

**ANIMAL
SCIENCE
2023
YEAR 2 TO 4**



KAPASA MAKASA UNIVERSITY

PAST EXAMINATION PAPERS

2023

**DEPARTMENT OF AGRICULTURE AND AQUATIC
SCIENCES**

SECOND YEAR

COURSE CODES:

AA/AS 211

AS 200

AS 220

NR 230



Kapasa Makasa University

Department of Agriculture and Aquatic Sciences

SESSIONAL EXAMINATIONS 2023

COURSE CODE: AS 220

COURSE NAME: PRINCIPLES OF CROP PRODUCTION

TIME ALLOWED: THREE (3) HOURS

DATE: 17TH OCTOBER 2023

TIME: 14:00hrs

INSTRUCTIONS:

- 1. Answer the COMPULSORY question one**
- 2. Answer any four other questions from**

INSTRUCTIONS:

QUESTION 1 (ONE) IS COMPULSORY AND ANSWER ANY OTHER FOUR QUESTION

1. A farmer in Mungwi district planted cabbage following the spacing of 90cm X 25cm.
 - a) Calculate the number of cabbage plants in the area of 100m X 100m. (10 marks)
 - b) Estimate the amount of fertilizer to be applied per plant if the farmer bought 200kg bag of fertilizer. (10 marks)
2. A small scale farmer comes to you for consultation on the **cereal** crop to grow this farming season of 2022/2023. What crops can you recommend and what products can be produced from these **cereal** crops? (20 marks)
3. Give a detailed explanation the process of photosynthesis in plants. (20 marks)
4. Discuss the factors that favour production of mango fruits in Zambia compared to apples. (20 marks)
5. Describe **nitrogen cycle** in the agricultural environment. (20marks)
6. (a) Describe two hormones found in plants
(b) Mention the use of these hormones in agriculture. (20 marks)
7. Differentiate with examples between **micro** nutrients from **macro** nutrients in crop production? (20 marks)

End of the Examination



KAPASA MAKASA UNIVERSITY
DEPARTMENT OF AGRICULTURAL AND AQUATIC SCIENCES
CHINSALI, MUCHINGA PROVINCE
ANIMAL ANATOMY AND PHYSIOLOGY AS 200
DEFERRED SESSIONAL EXAMINATION

NOVEMEBR 2023

INSTRUCTIONS TO CANDIDATES

1. Time allowed is **THREE** hours
2. Remember to write your identity number on the provided answer sheets
3. Read the instructions carefully before attempting the questions
4. All questions carry equal marks (**20 Marks**)
5. Question **ONE** is compulsory
6. Attempt any **OTHER FOUR** questions

CELLPHONES & PROGRAMMABLE CALCULATORS ARE NOT ALLOWED IN THE EXAMINATION ROOM

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QUESTION ONE

1. Based on your knowledge of Anatomy and Physiology, kindly attempt any four of the following:
 - A. State the different shunting mechanisms in a developing foetus (5 marks)
 - B. Describe the liver of an Ox (5 marks)
 - C. Describe the anatomy of a rib in a ewe (5 marks)
 - D. Differentiate between regional and systematic anatomy (5 marks)
 - E. State the major organs of the endocrine system (5 marks)

QUESTION TWO

2. Quality hides are a cornerstone for the leather and tanning industry. Hides obtained from slow growing animals such as local breeds have thicker hides compared to exotic breeds yet of poor quality due to poor management by traditional farmers. Due to an expansion programme, ZNS intends to venture into this enterprise. As an Animal Scientist, explain to the Commander the different layers of the skin and convince him how ticks damage the hides. (20 marks)

QUESTION THREE

3. Demonstrate how reproductive hormones interact to confer the different stages of the Estrous cycle in a dairy cow (20 Marks)

QUESTION FOUR

4. Explain how a Tuli bull utilizes nitrogen to attain its maximum body weight during pre-breeding season at Gamamwe ranches (20 marks)

QUESTION FIVE

5. Describe the physiological anatomy of the female reproductive system? (20 marks)



QUESTION SIX

6. The Vertebral column forms the framework upon which the body is built. While it firm, it allows for body movements and supports several other functions. With this in mind, kindly

- A. Describe the basic plan of a vertebrae (10 marks)
- B. Illustrate the anatomical variations of the vertebrae in each region (10 marks)

QUESTION SEVEN

7. Describe the anatomy of the stomach of *Gallus gallus Domesticus* (20 marks)



KAPASA MAKASA UNIVERSITY
CHINSALI, MUCHINGA PROVINCE
ANIMAL ANATOMY AND PHYSIOLOGY - AS 200
END OF YEAR FINAL EXAMINATION

OCTOBER, 2023

INSTRUCTIONS TO CANDIDATES

1. Time allowed is **THREE (3) HOURS**
2. Remember to write your identity number on the provided answer sheets
3. All questions carry equal marks (**20 Marks**)
4. Question **ONE** is compulsory
5. Attempt any **FOUR** questions

CELLPHONES & PROGRAMMABLE CALCULATORS ARE NOT ALLOWED IN THE EXAMINATION ROOM

DO NOT TURN THIS PAGE UNTIL YOU ARE TOLD TO DO SO BY THE INVIGILATOR

QUESTION ONE

1. Knowledge of anatomy and physiology will always be an important integral component of your future career as an Animal Scientist. While attempting any four of the following, kindly:

- A. State different classes of the bones of a heifer (5 Marks)
- B. Describe anatomy of ribs (5 Marks)
- C. State the common digestive secretions of a steer (5 Marks)
- D. Mention the most palpable lymph nodes in an ox (5 Marks)
- E. Indicate the major palpable lymph nodes of a Billy (5 Marks)
- F. Describe the liver of an ox (5 Marks)

QUESTION TWO

2. The future growth and improved livestock population in Zambia is partially based on full exploitation of the advances in Theriogenology and its application. While other countries are exploiting this avenue, Zambia is relatively passive in its approach especially with set target to feed the region. Therefore, there is need to manipulate this aspect whose basic understanding of the reproductive system and physiology is a must. When all is said and done, my dear colleague:

- A. State the major hormones that affect reproduction (13 Marks)
- B. Mention the organs associated or affected with normal function of hormones mentioned in A (7 Marks)

QUESTION THREE

3. Describe the anatomical boundaries of all body cavities in a ram (20 Marks)

QUESTION FOUR

4. With the aid of a sketch, describe foetal circulation in detail (20 marks)

QUESTION FIVE

5. Hides (Skin) play a critical role in the Leather industry, yet most hides in Zambia are of relatively low quality especially from the traditional farmers. As an enthusiast, kindly demonstrate your knowledge of the:

A. Anatomy of the skin of a bullock (15 marks)

B. Major causes of damage to hides in cattle (5 Marks)

QUESTION SIX

6. In detail, describe the anatomy of the stomach in the ox (20 marks)

QUESTION SEVEN

7. Heat synchronization remains a bedrock for dairy production in Zambia yet it's uptake by smallholder farmers is relatively low. As a new trainee at Manager KMU Dairy and Extension services:

A. Describe in detail the estrous cycle in cows (12 Marks)

B. State the major signs of heat (6 Marks)



KAPASA MAKASA UNIVERSITY
DEPARTMENT OF GRICULTURE AND AQUATIC SCIENCES

EARLY SESSIONAL GENETICS EXAMINATION -2023

COURSE: AA /AS 211

Instructions: 1. Answer the COMPULSORY QUESTION ONE

2. Answer any other 4 questions

1. a) In one of the local tribes in Chinsali District of Zambia, the frequencies of alleles determining the ABO blood group was estimated as 0.58 for *I^D*, 0.26 for *I^A*, and 0.16 for *I^B*. Assuming random mating, what are the expected frequencies of ABO genotypes and phenotypes?
(10)
- b) Explain the basic differences between chromosomal and extra-chromosomal inheritance. (5)
- c) List and explain on three characteristics of cytoplasmic inheritance (5)
2. a) The letters A, C, T, G, are casually referred to as the alphabets of life explain this statement. (2)
- b) List and explain the basic differences between DNA and RNA molecules (5)
- c) Explain what genetic code is and state the properties of the code. (8)
- d) Explain what crossing over is and state its significance in plant breeding (5)
3. Write short notes on the following terms;
 - a) Codominance (5)
 - b) Epistasis (5)
 - c) Additive gene action (5)
 - b) Meiosis and its significance (5)
4. A) Explain what genotype -environment association (G-E Association) is and state how it can be minimized in plant breeding. (5)
- b) Explain the differences between qualitative and quantitative genetics (5)
- c) Explain briefly what heritability is and its importance in breeding. (10)
5. a) State 3 factors on which genetic advance through selection depends and briefly but concisely explain on two of the factors (5)

b) State 3 factors affecting the estimation of heritability and briefly explain on two of the factors (5)

c) Excessive secretion of male sex hormones results in premature sexual maturation in males and masculinization of the sex characters in females. This disorder is called the adrenogenital syndrome, and in Chinsali District there is an autosomal recessive form of the disease that affects about one in 5000 new-borns.

i) Assuming random mating, what is the allele frequency of the recessive? (5)

ii) What is the frequency of heterozygous carriers? (5)

6. a) A sample of 300 plants from a population is examined for the electrophoretic mobility of an enzyme that varies according to the genotype determined by two alleles, F and S , of a single gene. The results are 7 plants with genotype FF , 106 with genotype FS , and 187 with genotype SS . What are the allele frequencies of F and S ? What are the expected numbers of the three (10)

b) State three types of chromosomes and explain on any two (7)

c) State three differences between the animal and plant cells (3)

7. a) Define mutation and give two methods in which it can induced artificially (10)

b) State and explain the significance of mutation in plant breeding (5)

c) State three practical applications of genetics and briefly explain what they mean. (5)



Kapasa Makasa University

Department of Agriculture and Aquatic Sciences

SESSIONAL EXAMINATIONS 2023

COURSE CODE: NR 230/AA 230

COURSE NAME: REMOTE SENSING AND GLOBAL INFORMATION SYSTEMS (GIS)

TIME ALLOWED: THREE (3) HOURS

DATE: 12TH OCTOBER 2023

TIME: 14:00HRS

INSTRUCTIONS:

- 1. There are (SIX) questions in this paper**
- 2. Answer the COMPULSORY question 1 and any other three (3) questions**
- 3. Question 1 carries 40 marks while the rest of the questions carry 20 marks each**
- 4. Please be concise (short, clear and to the point) in your explanations**

Question One

Geographic Information Science (GIScience) and Geographic Information Systems (GIS) are related but distinct fields within the realm of geospatial technology and play a very important role in land surveying.

- (a) Outline the key difference between GIScience and GIS [2 marks]
- (b) Discuss five various ways in which land surveying contributes to sustainable management of natural resources. In your discussion, provide real-world examples, case studies and or relevant statistics to support your arguments. [10 marks]
- (c) There are functions which represent the core capabilities of GIS, providing users with the tools necessary to collect, manage, analyze, visualize, and extract meaningful information from geospatial data. Describe 5 important functions commonly provided in a GIS. [10 marks]
- (d) What is the difference between datum and map projection? List any 3 map projections that you know. [5 marks]
- (e) Briefly explain any three (3) elements of image interpretation. [3 marks]
- (f) Before collecting GIS data, it's essential to carefully plan and consider various factors necessary for a successful and accuracy of the data collection process.
 - (i). Explain any 4 critical factors to take account when planning for GIS data collection [4 marks]
 - (ii). Describe 6 important components of a GIS process [6 marks]

Question Two

Write explanatory notes on All of each of the following

- (a) Spatial resolution of an image [2 marks]
- (b) Main components of the GPS technology [3 marks]
- (c) Supervised and unsupervised classification [4 marks]
- (d) Representation of GIS data model [6 marks]
- (e) Any 2 applications of Photogrammetry [2 marks]
- (f) Accuracy assessment of a classified image [3 marks]

Question Three

"Change detection" in the context of remote sensing and GIS refers to the process of identifying and analyzing differences in the Earth's surface or environment between or two more multiple time periods.

- (a) Explain why certain wavelengths are considered "windows" in the Earth's atmosphere for remote sensing. [2 marks]
- (b) Why is change detection important? Describe the fundamental steps required to undertake change detection process [7 marks]
- (c) Give meaning to each of the following key principles of image classification as important components of change detection
 - (i). Image preprocessing [2 marks]
 - (ii). Training data [2 marks]
 - (iii). Feature extraction [2 marks]

Photogrammetry is a versatile and powerful technique that leverages the principles of geometry and image analysis to generate accurate spatial data and visual representations from photographs

- (d) Define scale of an aerial photograph [1 mark]
- (e) If the focal length of the camera lens is 100 millimeters, and the aircraft's altitude is 3,000 meters (3 kilometers), calculate
 - (i). Scale of the aerial photograph [2 marks]
 - (ii). Ground coverage of the aerial photograph [2 marks]

Question Four

GIS data collection involves gathering geospatial information about the Earth's features and attributes. There are various approaches to collecting GIS data, each suited to specific purposes and requirements.

- (a) Explain two main approaches for GIS data collection, giving relative strengths and weaknesses of each approach. [6 marks]
- (b) Describe 5 important components of a GIS. [5 marks]

GIS data conversion and GIS data reduction are two distinct processes in the field of Geographic Information Systems (GIS), each with its own purpose and outcomes.

- (c) Outline the difference between the two concepts of data conversion and data reduction.

[2 marks]

- (d) What do you understand by spatial data analysis? By means of an example, explain how spatial data analysis can be used to solve a particular problem related to your field of study.

[7 marks]

Question Five

Remote sensing and Global Positioning System (GPS) technology play significant roles in modern land surveying, enhancing the accuracy, efficiency, and scope of surveying activities.

- (a) Explain the comprehensive process of land surveying and briefly highlight at least 3 main challenges associated with Land surveying.

[8 marks]

- (b) List 4 types of land surveying and briefly explain any 2 of them.

[6 marks]

- (c) Briefly outline how remote sensing and GPS technologies are applied in land surveying.

[6 marks]

Question Six

Write explanatory notes on the following

- (a) Difference between contour interval and contour gradient.

[1 mark]

- (b) Applications and properties of contour lines.

[4 marks]

- (c) Procedure that one can adopt during the process of contouring.

[3 marks]

- (d) Factors to consider while selecting a sensor for remote sensing.

[2 marks]

- (e) The concept of control networks. In your explanation include a definition, key components of a control network and three examples of its applications.

[6 marks]

- (f) Levels of spatial data analysis with clear examples.

[4 marks]

THE END



KAPASA MAKASA UNIVERSITY

PAST EXAMINATION PAPERS

2023

**DEPARTMENT OF AGRICUTURE AND AQUATIC
SCIENCES
THIRD YEAR**

COURSE CODES:

AS 310

AS 350

AS 301

AS 341



The Copperbelt University

Kapasa Makasa University Campus

Department of Agriculture and Aquatic Sciences

SESSIONAL EXAMINATIONS 2023

COURSE CODE: AS 310

COURSE NAME: ANIMAL NUTRITION

TIME ALLOWED: THREE (3) HOURS

DATE: 16TH OCTOBER 2023

INSTRUCTIONS: 1. Answer the COMPULSORY QUESTION ONE

2. Answer any other FOUR questions to make it a total of FIVE questions attempted.

Question 1

Formulate the 100kg feed for steers; the animal required should be 15% CP and 3000 ME Kcal/Kg energy.

