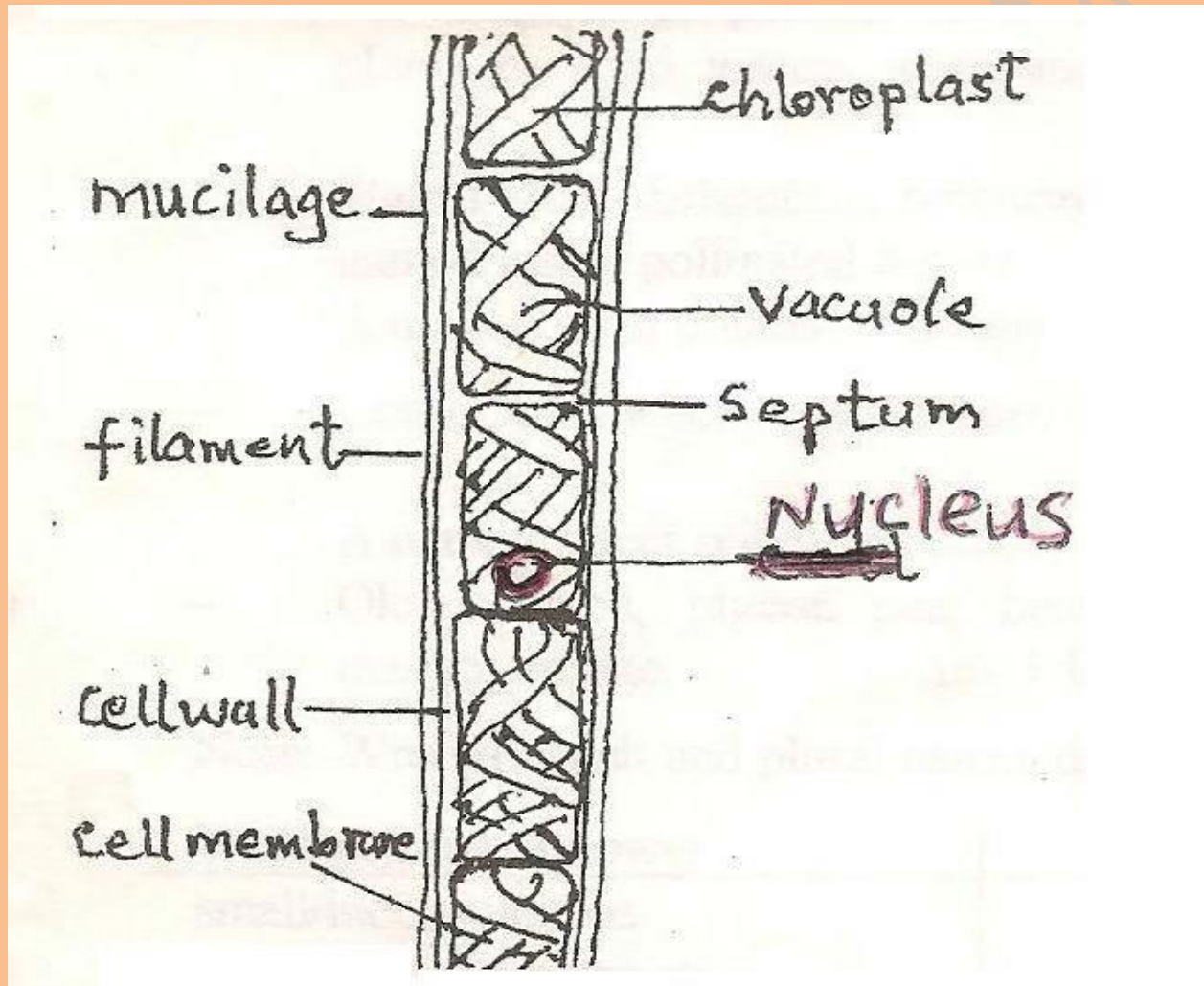


NATIONAL BUSINESS AND TECHNICAL EXAMINATIONS BOARD NATIONAL
TECHNICAL CERTIFICATE EXAMINATION

BIOLOGY

PART I – (INTRODUCTORY BIOLOGY)

1. (a) Draw a diagram 10 – 12cm long to show the microscopic appearance of a *spirogyra* filament.



