(1 mark)

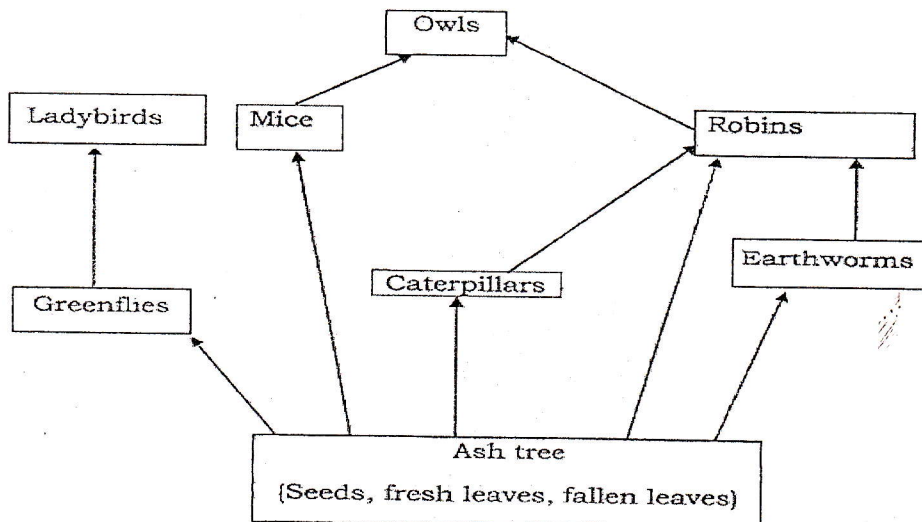
(iii) Niche

(1 mark)

(iv) Producer

(1 mark)

(b) Answer the following questions in relation to the food web shown below.



(i) Write two food chains with four organisms in it.

(2 marks)

(ii) Copy and complete the table below.

(4 marks)

|                      |  |
|----------------------|--|
| Autotrophic organism |  |
| Secondary consumer   |  |
| Omnivore             |  |
| Carnivore            |  |

15) (a) Describe the effects of the failure of the pancreas to produce sufficient insulin.

(2 marks)

(b) The pituitary gland produces several hormones.

(4 marks)

(i) Give any four (4) hormones it produces.

(4 marks)

(ii) Give the functions of each hormone named in (b) (i) above.

(4 marks)



## BIOLOGY I MARKING SCHEME, 2015

### SECTION A:

- Qn 1:** a) organelle – cell – tissue – organ – organ system – organism.  
b) i) a cat – organism, amoeba – organism/cell, leaf – organ, chloroplast – organelle, alimentary canal – organ system.
- Qn 2:** a) sensory cells/sense organ/receptor cells  
b) sensory neurone  
c) motor fibre/neurone
- Qn 3:** a) adult, b) larva, c) pupa, d) pupa
- Qn 4:** - Proper disposal of waste  
- Proper washing of hands after visiting the toilet  
- Drinking boiled water  
- Limited movement of people
- Qn 5:** a) Photosynthesis is a chemical process by which green plants synthesize organic compounds from carbon dioxide and water using sunlight and energy  
b) presence of water, carbon dioxide, sunlight energy, chlorophyll.
- Qn 6:** a) iron, magnesium  
b) i) magnesium is used for the formation of chlorophyll in plants  
ii) Iron is used for the formation of haemoglobin in mammals.
- Qn 7:** a) Community - a number of species interacting in a locality  
b) Ecosystem - interaction of organisms with each other and with their abiotic environment.  
c) Food web - a nutritional interrelationship of organisms  
d) Habitat - A place where an organism lives.
- Qn 8:** a) Catalysts are substances which in small amounts can greatly increase the rate of certain chemical reactions. Catalysts remain unchanged at the end of the reaction. Enzymes, unlike catalyst used in chemical works are proteins. They control the rate of reaction in living things e.g. in respiration and digestion.  
b) i) pH – pepsin digests proteins in the stomach where conditions are acidic. It will not do so in alkaline conditions.  
ii) Pepsin works best at body temperature. If boiled, it is destroyed and stops working. Cooling it in ice will stop its reaction but not destroy it.
- Qn 9:** a) A – vena cava, B – Aorta, C – Hepatic vein, D – Hepatic artery, E – Hepatic portal vein  
b) monosaccharide e.g. glucose, amino acids.
- Qn 10:** - Receive impulses from sensory organs of the body  
- Send motor impulses to effectors  
- Correlates the different stimuli from different sense organs  
- Coordinates body activities  
- Stores information

**Qn 11:** The hot object stimulates the sensory neurone of sense organs, sends impulses to the brain and the brain interprets the reaction as dangerous and sends impulses via the motor neurone to effector (muscle) which contracts and causes the withdrawal of the arm from the hot object.

