133/2 BIOLOGY 2

# PROPOSED MARKING SCHEME

1(a)(i) The name of a plant is Ferri (fern plant) (01)

(ii) Kingdom - Plantae (01)

Division - Filicinophyta (Pteridophyta) (01)

(iii) Its gametophyte stage is called Prothalus (01)

(iv) Habitat - In damp shaddy places eg in the floor of moist forests (01)

(v) Its leaf is called frond (01)

(v) Reproductive structure is sporangium called sori (sorus) (01)

(b) Adaptation to terrestrial environment

- They have roots for anchorage in the soil and for absorption of water and ions (02)
- Have chloroplasts with chlorophylls for Photosynthesis (02)
- Have stomata for gaseous exchange (02)
- Have xylem for transportation of water and ion and phloem for translocation of manufured food (02)
- Have Rhizome for food storage and propagating new fern plants
- Have cuticle on leaves to excess water loss (02)
- Have female parts on gametophyte (prothalus) that produce chemicals to attract male gametes antheroids for sexual reproduction (02)

Any 5 = 10 Marks

1(C) Economic important of Ferns

- They are used in Biological research and biological studies
- They are used for decoration of environment in home, offices and hotels etc
- They are used as source traditional and commercial medicine
- They are used for tourist attraction thus aid to generate National income
- They are used as source of food in some society eg fiddle heads or crozier are used as food.
- They can by used as material for mulching in agricuture preventing water loss from the soil

any 5 points = 05 marks

2(a) Kidney are paired bean-shaped organs found on each side of the back of the lower portion of the abdominal cavity. They are basically involved in filtration of urine from blood.

The main functions of Kidney areas follows:-

- Excretion. Kidney filters urea and other poison from blood as well as excess salt from the body to form urine which is removed out of the body as waste products

- water balance - Kidney adjust intake of water from filtrate depending on the amount of water present in the blood. when water level in blood decreases it increase reabsorption of water back into blood and vise versa.

- Blood pressure regulation. Kidney requires constant pressure to function. When blood pressure drops too low the Kidney increases the pressure by constriction of blood vessels

- Red blood cell regulation - when the Kidney do not get enough oxygen the send out a destress call by producing hormone erythropoetin that stimulate bone marrow to produce more red blood cells

- Regulation of PH - Kidney secrete $H^+$ ion into urine from blood to maintain PH but. also it conserve bicarbonate ions which buffer the blood.