- (b) State in a tabular form two differences between the following pairs.

A. EUGLENA	CHLAMYDOMONAS
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1. Spindle shaped	Globular in shape
2. one-flagellum	Two flagella
3. spindle shaped chloroplasts	Cup shaped chloroplast
4. has gullet and reservoir	Has no gullet and reservoir
5. pellicle present	Pellicle absent

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B. SPONGE	HYDRA
1. Massive/irregular shape	Vase-like in shape
2. has several water channels has no enteron	Has one enteron
3. has not tentacles	Has tentacles
4. has no nematocysts	Has nematocysts
5. a colony of similar cells	A tissue grade/level of organisation
C. LIVERWORT	MOSS
1. Thalioid/prostrate	Has erect stem-like structure
2. has no stem-like portion	Has stem-like portion
3. has gema cup	Has no gema cup

(c) *What limits the power of a microscope?*

1. resolving power/the ability to separate and distinguish two structures.
2. microscope cannot show object as separate if they are less than 0.0002mm apart.

2. PART II – FLOWERING PLANT AND SOIL SCIENCE

(a) i. *What is Pollination?*

The transfer of pollen from the anther to the stigma, in flowering plant by wind, insects water and other animals.

ii. *State FOUR differences between a named wind pollinated flower and a named insect pollinated flower.*

A named wind pollinated flower

Corn/maize, wheat, guinea corn, rice and any correctly named grass.

A named insect pollinated flower

Okro, melon, pigeon pea, bean, tomato, pawpaw, mango, orange, plantain/banana.

WIND POLLINATED FLOWER	INSECT POLLINATED FLOWER
1. Small/inconspicuous	Large/conspicuous
2. dull coloured/unattractive	Brightly colour/attractive
3. smooth/powdery pollen	Rough/spiky/sticky pollen
4. large number/numerous pollen	Fewer pollen
5. pendulous/feathery stigma	Erect and sticky stigma
6. no scent/not sweet smelling	Have scent/sweet smelling
7. no nectar	Secrete nectar

(b) i. *List FOUR condition necessary for germination.*

1. Water/moisture
2. Air/oxygen
3. healthy/viable seeds
4. Suitable temperature

ii. *Describe an experiment to show that heat energy is given off by germinating seed during aerobic cellular respiration.*

1. 2 lots of healthy seeds labelled A and B
2. Seeds A in their healthy condition are placed in a wet cotton wool in a flask with thermometer inserted.

3. Mouth of flask well sealed with cotton wool.
4. This is the experiment
5. Seeds B killed by boiling
6. Boiled seeds further soaked in formalin to prevent bacterial decay
7. Placed in wet cotton wool in a flask with a thermometer inserted
8. Mouth of flask well sealed with cotton wool. This is the control
9. Experiment and control are left in the same room temperature.

Result

At the fifth day, seeds A germinate and temperature slightly higher than the room temperature and Seed B. Difference due to heat energy produced by germinating seed.

CONCLUSION: Germinating seeds produce heat energy enough to make thermometer read higher.