It can also be due to stimulus → transmission → response

**Qn 12:** a) A gamete is a reproductive cell.

b) i) Animal – sperm, ovum (secondary oocyte) respectively

ii) Flowering plants: male – nucleus in pollen grains, Female – egg cell in the ovule.

**SECTION B:**

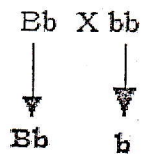
**Qn 13:** a) i) **Allele:** alternative form of a gene

ii) **Heterozygous:** having two different alleles for a single trait/characteristic.

iii) **Phenotype:** the appearance of an organism resulting from the interaction of the genotype and the environment.

b) i) The genotype of the brown-eyed parent is **Bb**.

ii) The possible gametes that each parent can produce:



iii) A punnett square to show the possible genotypes of their children

|   |    |       |
|---|----|-------|
|   | B  |       |
| B | Bb | Brown |
| b | Bb | Blue  |

**Qn 14:** a) i) **Biosphere:** part of the earth where life exists.

ii) **Habitat:** part of the environment where organisms/plants/animals live.

iii) **Niche:** position of an organism in its ecosystem/functional role of an organism.

iv) **Producer:** Organism producing food (organic material)/Autotroph

b) i) Ash tree → Caterpillars → Robins → Owls

Ash tree → Earthworms → Robins → Owls

ii)

|                      |                         |
|----------------------|-------------------------|
| Autotrophic organism | Ash tree                |
| Secondary consumer   | Ladybirds, Robins, Owls |
| Omnivore             | Robin                   |
| Carnivore            | Ladybird, Owl, Robins   |

**Qn 15:** a) The body is unable to control effectively the glucose concentration of the blood. The glucose concentration therefore fluctuates from dangerously high to dangerously low.

b) i) and ii)

- ADH – Anti-diuretic hormone: causes the kidney to reabsorb more water from the renal tubules, so reducing the production of urine.
- FSH – Follicle-stimulating hormone: acts on the ovaries and promotes the maturation of the follicles.
- LH – Luteinizing hormone: acts on the follicles to cause ovulation.
- TSH – Thyroid-stimulating hormone: stimulates the thyroid gland to produce thyroxine.

**Qn 16:** a) A – Vagina, B – Cervix, C – amniotic sac, D – Uterus, E – Placenta, F – Oviduct/Fallopian tubes, G – Fetus

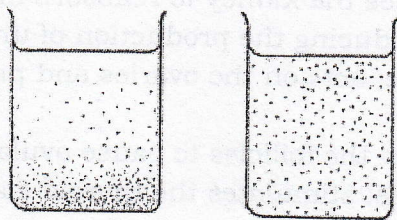
- b) i) Ovum matures in ovary, ii) Ovum releases from follicle/ovulation,  
iii) Sperms deposited at top of vagina/copulation/sexual intercourse,  
iv) Ovum enters oviduct, v) Sperm fertilizes ovum/fertilization.

**Qn 17:** a) i) Petal: attraction of insects or feature/platform for insects to land on.  
ii) Sepal: protection of flower/bud, for photosynthesis.

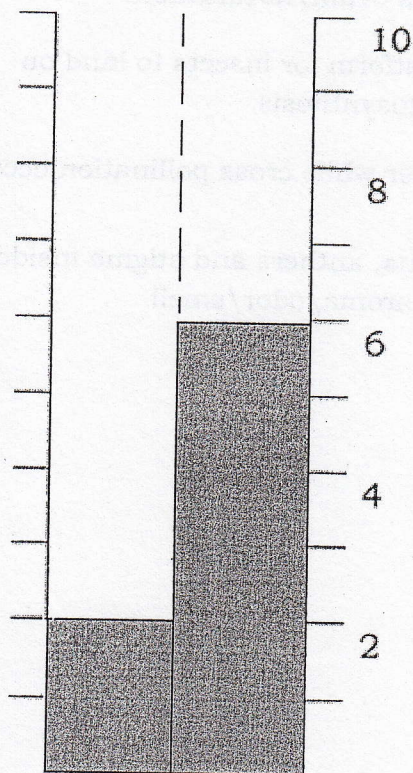
- b) Self pollination occurs on same plant/flower while cross pollination occurs between different plants/flowers.
- c) coloured petals, spiky or sticky pollen grains, anthers and stigma inside the flower, production of nectar, production of scent/aroma/odor/smell.
- d) from food stored in the cotyledons.

**SECTION C**

**Qn 18:** a) i) and ii)



- iii) by the transport mechanism (process) called diffusion.
- b) i) diagram showing the liquid levels after an hour or two hours.



- ii) There has been a rise in the level on the right and a corresponding fall on the left as water passes from the dilute to the concentrated solution.
- iii) Osmosis
- iv) Osmosis is the movement of water from a dilute solution to a concentrated solution across a partially/semi-permeable membrane.

**END**