Show all working and present your answer in a table form showing all measured quantities to be included in feed, balances for crude protein and energy.(20 marks)

Ingredients	%CP	ME Kcal/Kg
MM	8	3300
SBM	40	2400
Alfalfa	18	1600

Question 2

a.The following information was obtained from proximate analysis procedure of a given livestock feed. Total Feed fresh sample 200g, Dry weight 170g, Nitrogen 30g, Ether extract 30g, Crude fiber 40g, and Ash content10g.

Calculate the following:

- Percentage (%) dry matter of feed
- (%) Moisture Content
- (%) Crude fiber
- (%) Crude Protein
- (%)Nitrogen free extractives (15 marks)

b. what does the value of Nitrogen Free Extractive indicate in a feed sample? (2 marks)

b. Differentiate between neutral detergent fiber (NDF) and acid detergent fiber (ADF). (3 marks)

Question 3

1. What are the major volatile fatty acids (VFAs) produced by rumen fermentation?
(5 marks)
2. a) What causes rumen acidosis? (3 marks)

b) Explain the following terms used protein degradation in the rumen (4 marks)
 - i) Bypass proteins
 - ii) Rumen degradable proteins
3. What is the difference between saturated, and unsaturated? (4 marks)
4. What is the difference between omega-3 and omega-6 fatty acids? Give an example of each. (4marks).

Question 4

- a) Formulate 1tonne of broiler grower feed for grower chickens that requires protein levels of 18%CP in diet. The ingredients to be used include, Maize meal has 8.5% CP and Soya bean cake with 38% CP, fish meal 40%CP. Fish is to be included in the diet at predetermined level of 8.5%. The allowance for premix vitamin, DCP, limestone, salt, lysine and methionine is estimated at 3.5%. Show all your calculations and present the all the quantities for each ingredient to be included in feed, and balance on protein requirement in a table. (20 marks)

Question 5

- a)The sheep consumed 2.5 kg hay and excreted 1.55 kg faecal DM. If we assume that the GE content of hay and faecal were 18.5 MJ/kg DM and 19.7 MJ/kg DM, respectively, calculate the digestible energy (DE) of hay.(5 marks)
- b)Calculate the Metabolisable energy that was available for use by the animal if on average, if ME of ruminants was estimated from DE value by multiplying by 0.81.(5 marks)
- c)The sheep also generated heat through the metabolism of the gut microorganisms: this is estimated to amount to about 6.5% of ME intake. Calculate the energy that was retained for maintenance and production.(5 marks)
- d) Outline five uses of energy retained in the body of the animal. (5 marks)

Question 6

1. Contrast the gastrointestinal tract of a pig to that of a cow in structure and function. (16 marks).
2. List two differences between fermentation in foregut and hindgut animals. (2marks).
3. Outline two reasons why study of nutrition is important in today's livestock production?(2 marks)

Question 7

- a) Give the reasons with practical examples, why the following feed additives are added in animal feed
 - i) Enzymes
 - ii) Antioxidants
 - iii) Antibiotic growth promoters (6 marks)
- b) Give the difference between probiotics and prebiotics (4 marks)
- c) What is the effect of excessive use of antibiotic growth promoters in feeds? (4 marks)
- d) Explain the following methods with examples in feed processing.(6 marks)
 - i) Wet processing methods
 - ii) Dry processing methods

ALL THE BEST



The Copperbelt University

Kapasa Makasa University Campus

Department of Agriculture and Aquatic Sciences

SESSIONAL EXAMINATIONS 2023

COURSE CODE: AS 350

COURSE NAME: POULTRY, PIG AND RABBIT PRODUCTION

TIME ALLOWED: THREE (3) HOURS

DATE: 23RD OCTOBER 2022

TIME: 14:00hrs

INSTRUCTIONS:

- 1. Answer the COMPULSORY QUESTION ONE**
- 2. Answer ANY other FOUR questions in the exam and follow the instructions given in the answer booklet such as "START A NEW QUESTION ON A FRESH PAGE"**

Section A (Compulsory)

Question 1

a) Describe the management Practices needed for successful brooding management of broiler day-old chicks up to 2 weeks. *(10 marks)*

b) A farmer in Chinsali District owns a piggery unit with 10 sows, the average gestation period is 115days, the length of lactation is 6 weeks, and the weaning- to- first service is estimated at 21 days. The common practice at the farm is that;

- The sow is taken to the farrowing pen 1 week before farrowing date
- Piglets are left in pen for 7 days after weaning
- The period for cleaning and disinfecting takes 2 weeks

Using the information provided above calculate the following: (show your work)

- i) The average farrowing interval for the sows. *(2 marks)*
- ii) Calculate the number of farrowing per sow per year. *(2 marks)*
- iii) Determine the number of farrowing pens needed for 10 sows per year. *(2 marks)*
- iv) Explain the critical factors that would determine the production efficiency of pig production on this farm. *(4 marks)*

Section B (Choose any four questions)

Question 2

- a) Briefly describe various conditions that make a rabbit susceptible to diseases. *(6 marks)*
- b) Explain the meaning of Caecotrophy in rabbits? *(6 marks)*
- c) Give 2 (two) signs of kindling? *(4 marks)*
- d) How would you identify a female rabbit? *(4 marks)*

Question 3

Briefly explain and give importance of the following practices in pig production.

- a) Boar and sow should not be housed in the same pen. *(5 marks)*
- b) Piglets should be housed in the farrowing pen from day 1 to 6 weeks. *(5 marks)*
- c) Sow should be given extra feed 1 week before servicing and 1 week before farrowing *(5 marks)*
- d) Tail docking operation is done in piglets *(5 marks)*

Question 4

a) Briefly explain the meaning and give importance of the following practices in poultry production.

- i) Candling *(4 marks)*
- ii) De-beaking is important in layers *(4 marks)*
- iii) Brooding *(4 marks)*
- b) Why is it important to set temperature at 35°C twenty-four hours before the arrival of day old chicks? *(4 marks)*
- c) Give a reason why the roof at a poultry house should be of corrugated material. *(4 marks)*

Question 5

- a) Outline the criteria used when selecting does for breeding. *(8 marks)*
- b) Briefly describe successful mating in rabbits. *(4 marks)*
- c) List four (4) advantages of rabbit meat over other meats. *(8 marks)*

Question 6

- a) Contrast the free range system and the intensive system of pig production. *(8 marks)*
- b) Outline the types of pens in pig housing. *(8 marks)*
- c) Explain the reasons for providing different housing structures for pigs. *(4 marks)*

Question 7

- a) Discuss the general principles of poultry housing under tropical conditions. *(8 marks)*
- b) What is moulting and why is it important in layers? *(4 marks)*
- c) Explain the four necessary requirements for incubation of eggs. *(8 marks)*



THE COPPERBELT UNIVERSITY
KAPASA MAKASA UNIVERSITY CAMPUS
DEPARTMENT OF AGRICULTURE & AQUATIC SCIENCES

3RD YEAR ANIMAL SCIENCE END OF 2022/2023 EXAMINATION – DEFERRED/SUPPLEMENTARY
ANIMAL BREEDING (AS 301)

EXAMINER: MUPEYO B.

DATE: 1ST FEBRUARY 2024

MARKS: 100

TIME:

DURATION: 3 HOURS

INSTRUCTION:

MARKS: 100

1. There are Five (5) Questions in this paper, **Attempt five ALL**
2. Show calculations clearly

-
- Q1.** By using the rule of independent assortment, discuss how genes for milk production, polledness x horniness and color are related. Use M for milk producing genes, P for polledness or lack of it and R for colour.
- Q2.** Gregory Mendel, who is the father of genetics from which all our breeding efforts are based, came up with two rules as regard to how characters are inherited and passed on from one individual to the other. By giving clear examples, explain these rules indicating also what happens from Parents to F₂ generations.
- Q3.** As a breeder you are approached by a small-scale farmer rearing cross breed beef cattle, wanting to improve his herd and come up with a pure breed. How can you help this farmer?

- Q4. a. What is selection in animal breeding and why is it important to a farmer?
a. Discuss the selection methods used in animal breeding.
- Q5. Explain the importance of a combination of crisscross and terminal cross in beef management.

END OF EXAM



**THE COPPERBELT UNIVERSITY
KAPASA MAKASA UNIVERSITY CAMPUS
DEPARTMENT OF AGRICULTURE & AQUATIC SCIENCES
3RD YEAR ANIMAL SCIENCE FINAL EXAMINATION.
FORAGES & PASTURES (AS 341)**

DATE: 13TH JULY 2023.

TIME ALLOWED: 3 HOURS

INSTRUCTIONS:

- A. Answer Five (5) and question 1 is compulsory
 - B. Show calculations clearly
-

1. Ms Machila, a farmer in Muchila, intends to go into intensive dairy production. She acquires some land of about 1000 ha, suitable for dairy production. The piece of land he acquires has predominantly Rhodes grass in it which regenerates every 28 days. You have determined that rotational plan for this grass is 7 days.
 - (a) Determine for her the size of each paddock given that he has bought 500 Dairy cows and the stocking rate for Rhodes grass is 3 cows/ha. [10]
 - (b) Define stocking rate and carrying capacity, indicating importance of each. [5]
 - (c) Given that the pastures on this farm have a carrying capacity of 2.0 ha/1 LSU and each adult animal is 1.5 LSU, comment on the stocking rate at this farm. [5]
2.
 - a) What is silage? [3]
 - b) Embark on silage making including all the processes involved for a good feed. [12]
 - c) Explain scientifically how silage is preserved. [5]
3. Give a detailed account of establishing Rhodes grass in terms its scientific name, land preparations, sowing and sowing rates, management up to harvest, its utilization and its yield. [20]

4. When assessing the plant distribution in a rangeland, you need to understand the composition of that rangeland.
 - a) Why do you need to take stock of species in that rangeland? [5]
 - b) State and explain the six (6) attributes commonly used in rangeland measurements. [15]

5. a) What do you understand by the term 'regeneration of a degradable rangeland'? [3]
 - b) Mention the benefits of a good rangeland management. [7]
 - c) Explain the four (4) to consider when regenerating a rangeland. [4]
 - d) State the approaches involved in regenerating a rangeland. [6]

6. a) Discuss fire as a form of bush control mechanism. [8]
 - b) What systems of grazing would you advise the following farmers to undertake? Give reasons for the choice of the system(s): [12]
 - i) A farmer living in a community
 - ii) A farmer who owns vast land under title
 - iii) A farmer with limited land space

7. a) Mr. Mudaïdo, a fresher at your university would like to know more about pastures and why they are important. Explain to him among others the benefits of pastures. [13]
 - b) Furthermore, Mr. Mudaïdo has heard of grazing systems. Educate him on what grazing systems are. [7]



**KAPASA MAKASA UNIVERSITY
PAST EXAMINATION PAPERS
2023**

**DEPARTMENT OF AGRICULTURE AND AQUATIC SCIENCES
FOURTH YEAR ANIMAL SCIENCE**

COURSE CODE:

AS 461

AS 430

AS 411

AS 421

AS 401



THE COPPERBELT UNIVERSITY
KAPASA MAKASA UNIVERSITY
CHINSALI, MUCHINGA PROVINCE
ANIMAL HEALTH AND DISEASE PREVENTION – AS 401
FINAL EARLY SESSIONAL EXAMINATIONS

12TH JULY 2023

Candidate's

ID:.....

INSTRUCTIONS TO CANDIDATE

1. Time allowed is **THREE** hours,
2. Write your Examination Number in the spaces provide,
3. Read the questions very carefully before attempting to answer,
4. Attempt any **FIVE** questions
5. Question one is **COMPULSORY**

CELLPHONES & PROGRAMMABLE CALCULATORS ARE NOT ALLOWED IN THE EXAMINATION ROOM

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QUESTION ONE

1. Discuss the various strategies the Ministry of Livestock and Fisheries Development can employ to combat livestock diseases in Zambia (20 Marks)

QUESTION TWO

2. If you have been consistent with current development stories pertaining to livestock development in the country. You must be familiar with Government efforts to eradicate a particular DNEI in Western province through test and slaughter. However, due to limited publicity and stakeholders' concerns, the process is grinding slowly. The diseases manifests with high fever (40°C), shade seeking and the animal is disinclined to move. Based on the above, kindly state:
 - A. Your tentative (suspected) diagnosis? (2 Marks)
 - B. The other ante-mortem signs are you likely to observe? (6 Marks)
 - C. The expected PM picture (6 Marks)
 - D. The other control measures (2 Marks)
 - E. What is the economic importance of the disease? (4 Marks)

QUESTION THREE

3. Considering the unlimited opportunities ahead of you either as a Livestock Production Director in government, a potential farmer or serious entrepreneur in any other undertaking. Some knowledge must always remain despite the what the future holds for you. Clearly (attempt any four):
 - A. State how would prevent the zoonotic transmission of parasitic infections (5 Marks)
 - B. Mention some diseases/conditions likely to cause sudden death in cattle (5 Marks)
 - C. Describe the AM signs associated with Blackquarter in an ox (5 Marks)
 - D. Describe the PM signs associated with Tetanus (5 Marks)
 - E. Indicate which diseases abattoir workers must be protected against (5 Marks)

QUESTION FOUR

4. During your routine extension services as Private practitioner in *Chisekese* area, your notice a steer with emaciation has tendency to seek shade all the time with some traces of tearing. As a routine part of clinical examination, you engage the farmer into a formal conversation who laments about the cost of acaricides (dipping chemicals). With that in mind:

- A. What is your tentative diagnosis? (2 Mark)
- B. State the risk factors for the continued transmission of the disease A. (3 Mark)
- C. Detail other AM signs in A. (4 Marks)
- D. Detail the expected PM picture (4 Marks)
- E. State how you will manage the case (5 Marks)
- F. Advice the farmers on the control of the disease (2 Marks)

QUESTION FIVE

5. Develop a complete a routine health and vaccination programme for a dairy herd at Farm in *Shiwangandu* district (20 marks)

QUESTION SIX

6. You have been called to a poultry farm in Mpika owned by a cooperative that has benefitted from the CDF fund. They recently ventured into broiler production and procured some birds. Upon arrival the feces of infected birds are greenish and watery with comb becoming bluish (cyanotic) in colour. Based on your experience, kindly state:

- A. Your suspected diagnosis? (2 marks)
- B. Other signs you are likely to observe (5 marks)
- C. Post-mortem signs you are likely to observe (3 marks)

- D. How will you manage the situation in A? (5 marks)
- E. How will you prevent this disease in part A? (5 marks)

QUESTION SEVEN

7. Population structure has an effect on the continued spread of diseases. Therefore;
- A. Differentiate between an open and closed population. Clearly demonstrate the implications each has on the spread of diseases (10 Marks)
- B. Develop a vaccination programme for broiler birds for Golonita farms (10 Marks)

QUESTION 8

8. You visit a dairy farm in Kitwe district with 200 milking cows. The farmer recently culled five cows due to poor milk production related problems. This matter interest you and you therefore demand to randomly examine some animals in his sick pen and observe the milking practices of his workers. Upon physical examination, you notice fibrosis and abscess on the udder. Based on the above: Kindly state:

- A. Your suspected diagnosis? (2 marks)
- B. Other signs you are likely to observe (5 marks)
- C. Post-mortem signs you are likely to observe (3 marks)
- D. How will you manage this case? (5 marks)
- E. What your advice to the farmer to prevent any future occurrence? (5 marks)



The Copperbelt University

Kapasa Makasa University Campus

Department of Agriculture and Aquatic Sciences

SESSIONAL EXAMINATIONS 2023

COURSE CODE: AS 421

COURSE NAME: APPLIED ANIMAL REPRODUCTION

TIME ALLOWED: THREE (3) HOURS

DATE: 19TH OCTOBER 2023

TIME: 14:00hrs

INSTRUCTIONS:

- 1. Answer the COMPULSORY QUESTION ONE**
- 2. Answer ANY other FOUR questions in the exam and follow the instructions given in the answer booklet such as "START A NEW QUESTION ON A FRESH PAGE"**

Question One (COMPULSORY QUESTION)

A beef farmer has two 15 year old breeding cows with the following Identification numbers (BC JQ11 and BC JQ12, respectively) which have been giving him a calf every year for the last 12 years. Given the exemplary traits that have been passed on from generation to generation over the years, the farmer would like the traits of the two aging cows to be escalated in his breeding herd which has 100 readily available cows, as well as in community nearby starting in January 2024. Two of the neighbouring farms have another set of readily available breeding cows numbering, 21 and 33 belonging to farmer X and Y, respectively.