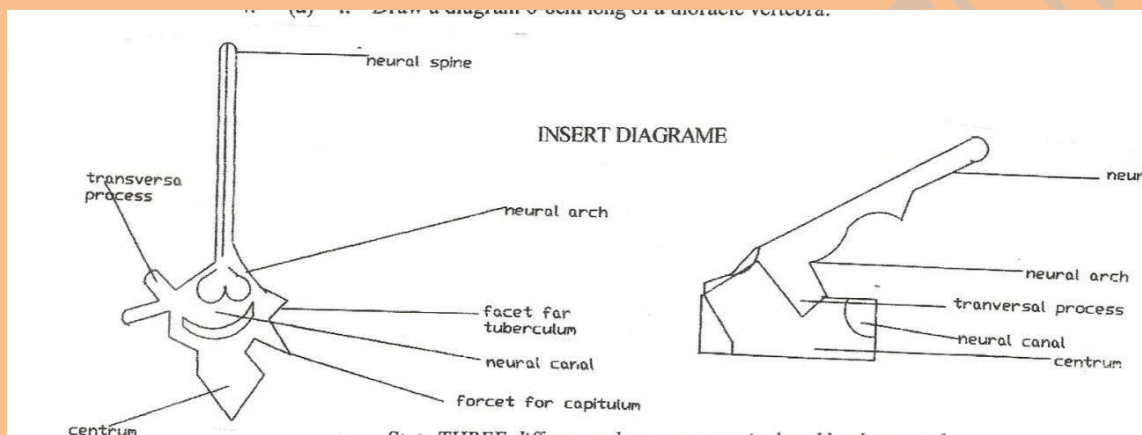
- ii. *Name the product of anaerobic respiration of glucose in the muscle of man.*
Energy (ATP), Lactate/Lactic acid, and water.
3. (a)
- i. *What is soil erosion?*
It is the washing away of the topsoil by rain water/the blowing away of the top soil by wind and dropping it elsewhere.
 - ii. *List THREE agents of soil erosion.*
 1. rain water
 2. wind
 3. human activities
 - iii. *State FIVE ways of conserving soil.*
 1. mechanical control of soil erosion such as contouring, ridging terracing to prevent top soil from being washed away.
 2. planting leguminous crops to return soil nutrients and also act as cover crops to prevent exposure of top soil to intensive heat and leaching.
 3. practice crop rotation method of farming
 4. practice shifting cultivation methods to allow some area regain nutrients during fallowing periods
 5. use more organic manure in returning nutrient to the soil
 6. proper application of fertilizers to replenish soil fertility
 7. avoid bush burning
 8. discourage over-grazing/deforestation over cropping way.
- (b) *State FOUR characteristics of clay soil.*
1. Fine particle that are closely packed.
 2. fine/narrow pore spaces
 3. sticky and slippery when wet
 4. hard and cracked when dry
 5. heavy when wet
 6. wets slowly and dries slowly
 7. difficult to till.

(c) Mention TWO differences between sandy soil and loamy soil.

SANDY SOIL	LOAMY SOIL
1. mainly large sand particle	Mixture of clay, sand and silt
2. has large pore spaces]	Tiny pore spaces
3. coarse or rough to touch	Moderately smooth to touch
4. less organic matter	Large/more organic Matter

PART III – ANIMAL BIOLOGY

4. (a) i. Draw a diagram 6-8cm long of a thoracic vertebra.



ii. State THREE differences between a cervical and lumbar vertebra

CERVICAL VERTEBRA	LUMBAR VERTEBRA
1. reduced neural spine	Short neural spine
2. reduced transverse process	Long transverse process
3. wide neural canal	Narrow neural canal
4. has vertebrarterial canal	Has no vertebrarterial canal
5. has odoritoid process	Has no odoritoid process
6. fewer facets	More facets
7. no Centrum in atlas	Centrum well developed

iii. (a) Name the joint formed between the atlas and axis vertebrae

Swivel/rotating/pivot joints.

(b) List FOUR types of mammalian teeth.

1. incisor
2. canine
3. premolar
4. molar

(c) Mention TWO ways of caring for the teeth

1. clean with chewing stick/paste and brush everyday
2. clean teeth with tongue and water after each meal
3. use tooth pick to remove lodged piece of food

4. chew moderately hard food
5. avoid sugared food close to bed time
6. see dentist when necessary
7. avoid eating too cold or too hot food

5. (a) *Explain the mechanism of blood clotting*
1. when bleeding occur, blood platelets break apart
 2. platelets release chemical into the plasma
 3. causing plasma protein prothrombin to become thrombin
 4. in the presence of calcium ions
 5. thrombin changes fibrinogen into fibrin
 6. many strands of fibrins, form a mesh
 7. blood cells are trapped in the mesh forming a cloth
 8. clot dries to form scab over the wound.

