S5 AGRICULTURE THEORY SCENARIO TASKS

Topic 1: Cells and Cell Physiology Scenario 1: Cell Membrane and Selective Permeability A biology student places potato strips in three beakers containing distilled water, 5% salt solution, and 10% salt solution. After 30 minutes, the strips in distilled water become firm, while those in 10% salt shrink. Task: Explain how the structure and function of the cell membrane are responsible for these observations. Discuss how this principle is important in maintaining water balance in plants during drought.

Scenario 2: Photosynthesis Efficiency Two maize plants are grown under different conditions — one under full sunlight, the other under a shade. The one under sunlight grows faster and produces more biomass. Task: Using your knowledge of cell physiology, explain how light intensity affects photosynthesis and the production of carbohydrates in plants. Discuss how farmers can manipulate light for maximum yield in crops like coffee or bananas.

Scenario 3: Respiration in Living Cells A teacher seals germinating seeds in a flask with limewater and another flask with boiled seeds as control. After a few hours, the limewater in the first flask turns milky. Task: Explain the process responsible for this observation and discuss the importance of respiration to both plant and animal cells.

Topic 2: Biochemical Compounds in Cells Scenario 1: Protein Deficiency A livestock farmer feeds his animals mainly on cassava peels and banana leaves. Over time, animals show stunted growth and poor hair condition. Task: Explain the role of proteins in animal cells and discuss the effects of protein deficiency on growth and production.

Scenario 2: Enzymes in Metabolic Reactions In a milk-processing plant, an enzyme called rennin is added to milk to produce cheese. However, when the enzyme is heated to 90°C, it loses its ability to act. Task: Explain why high temperature affects enzyme activity and discuss how this concept is applied in both food preservation and digestion in animals.

Scenario 3: Lipids and Energy Storage A camel can travel long distances in the desert with little food or water because of fat stored in its hump. Task: Explain the importance of lipids as storage molecules and discuss how animals utilize fat reserves during food scarcity.

Topic 3: Transmission Genetics and Genetic Engineering Scenario 1: Mendelian Ratios A scientist crosses two heterozygous pea plants for seed colour (Yy × Yy). The offspring show a ratio of 3 yellow seeds to 1 green. Task: Explain how this ratio arises using Mendel’s laws of inheritance. Illustrate your answer with a genetic diagram and discuss how such knowledge can be used in crop improvement.

Scenario 2: Sex-Linked Traits A poultry farmer observes that more male chicks survive than females in a flock with a hereditary defect causing weak leg muscles. Task: Explain how sex-linked inheritance can cause unequal survival between male and female offspring. Discuss the management practices the farmer could adopt to reduce losses from such genetic defects.

Scenario 3: Ethical Issues in Genetic Engineering Scientists propose releasing genetically modified cassava resistant to mosaic virus. Some religious and cultural leaders oppose it, citing “tampering with nature.” Task: Discuss both the scientific and ethical considerations in the use of genetic engineering to improve crops. Suggest ways governments can ensure responsible application of biotechnology.

Topic 4: Animal Anatomy, Morphology, and Physiology Scenario 1: Reproductive Systems A farmer notices that some cows fail to conceive even after repeated mating with a fertile bull. A veterinary officer discovers blocked oviducts in affected cows. Task: Describe the structure and function of the female reproductive system in cattle and explain how blockage of the oviducts leads to infertility.

Scenario 2: Temperature Regulation A pig farmer notices that pigs kept in poorly ventilated housing become restless, eat less, and show signs of heat stress. Task: Explain the physiological

mechanisms animals use to regulate body temperature and discuss management practices that help maintain thermal comfort in livestock.

Scenario 3: Blood and Circulation During a school demonstration, a teacher pricks a student's finger to show how oxygenated and deoxygenated blood differ in colour. Task: Explain the role of red blood cells and haemoglobin in oxygen transport. Discuss the importance of an efficient circulatory system in maintaining homeostasis in animals.

Topic 5: Livestock Management and Rearing Practices Scenario 1: Housing Design A poultry farmer constructs a deep-litter house with poor drainage and no ventilation. After a few weeks, chickens develop respiratory infections. Task: Explain the importance of proper housing design in poultry rearing. Discuss key factors to consider when constructing livestock houses in tropical climates.

Scenario 2: Breeding and Record Keeping A dairy farmer keeps no breeding records and notices reduced milk yield and long calving intervals. Task: Discuss the importance of record keeping in livestock management and explain how selection and breeding records can improve herd performance.

Scenario 3: Feeding Management A cattle farmer provides the same quantity of feed to all animals regardless of age or purpose. Task: Explain how feeding requirements differ among calves, lactating cows, and bulls. Discuss the importance of balanced rations in animal productivity.

Topic 6: Harvesting Farm Animals and Animal Products Scenario 1: Milk Hygiene A farmer milks cows using unclean containers and does not cool milk after collection. Consumers later complain of sour milk. Task: Explain how poor handling affects milk quality and discuss hygienic practices required to maintain milk safety from cow to consumer.

Scenario 2: Meat Preservation A butcher in a rural area sells meat without refrigeration. To prevent spoilage, he smokes and salts the meat before sale. Task: Explain how smoking and salting help preserve meat. Discuss the advantages and limitations of traditional methods of meat preservation.

Scenario 3: Wool and Hide Processing In a leather tannery, workers treat animal skins with chemicals to prevent rotting. Some workers report skin irritation. Task: Explain the process of hide preservation and discuss the health and safety measures required during processing of animal products.