2b

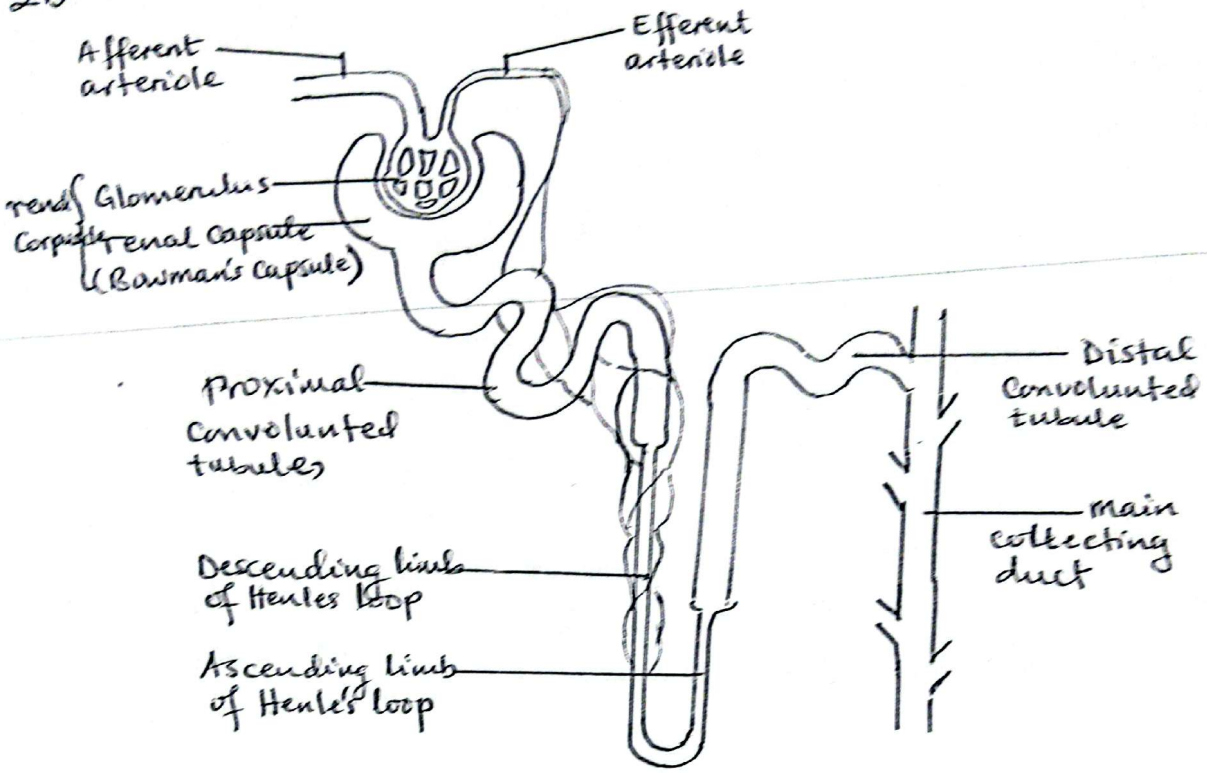



Diagram showing structure of nephron

2c Adaptations of cells of proximal convoluted tubule is as follows

- They have numerous microvilli and basal channels which increase surface area for the reabsorption process

- They have numerous mitochondria to supply energy which is constantly needed for active uptake of substances from filtrates

- Their basement membrane are very close to the endothelial lining of blood capillaries to ensure fast uptake of materials

- Presence of channel protein for transportation of materials such as amino acids and ions

- They have vesicles (vacuoles) that contain proteins at the base of microvilli. These protein are taken into the cells by pinocytosis (cell drinking)

3(a) Seed dormancy is the state in which seeds are prevented to germinate even when condition for germination are available

There two types of seed dormancy.

Primary seed domancy and secondary seed domancy

Primary seed domancy is the type of seed domancy in which seeds fail to germinate even when factors for germination are available immediately after dispersal

Reasons for primary seed domancy

- Seed must and require certain changes after ripening of fruit. These change prevent premature germination and increase seed survival

- Inhibitors in the seed coat can prevent the action of enzymes important for initiation of germination to work for embryo growth

- Hardness of testa can prevent germination until other mechanism are applied to the testa to allow germination

- impermeability of testa can not allow water to enter the cotyledons or endosperm to enable growth of the embryo and functioning of enzymes to work

- Im

Secondary seed domancy is the type of seed domancy that occurs when the seed lack all or some of the environmental conditions that are necessary for germination

## Reasons for Secondary dormancy

- lack of optimum temperature. required to facilitate enzyme function in the embryo
- lack of oxygen which facilitate respiration of the embryo
- lack of light required for facilitating function of phytohormones necessary for germination eg Auxin Gibberellins
- lack of water important for functioning of enzymes and growth of the embryo

3(b) ## Methods to overcame seed dormancy

- Soaking seed in water to softern the testa and for removing the inhibitors
- Scarification - by using hammer or knife to weaken the seed coat to allow entry of water and oxygen
- Partial digestion when seeds are eaten by animals with grasses their are softened during digestion of food thus breaking dormancy
- Chemical scarification involve soaking seeds in alcohol and or acids for some times to weaken the seed coat.

Cold stratification involve placing the seeds close together under a thin film (layer) of sand which are kept moist to make the environment cold to enable seeds to germinate

Fire stratification involves placing seeds close together under a thin film of sand (layer) and set fire on top

## Hereditary materials

4(a) Hereditary material is a chemical molecule or a unit molecule of a DNA molecule or a gene of a chromosome

- Hereditary materials are responsible for passage of genetic information from one generation to another
- Hereditary materials are made up of genes
- There are two types of hereditary materials
  (i) DNA (deoxyribonucleic acid)
  (ii) RNA (Ribonucleic acid)
- Each type of hereditary material in the body is usually encoded the DNA or RNA gene

(b) Properties of genetic materials

(i) They contain genes (hereditary informations) in a coded form

(ii) Structural elements are found everywhere in life forms (They are ubiquitous)