Given that the farmer wants to use cow number BC JQ11 to spread its traits within his farm and cow number BC JQ12 to help spread her traits among the cows in the neighbouring herds; work out a breeding programme that will increase the herd size on his farm if embryo collections are conducted every three months which yield ten embryos per cow.

- a) What will be the projected herd size at his farm and the neighboring farms by the end of the year 2025 if the calving rate is one per cow per year? *(18 marks)*
- b) What can be possibly be done to the excess embryos at the end of the year 2025? *(2 marks)*

Hint: Clearly labeled diagrams will be ideal in answering this question.

Question Two

- a) Give a detailed explanation of the causes of reproductive failure among cows in a dairy herd. *(10 marks)*
- b) Discuss the possible herd management activities that can involve temporary and permanent removal from a breeding herd of breeding cows on a beef ranch. *(10 marks)*

Question Three

- a) Explain the following terms as they relate to animal production:
 - i) Luteal phase of oestrous *(5 marks)*
 - ii) Polytochous animals *(5 marks)*
- b) Explain how the male reproductive system can be manipulated to control inbreeding on the farm (for example, in cattle). *(10 marks)*



The Copperbelt University

Kapasa Makasa University Campus

Department of Agriculture and Aquatic Sciences

SESSIONAL EXAMINATIONS 2023

COURSE CODE: AS 411

COURSE NAME: MANAGEMENT OF ANIMAL PRODUCTS AND BY -PRODUCTS

TIME ALLOWED: THREE (3) HOURS

DATE: 26TH OCTOBER 2023

INSTRUCTIONS:

- 1. Answer the COMPULSORY QUESTION ONE**
- 2. Answer ANY other FOUR questions in the exam and follow the instructions given in the answer booklet such as "START A NEW QUESTION ON A FRESH PAGE"**



Question One

The Ministry of Fisheries and Livestock in Zambia has expressed concern about the extremely low contribution of the traditional livestock sector towards the production of hides and skins. As Chief Livestock Officer in charge Animal Products and By-products, write a position paper to be presented to a high level Ministerial Committee that has been established to address the situation. What will be the contents of your paper? *(20 marks)*

Question Two

There has been negative feedback from consumers that meat being supplied by the local farmers has a rather "tough and hard feel" about it. You have been contracted by the local Livestock Producers Association to investigate the disturbing scenario. Outline the possible findings of your inquiry. *(20 marks)*

Question Three

a) Photo-period is a major consideration on a farm that specializes in egg production. Discuss.

(10 marks)

b) Describe the factors that affect egg shell quality.

(10 marks)

Question Four

a) Consumers dictate what type of dairy products a farmer or processor will present on the market. Discuss. *(10 marks)*

b) You have been given an assignment by your supervisor to present a paper on "Factors affecting milk composition". What will be the contents of your presentation? *(10 marks)*



Question Five

- a) Explain the meaning of the following statement: "Meat is said to be of high biological value".
(5 marks)
- b) Give a detailed description of methods by which meat can be preserved.
(15 marks)

Question Six

- a) It is always said that animals must be treated in a humane manner prior to slaughter. Discuss the importance of this statement.
(10 marks)
- b) Write concise notes on the aspect of undesirable flavours in meat.
(10 marks)

Question Seven

Explain how the incidence of marbling in meat is perceived differently by consumers, human nutritionists, animal nutritionists and livestock producers.
(20 marks)

END OF THE EXAMINATION – ALL THE BEST



THE COPPERBELT UNIVERSITY
KAPASA MAKASA UNIVERSITY CAMPUS
DEPARTMENT OF AGRICULTURE & AQUATIC SCIENCES
4TH YEAR ANIMAL SCIENCE END OF 2022/2023 EXAMINATION.
BEEF, DAIRY & SMALL RUMINANT PRODUCTION (AS 430)

EXAMINER: MUPEYO B.

TIME: 09:00 – 12:00

DATE: 25TH OCTOBER 2023

MARKS: 100

DURATION: 3 HOURS

INSTRUCTIONS TO CANDIDATES

1. Answer all questions in Section A and ANY three (3) in Section B.

Section A (40 Marks) – Answer All Questions.

1. Which is the sure sign of a heifer being on heat and receptive? [2]
2. When is a heifer on heat supposed to be serviced by the bull? [1]
3. What is the recommended insemination time for a cow on heat? [2]
4. Differentiate between 'Steaming up' and 'Challenge feeding' [4]
5. State the signs of heat in a dairy heifer [5]
6. In feeding dairy animals, what is the minimum requirement of roughage in the diet? [1]
7. How much dry matter intake (DMI) is allowed for a dairy animal? [1]
8. Calculate the DMI of a dairy cow weighing 630kg live-weight. [3]
9. If the milk production from the dairy cow above is 40kg/day, how much concentrates (in DM) are you supposed to feed it if from pastures 8kg milk is produced? [2]
10. What are the three (3) beef production systems used in Zambia [3]
11. What is the source of energy in ruminant animals and how is it obtained? [3]
12. Mention the exotic dairy animals you know. [5]
13. Mention the wild cattle from which today's cattle originated and mention the major cattle types to emerge from this wild cattle. [3]

14. What are the five (5) breeds of goats found in Zambia? [5]
15. Mention any two (2) beef breeds you know. [2]

Section B (60 Marks) – Answer Three (3) Questions in this section. Each Question Carries 20 Marks.

16. Zambian veldt grows very fast and matures early; and tends to have high nutritive value during the rainy season and low nutritive value in the dry season leading to a peculiar growth pattern annually observed in beef cattle. Discuss this growth pattern that is annually observed in beef cattle and how this can be taken advantage of by the commercial feedlot farmers.
17. Small ruminant animals have played a central role in recent years in the livelihood of rural farmers providing them with income. With reference to goat production, discuss briefly under the following headings how you can successfully manage them to give you high yields:
- i. Breeding management in terms of boar goat and does mating season
 - ii. Feeding management
 - iii. Control of any five (5) common diseases
18. The choice of the breeding season in beef cattle determines the profitability of the enterprise.
- i. Mention two methods used in the breeding of beef by natural service.
 - ii. Discuss the use of the restricted breeding season in beef cattle.
20. A calf today is tomorrow's cow. With this in mind, explain how you would properly manage a heifer calf from calving to weaning.
21. (a) Milk is harvested from the udder of the animal after it has been manufactured by the secretory cells. There are basically two processes involved from time milk components are pinched off in the alveoli until end of lactation. Discuss these processes fully.
- (b) Milk is composed of various components in varying proportions. Give these components and the corresponding proportions.

END OF EXAMINATION



The Copperbelt University

Kapasa Makasa University Campus

Department of Agriculture and Aquatic Sciences

SESSIONAL EXAMINATIONS 2023

COURSE CODE: AS 461

COURSE NAME: PRINCIPLES OF GAME RANCHING AND APICULTURE

TIME ALLOWED: THREE (3) HOURS

DATE: 23RD OCTOBER 2023

TIME: 09:00hrs

INSTRUCTIONS: 1. Answer the COMPULSORY QUESTION ONE

- 2. Question 1 a should be answered in the same booklet as any TWO questions from Section B**
- 3. Question 1 b should be answered in the same booklet as any TWO questions from Section C**
- 4. Submit separate answer booklets for section B and C**

SECTION A (COMPULSORY)

Answer Question 1a in the same booklet as Section B

Answer Question 1b in the same booklet as Section C

Question One

- a) Clearly explain the approaches to a successful game ranching industry. **[10 marks]**
- b) Contract farming has been used to upscale commodity production of some selected agricultural crops such as cotton and tobacco. Discuss the critical role that contract bee farming can be used to stimulate the growth of the apiculture sector in Zambia. **[10 marks]**

Section B

Question Two

- a) Critically evaluate the following animal communication types:
- i) Olfactory **[5 marks]**
 - ii) Tactile **[5 marks]**
- b) Describe the relevance of Promotion and Place in marketing a new game ranching enterprise. **[10 marks]**

Question Three

Design a stocking programme at 30% of the ideal carrying capacity for Kwaku Game Safari and Lodge located in Mwinilunga district with a total of 7,500ha of land available to small and medium sized ungulates occurring in North Western Zambia. Clearly provide reasons for each ungulate that you recommend to be stocked on the ranch. Further, determine the ideal carrying capacity for Kwaku Game Safari and Lodge. **[20 marks]**

Question Four

Design a stocking program at 30% of the ideal carrying capacity for Mbao Game Ranch located in Kasama district with a total of 15,000ha of land available to small, medium and large sized ungulates occurring in Northern Zambia. Clearly provide reasons for each feeding class that you recommend to be stocked on the ranch. Further, determine the ideal carrying capacity for Mbao Game Ranch. **[20 marks]**

Supplementary information for question 3 and 4

Table 1: Feeding classes and LSU equivalents of game. Adapted from Zieger U. and Cauldwell A. (1998) – Wildlife Ecology and Management: Practical Aspects for Zambian Game Ranches

SN	BULK GRAZER	LSU
1	Buffalo	1.0
2	Burchell's Zebra	0.75
3	Defassa Waterbuck	0.51
	MIXED FEEDER	
1	Elephant (50% graze, 50% browse)	4.5 – 9.0
2	Eland (30% graze, 70% browse)	0.97
3	Impala(50% graze, 50% browse)	0.17
	SELECTIVE GRAZER	
1	Hippopotamus	2.75
2	Roan Antelope	0.65
3	Sable Antelope	0.57
4	Blue Wildebeest	0.51
5	Lichtenstein Hartebeest	0.48
6	Tsessebe	0.39
7	Sitatunga	0.31
8	Lechwe	0.28
9	Puku	0.23
10	Bushpig (Omnivore)	0.23
11	Warthog (Omnivore)	0.22
12	Reedbuck	0.16
13	Oribi	0.08

Table 1 continued

SN	BROWSER	LSU
1	Black rhino	1.65
2	Giraffe	1.56
3	Greater Kudu	0.46
4	Bushbuck	0.14
5	Common Duicker	0.10
6	Klipspringer	0.10
7	Sharpe's grysbok	0.05
8	Blue duiker	0.03

Table 2: Stocking Potential of Vegetation Types, Adapted from Grossman (1991)

No.	Woodland type of Vegetation	No. of Large Animal Units/100ha
1	Mopane Woodland	4 - 5
2	Terminalia Woodland	6 - 8
3	Combretum Woodland	8
4	Mixed Woodland (Broad leafed)	9
5	Mixed thorn Woodland	10 - 12
6	Acacia Woodland	12

SECTION C: Choose Two Questions from this Section

Question Five

a) Discuss the ecological benefits of using improved bee hive such as the top bar hive.

[6 marks]

b) Routine inspection of bee hives is an important exercise that farmers owning an apiary should carry out. Explain all the general rules for hive inspection that the farmer should follow.

[9 marks]

c) Explain what happens when there is absence of the Queen as a result of death in the colony.

[5 marks]

Question Six

Zambia is one of the largest producers of organic honey and other related products in Africa though the quantity exported continues to be small. Discuss in full why the export of honey and related products is stagnantly small?

[20 marks]

Question Seven

The policy on agriculture in Zambia for a long time has mainly favored the production of cereals such as maize.

a) Give reason reasons why there should be a policy shift where Apiculture should be one of the enterprises to be included in the diversification plan of the agriculture sector in Zambia?

[10 marks]

b) If you were employed in the Ministry of Agriculture as a Specialist responsible for establishment of agricultural farming blocks where apiculture will be one of the major enterprises, what factors would you consider when setting up such farming blocks across the country?

[10 marks]

**ANIMAL
SCIENCE
2024
YEAR 2 TO 4**



KAPASA MAKASA UNIVERSITY
FACULTY OF APPLIED SCIENCE AND OPEN LEARNING
DEPARTMENT OF AGRICULTURE AND AQUATIC SCIENCES
CHINSALI, MUCHINGA PROVINCE
GENETICS – AS 211
END OF YEAR FINAL SESSIONAL EXAMINATION

29TH OCTOBER 2024

INSTRUCTIONS TO CANDIDATES

1. Time allowed is **THREE (3) HOURS**
2. Remember to write your student identity number (SIN) on the provided answer sheets
3. All questions carry equal marks (**20 Marks**)
4. Question one is **COMPULSORY**
5. Attempt a total of **FIVE** questions

CELLPHONES AND OTHER RELATED GAGETS ARE NOT ALLOWED IN THE EXAMINATION ROOM

DO NOT TURN THIS PAGE UNTIL YOU HAVE BEEN TOLD TO DO SO BY THE CHIEF INVIGILATOR

QUESTION ONE

1. The following variances were calculated for two traits in a herd of hogs.

Trait	VP	VG	VA
Back fat	30.6	12.2	8.44
Body length	52.4	26.4	11.70

- A. Calculate broad-sense (H^2) and narrow-sense (h^2) heritability for each trait in this herd. (8 marks)
- B. Which of the two traits will respond best to selection by a breeder? State why? (2 Marks)
- C. The exchange of precisely homologous segments between non-sister chromatids of homologous chromosomes are vital for breeding. State three factors that affects this process and briefly explain on any of the two factors. (5 marks)
- D. Define gene action and briefly explain the gene action based on pleiotropy (5 marks)

QUESTION TWO

2. Write short notes on the following;

- A. Hardy-Weinberg equilibrium and the factors necessary for the maintenance of equilibrium in any given population (5 marks)
- B. Artificial selection (5 marks)
- C. Significance of mitosis (5 marks)
- D. Gene action based on incomplete dominance (5 marks)

QUESTION THREE

- 3.

- A. State three reasons that led to Mendel's success in his work and briefly explain any of the two. (5 marks)
- B. Explain the meaning of the statement, "The phenotype of an organism does not always reflect its genotype." (5 marks)
- C. Explain briefly how you can determine whether an organism with a dominant phenotype is homozygous dominant or heterozygous dominant (6 marks)
- D. Explain the practical importance of the Mendel's law of dominance (4 marks)

QUESTION FOUR

4.

