CHRISTIAN SOCIAL SERVICES COMMISSION (CSSC)

NORTHERN ZONE JOINT EXAMINATIONS SYNDICATE (NZ-JES)

FORM SIX PRE-NATIONAL EXAMINATIONS 2026

134/2 AGRICULTURAL SCIENCE 2

MARKING SCHEME

1.a)

i. **Weeds have Ability to colonize a wide range of soils with sometimes quite harsh conditions, rapidly.**
ii. **Weeds have Ability to adjust their plant size to varying population densities.**
iii. **Weeds have Tolerance to diverse soil and climatic condition .**
iv. **Weeds Are Mostly heavy feeders as compared to growing crops.**
v. **Weeds exhibits allelopathy properties (Produces chemicals that inhibit the growth of other plants). (01 mark @ = 05 marks)**

(b) These believes have to be rehabilitated because;
i. Weeds provide a vegetative cover that protects the soil surface against erosive action of rain and wind. ii.Weeds play an important part in nutrient recycling.

iii. Roots of weeds tap nutrients from the lower soil depths and return these to the soil surface as litter when the weeds shed their leaves or when the entire plant plants dies and decays.

iv.Weeds add organic matter to the soil both from the roots and from the above ground parts.

iv.Many plants that are designated weeds are used as potherbs e.g Talinum triangulare.

v. Weeds are sources of pesticides e.g Chrysanthemum cinerariifolium which provides insecticide pyrethrum.

vi. Weeds provide food and cover for animal. Wildlife generally depends on weeds for survival as food and shelter.

vi. Weeds serve as an important source of genetic materials for crop improvement such as breeding for resistance to pests and diseases which are made possible by genetic materials provided by wild species of the crop plants.

Vii Weeds serve as hosts beneficial insects, and at the same time provide nectar for bees.

Viii. Many weeds help to beautify the landscape. e.g a good ground cover of Cynodon dactylon beautifies the home. (any 5 points 01 mark @ = 05 marks)

2.

a) **Fungal groups which cause diseases in plant.**
   i. Chytridiomycetes: They have round or elongated mycelium that lacks cross-wall. Importance genera are. Olpidium brassicae which parasitize the roots of cabbage and other plants. Physoderma maydis which cause the browning of corn. Majority are saprobs
   ii Zygomycetes; Members produce non-motile asexual spores in sporangia known as sporangiospores. No zoospores are produced by zygomycetes. The resting spore is zygospore produced sexually by fusion of gametes. eg Rhizopus and Choanephora which cause soft rot of fruits and vegetables.
   iii. Ascomycetes; Produce sexual spores called ascospore normally eight ascospore are formed within an ascus. Some ascomycetes like yeast, have only four ascospore per ascus.
   iv. Mitosporic fungi/Deuteromycetes; They are essentially asexual fungi, sexual reproduction and structures are lacking or unknown. Large number of plant pathogenic fungi fall under this group.
   v. Basidiomycetes; Also known as club fungi. Produce haploid basidiospores as a result of sexual reproduction.
   vi Oomycetes; Produce zoospore. Oospore are produced by union of morphologically different gametes. (any 5 points 01 mark @ = 05 marks)

b) **Necrotic symptoms in diseased plants.**
   - ❖ **Wilting is loss of turgor pressure in a plant leading to temporary or permanent drooping of leaves, shoots, or entire plants from lack of water or infection by different pathogens.**
   - ❖ **Spot is a definite, localized, round to regular lesion, often with a border of a different colour, characterized as to location (leaf spot, fruit spot) and colour (brown spot, black spot);**
   - ❖ **Blight is the sudden or total discoloration and killing of large area of a leaf, shoots, or stems or the entire plant;**
   - ❖ **Blast is sudden blighting or death of young buds, flowers, or young fruit;**

- **Damping off - decay of seed in soil, rapid death of germinating seedlings before emergence, or emerged seedlings suddenly wilting, toppling over, and dying from rot at or near the soil line.**
- **Dieback progressive browning and death of shoots, branches, and roots starting at the tips to down ward.**
- **Rots refer to the decomposition and putrefaction of cells, later of tissues and organs.**
- **Canker a definite, dead, often sunken or swollen and cracked area on a stem, limb, trunk, tuber, or root surrounded by living tissues: (any 5 points 01 mark @ = 05**