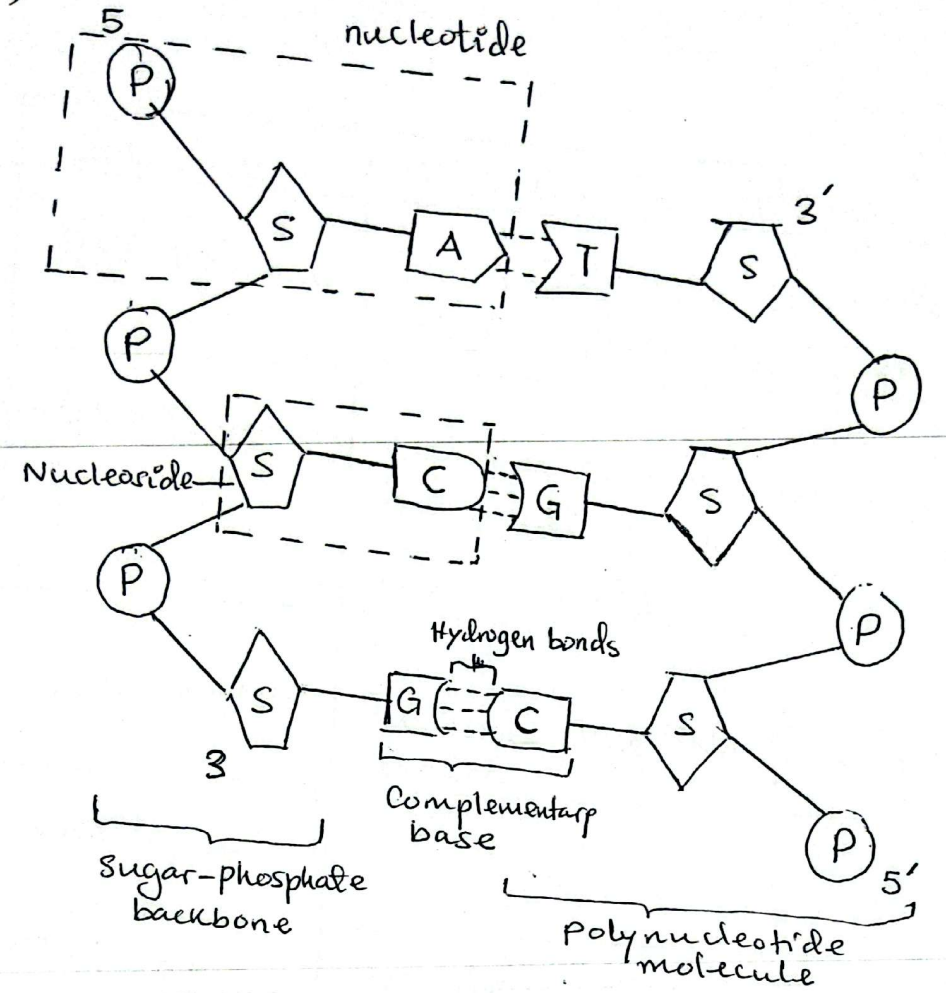
(iii) They have ability to replicate or produce their copies

(iv) They are stable physically and chemically

(v) They are in same quantity and quality in all somatic (body) cell of an organism.

(vi) They can undergo Mutations (change in structure and number of DNA or gene)

4 (b)




Key

P ⇒ phosphate group

S ⇒ D.

A – Adenine

T – Thymine

G – Guanine

C – Cytosin

Molecular Structure of a DNA

4c

| Enzyme | Function in replication process |
| --- | --- |
| DNA helicase | Unwinding the DNA double helix at the replication fork |
| DNA Polymerase | Build a new double strands of DNA By adding nucle to form new strands. |
| Topoisomerase | Relaxes the DNA from its supercoiled nature |
| DNA ligase | |
| Primase | Provide an RNA primer for DNA Polymerase to begin synthesis of new DNA strands |

5(a)(i) Analogous structures are the body organs from different species which have different Constructions and origin but perform the Same functions

Examples of analogous structure are the wings of birds, bat and insects

(ii) Homologous structure are the body organs of different species which have the same Construction and origin but perform different functions

Example fore limbs of vertebrates all are constructed with five digits (pentadactyl) but are used differently eg diging, swimming flying etc.