- A. Briefly but concisely explain what Cytoplasmic Male Sterility in maize is and its practical importance in breeding. (5 marks)
- B. State three common assumptions of quantitative genetic analysis that a researcher makes as he/she plans to undertake a breeding program (5 marks)
- C. In Caucasians, the *M*-shaped hairline that recedes with age (sometimes to nearly complete baldness) is due to an allele that is dominant in males but recessive in females. The frequency of the baldness allele is approximately 0.3. Assuming random mating, what frequencies of the bald and non-bald phenotypes are expected in males and females? (5 marks)
- D. State three types of chromosomes and explain any two. (5 marks)

QUESTION FIVE

5.

- A. Explain the basic differences between mitotic and meiotic cell division (5 marks)
- B. State three ways in which linkage can be classified and explain briefly but concisely the classification based on crossing over (5 marks)
- C. State five differences between prokaryotic and eukaryotic cells (5 marks)
- D. State five characteristics of mutation (5 marks)

QUESTION SIX

6.

- A. Mendel summarized his conclusions about heredity by describing the gametes produced by the F1 generation in the following manner: "Pea hybrids form germinal and pollen cells that in their composition correspond in equal numbers to all the constant forms resulting from the combination of traits united through fertilization." Explain this statement in terms of the principles of segregation and independent assortment. (10 marks)
- B. A genetically heterogeneous population of wheat has a variance in the number of days to maturation of 46 whereas two inbred populations derived from it have a variance in the number of days to maturation of 8.

- I. What is the genotypic variance, (V_G), the environmental variance, (V_E), and the broad-sense heritability, (H^2), of days to maturation in this population? **(6 marks)**
- II. If the inbred lines were crossed, what would be the predicted variance in days to maturation of the F1 generation? **(4 marks)**

QUESTION SEVEN

7. The breeder informs you that there are not sufficient genetic variations in the germplasm available to work with to advance desirable traits in an elite line. Explain briefly but concisely how you can help the breeder working with the same germplasm but achieve the objective of introgression of desirable traits in the elite line. **(20 marks)**

END OF THE EXAMINATION. ALL THE BEST.



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FACULTY OF APPLIED SCIENCE AND OPEN LEARNING
DEPARTMENT OF AGRICULTURE AND AQUATIC SCIENCES
CHINSALI, MUCHINGA PROVINCE
PRINCIPLES OF CROP SCIENCE - AS 220
END OF YEAR FINAL SESSIONAL EXAMINATION

15TH OCTOBER 2024

INSTRUCTIONS TO CANDIDATES

1. Time allowed is **THREE (3) HOURS**
2. Remember to write your student identity number (SIN) on the provided answer sheets
3. All questions carry equal marks **(20 Marks)**
4. Question one is **COMPULSORY**
5. Attempt a total of **FIVE** questions

CELLPHONES AND OTHER RELATED GAGETS ARE NOT ALLOWED IN THE EXAMINATION ROOM

DO NOT TURN THIS PAGE UNTIL YOU HAVE BEEN TOLD TO DO SO BY THE CHIEF INVIGILATOR

QUESTION ONE

1. A farmer in Chinsali district planted maize following the spacing of 75cm X 30cm.
 - A. Calculate the number of maize plants in the area of 50m X 50m. (10 marks)
 - B. Estimate the amount of fertilizer to be applied per plant if the farmer bought 4 X 50kg bags of fertilizer. (10 marks)

QUESTION TWO

2. A small-scale farmer comes to you for consultation on the legume crop to grow this farming season of 2023/2024.
 - A. What crops can you recommend? (6 marks)
 - B. What products can be produced from these legume crops? (5 marks)
 - C. What benefits do these legume crops give to the soil? (5 marks)
 - D. With examples mention some legume crops that can benefit the soil. (4 Marks)

QUESTION THREE

3.
 - A. Explain the process of respiration in plants. (15 marks)
 - B. List factors that affect the rate of respiration (5 Marks)

QUESTION FOUR

4. Discuss the factors that favour distribution of crops across the globe that result in crops located in one place but fails to grow in another place. (20 marks)

QUESTION FIVE

5.
 - A. Define the enzymes in plants. (10 marks)
 - B. What factors affect the work of enzymes (10 marks)

QUESTION FIVE

6.
 - A. Mention environmental stresses that affect plants. (12 Marks)
 - B. How do plants adapt to environmental tresses? (8 Marks)

QUESTION SEVEN

7.

- A.** What are weeds in agriculture production? **(6 marks)**
- B.** How are weeds classified? **(8 marks)**
- C.** Give reasons for controlling weeds in the field where crops grow. **(6 marks)**

END OF EXAMINATION, BEST WISHES.



KAPASA MAKASA UNIVERSITY
CHINSALI, MUCHINGA PROVINCE
ANIMAL ANATOMY AND PHYSIOLOGY – AS 200
END OF YEAR FINAL SESSIONAL EXAMINATION

OCTOBER 2024

INSTRUCTIONS TO CANDIDATES

1. Time allowed is **THREE (3) HOURS**
2. Remember to write your identity number on the provided answer sheets
3. All questions carry equal marks (**20 Marks**)
4. Question one is **COMPULSORY**
5. Attempt a total of **FIVE** questions

**CELLPHONES & PROGRAMMABLE CALCULATORS ARE NOT ALLOWED IN THE EXAMINATION
ROOM**

DO NOT TURN THIS PAGE UNTIL YOU ARE TOLD TO DO SO BY THE INVIGILATOR

QUESTION ONE

1. Knowledge of anatomy and physiology will always be an important integral component of your future career as an Animal Scientist. While attempting **ANY FOUR** of the following, kindly:

- A. State the different classes of the bones of a heifer (5 Marks)
- B. Mention the organs that comprise the endocrine system (5 Marks)
- C. Describe a broiler's stomach (5 Marks)
- D. State the most palpable lymph nodes in an ox (5 Marks)
- E. Demonstrate the major signs of estrus in a heifer (5 Marks)
- F. Describe the anatomy of the ox trachea and lungs (5 Marks)

QUESTION TWO

2. The future growth and improved livestock population in Zambia is partially based on full exploitation of the advances in Theriogenology and its application. While other countries are exploiting this avenue, Zambia is relatively passive in its approach especially with set target to feed the region. Therefore, there is need to manipulate this aspect whose basic understanding of the reproductive system and physiology is a must. When all is said and done, my dear colleague, state the major hormones that affect reproduction (20 Marks)

QUESTION THREE

3. With the aid of a sketch, describe foetal circulation in detail (20 marks)

QUESTION FOUR

4. In detail, describe the anatomy of the stomach in the ox (20 marks)

QUESTION FIVE

5. With the aid of a sketch, describe the anatomy of the skin (20 marks)

QUESTION SIX

6. Compare and contrast the carcass characteristics of a heifer and bullock (20 marks)

QUESTION SEVEN

7. Successful calving is vital to ensure profitability of the beef herd. Given your vast knowledge of

Animal physiology, precisely and concisely attempt and state:

- A. The process of maternal recognition of pregnancy in a cow (10 marks)
- B. The hormones involved in the maintenance of pregnancy (5 marks)
- C. The methods of pregnancy diagnosis in cattle (5 marks)



KAPASA MAKASA UNIVERSITY
FACULTY OF APPLIED SCIENCE AND OPEN LEARNING
DEPARTMENT OF AGRICULTURE AND AQUATIC SCIENCES
CHINSALI, MUCHINGA PROVINCE
POULTRY, PIG AND RABBIT PRODUCTION - AS 350
END OF YEAR FINAL SESSIONAL EXAMINATION

5TH NOVEMBER 2024

INSTRUCTIONS TO CANDIDATES

1. Time allowed is **THREE (3) HOURS**
2. Remember to write your student identity number (SIN) on the provided answer sheets
3. All questions carry equal marks (**20 Marks**)
4. Question one is **COMPULSORY**
5. Attempt a total of **FIVE** questions

CELLPHONES AND OTHER RELATED GAGETS ARE NOT ALLOWED IN THE EXAMINATION ROOM

DO NOT TURN THIS PAGE UNTIL YOU HAVE BEEN TOLD TO DO SO BY THE CHIEF INVIGILATOR

QUESTION ONE

1. A farmer in Mutakupikwa village owns a piggery unit with 6 Sows; he wishes to construct a piggery unit so that he can improve the production levels. As a graduate in animal science you are requested to give advice on the number of pens he can construct. Assume the common practices that successful farmers do such as:

- The sow is taken to the farrowing pen 1 week before farrowing date
- Piglets are left in pen for 7 days after weaning
- The period for cleaning and disinfecting takes 2 weeks
- The length of lactation is 6 weeks, and
- Weaning- to- first service is estimated at 21 days.
- Following average gestation period 115days

Using the information provided above calculate the following: (show your work)

- A. The average farrowing interval for the sows. (4 marks)
- B. Calculate the number of farrowing per sow per year. (4 marks)
- C. Determine the number of farrowing pens needed for 6 sows per year. (4 marks)
- D. Explain the critical factors that would determine the production efficiency of pig production on this farm. (8 marks)

QUESTION TWO

2.

- A. Describe the management Practices needed for successful brooding management of broiler day-old chicks up to 2 weeks. (12 marks)
- B. Comment on the feeding requirements for the following classes of poultry
- i. Layers (4 marks)
 - ii. Pullets (4 marks)

QUESTION THREE

3.

- A. Briefly describe various conditions that make a rabbit susceptible to diseases.

(6 marks)

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- well letter
Barry - feeder
over number
- B. Explain the meaning and importance of Caecotrophy in rabbits? (6 marks)
 - C. List the signs of kindling? (4 marks)
 - D. Outline the stages would you follow sexing rabbits? (4 marks)

QUESTION FOUR

4. Briefly write short notes on the following practices in pig production.
 - A. Young Boar should not be over used in first 6 months of breeding (4 marks)
 - B. Feeding of colostrum (5 marks)
 - C. Steaming up and flushing in sows. (6 marks)
 - D. Teeth clipping operations in piglets. (5 marks)

QUESTION FIVE

5. Briefly explain the meaning and when the following practices are performed in poultry production.
 - A. Candling (5 marks)
 - B. De-beaking in layers (5 marks)
 - C. Brooding (5 marks)
 - D. Culling (5 marks)

QUESTION SIX

6.
 - A. What do you understand by integrated system in pig production. (8 marks)
 - B. Outline the types of pens in pig housing (4 marks)
 - C. Explain the reasons for providing different housing structures for pigs. (4 marks)
 - D. Outline the predisposing factors to piglet mortality (4 marks)

QUESTION SEVEN

7.
 - A. Discuss the general principles of poultry housing in tropical conditions under the following headings:
 - i. Orientation of building (4 marks)
 - ii. Height of building (4 marks)

B. What is induced molting and why is molting important in layers? (4 marks)

C. Explain the optimum requirements and the importance of the following during incubation of eggs.

i. Temperature (4 marks)

ii. Humidity (4 marks)

END OF THE EXAMINATION, BEST WISHES.



KAPASA MAKASA UNIVERSITY

CHINSALI, MUCHINGA PROVINCE

BACHELOR OF SCIENCE IN FISHERIES AND AQUACULTURE

INTRODUCTION TO AQUACULTURE – AS 331

END OF YEAR FINAL SESSIONAL EXAMINATION

31ST OCTOBER 2024 (09:00 HRS)

INSTRUCTIONS TO CANDIDATES

1. Time allowed is **THREE (3) HOURS**
2. Remember to write your student identity number (SIN) on the provided answer sheets
3. All questions carry equal marks (**20 Marks**)
4. Question one is **COMPULSORY**
5. Attempt a total of **FIVE** questions. One compulsory question and **FOUR** other questions.
6. Do **NOT** write in pencil (except for graphs and diagrams).
7. The marks shown against the requirement(s) for each question should be taken as an indication of the expected length and depth of the answer.
8. All workings must be done in the answer booklet.
9. Present legible and tidy work.

CELLPHONES AND OTHER RELATED GAGETS ARE NOT ALLOWED IN THE EXAMINATION ROOM

DO NOT TURN THIS PAGE UNTIL YOU HAVE BEEN TOLD TO DO SO BY THE CHIEF INVIGILATOR

QUESTION ONE

1. Pond fertilization plays a vital role in extensive and semi-intensive aquaculture systems by supplying essential live food sources, such as phytoplankton and zooplankton. The use of fertilizers, both inorganic and organic, has distinct advantages and disadvantages that must be considered to optimize pond productivity. Discuss the advantages and disadvantages of using inorganic and organic fertilizers in pond fertilization. (20 marks)

QUESTION TWO

2.
 - A. List four (4) commonly used aquaculture facilities in intensive aquaculture? (4 marks)
 - B. Provide a detailed description of the process you would use to select a site for an aquaculture facility of your choice. (16 marks)

QUESTION THREE

3. A comprehensive understanding of optimal conditions is essential for fish farmers to achieve high production levels and ensure economic viability. Discuss any five water quality parameters that are critical in aquaculture. (20 marks)

QUESTION FOUR

4.
 - A. In your own words, define the following terms used in aquaculture:
 - i. Conditioning of fingerlings (4 marks)
 - ii. Acclimatization of fingerlings in a production pond (4 marks)
 - B. Explain the external features that would help you to differentiate male and female tilapia fish. (12 marks)

QUESTION FIVE

5. Describe how you would administer a sex-reversal hormone such as 17 α -methyltestosterone (MT) in the Kafue Bream (*Oreochromis andersonii*) which is one of the commonly cultured fish species in Zambia. (20 marks)

QUESTION SIX

6.

- A.** Explain what you understand by aquaponic systems. **(4 marks)**
- B.** Integration of Agriculture and Aquaculture one of the most effective strategies for enhancing the productivity of small-scale farming in rural areas with limited resources. Discuss any two forms of IAA you are familiar with. **(16 marks)**

QUESTION SEVEN

- 7.** You recently attended an interview for the position of farm manager at Yalelo Zambia Limited. The company contacted you to confirm that you were successful, and you have been given the job. As a recent graduate from Kapasa Makasa University who had studied and understood the course Introduction to Aquaculture, your first task at work was to share your knowledge on the characteristics of good quality broodstock with the general workers at the fish farm. Describe the characteristics or attributes which they should have looked for in the tilapia broodstock for the breeding season that was starting at the end of August. Provide clear explanations for each of your points. **(20 marks)**

THE END OF EXAMINATION, WISHING YOU ALL THE BEST!!!!!!



