

**NATIONAL BUSINESS AND TECHNICAL EXAMINATIONS BOARD NATIONAL  
TECHNICAL CERTIFICATE EXAMINATION**

**BIOLOGY (ESSAY)**

**PART I – INTRODUCTION TO**

**BIOLOGY**

1. (a) *Mention FIVE beneficial uses of bacteria.*
1. The decaying of dead organic material into humus which serve as plant nutrients/purification.
  2. The production of composite manure.
  3. Conversion of atmospheric nitrogen to nitrates through ammonia and nitrites, demystification of nitrates.
  4. Vinegar making from alcohol.
  5. Tanning of leather
  6. Pitting of flax or jute
  7. Curing of tobacco
  8. Butter/Cheese/Cream making
  9. Making vitamin B and K in large intestine of man
  10. Digestion of cellulose in ruminants
  11. Turning of sewage into fertilizer
  12. Vaccine making by using weakened bacteria
  13. Production of biogas
- (b) *State THREE places each where:*
- i. Viruses may be found  
Air, Soil, water, saliva, blood plasma, semen. cells
  - ii. Bacteria may be found  
Air, soil, water, dirt under the fingernail, in the body of living things, toilet/latrine, compost, gutter.
- (c) *State briefly the various methods that can be adopted in the prevention of viral disease in:*
- i. Animals
    1. Stocking the farm with healthy animals
    2. Feeding the animals with clean food
    3. Keeping the animal in clean and tidy habnitat
    4. Vaccinating the animals against viral disease
    5. Raising disease resistant species or animals
    6. Isolation of infected animals

7. Use of quarantine services.

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ii. Plants

1. Using the right planting distance, method and season.
2. Removing and destroying infected plants
3. spraying plants with pesticides at the right time
4. growing disease resistant crops
5. planting healthy seeds, seedlings and stem cuttings
6. control of vectors (e.g. in cassava mosaic)

PART II – FLOWERING AND SOIL SCIENCE

2. (a) *Describe the external features of a named monocotyledonous flowering plants.*

Oil palm tree, maize, rice, spear grass, sugarcane, onion, plantain, banana, pineapple, bamboo, arrowroot, cocoyam.

Description

1. roots are numerous, long and slender/fibrous
2. all the roots arise at the same point at the base of the stem
3. stem is long and cylindrical
4. stem shows distinct/clear nodes and internodes
5. Stem show no branding, sometime covered by sheathing leaf bases.
6. Leaf is long and narrow/slender/linear, with or without sheathing leaf base.
7. leaf is parallel – veined
8. Flowers are small and numerous, usually dull coloured, not sweet smelling.
9. pendant stamens, feathery stigma on flowers.

- (b) *What is the role of green algae in an aquatic habitat?*

1. primary producer
2. removes excess carbon dioxide
3. returns oxygen to the habitat
4. pollutes water

3. (a) *Define the terms:*

1. Photosynthesis

The process by which green plants manufacture carbohydrates from water and carbon dioxide using sunlight and giving off oxygen as a by-product.

2. Respiration

A process in which oxygen is used to break down organic matter to release energy in all living cells, while water and carbon dioxide are released as waste products.

- (b) *What are the differences between photosynthesis and respiration?*

Photosynthesis builds organic compound/anabolic/breaks down organic matter/catabolic

| Photosynthesis   | Respiration  |
|--|--|
| <ol style="list-style-type: none"> <li>1. Stores energy in organic compound</li> <li>2. carbon dioxide is assimilated/used up</li> <li>3. oxygen is given off</li> <li>4. water is used up</li> <li>5. takes place in chloroplasts only</li> <li>6. takes place in day time only.</li> </ol> | <ol style="list-style-type: none"> <li>Releases energy from organic matter</li> <li>Carbon dioxide is released</li> <li>Oxygen is used up</li> <li>Water is liberated</li> <li>Takes place in all living cells</li> <li>Takes place both day and night.</li> </ol> |

(c) Describe ONE mechanism of transportation in plant.

1. Root pressure
2. soil water flows into cell sap or root hairs
3. water in the root hairs moves into xylem vessels through the cortex, endodermis and pericycle
4. water in the xylem vessels of the root is moved into the xylem of the stem branches and leaves under root pressure. OR
5. Suction pressure/transpiration pull/unbroken water column
6. As water passes from soil into roots, stem and leaves suction pressure is set up
7. as excess water is evaporated from the leaves an unbroken water column is maintained in the xylem vessels
8. as transpiration continues, a transpiration pull is set up.