3. Bean Anthracnose

a) Symptoms.
- **Brown sunken spots with dark margins on the pods of fresh bean.**
- **Red to black spots occur on the leaves on the underside (01 mark @ = 02 marks)**

b) The causal agent of the disease fungus known as *Colletotrichum lindemutheanum* (02 marks)

c) Ways through which the disease is transmitted.
- **Planting materials**
- **Plant residues (01 mark @ = 02 marks)**

d) Control measures of the disease.
- **Growing resistant variety**
- **Crop rotation**
- **Destruction of crop residues**
- **Use clean planting materials**
- **Application of approved fungicides (any 4 points 01 mark @ = 04 marks)**

4. Mass selection; in this method of selection a group of similar appearing individuals or plants are selected and the seeds are composited to form a new population or variety. The objective of mass selection is to improve the level of population by selecting and bulking the superior genotype present in the particular population. (02 marks)

Procedures of developing new variety through mass selection

- **1st season; select a few (say 20-100) of plants with similar desirable phenotypes. Harvest and composite (mix) the seeds of the harvested plants.**
- **2nd season; grow in preliminary yield trial (PYT) and compare with the standard variety as a check.**
- **3rd season to 6th season; continue with yield tested to determine the performance and adaptation of the new population using the checks as explained above.**
- **7th season; increase seeds production for distribution as anew variety (2 marks @ = 08 marks)**

5.(a) Reasons for modifying the genetic makeup of some organisms.

- ❖ **To obtain organisms with improved quality and yield of agricultural products such as fruits, cereals, legumes and vegetables**
- ❖ **To obtain organisms with adaptive features to the changing environmental conditions**
- ❖ **To obtain the organisms which are more resistance to certain diseases such as maize plants with modified genes for leaf rust disease resistance or genes for resistance to leaf rust disease**
- ❖ **To obtain the organisms which reach market weight early such as livestock or animals and plants imparted with the genes for early growing or use of growth hormones (GH) for production purposes. . (any 4 points 1 mark =4 mrk)**

(b) Sustainable agricultural practice that may build and maintain the health of the soil

- ❖ **Rotating crops and embracing diversity; planting a variety of crops can have many benefits, including healthier soil and improved pest control. Crop diversity practices include intercropping (growing a mix of crops in the same area) and complex multiyear crop rotations.**
- ❖ **The use of cover crops; Cover crops, like clover or hairy vetch, are planted during off-season times when soils might otherwise be left bare. These crops protect and build soil health by preventing erosion, replenishing soil nutrients, and keeping weeds in check, reducing the need for herbicides.**
- ❖ **Reducing or eliminating tillage; Traditional plowing (tillage) prepares fields for planting and prevents weed problems, but can cause a lot of soil loss. No-till or reduced till methods, which involve inserting seeds directly into undisturbed soil, can reduce erosion and improve soil health.**
- ❖ **Applying integrated pest management (IPM); a range of methods, including mechanical and biological controls, can be applied systematically to keep pest populations under control while minimizing use of chemical pesticides.**
- ❖ **Integrating livestock and crops (mixed farming); Industrial agriculture tends to keep plant and animal production separate, with animals living far from the areas where their feed is produced, and crops growing far away from abundant manure fertilizers. A growing body of evidence shows that a smart integration of crop and animal production can be a recipe for more efficient, profitable farms.**
- ❖ **Adopting agro-forestry practices; By mixing trees or shrubs into their operations, farmers can provide shade and shelter to protect plants, animals, and water resources, while also potentially offering additional income. (Any 6 points =6 marks)**
- ❖ **Mulching**

6. Management practices might be taken for the improvement of the natural pastures are as follows;

- ❖ **Adjusting stocking rate so as to avoid overgrazing**
- ❖ **Provide adequate watering points (irrigation)**
- ❖ **Rehabilitation (destroyed areas)**
- ❖ **Control parasites and diseases**

- ❖ **Weed control**
- ❖ **Application of fertilizers**
- ❖ **Use of better livestock husbandry**
- ❖ **Reseeding and controlling bush fire (any 5 points 2 marks @)= 10 marks)**

7. (a) Factors which affect the water requirements in animals

- ❖ **The type of diet, i.e., green forage/dry forage**
- ❖ **The purpose of the animal, i.e., lactating/beef**
- ❖ **The type of digestive tract, i.e., ruminant/non-ruminant**
- ❖ **The type of urinary system, i.e., mammals/birds (any 4 points 1 mark @)= 4 marks)**

(b) Ways in which the animal can obtain water for use in their body.