KAPASA MAKASA UNIVERSITY
FACULTY OF APPLIED SCIENCE AND OPEN LEARNING
DEPARTMENT OF AGRICULTURE AND AQUATIC SCIENCES
CHINSALI, MUCHINGA PROVINCE
ANIMAL NUTRITION - AS 310
END OF YEAR FINAL SESSIONAL EXAMINATION

21ST OCTOBER 2024

INSTRUCTIONS TO CANDIDATES

1. Time allowed is **THREE (3) HOURS**
2. Remember to write your student identity number (SIN) on the provided answer sheets
3. All questions carry equal marks (**20 Marks**)
4. Question one is **COMPULSORY**
5. Attempt a total of **FIVE** questions

CELLPHONES AND OTHER RELATED GAGETS ARE NOT ALLOWED IN THE EXAMINATION ROOM

DO NOT TURN THIS PAGE UNTIL YOU HAVE BEEN TOLD TO DO SO BY THE CHIEF INVIGILATOR

QUESTION ONE

1. The farmer in Isoka district realise that his cattle take years to reach market weight under extensive management. The farmer wishes to start supplementing the steers with formulated feed to improve on weight gain. As animal science graduate formulate a ration for steers to help the farmer, the ration must include;

13.5% DCP
73%TDN
15% Silver leaf
12% Maize bran
7% Sugar cane molasses
6% Soya bean straw
2% Mineral premix
1% Salt
1% Di-calcium phosphate

Other main plant sources available on dry matter basis include;

	DM	DCP	TDN
Maize	89	10	88
Groundnut meal	92	53.8	83
Groundnut haulms	91	10.9	58
Leucaena	90	18.4	57

Assume that you are making 100 kg of complete feed ration, present your answers in a table to balance the DCP and TDN.
(20 marks)

QUESTION TWO

- 2.
- A. Outline two roles of microbes in the rumen. (4 marks)
 - B. What is the importance of using urea leaks when feeding ruminants? (4 marks)
 - C. Give two advantages of feeding molasses in livestock. (4 marks)
 - D. List two effects of feeding untreated soya beans in animals? (4 marks)
 - E. Give two reasons why the use of oil sources is restricted to 15% in feed formulation? (4 marks)

QUESTION THREE

3. Mr. Kabwe harvested maize Stover from the farm which he uses to feed his goats. Before feeding he realizes that Mwansa is a student at KMU doing a BSc. Animal Science who can advise well. Mwansa quickly remembers that he should first know the digestible nutritional values of maize Stover, after checking through the book he finds values for proximate analysis in maize Stover conducted during lab sessions, which can be used to determine the TDN and ME before he can comment. As a friend doing the same course assist Mwansa to calculate the following assuming the proximate values are as shown;

Serial No	Nutrient	g/kg
1	DCP	20
2	DEE	6
3	DCF	127
4	DNFE	246

- A. Calculate the TDN and comment to advise Mr. kabwe (4 marks)
- B. Estimate the dry matter intake (DMI) if the steers weigh 360kg (formula; $DMI=0.025W$). (4 marks)
- C. Calculate ME (MJ/Kg DM) (formula; $0.0152DCP + 0.0342DEE + 0.0128DCF + 0.0159DNFE$) (4 marks)
- D. Calculate total the ME for the DMI value in (iii) above. (4 marks)
- E. Calculate the net energy in maize Stover, if the net energy is estimated at 70% metabolisable Energy. (4 marks)

QUESTION FOUR

- 4.
- A. Formulate 150kg broiler grower feed for chickens in broiler starter feed with protein level of 21%CP in diet. The ingredients to be used include, Maize meal has 8.5% CP, sorghum meal with 6%CP to be used at predetermined rate of 10%, and Soya bean cake with 40% CP. The allowance for premix vitamin, DCP, limestone, salt, lysine and methionine are estimated at 3.5%.
 - I. Construct a table to show the balances on crude protein requirement of the animal and total quantity of feed. (14 marks)
 - B. Give the reasons why the following are added to the feed;
 - I. Limestone (2 marks)
 - II. Lysine and methionine (2 marks)

III. Vitamin Premix

(2 marks)

QUESTION FIVE

5.

- A.** Outline four factors that can affect the feed quality in storage. **(4 marks)**
- B.** Outline four precautionary measures to be taken while fumigation is done in a storage house. **(4 marks)**
- C.** What are anti-nutritional factors? Explain their effects using a suitable example(s). **(6 marks)**
- D.** Discuss the classification of carbohydrates, minerals and vitamins and please give examples. **(6 marks)**

QUESTION SIX

6.

- A.** Explain the processing method used for:
 - I.** Conditioning the grains to raise moisture. **(6 marks)**
 - II.** Increasing the density of ground grains. **(6 marks)**
- B.** Explain the meaning of the following methods in feed processing. Giving practical examples.
 - I.** Exploding **(4 marks)**
 - II.** Extrusion **(4 marks)**

QUESTION SEVEN

7.

- A.** Outline the partition of energy as utilized in the body of an animal **(10 marks)**
- B.** Briefly explain the various steps involved in feed compounding **(10 marks)**

END OF EXAMINATION, BEST WISHES.



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FACULTY OF APPLIED SCIENCE AND OPEN LEARNING
DEPARTMENT OF AGRICULTURE AND AQUATIC SCIENCES
CHINSALI, MUCHINGA PROVINCE
ANIMAL BREEDING – AS 301
END OF YEAR FINAL SESSIONAL EXAMINATION

28TH OCTOBER 2024

INSTRUCTIONS TO CANDIDATES

1. Time allowed is **THREE (3) HOURS**
2. Remember to write your student identity number (SIN) on the provided answer sheets
3. All questions carry equal marks **(20 Marks)**
4. Question one is **COMPULSORY**
5. Attempt a total of **FIVE** questions

CELLPHONES AND OTHER RELATED GAGETS ARE NOT ALLOWED IN THE EXAMINATION ROOM

DO NOT TURN THIS PAGE UNTIL YOU HAVE BEEN TOLD TO DO SO BY THE CHIEF INVIGILATOR

QUESTION ONE

1. The following information was recorded from the dam milk yield and daughter milk yield at Mr. Mulenga's farm.

ID	1	2	3	4	5
Dam milk yield (x)	5	7	10	8	6
Daughter milk yield(y)	10	5.5	9	10	5

- A. Estimate the narrow sense heritability using correlation between the dam milk yield and daughter milk yield. (10 marks)
- B. State (2) differences between heritability and repeatability (4 marks)
- C. Write three (3) limitations of using repeatability? (6 marks)

QUESTION TWO

2.

- A. Animal selection is based on estimated breeding value (EBV) of the animal. Explain the concept of estimated breeding value? (5 marks)
- B. The average milk yield of daughters of a bull A is 255liters and for Bull B is 250 liters in lactation. The herd mean is 200lit for Bull A and 220lit for bull B. show your working clearly.
- I. Predict the EBV of the milk yield for the bulls if the heritability is 0.51 for both animals. (8 marks)
- II. Which Bull A or Bull B would you choose for breeding? Give a reason for the answer. (2 marks)
- III. Estimate the genetic potential (performance) of the male progeny for bull A, if the EBV on record for a cow mated with Bull A was found to be 10 liters. (5 marks)

QUESTION THREE

3.

- A. Define animal breeding. (4 marks)
- B. What is the difference between selective breeding and natural breeding? (6 marks)
- C. The question in breeding goal looks at which traits should be improved in the next generations.

- I. Explain the difference between qualitative and quantitative traits in animal breeding. (6 marks)
- II. State two Qualitative traits to consider in cattle breeding (2 marks)
- III. State any two quantitative traits to consider in poultry breeding (2 marks)

QUESTION FOUR

4.

- A. Gregory Mendel is father of genetics; state the meaning of the following principles by Mendel.
 - I. The principle of segregation (3 marks)
 - II. The principle of independent assortment (3 marks)
- B. Consider that cattle can be horned or polled. The horns trait is recessive, if a bull is heterozygous and cow is homozygous dominant for the genes mated,
 - I. What would be the genotypic and phenotypic ratios for this cross in first generation? (5 marks)
 - II. If female offspring that heterozygous is back crossed with the male, estimate the genotypic and phenotypic ratios in the second generation (F₂). (5 marks)
 - III. Which situation would a dihybrid cross be used. (2 marks)
 - IV. Explain the difference between Phenotype and genotype? (2 marks)

QUESTION FIVE

5.

- A. In breeding program, relevant information on traits should be collected from records such individual records, pedigree records, progeny records and family/ sibs records. State when and why we use information from:
 - I. Progeny (4 marks)
 - II. Pedigree (4 marks)
 - III. Sib (4 marks)
 - IV. Individual selection/performance testing (4 marks)
- B. State the meaning of the following methods used in selecting multiple traits:
 - I. Tandem (2 marks)
 - II. Selection index (2 marks)

QUESTION SIX

6.

- A. Describe gene action affecting a genotype:
- I. Additive gene action. (3 marks)
 - II. Epistasis gene action. (3 marks)
- B. If GG animals weigh 40 kg, and gg animals 36 kg. Calculate the body weight of the heterozygous offspring of the two homozygous animals if the two alleles have an additive effect in co-dominance. (5 marks)
- C. GG animals weigh 40 kg, Gg animals 42 kg and gg animals 36 kg. The body weight of the heterozygous animal is higher than the average of the two homozygous animals and even higher than the value of the highest homozygous parent. Explain the cause of this effect in crossing of alleles. (3 marks)
- D. If alleles G and g are worth 1 and -1 respectively assume the additivity of GG, Gg, and gg. (6 marks)

QUESTION SEVEN

7.

- A. Breed 1 is producing 96 eggs per year and breed 2 is producing 94 eggs per year. Cocks of breed 1 are mated to hens of breed 2. Their offspring with genotype Aa is expected to produce 95 eggs per year, the average of the two parent breeds, but they do produce 100 eggs per year.
- I. Calculate the heterosis percentage. (6 marks)
 - II. Heterosis is one of the reasons to apply crossbreeding of breeds or lines. State any other two (2) reasons for crossbreeding. (4 marks)
- B. Inbreeding is the mating of animals more closely related to each other than the average.
- I. State two advantages and two disadvantages of inbreeding. (4 marks)
 - II. State the commercial use of inbreeding in livestock. (2 marks)
- C. What is genetic diversity? Outline two (2) causes of genetic diversity in animal breeding. (4 marks)

END OF THE EXAMINATION



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FACULTY OF APPLIED SCIENCE AND OPEN LEARNING
DEPARTMENT OF AGRICULTURE AND AQUATIC SCIENCES
CHINSALI, MUCHINGA PROVINCE
FORAGES AND PASTURES - AS 341
END OF YEAR FINAL SESSIONAL EXAMINATION

21ST OCTOBER 2024

INSTRUCTIONS TO CANDIDATES

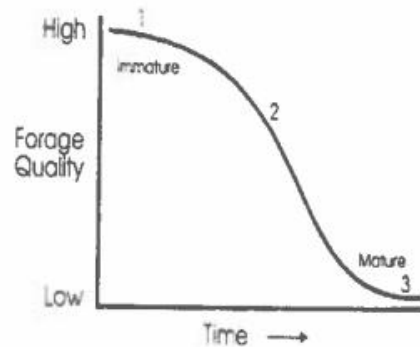
1. Time allowed is **THREE (3) HOURS**
2. Remember to write your student identity number (SIN) on the provided answer sheets
3. All questions carry equal marks (**20 Marks**)
4. Question one is **COMPULSORY**
5. Attempt a total of **FIVE** questions

CELLPHONES AND OTHER RELATED GAGETS ARE NOT ALLOWED IN THE EXAMINATION ROOM

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QUESTION ONE

1. Study the graph below for grass pasture and answer the questions below.



- A. From the graph at which stage would you expect forage to be of high quality? Give reasons for your answer. (5 marks)
- B. Explain the quantity and digestibility forage at stage 3. (5 marks)
- C. Between which stages would be suitable to harvest hay and to harvest silage for animals? Give reason(s) for your answer. (5 marks)
- D. Name and describe a common disorder of feeding to much legume pasture in stage 1 and suggest the measure to correct the disorder you have mentioned. (5 marks)

QUESTION TWO

2.

- A. State five (4) differences between legume and grass pastures. (4 marks)
- B. State (4) differences between native and improved pastures. (4 marks)
- C. Using local and scientific names, list six (6) native pastures and six (6) improved pastures given to animals. (12 marks)

QUESTION TWO

3.

- A. Explain the following methods of sowing pasture as applied in pasture establishment
- i. Under sowing (4 marks)
 - ii. Sod sowing (4 marks)
- B. What is vegetative propagation? List any two plant material that you would use under vegetative propagation to plant grass pastures. (6 marks)

- C. Briefly describe the procedure during land preparation for pasture establishment.

(6 marks)

QUESTION FOUR

4.

- A. Why is it important to make hay and silage for animals? (4 marks)
- B. Give two characteristics of good hay? (2 marks)
- C. What is conditioning in hay making process? (4 marks)
- D. What is the importance of fermentation in silage making? (4 marks)
- E. Give two characteristics of good silage. (2 marks)
- F. Outline two methods of harvesting grass pasture seeds. (4 marks)

QUESTION FIVE

5.

- A. Forage anti-quality is the reduction of quality in forage. List and explain any three (3) factors that can cause reduction in the quality of forage. (6 marks)
- B. Animal response to toxins may vary; explain how the following factors may affect the animals in response to toxic substances.
 - i. Condition of the animal matters. (4 marks)
 - ii. Amount of plant consumed. (4 marks)
- C. What is grass tetany? What measures would you put in place to avoid the problem. (6 marks)

QUESTION SIX

6.

- A. Explain four (4) factors affecting the Biological Optimum of Stocking Rate. (8 marks)
- B. Explain the meaning of the following terms;
 - i. Carrying Capacity of Pasture (4 marks)
 - ii. Stocking Rate (4 marks)
 - iii. Stocking density (4 marks)

QUESTION SEVEN

7. Explain the meaning of the following grazing systems;

- A. Communal Grazing (4 marks)

- B. Rotational Grazing** (4 marks)
- C. Continuous Grazing** (4 marks)
- D. Deferred Grazing** (4 marks)
- E. Strip Grazing** (4 marks)

END OF EXAMINATION, BEST WISHES.



KAPASA MAKASA UNIVERSITY
SCHOOL OF APPLIED SCIENCE AND OPEN LEARNING

BACHELOR OF SCIENCE IN ANIMAL SCIENCE

AS321: FUNDAMENTALS OF MICRO AND MACRO ECONOMICS

SESSIONAL EXAMINATION

WEDNESDAY 16TH OCTOBER 2024

TIME: 3 HOURS

INSTRUCTIONS TO CANDIDATES

1. Write your Student Identification Number on the Answer Booklet provided. Your name must NOT appear anywhere on your answer booklet
2. You have FIVE (5) minutes of reading time. Use it to study the examination paper carefully to understand what to do in each question.
3. This paper consists of seven (7) questions:
4. Answer 5 questions and question 1 is compulsory.
5. Do NOT write in pencil (except for graphs and diagrams).
6. The marks shown against the requirement(s) for each question should be taken as an indication of the expected length and depth of the answer.
7. All workings must be done in the answer booklet.
8. Present legible and tidy work.
9. Cell Phones are NOT allowed in the Examination Room.

DO NOT TURN THE PAGE UNTIL YOU ARE TOLD TO DO SO

Question 1 COMPULSORY

- (a) Suppose that in the economy under consideration has the following autonomous consumption = 500, marginal propensity to consume = 0.8, Y is national income, T is taxes: Also given that Taxes (T): T=200, Government Spending (G): G=400; Investment (I): I=300; Net Exports (X-M): =100.
Calculate the aggregate demand (AD). [4 Marks]
- (b) firm has the following total revenue and total cost functions:
 $TR = 60,000 + 120x - x^2$
 $TC = 10,000 - 10x + x^2$
Where x is the number of units of the products, (in thousands).
Required:
Find:
- (i) The profit function [4 Marks]
 - (ii) The level of output at the breakeven point [4 Marks]
 - (iii) The actual amount of profit at the breakeven point [4 Marks]
- (c) State and Explain two major functions of money in an economy [4 Marks]

Question 2

- (a) At Chinsali Main Market the quantity (Q) and the price (P) of the commodity Y is given below .

$$2P = 7 - Q$$

$$P = 3Q$$

Compute the equilibrium price and equilibrium quantity traded for the commodity Y in the following equations: [5 Marks]

- (b) This commodity has a price elasticity of demand PED=-2 and income elasticity of demand YED=+0.1 Briefly explain; the nature of the product [3 Marks]
- (c) At Nakonde Market the same commodity Y as the demand and supply equations as follows

$$Q_d = 300 - 3P$$

$$Q_s = 100 + 5P$$

Where Q is the quantity and P is the price:

- i. Calculate the equilibrium price and quantity for this good. [2 Marks]
- ii. Suppose that an increase in the consumer income resulted in the new demand equation $Q_d = 420 - 3P$. What is the new equilibrium price and quantity for this good. [4 Marks]
- iii. Suppose the government enacts legislation that imposes a price ceiling equivalent to the original equilibrium price, what is the result of the legislation [2 Marks]

[Total: 20 marks]

Question 3

In modern economies, most economic activities take place in markets, where buyers and sellers come together to strike bargains. A simple model called demand and supply does an excellent job of describing how markets work. This model reasonably separates buyers from sellers and then summarises each group's behaviour with a single line graph. For example, in the market for **Chickens** the model can show how buyers and sellers interact to determine how much will be sold and at what price.