### PART III – ANIMAL BIOLOGY

4. (a) Give THREE differences between autotrophic and heterotrophic modes of nutrition.

| Autotrophic Mode of Nutrition                                      | Heterotrophic mode of nutrition   |
|--|---|
| 1. the organisms (green plant) make food in their body             | The organisms (non-green plant and animals) depend on food made by green plant.     |
| 2. possible only in the presence of sunlight                       | Possible at all times.  |
| 3. makes complex organic compounds from simple inorganic materials | Takes in complex organic compounds and break them down into simple absorbable forms |
| 4. food made by the process of photosynthesis and chemosynthesis   | Food is taken in by holozonic, saprophytic, symbiotic and parasitic methods.        |

ii. State *THREE* differences between parasitic and saprophytic modes of feeding.

| Parasitic  | Saprophytic  |
|--|--|
| 1. Food drawn from living organisms (Hosts)          | Food taken from dead organisms (Substrates)              |
| 2. Absorbs already digested food or undigested food. | Absorbs already digested food only                       |
| 3. May cause disease or death of organisms (Hosts)   | May cause complete breakdown or decompose the substrate. |

b. i. State the mechanism involved in the digestion of piece of fish in the stomach and in the small intestine.

1. Churning/turning/mixing by the stomach wall.
2. Addition of water, enzymes and dilute HCL/Gastric Juice.
3. Relaxation and contraction of the pyloric sphincter at the duodenum.
4. Neutralization of the acid medium from the stomach
5. Addition of water, enzymes and bile.

ii. Name the two reagents used in testing for protein.

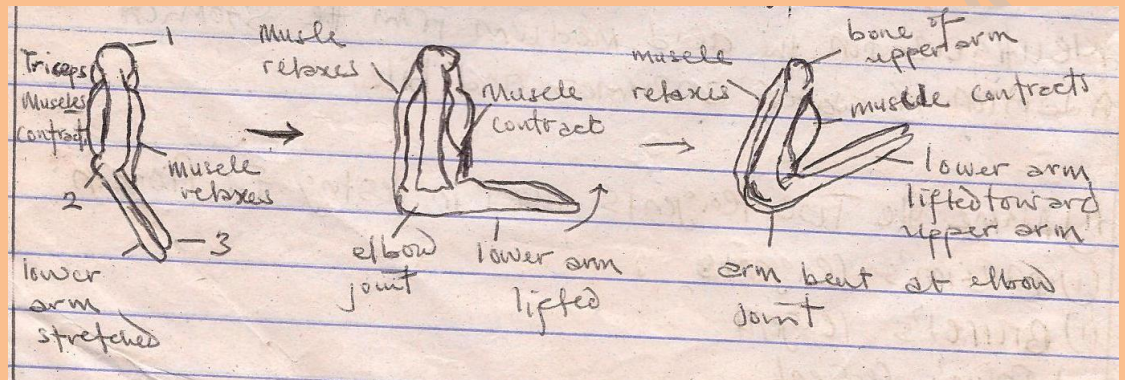
1. Million's reagent
2. Biliret's reagent
3. Folin's reagent
4. Xanthoproteic reagent.

5. (a) State *FIVE* functions of the skeleton.

1. Give shape/form to the body
2. support sort and other part of the body
3. protect delicate organs and structures of the body
4. provides places for attachment of muscles
5. joins the muscles to bring about movement of the body
6. aids breathing
7. Manufactures white and red blood cells.

(b) With the aid of diagram describe how the muscles cause bending in a named joint.

- i. Elbow joint, knee joint
- ii. When the triceps contracts, the biceps relaxes and the arm is stretched.
- iii. When biceps contracts, the triceps relaxes and the arm bends at the elbow joint.
- iv. The lower arm is brought close to the upper arm.



(c) What aid would you give to a person with a suspected simple fracture of the tibia.

- i. Encourage the person to lie on his back
- ii. Put a splint on either side of the leg.
- iii. Bandage or tie the splints away from the injured point.
- iv. Use a stretcher to take the person to the nearest hospital
- v. Reassure the victim of safety.

#### PART IV – GENETICS AND ECOLOGY

6. (a) State FOUR physical characteristics in man, which show variation among offspring from the same parents.

- i. Tallness, shortness, dark complexion, light complexion
- ii. Hairy body, baldness, flat nose, pointed nose, thick lips
- iii. Gigantism, dwarfism, fatness, thinness, albinism, knock-kneed
- iv. Free/attached ear lobe
- v. Finger print

- (b) *Explain briefly ONE way in which the characteristics for tallness is passed from parent to offspring.*
1. The allels for tallness can be homozygous or heterozygous as TT or Tt
  2. During gametes formation the genes separate independently
  3. Genes of gametes combine randomly during frertilisation
  4. A gamete carries only one member of the alleles T or t
  5. During fertilization T may combine with t to form a zygote, Tt for tallness since T for tallness is dominant over t for shortness.
- (c) *How is the sex of a human embryo determined at fertilisation:*
- i. The male produces two different types of gametes – Y and X
  - ii. The female produces only one type of gamete – X
  - iii. After mating, numerous male gametes surround the female gamete
  - iv. Some of these male gamete carry Y and other X chromosomes.
  - v. If the male gamete carrying Y fuses with the female gamete X, the zygote is XY which is male embryo
  - vi. If the male gamete carrying X fuses with the female gamete X, the zygote is XX which is female embryo.