(iii) Vestigial structures - are homologous structures in Same species of organism which have no significant function (they have lost their functions and are less developed)

Example Appendix in human correspond to caecum in herbivore that is the site of cellulose digestion

Halters in house fly to hind wings

5(b) Selective breeding is a process of choosing a few organisms, Plants or animals with the desirable traits to serve as parents for the next generations where by when crossed they produce hybrids (organisms with favaurable variation)

- Selective breeding is also known as artificial selection.
- Through selective breeding the organisms with desirable traits are preserved while those with undisirable traits are eliminated from a generation to generation.
- Thus continuous selective breeding of plants and animals produce varieties that give rise to new species.
- This indicates that selective breeding is the process of evolution

Evidence from classification (Taxonomy)

- The study of Taxonomy or classification is based on comparing similarities and differences between organisms

- Similarities in organisms suggests that they evolved from a common ancestor

- Similarities and differences is said to have been due to progressive adaptation to the changing environmental condition over a period of time

- From these comparative characteristics scientists have been able to classify organisms.

- Classification therefore support the process of evolution because ~~they~~ it suggest that similarities and differences of organism occured to successive adaptation to environmental changes

## Evidence from Comparative Embryology

- The study of the developing embryo in vertebrates has shown similarities in their early stages of embryonic developments

- The similarities of vertebrate embryo is observed during the process of cleavage, blastulation, gastrulation and early stage of differentiations

- Similarity in embryonic development indicates that all vertebrates originated a common ancestor.

- The similarities in embryo is not observed in the adult vertebrates indicates evolution had occured

- Example Embryo of all vertebrate have notochord visceral clefts (gill ~~slit~~ slits) or pharyngeal pouches. and tail.

6 Introduction

Interaction is the effect that occurs between a pair of organisms living together within the community. It can be either between members of the same species or of different species

There are various ways by which organisms interact in an ecosystem or a community which are Competition, Predation, grazing and Symbiosis

Competition is a struggle between organisms in a community for environmental resources such as food, water, mate and space.

The competition can be either intraspecific (between members of the same species) or interspecific Competion (between members of different species)

Example of intraspecific competion is when several bull fight for a female cow during mating season.

Where as interspecific competition is when different animals such as goat, antelope, cow buffaro compete for grass or fodder.

Predation is a biological relationship in which the hunting animal eats another animal of different species. The animal that is eaten by predator is called Prey. The animal that

feed on another animal is called predetor.
Example The hunting animals such as Lion Leopards, cats are predators while the hunted animals such as buffalo, antelope zebra and rats are preys. When predators increases prey decreases. The decrease in prey predators starves and start dying, leading to increased prey again.
Grazing is the process by which herbivore animals feed on plants or vegetations such as grass, shrubs and trees
When herbivore increases cause the decreased vegetation in the area which may cause starvation and death of the grazers. Death of grazer may lead to increased vegetation again.

Symbiosis is a relationship betw organisms of different species living together in which one or both organisms may benefit from the relationship.
There are three main types of symbiosis which are Mutualism, Commensalism, and parasitism

Mutualism refers to a symbiotic relationship of two organisms of different species living together in which each member benefits from the association.
Example Bacteria obtain shelter in the gut of ruminant animal that feed on cellulose but have no ability to digest it. Bacteria produce cellulase enzyme that digest cellulose helping the animal to obtain digested food

Commensalism is a symbiotic relationship in which one species benefit from the association without causing harm to the partner

Example the barnacles live on the whale and are transported to various parts of the ocean for feeding without causing harm to the whale.

Parasitism is a type of symbiotic relationship in which one species benefit (parasite) and the other organism (Host) is harmed.

The parasite that live outside the body of the host is called ectoparasite Example Aphids feed on the surface of the leaf, .. Lice sucking blood on the body of human, ticks and so on

The parasite that live inside the body of the host is called Endoparasite Example Plasmodium (Malaria parasite), Tape worm, Ascaris etc

conclusion

Interactions therefore have the positive and negative impact to the ecosystem. the positive impact is to regulate the ecosystem in order it stay balanced. However excessive death of organism can lead to destruction of the community or cause its shift to new kind of ecosystem.