Using demand and supply analysis, illustrate graphically and explain the effects of each of the following events on equilibrium price and equilibrium quantity on the market for Chickens:

Required:

- Decrease in the price of Chickens [5 Marks]
- Increase in the cost of chemicals and feed used in Chicken production [5 Marks]
- Discovery of a new uses for Chickens [5 Marks]
- Increase in minimum wages paid to farm workers [5 Marks]

[Total: 20 Marks]

Question 4

Consider the total product plan of a firm operating in a perfectly competitive market below:

Labor (Workers per week)	Output (Q)	Fixed cost (K)	Variable cost	Total Cost	Marginal cost	Revenue	Marginal revenue	Profit/loss
0	0							
5	50							
10	90							
15	140							
20	180							
25	210							
30	230							
35	240							

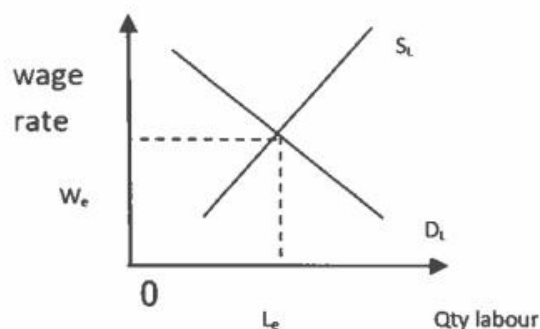
- If the firm hires workers, each is paid K700, and a firm is Paying K1,000 per week for the space it has occupied. The selling price of each well-produced product is K300. Fill in the table above by calculating the cost functions of the firm [16 Marks]
- Compare the column for marginal product and the column for marginal cost and explain the relationship [2 Marks]
- Compare the column for average total cost and the column for marginal cost and explain the relationship [2 Marks]

[Total: 20 Marks]

Question 5

- (a) Distinguish between stagflation and hyperinflation. **[4 Marks]**
- (b) Describe how fiscal policy can be used to deal with rising inflation. **[6 Marks]**
- (c) Assume the following data for a country: total population, 500; population under 16 years of age, 120; not in labor force, 140; unemployed, 36; part-time workers looking for full-time jobs, 10.
 - i. Calculate the size of the labor force **[2 Mark]**
 - ii. Determine the official unemployment rate **[2 Mark]**
- (d) Assume the labor market is represented by the graph below. Illustrate what happens to the wage rate, quantities of labor supplied and demanded, as the economy goes into recession and demand for labour falls; (assume sticky wages) **[3 Marks]**

Labour Market Equilibrium



- (e) State the Effects of un Employment in a country like Zambia **[3 Marks]**

[Total: 20 Marks]

Question 6

The ICT sector is one of the most dynamic economic segments globally. Given its dynamism, it is being considered as an enabler of growth in almost all countries, Zambia included. Over the years, the sector has become increasingly important in supporting growth as governments and enterprises go digital in an attempt to increase their market size while cutting operational costs. Zambia's ICT sector is dominated by the service providers with other components playing a relatively smaller role. The telecommunication sector is among the service providers that have dominated the ICT sector in Zambia with its performance in terms of competition, profitability and market penetration increasing over the years.

Required:

- a. From your economic knowledge of market structures, under which market structure does the telecommunication sector in Zambia fall? **[1 Mark]**
- b. Outline any five (5) features of the market structure you have stated in (a) above. **[10 Marks]**
- c. Explain price determination in this industry. **[3 Marks]**
- d. Describe the three (3) fundamental economic problems faced by firms under the telecommunication sector and how these problems are solved. **[6 Marks]**

[Total: 20 Marks]

Question 7

The Finance; Minister Situmbeko Musokotwane on 27TH September 2024 Presented a 2 Billion Kwacha budget on which its objective is fiscal discipline reducing inflation and raising revenue through taxation. In Paragraph 11, he said “On inflation madam speaker, the country has experienced pressure over the past year, registering 15.6% in September 2023. The main drivers are linked to the drought which resulted in increased food prices. To moderate inflationary pressure, the Bank of Zambia tightened its monetary policy. The government of Zambia has been using monetary policy to influence the economy.

- a. Outline any four (4) reasons why Governments impose tax [4 Marks]
- b. Explain how the following tools can be used to reduce the rate of inflation.
 - ii. Fiscal policy; and [3 Marks]
 - iii. Monetary Policy. [3 Marks]
- d. Explain what a budget deficit means. [2 Marks]
- e. Briefly describe the following terms:
 - i. Debt-sustainability [2 Marks]
 - ii. GDP [2 Marks]
- f. Adam Smith outlined four (4) canons of taxation in his book “The Wealth of Nations”, which are still applicable today. Briefly explain the four (4) canons of taxation. [4 Marks]

[Total: 20 Marks]

The End of Examination



THE COPPERBELT UNIVERSITY

KAPASA MAKASA UNIVERSITY

CHINSALI, MUCHINGA PROVINCE

BEEF, DAIRY AND SMALL RUMINANT PRODUCTION - AS 430

END OF YEAR FINAL SESSIONAL EXAMINATION

17TH OCTOBER 2024

INSTRUCTIONS TO CANDIDATES

1. Time allowed is **THREE (3) HOURS**.
2. Remember to write your student identity number (SIN) on the provided answer sheets.
3. All questions carry equal marks (**20 Marks**).
4. Question one is **COMPULSORY**.
5. Attempt a total of **FIVE** questions.

CELLPHONES AND OTHER RELATED GAGETS ARE NOT ALLOWED IN THE EXAMINATION ROOM

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QUESTION ONE

1.

- A. State four (4) Characteristics of an ideal dairy cow. (4 marks)
- B. State four (4) characteristics of beef cattle (4 marks)
- C. Explain four features that helps *Bos indicus* cattle to adapt to their environment. (4 marks)
- D. Discuss the management of kids/ lambs with emphasis on feeding, weaning, and routine practices. (8 marks)

QUESTION TWO

2.

- A. Describe milk synthesis including hormones involved in milk let down and milk hold up. (10 marks)
- B. Outline the methods of milk treatment on a dairy farm. (10 marks)

QUESTION THREE

3.

- A. What is calving? Give any three (3) signs of calving. (4 marks)
- B. Describe the caring new born calf to weaning stage (12 marks)
- C. What is drying off? And give three (3) reasons why it is important. (4 marks)

QUESTION FOUR

4.

- A. Discuss on Summer Breeding Season in beef production and state 3 advantages and disadvantages. (12 marks)
- B. Outline the Stages in the Beef Production Cycle (the life history of Beef Cattle). (8 marks)

QUESTION FIVE

5.

- A. The intensive beef production system requires that the cattle are kept in confinement and high-quality feed. Discuss ranching and finishing Steers on concentrates in the feedlot under intensive system. (12 marks)
- B. Explain the Nutritive Value of the Zambian Veldt (Range) and the need for supplementation. (8 marks)

QUESTION SIX

6.

A. Discuss how and why feeding Urea and poultry manure is important in ruminant diets.

(12 marks)

B. Explain the feeding management of cows before gestation, before calving and during lactation.

(8 marks)

QUESTION SEVEN

7.

A. Write down the points to consider when selecting a ram for breeding. **(6 marks)**

B. Outline the importance of weight estimation in sheep and goats. **(6 marks)**

C. Give four signs of heat in Does. **(4 marks)**

D. Write on the preparing the doe for kidding/lambing. **(4 marks)**

END OF EXAMINATION, BEST WISHES.



THE COPPERBELT UNIVERSITY
KAPASA MAKASA UNIVERSITY
CHINSALI, MUCHINGA PROVINCE
PRINCIPLES OF GAME RANCHING AND APICULTURE – AS 461
END OF YEAR FINAL SESSIONAL EXAMINATION

23RD OCTOBER 2024

INSTRUCTIONS TO CANDIDATES

1. Time allowed is **THREE (3) HOURS**
2. Remember to write your student identity number (SIN) on the provided answer sheets
3. All questions carry equal marks (**20 Marks**)
4. Question one is **COMPULSORY**
5. Attempt a total of **FIVE** questions (TWO from each section plus the compulsory question)
6. **ANSWER PART A OF QUESTION ONE AND SECTION B USING THE SAME ANSWER BOOKLET**
7. **ANSWER PART B OF QUESTION ONE AND SECTION C USING THE SAME ANSWER BOOKLET BUT SEPARATE FROM THE ONE USE IN INSTRUCTION 6.**

CELLPHONES AND OTHER RELATED GAGETS ARE NOT ALLOWED IN THE EXAMINATION ROOM

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SECTION A (COMPULSORY QUESTION)

QUESTION ONE. (PLEASE USE DIFFERENT ANSWER BOOKLETS FOR PART A AND B)

1.

- i. Having been appointed as an Apiary Manager at Kapasa Makasa University;
 - i. Illustrate how you would carry out a colony multiplication/queen raising programme in order to increase the population of bees **(3 marks)**
 - ii. Discuss the importance of bee breeding in apiculture industry? **(5 marks)**
 - iii. Honey bees are social insects and the basic requirement of sociality is effective communication. What are the basic modes of communication in honey bees?
(2 marks)
- ii. Game Ranching in Zambia has the potential for significant growth and development, especially in light of contemporary trends and indicators. The current challenges of disease outbreak such as foot and mouth being faced by the livestock sector has opened another window of opportunity for Zambians to turn to Game Ranching as an appropriate alternative option to livestock farming. Discuss the two categories of Game Ranching found in Zambia and their potential benefits. **(10 marks)**

SECTION B.

PLEASE CHOOSE ANY TWO QUESTIONS FROM THIS SECTION AND ALL QUESTIONS CARRY EQUAL MARKS (20 MARKS).

QUESTION TWO

2. Discuss the relationship between colony multiplication and queen raising **(20 marks)**

QUESTION THREE

3. Outline in brief how you would go about setting up an apicultural out-grower scheme in Chama district of Muchinga Province of Zambia **(20 marks)**

QUESTION FOUR

4. Mr Kambikambi, a farmer in Mukunashi settlement in Kasempa District wants to expand his production of honey and wax on his piece of land whose dimensions is 150m in length and 100m width. He has been spacing his hives at 10m apart. Mr Kambikambi now wants to reduce this spacing to 5m apart.
- i. How many hives does he have when the spacing is 10m apart? **(2 marks)**
 - ii. If he reduces the spacing to 5m apart, how many hives will his piece of land accommodate? **(2 marks)**
 - iii. In order to maintain his productivity with the new spacing, what measures should he take? **(6 marks)**
 - iv. What are the three parameters that determine the quality of honey? **(6 marks)**
 - v. Apiculture is a sector that can contribute to the development of Zambia though its value in the country has not been realized. Mention the four serious measures the Zambian government should undertake to promote this industry? **(4 marks)**

SECTION C

PLEASE CHOOSE ANY TWO QUESTIONS FROM THIS SECTION AND ALL QUESTIONS CARRY EQUAL MARKS (20 MARKS).

QUESTION FIVE

5. Ecology is the scientific study of the interactions that determine the distribution and abundance of organisms. As a manager of a game ranch, discuss the factors that affect distribution and abundance of organisms in a game ranch ecosystem. **(20 marks)**

QUESTION SIX

6. Animal production from domestic stock is facing tremendous challenges of disease out breaks and fisheries resources have been depleted in many water bodies. As a consequence of this, increasing human populations may face declining protein supply from domesticated livestock and fisheries, which are supposed to be the main source of protein. To mitigate the anticipated

protein deficit, and also for the purpose of empowering indigenous Zambians to participate in the establishment and management of Private Wildlife Estate, an investor from United Kingdom would like to partner with you, in the investment of a Game Ranch on a piece of land of about 100 hectares in a semi-arid area, where different species of antelopes will be kept for the purpose of processing and marketing wildlife products for both local market and exporting to other countries. Your partner is now seeking to know from you, the process involved in the establishment of Game Ranch in Zambia. Discuss. **(20 marks)**

QUESTION SEVEN

7. The costs associated with game ranching can vary significantly based on location, scale, and the specific goals of the operation. Thorough business plans and financial analyses are essential for potential investors to understand the full scope of both capital and running costs involved in the game ranching investments. Discuss. **(20 marks)**

END OF THE EXAMINATION. BEST WISHES.



THE COPPERBELT UNIVERSITY

KAPASA MAKASA UNIVERSITY

CHINSALI, MUCHINGA PROVINCE

FARM MANAGEMENT AND AGRICULTURAL EXTENSION - AS 440

END OF YEAR FINAL SESSIONAL EXAMINATION

01ST NOVEMBER 2024

INSTRUCTIONS TO CANDIDATES

1. Time allowed is **THREE (3) HOURS**
2. Remember to write your student identity number (SIN) on the provided answer sheets
3. All questions carry equal marks (**20 Marks**)
4. Question one is **COMPULSORY**
5. Attempt a total of **FIVE** questions (TWO from each section plus the compulsory question)
6. **ANSWER PART A OF QUESTION ONE AND SECTION B USING THE SAME ANSWER BOOKLET**
7. **ANSWER PART B OF QUESTION ONE AND SECTION C USING THE SAME ANSWER BOOKLET BUT SEPARATE FROM THE ONE USE IN INSTRUCTION 6.**

CELLPHONES AND OTHER RELATED GAGETS ARE NOT ALLOWED IN THE EXAMINATION ROOM

DO NOT TURN THIS PAGE UNTIL YOU HAVE BEEN TOLD TO DO SO BY THE CHIEF INVIGILATOR

SECTION A (COMPULSORY)

QUESTION ONE. (PLEASE USE DIFFERENT ANSWER BOOKLETS FOR PART A AND B)

1.

- A. The balance sheet helps to measure the financial strength of the business. Given the information from the balance sheet as follows:

Total Fixed Assets	K 42,400
Total Liabilities	K 28,420
Owners' equity	K 31,830
Current Assets	K 8,650
Current Liabilities	K 7,220
Intermediate Assets	K 9,200
Intermediate Liabilities	K 3,200

- i. Determine the solvency position of this business (5 marks)
- ii. Determine the liquidity position of the Business (5 marks)

- B. Discuss Edgar Dale's Cone of Experience (10 marks)

SECTION B

PLEASE CHOOSE ANY TWO QUESTIONS FROM THIS SECTION AND ALL QUESTIONS CARRY EQUAL MARKS (20 MARKS).