- ❖ **Drinking water;**
- ❖ **Water in Feed; such as succulents**
- ❖ **Metabolism (break down of nutrients). (any 3 points 2 mark @)= 4 marks)**

8.

ANTHRAX

Cause: Bacteria known as Bacillius anthracis

Symptoms: -Higher fever -Shivering -Difficult in breathing Blood stained faeces Sudden death followed by fast decomposition.

Control: -Vaccination of the animals annually. Imposing a quarantine in case of an outbreak Ensuringthatthecarcass is not opened

NEW CASTLE DISEASE.

Cause: Virus of the paramyxovirus group

Symptoms:- coughing and sneezing - drop in egg production - drooping wings paralysis of wings and leg - difficulty in breathing

Control:- Imposing a quarantine in case of an outbreak - Regular Vaccination startingfromsixweekof age. - Cleaning and disinfection of poultry house before bringing a new stock

EAST COAST FEVER (ECF)

Cause: Protozoan called Theileria parva

Symptoms:- higher fever about 40°C - swollen lymph nodes which appear around ear thenspreadtootherparts of the body - difficulty in breathing - weakness and loss of appetite

Control:- fencing of the animal to keep away stray animals - regular spraying or dipping using appropriate acaricides

FOOT AND MOUTH DISEASE

Caused by Enterovirus.

Symptoms:- High fever which lasts for only a few hours Great reduction of milk production. - Excessive salivation - Appearance of painful blisters on the mouth and feet

Control:- Quarantine should be imposed during the out break-Massvaccination should be carried out every six months Slaughter, burns and bury affected animals.

(2.5 marks @= 10 marks)

9.(a) Five categories of pest basis of the crop parts attacked

- **Rootfeeders: these either feed on the plant roots or attack the plant root system causing the death of whole plant. Examples sugarcane termites (Psudocanthotermesmilitaris),andnematodeswhichattackrootsofIrish potato plants.**
- **Stemborers: adult months lay their eggs between leaf sheaths and plant stems. The eggs hatch into larvae which bore into the plant stems eating the stem tissue and thus interfering with plant transport system. Example maize stalk borer (Busseolla fusca).**
- **leaf feeders: these are either large animals such as elephants, buffalos and cattle or insects which damage the leaves. Examples of insect leaf feeders are coffee leaf minor (Leucoptera spp) and coffee thrips (Heliothrips coffea).**
- **Fruit feeders: thes mainly feed on fruits and seeds. Examples are American bollworm(Heliothis armigera) and antestia bugs (Antestiopsis spp) which attack cotton and young coffee berries and others are large animals such as monkeys apes and wild pigs.**
- **Grain-eaters: are mainly insect pest which attack crops in the store e.g maize weevils (Sitophilus zeamais), bean bruchid (Acanthoscescelides obtectus), rats (Rattus rattus), birds such as sudan dioch (Queles qualea aethiopica) and guinea fowl. (5 marks)**

b) Biological pest control These are methods which involve the use of living organisms such as predators, parasites and pathogens to reduce populations of pests. Such natural enemies may be anthropods (insects and mites), bacteria, viruses, nematodes or even vertebrates (birds, toads and fish).

Prerdator	Target pest
Parasitic wasp	Whiteflies in citrus, coffee mealybug
Lady bird beetle	Aphids, cottony cushion scale

Praying mantis	**Giant lopers**
cats	**Moles, rats, mice and other rodents**
Chicken	**Cotton strainers, termites**

(1 Mark @ = 5marks)

10.a)

i) **Natural mating** is the process whereby a male animal mates with a female animal.

ii) **Flock mating** is the mating whereby male animals allowed to run with females on heat

iii) **Hand mating** is the taking the female animal on heat to a male in a pen **(1 Mark @ = 3 marks)**

b) Problems of natural mating

- ✓ It is not possible to utilize good male animal to mate female animals which are kept in another area far away
- ✓ It is costly to keep male animals for breeding
- ✓ Only a limited number of females can mate with one male during its life time
- ✓ When male animal is sick, it may fail to mate the females
- ✓ Once a male animal dies, its usefulness ends
- ✓ It is not easy to detect whether the male animal is sterile or fertile
- ✓ Large male animals may injure weak or small animals during the mating process
- ✓ Easy to spread veneral diseases once male animals infected