- (b) (i) State THREE differences between open and closed system of circulation

OPEN SYSTEM CIRCULATION	CLOSE SYSTEM CIRCULATION
1. Heart not chambered	Chambered heart
2. few short blood vessels for a short distance and for a while	Blood flows in long vessels all the time
3. blood flows into coelom for some time	Blood remains in vessels through out
4. no capillaries	Presence of complex network of capillaries
5. organs are bathed by blood	Organs are supplied with blood by vessels

- (ii) List two organisms each that operates open and closed system of circulation.

Open System: Grasshopper, cockroach, housefly.

Closed System: Tilapia, rainbow lizard, dove, domestic fowl, goat.

- (iii) *Mention the part of the heart that pumps oxygenated blood to other parts of the body.*

Left ventricle

- (c) *State TWO transport functions of blood.*

1. transports absorbed food from the intestine to the liver
2. red blood cells transport oxygen to all cells
3. transports urea from the liver to the kidneys
4. transport heat from the liver to all parts of the body.
5. Transports hormones from ductless glands to target organs.

PART IV – GENETICS AND ECOLOGY

6. (a) i. *Define Ecology*

The study of interactions of organisms with their habitat/physical environment and with each other.

- (ii) *Briefly explain FOUR ecological factors that affect the distribution of organisms in a terrestrial habitat.*

1. Availability of water/rainfall: seed germinate, plants grow to form vegetation forms habitat and source of food for other organisms. Rivers form for supply of water during dry seasons.

2. Suitable temperature: green plants will grow and primary production will be high to support many species. Animal will move to areas that have suitable temperature for healthy living and survival.
3. Presence predators: weak animals that form preys for predators will be scared away from a habitat that has abundance of predators to a habitat with less number of predators.
4. Wind direction: wind ward side of mountainous region support dense populations of plant and animal species as wind brings rainfall promotes wind pollination and seed dispersal. Lee ward side of mountainous region have scanty vegetation and few animal species.
5. Sunlight: green plants need sunlight for photosynthesis while animals need it to see. There will be food supply and habitat for animals in a place where plants grows. Animals cannot be found in a place where plants do not thrive.

(iii) *Mention TWO adaptive features of named terrestrial animal.*

1. Giant Rat: 1. claws and digits of forelimbs for digging burrow 2. Whiskers on snout for sensing food and danger.
2. Grasshopper: 1. long hind limbs for hopping 2. Wings for flying away from predators.
3. Toad: 1. thick sticky tongue for catching insects. 2. Large bulging eye for wide range of view.
4. Rainbow Lizard: 1. claws on digits for gripping and climbing smooth surface 2. long powerful tail for offence and defence.

(b) *Explain FOUR methods of food preservation.*

1. boiling: fresh food that is boiled with salt added to it can remain good for some days if warmed each day
2. Salting and curing: salt added to fresh meat and fish will destroy the bacteria. When the meat and fish are placed over dry heat they will become dry. Then can be preserved for many days.
3. Drying: fresh leaves/vegetable, tomato, okro can be spread in the sun for some days so that the moisture or water in them is removed to a level that micro organisms can no longer attack them.
4. Refrigeration/Freezing: the food is kept in a very low temperature condition in which the growth and multiplication of bacteria and fungi are retarded the food can be preserved for many days without getting denatured.
5. Canning: food is cleaned, processed and sealed up in cans, the canned food is heated to a selected temperature. When cooled the canned food can remain preserved for many months.
6. Pasteurization: milk, beverages and alcohol are heated to certain level of temperature and cooled immediately. Bacteria fungi and other micro. Organisms are killed while the flavour and nutrients are intact.