QUESTION TWO

2. Discuss the four functions of management and relating how the functions can be applied in a farm business. (20 marks)

QUESTION THREE

3. Farming business is associated by some various forms of risks and uncertainty which you need to have in mind as you are doing your planning for the success of the business.
- A. Define Risk and Uncertainty. (4 marks)

- B. Define linear programming and state the assumptions that are associated with linear programming. (8 marks)
- C. How can a farmer mitigate against the mentioned risks? (8 marks)

QUESTION FOUR

4. Imagine you are considering an additional enterprise on your farm and after conducting research you establish that the new investment will have the following cash flow in the next 5 years.

Year 1	- 138,000
Year 2	- 250,000
Year 3	- 350,000
Year 4	- 500,000
Year 5	- 450,000

Using the Net Present Value method determine what will be your decision of this new enterprise on your farm. (The initial capital required is K 800,000 and the interest rate is 8%). (20 marks)

SECTION C

PLEASE CHOOSE ANY TWO QUESTIONS FROM THIS SECTION AND ALL QUESTIONS CARRY EQUAL MARKS (20 MARKS).

QUESTION FIVE

- 5.
- A. Discuss various factors that should be considered for Selection of Extension Teaching Methods (10 marks)
- B. In details, describe different types of leadership styles. Further, deduce their merits and demerits. (10 Marks)

QUESTION SIX

- 6.
- A. Write few notes on the following
- i. Philosophy of extension (2 Marks)

- ii. Extension Education (2 Marks)
- iii. Ethnocentrism (2 Marks)
- iv. Heterophily (2 Marks)

- B. Extension work world over is based on some working principles and the knowledge of these principles is necessary for the extension personnel. Explain the various principles of extension as they relate to extension education. (12 marks)

QUESTION SEVEN

7.

- A. In extension and innovation transfer there is a common and important proverb "*The best way to peoples' heart is through their stomach, but the best way to their brain is through their eyes and ears*". In details, explain the meaning of this proverb. (6 marks)
- B. In detail, discuss the elements of diffusion. (14 marks)

END OF THE EXAMINATION, BEST WISHES.



THE COPPERBELT UNIVERSITY

KAPASA MAKASA UNIVERSITY

CHINSALI, MUCHINGA PROVINCE

LIVESTOCK ECONOMICS AND ENTREPRENEURSHIP – AS 450

END OF YEAR FINAL SESSIONAL EXAMINATION

15TH OCTOBER 2024

INSTRUCTIONS TO CANDIDATES

1. Time allowed is **THREE (3) HOURS**
2. Remember to write your student identity number (SIN) on the provided answer sheets
3. All questions carry equal marks (**20 Marks**)
4. Question one is **COMPULSORY**
5. Attempt a total of **FIVE** questions (TWO from each section plus the compulsory question)
6. **ANSWER PART A OF QUESTION ONE AND SECTION B USING THE SAME ANSWER BOOKLET**
7. **ANSWER PART B OF QUESTION ONE AND SECTION C USING THE SAME ANSWER BOOKLET BUT SEPARATE FROM THE ONE USE IN INSTRUCTION 6.**

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SECTION A (COMPULSORY)

QUESTION ONE. (PLEASE USE DIFFERENT ANSWER BOOKLETS FOR PART A AND B)

1.

- A. The Rochdale Co-operative Principles form the basic philosophical foundation which guides the development and operation of co-operative societies all over the world. Prepare a write up on these principles since you will have to include them in your draft Business Plan for your new cooperative. **(10 marks)**

- B. Given the production function of beef production is given by

$$Y = 18X_1 - X_1^2 + 14X_2 - X_2^2$$

- i. Calculate the combination of the two inputs hay and forage that will maximize an enterprise profit **(5 marks)**
- ii. Calculate the yield of beef in Kgs at profit maximization **(5 marks)**

SECTION B

PLEASE CHOOSE ANY TWO QUESTIONS FROM THIS SECTION AND ALL QUESTIONS CARRY EQUAL MARKS (20 MARKS).

QUESTION TWO

2. "Whereas creativity and innovation are the citadel of entrepreneurship and lies at the heart of blue-chip companies, it is not without difficulties and challenges". Discuss in detail what could be done to overcome the challenges before crafting a business plan to launch the enterprise. **(20 marks)**

QUESTION THREE

3. Kapasa Musonda is having challenges in selling her Japanese Quails on the local market. She has been advised to visit the Zambia Development Agency (ZDA) for business advisory services as she is considering entering the export market for her Japanese Quails.
- A. Discuss the role of ZDA in promoting entrepreneurs with regards to the export market. **(10 marks)**
- B. How would Kapasa Musonda be assisted by the Citizens economic empowerment Commission (CEEC) in her intentions using empowerment pillar number four. **(5 marks)**

- C. Discuss why it would be important for Kapasa Musonda to draft a business plan before entering the export market. (5 marks)

QUESTION FOUR

4. Constituency Development Fund (CDF) is a government budget allocation mechanism that channels a specific portion of the national budget to the constituencies to finance development projects such as school facilities, health clinics and water supply systems and entrepreneurial development.
- A. Discuss the challenges of using CDF to promote entrepreneurial activities. (10 marks)
 - B. Discuss the concept of product life cycle management. (5 marks)
 - C. Explain any two of the four areas that financial management covers in entrepreneurship. (5 marks)

SECTION C

PLEASE CHOOSE ANY TWO QUESTIONS FROM THIS SECTION AND ALL QUESTIONS CARRY EQUAL MARKS (20 MARKS).

QUESTION FIVE

5. Using a well labeled diagram show and explain how the equilibrium is restored in the long run if the demand for eggs goes up in the market, ensure to show both scenarios at an individual farm level and the market. (20 marks)

QUESTION SIX

6. A. Given a cost function of a classical production function as follows;

$$TC = 100 + 6Y - 0.4Y^2 + 0.02Y^3,$$

Compute the following:

- i. AFC (3 marks)
 - ii. AVC (3marks)
 - iii. MC (3 marks)
 - iv. Calculate the output when the AVC is at its minimum (3 marks)
- B. Discuss the 4 assumptions of a perfect competitive Market (8 Marks)

QUESTION SEVEN

7.

A. ANK Farms is engaged in the production of tomatoes and pock, using the product-product relationship explain how the profit can be maximized on the farm. *Hint: use a diagram.*

(15 marks)

B. If ANK Farms want to introduce a third enterprise on the farm say broiler chicken production state the equi- marginal principle that will maximize the net farm income.

(5 marks)

END OF THE EXAMINATION. BEST WISHES



The Copperbelt University

Kapasa Makasa University Campus

Department of Agriculture and Aquatic Sciences

SESSIONAL EXAMINATIONS 2024

COURSE CODE: AS 421

COURSE NAME: APPLIED ANIMAL REPRODUCTION

TIME ALLOWED: THREE (3) HOURS

DATE: 4th NOVEMBER 2024

TIME: 09:00 HRS

INSTRUCTIONS: 1. Answer the COMPULSORY QUESTION ONE

2. Answer any other four questions

Question One (COMPULSORY QUESTION)

a) A farmer has lamented to you that his prize bull, which has been a marvel in the surrounding farming community for its superiority in terms of traceable traits is suddenly losing the motivation to mate with cows/heifers that are exhibiting obvious signs of heat. Offer an explanation to the farmer about the possible reasons for observations he has made.

(10 marks)

b) How can the farmer ensure that the superior attributes of the bull are preserved for a long time to come even beyond the animal's life?

(10 marks)

Question Two

a) It is generally known that different animal species on the farm have different types of penises. Give a detailed account of this statement.

(10 marks)

b) Give at least five methods by which a breeding bull can be removed from the production line and brought back five years later without necessarily slaughtering it.

(10 marks)

Question Three

As an observer at the proceedings of weekly meeting for the Mulakupikwa Young Farmers Club in Chinsali, you notice that there are different opinions being offered about the pros and cons of artificial insemination in livestock production. What will be your expert contribution to this gathering on this rather intriguing topic?

(20 marks)

Question Four

There are different ways in which breeding cows on the farm can have their oestrous cycles occurring at the same time.

a) Explain with three clear examples on how this is possible.

(15 marks)

b) What are the advantages of this activity?

(5 marks)

Question Five

Cryptorchidism is a condition in the male reproductive system that has dire consequences on the economics of running a successful livestock enterprise. Discuss. **(20 marks)**

Question Six

Give a detailed explanation the ovarian activity that leads to the incidence of cystic ovaries among breeding cows on the farm. **(20 marks)**

Question Seven

The introduction of beef breed improvement programmes where superior traits can be introduced in the local gene pools to improve performance and productivity has been high on the agenda for the department of livestock production. Discuss the considerations to be made when introducing superior traits in local gene pool. **(20 marks)**

END OF THE EXAMINATION – ALL THE BEST



The Copperbelt University

Kapasa Makasa University Campus

Department of Agriculture and Aquatic Sciences

SESSIONAL EXAMINATIONS 2024

COURSE CODE: AS 411

COURSE NAME: MANAGEMENT OF ANIMAL PRODUCTS AND BY-PRODUCTS

TIME ALLOWED: THREE (3) HOURS

DATE: 28th OCTOBER 2024

TIME: 09:00 HRS

INSTRUCTIONS: 1. Answer the COMPULSORY QUESTION ONE

2. Answer any other four questions

SECTION A (COMPULSORY QUESTION)

Question One

a) Discuss how photo-period is an important consideration when it comes to egg production.

(5 marks)

b) A child has been tasked to observe the laying period of a point-of-lay pullet by counting the number of eggs collected on daily basis until the number of eggs stops increasing. He reports to the father that he has collected 20 eggs with the last collection being two days ago at 16hrs. If today is 28th October 2024, work out the first time the pullet laid an egg in terms of date and time assuming that the pullet had a lag period of 30 minutes between egg drop and the next ovulation.

(15 marks)

Question Two

Explain the importance of the following terms in dairy production

a) Galactopoiesis

(5 marks)

b) Steaming up

(5 marks)

c) Challenge feeding

(5 marks)

d) Standardisation

(5 marks)

Question Three

The Meat Producers Association of Muchinga Province is holding a sensitization seminar whose theme is "Quality Meat for the Consumer". As a consultant, you have been requested to present a paper on ante-mortem handling of animals and post-mortem handling of carcasses and their effect on water holding capacity of meat. Give a detailed outline of your presentation.

(20 marks)

Question Four

- a) Milk ejection in lactating cattle is said to occur as a neuro-endocrine reflex. Give a detailed explanation of this concept. (5 marks)
- b) Consumers dictate what type of dairy products a producer or processor will present on the market. Discuss. (7.5 marks)
- c) Give a detailed explanation of the factors that affect milk yield (7.5 marks)

Question Five

You have been recently employed as a supervisor in charge of the layers' house at a large poultry farm in Dundumwezi district. The Managing Director has asked you to investigate the incidence of cracked egg shells and generally poor egg shell quality that has been observed. What will the contents of your report to the MD which must include remedial measures to be taken to avoid a repeat of the observations made? (20 marks)

Question Six

You are attending a food exhibition fair in Shibuyunji district where various types of edibles are on display and the show goers are encouraged to do more than just watch, but to have a taste of the variety of foodstuffs on display. One exhibitor has some boiled meat from both a domesticated pig and a wild bush pig. Account for the differences in flavor as alluded to by the general public that have tasted the two meat types. (20 marks)

Question Seven

There is a paradox when it comes to the perception of marbling in meat by different schools of thought. Discuss, (20 marks)

END OF THE EXAMINATION - ALL THE BEST



**THE COPPERBELT UNIVERSITY
KAPASA MAKASA UNIVERSITY
CHINSALI, MUCHINGA PROVINCE
ANIMAL HEALTH AND DISEASE PREVENTION – AS 401
END OF YEAR FINAL SESSIONAL EXAMINATION**

OCTOBER 2024

INSTRUCTIONS TO CANDIDATE

1. Time allowed is **THREE (3)** hours,
2. Write your Examination Number in the spaces provide,
3. Read the questions very carefully before attempting to answer,
4. Question one is **COMPULSORY**
5. Attempt a total of **FIVE** questions

CELLPHONES & PROGRAMMABLE CALCULATORS ARE NOT ALLOWED IN THE EXAMINATION ROOM

DO NOT TURN THIS PAGE UNTIL YOU ARE TOLD TO DO SO BY THE INVIGILATOR

QUESTION ONE

1. Describe how you would conduct both general and physical examination of a beef herd at Mr Kasonde's farm in Ichishi. Kindly fill in the POMR form (20 Marks)

QUESTION TWO

2. Discuss the various strategies the Ministry of Livestock and Fisheries Development can employ to combat the continued spread of livestock diseases (20 Marks)

QUESTION THREE

3. You must be familiar with Government efforts to eradicate a particular DNEI in Western province through test and slaughter. However, due to limited publicity and stakeholders' concerns, the process is grinding slowly. The diseases manifests with high fever (40°C), shade seeking and the animal is disinclined to move. Based on the above, kindly state;
 - A. Your tentative (suspected) diagnosis? (2 Marks)
 - B. The other ante-mortem signs are you likely to observe? (6 Marks)
 - C. The expected PM picture (6 Marks)
 - D. The other control measures (2 Marks)
 - E. What is the economic importance of the disease? (4 Marks)

QUESTION FOUR

4. During your routine extension services as Private practitioner in Isoka district, you notice a steer with a tendency to seek shade all the time with some traces of tearing and generalized swelling of lymph nodes. As part of your routine examination, you engage the farmer into a formal conversation who laments about the high cost of acaricides and maintenance of a dip tank. Given this information;
 - A. What is your suspected diagnosis? (4 Mark)

- B. Detail other clinical signs associated with your diagnosis in A. (5 Marks)
- C. Detail the expected PM picture (4 Marks)
- D. State how you will manage the case (5 Marks)
- E. Advise the farmers on the control of the disease (2 Marks)

QUESTION FIVE

- 5. Develop a vaccination programme for beef cattle at Golonita farms (20 Marks)

QUESTION SIX

- 6. Given your vast and expanse knowledge in Animal Health and Disease prevention, kindly attempt the following:
 - A. State the objectives of herd health in the feedlot (4 marks)
 - B. Mention the major routes of drug administration in the ox (4 marks)
 - C. Demonstrate how you would prevent the transmission of zoonotic infections from animals to humans in *Shiwangandu* (4 marks)
 - D. Elaborate on the judicious use of drugs in dairy cattle (4 marks)
 - E. Mention the PM signs associated with Tetanus (4 marks)

QUESTION SEVEN

- 7. Discuss the relevant and key strategies the Government of Zambia can undertake to promote livestock production in Zambia. (20 marks)

**ANIMAL
SCIENCE
2025
YEAR 2 TO 4**



KAPASA MAKASA UNIVERSITY
DEPARTMENT OF AGRICULTURE AND AQUATIC SCIENCE
END OF YEAR EXAMINATIONS
2024/2025 ACADEMIC YEAR

AA200/NR200 : BIOMETRY

Thursday, 13th November 2025 : 09 : 00 – 12 : 00

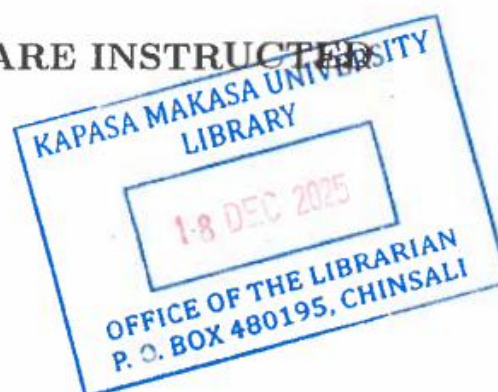
Time Allowed: 3 hours

Total Marks: 100

Instructions

1. Indicate your **computer number** on all your answer booklets.
2. There are **Two** sections in this examination paper. The question in **Section A** is compulsory and in **Section B** attempt **any three (3)** questions.
3. All questions carry equal marks. Mark allocations are shown in brackets.
4. **Full credit** will only be given when **all necessary working** is shown.
5. Use of scientific, non-programmable **calculators** is **allowed**.
6. Use of smartphones, smartwatches, or any other electronic devices capable of communication, calculation, or data storage is **strictly prohibited**.

DO NOT TURN OVER UNTIL YOU ARE INSTRUCTED



Section A

1. (a) Distinguish the following terms used in Biometry.
- (i) Biometry and Statistics [2]
 - (ii) Descriptive and Inferential statistics [2]
 - (iii) Quantitative and Qualitative data [2]
- (b) The following data represent the yields (in tons per hectare) of a specific crop collected from various agricultural fields during a regional field survey:

12.4 17.8 14.2 20.6 11.3 16.9 18.5 22.7 28.4 19.6 23.5 25.0
30.2 13.1 17.4 21.9 24.3 27.8 29.1 10.7 15.9 18.2 26.6 34.0
19.8 15.3 20.4 25.7 31.3 33.5 32.1 14.6 11.9 16.2 21.1 23.8
28.9 29.4 24.0 30.8

- (i) Create a cumulative distribution table using class intervals of width 4, starting with a lower limit of 10.0. [8]
 - (ii) Construct a frequency polygon. [3]
 - (iii) Construct an Ogive [3]
- (c) A researcher collected data on the weight (in kilograms) of maize harvest from 12 small-holder farms. The following summary statistics were obtained:

$$\sum_{i=1}^{12} x_i = 960 \quad \text{and} \quad \sum_{i=1}^{12} x_i^2 = 82,560$$

Using this information, calculate the following.

- (i) The mean harvest weight per farm. [2]
- (ii) The variance of the harvest weights. [3]

Section B

2. (a) Show that for a sample $x_1, x_2, \dots, x_n$, the sample variance

$$\frac{1}{n-1} \sum_{i=1}^n (x_i - \bar{x})^2 = \frac{1}{n-1} \left(\sum_{i=1}^n x_i^2 - n\bar{x}^2 \right)$$

[4]

- (b) A total of 50 fish farmers participated in a training workshop. As part of a skills assessment, they were tested on their ability to correctly grade Tilapia. The number of fish each farmer correctly graded in a 5-minute period is shown below along with their frequencies.

Fish Graded Correctly	Number of Farmers (Frequency)
10	3
15	6
20	10
25	15
30	9
35	5
40	2

Find the following:

- (i) The mean number of fish correctly graded. [4]
 - (ii) The median number of fish correctly graded. [3]
 - (iii) The standard deviation of the number of fish graded. [5]
- (c) The following data represents the daily water requirements (in liters) for 30 different small-scale irrigation plots recorded during one growing season:

25 32 28 30 27 35 40 33 31 29
 34 36 38 41 37 26 24 39 43 45
 22 23 21 44 42 20 19 18 17 46

- (i) Find the **Interquartile Range (IQR)** [5]
- (ii) Find the **25th percentile**

[4]

3. (a) Distinguish the following terms used in Probability.

- (i) Mutually exclusive and Non mutually exclusive events [2]
- (ii) Statistically dependent and independent events [2]
- (iii) Discrete random variable and Continuous random variable

[2]

- (b) At a large grain cooperative, the moisture content of a randomly selected batch of wheat is normally distributed with a mean of 14.5% and a standard deviation of 2.2%. This is a critical measure, as high moisture can lead to spoilage during storage.

Determine the probability that a randomly selected batch of wheat will have a moisture content that is:

- (i) Between 13% and 16%. [4]
- (ii) Between 17% and 19%. [4]
- (iii) Below 12%. [2]

(iv) To prevent spoilage, batches in the highest 5% of moisture content must be dried before storage. What is the minimum moisture content that requires a batch to be dried? [5]

(c) A study was conducted on the monthly fertilizer usage for a sample of 80 small-scale maize farms. The average fertilizer usage for the sample is 420 kg per month. Assuming the standard deviation of fertilizer usage for all farms is 50 kg, construct a 95% confidence interval estimate of the actual mean fertilizer usage. [4]

4. (a) A grain storage facility has observed that trucks delivering maize arrive randomly at an average rate of 30 trucks per hour. Calculate the probability that:

(i) only 2 trucks will arrive during a specified 1-hour period [2]

(ii) at least 3 trucks will arrive during a specified 30-minute period. [5]

(b) A study is conducted to compare maize yields under two different sustainable farming practices: **Conservation Tillage (CT)** and **Organic Farming (OF)**. A random sample of 60 farms using CT records an average yield of **4.8 tons per hectare** with a known population standard deviation of **0.6 tons**, while 55 farms using OF record an average yield of **4.5 tons per hectare** with a known population standard deviation of **0.5 tons**. At the 5% level of significance, test whether the average maize yields are the same under the two farming practices. [8]

(c) A study was conducted on 9 different commercial tomato farms to investigate the relationship between the amount of fertilizer applied and the resulting crop yield. The data collected are shown below:

Farm	Fertilizer Applied (kg/ha)	Tomato Yield (tons/ha)
1	50	12.5
2	200	28.0
3	100	22.0
4	150	26.5
5	250	29.0
6	75	18.0
7	175	27.5
8	125	24.0
9	225	30.5

(i) Identify which variable is the dependent variable and why? [2]

(ii) Calculate the Pearson correlation coefficient and interpret. [8]

5. (a) A survey was conducted among students in the School of Agricultural Sciences at Kapasa Makasa University. The students were classified by their *field of specialization* and by *gender*. The results are shown below:

Field of Specialization	Male	Female	Total
Crop Science (CS)	18	22	40
Animal Production (AP)	20	15	35
Fisheries Management (FM)	25	30	55
Total	63	67	130

If one student is chosen at random from this group, find:

- (i) $P(\text{Female})$ [2]
 - (ii) $P(\text{Male} \cap \text{Crop Science})$ [2]
 - (iii) $P(\text{Fisheries Management} \mid \text{Female})$ [3]
- (b) A nutritionist claims that a certain breed of goats produces an average of **2.5 liters of milk per day**. A random sample of 12 goats produces a mean of **2.8 liters/day** with a sample standard deviation of **0.4 liters**. Using a 5% significance level, test whether the average daily milk production differs from the claimed 2.5 liters. [6]
- (c) A researcher recorded the **amount of fertilizer applied (kg/ha)** and the corresponding **maize yield (tons/ha)** from eight experimental plots, as shown below:

Fertilizer (kg/ha)	0	20	40	60	80	100	120	140
Maize yield (t/ha)	1.2	1.8	2.3	2.6	3.0	3.3	3.5	3.6

- (i) Identify independent variable [1]
 - (ii) Construct a **scatter plot** of maize yield against fertilizer rate. [3]
 - (iii) Determine the **linear regression equation** that best fits the data. [7]
 - (iv) Using the regression line, **estimate the expected maize yield** when 50 kg/ha of fertilizer is applied. [1]
6. (a) Define the following terms used in Biometry
- (i) Variable [1]
 - (ii) Sample [1]
- (b) A commercial farming company has observed that only 30% of job applicants for farm machinery operation are fully qualified. If 6 applicants are interviewed, let X be the number of qualified applicants.

Find the following probabilities:

(i) $P(X = 1)$

(ii) $P(X \geq 3)$

[3,5]

- (c) A livestock nutritionist conducted an experiment to compare the average daily weight gain (in kg) of lambs fed four different dietary supplements (Supplement P, Q, R, and S). The weight gains over a 30-day trial period are shown below:

Here's the table with totals for each group added:

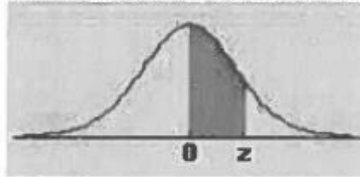
Supplement P	Supplement Q	Supplement R	Supplement S
0.8	1.2	1.5	1.0
0.9	1.1	1.4	0.9
0.7	1.3	1.6	1.1
1.0	1.0	1.3	0.8
0.8	1.0		1.2
Total: 4.2	Total: 4.6	Total: 5.8	Total: 5.0

- (i) State three assumptions assumed to carry out analysis of variance [3]

- (ii) Test the hypothesis that there is no significant difference in the mean daily weight gain among the four supplements at $\alpha = 0.05$ level of significance. [12]

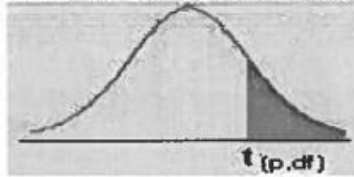
END OF EXAMINATION PAPER!

TABLE 1: THE STANDARD NORMAL DISTRIBUTION



z	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
0.0	0.0000	0.0040	0.0080	0.0120	0.0160	0.0199	0.0239	0.0279	0.0319	0.0359
0.1	0.0398	0.0438	0.0478	0.0517	0.0557	0.0596	0.0636	0.0675	0.0714	0.0753
0.2	0.0793	0.0832	0.0871	0.0910	0.0948	0.0987	0.1026	0.1064	0.1103	0.1141
0.3	0.1179	0.1217	0.1255	0.1293	0.1331	0.1368	0.1406	0.1443	0.1480	0.1517
0.4	0.1554	0.1591	0.1628	0.1664	0.1700	0.1736	0.1772	0.1808	0.1844	0.1879
0.5	0.1915	0.1950	0.1985	0.2019	0.2054	0.2088	0.2123	0.2157	0.2190	0.2224
0.6	0.2257	0.2291	0.2324	0.2357	0.2389	0.2422	0.2454	0.2486	0.2517	0.2549
0.7	0.2580	0.2611	0.2642	0.2673	0.2704	0.2734	0.2764	0.2794	0.2823	0.2852
0.8	0.2881	0.2910	0.2939	0.2967	0.2995	0.3023	0.3051	0.3078	0.3106	0.3133
0.9	0.3159	0.3186	0.3212	0.3238	0.3264	0.3289	0.3315	0.3340	0.3365	0.3389
1.0	0.3413	0.3438	0.3461	0.3485	0.3508	0.3531	0.3554	0.3577	0.3599	0.3621
1.1	0.3643	0.3665	0.3686	0.3708	0.3729	0.3749	0.3770	0.3790	0.3810	0.3830
1.2	0.3849	0.3869	0.3888	0.3907	0.3925	0.3944	0.3962	0.3980	0.3997	0.4015
1.3	0.4032	0.4049	0.4066	0.4082	0.4099	0.4115	0.4131	0.4147	0.4162	0.4177
1.4	0.4192	0.4207	0.4222	0.4236	0.4251	0.4265	0.4279	0.4292	0.4306	0.4319
1.5	0.4332	0.4345	0.4357	0.4370	0.4382	0.4394	0.4406	0.4418	0.4429	0.4441
1.6	0.4452	0.4463	0.4474	0.4484	0.4495	0.4505	0.4515	0.4525	0.4535	0.4545
1.7	0.4554	0.4564	0.4573	0.4582	0.4591	0.4599	0.4608	0.4616	0.4625	0.4633
1.8	0.4641	0.4649	0.4656	0.4664	0.4671	0.4678	0.4686	0.4693	0.4699	0.4706
1.9	0.4713	0.4719	0.4726	0.4732	0.4738	0.4744	0.4750	0.4756	0.4761	0.4767
2.0	0.4772	0.4778	0.4783	0.4788	0.4793	0.4798	0.4803	0.4808	0.4812	0.4817
2.1	0.4821	0.4826	0.4830	0.4834	0.4838	0.4842	0.4846	0.4850	0.4854	0.4857
2.2	0.4861	0.4864	0.4868	0.4871	0.4875	0.4878	0.4881	0.4884	0.4887	0.4890
2.3	0.4893	0.4896	0.4898	0.4901	0.4904	0.4906	0.4909	0.4911	0.4913	0.4916
2.4	0.4918	0.4920	0.4922	0.4925	0.4927	0.4929	0.4931	0.4932	0.4934	0.4936
2.5	0.4938	0.4940	0.4941	0.4943	0.4945	0.4946	0.4948	0.4949	0.4951	0.4952
2.6	0.4953	0.4955	0.4956	0.4957	0.4959	0.4960	0.4961	0.4962	0.4963	0.4964
2.7	0.4965	0.4966	0.4967	0.4968	0.4969	0.4970	0.4971	0.4972	0.4973	0.4974
2.8	0.4974	0.4975	0.4976	0.4977	0.4977	0.4978	0.4979	0.4979	0.4980	0.4981
2.9	0.4981	0.4982	0.4982	0.4983	0.4984	0.4984	0.4985	0.4985	0.4986	0.4986
3.0	0.4987	0.4987	0.4987	0.4988	0.4988	0.4989	0.4989	0.4989	0.4990	0.4990

TABLE 2: THE T-DISTRIBUTION



df/p	0.40	0.25	0.10	0.05	0.025	0.01	0.005	0.0005
1	0.324920	1.000000	3.077684	6.313752	12.70620	31.82052	63.65674	636.6192
2	0.288675	0.816497	1.885618	2.919986	4.30265	6.96456	9.92484	31.5991
3	0.276671	0.764892	1.637744	2.353363	3.18245	4.54070	5.84091	12.9240
4	0.270722	0.740697	1.533206	2.131847	2.77645	3.74695	4.60409	8.6103
5	0.267181	0.726687	1.475884	2.015048	2.57058	3.36493	4.03214	6.8688
6	0.264835	0.717558	1.439756	1.943180	2.44691	3.14267	3.70743	5.9588
7	0.263167	0.711142	1.414924	1.894579	2.36462	2.99795	3.49948	5.4079
8	0.261921	0.706387	1.396815	1.859548	2.30600	2.89646	3.35539	5.0413
9	0.260955	0.702722	1.383029	1.833113	2.26216	2.82144	3.24984	4.7809
10	0.260185	0.699812	1.372184	1.812461	2.22814	2.76377	3.16927	4.5869
11	0.259556	0.697445	1.363430	1.795885	2.20099	2.71808	3.10581	4.4370
12	0.259033	0.695483	1.356217	1.782288	2.17881	2.68100	3.05454	4.3178
13	0.258591	0.693829	1.350171	1.770933	2.16037	2.65031	3.01228	4.2208
14	0.258213	0.692417	1.345030	1.761310	2.14479	2.62449	2.97684	4.1405
15	0.257885	0.691197	1.340606	1.753050	2.13145	2.60248	2.94671	4.0728
16	0.257599	0.690132	1.336757	1.745884	2.11991	2.58349	2.92078	4.0150
17	0.257347	0.689195	1.333379	1.739607	2.10982	2.56693	2.89823	3.9651
18	0.257123	0.688364	1.330391	1.734064	2.10092	2.55238	2.87844	3.9216
19	0.256923	0.687621	1.327728	1.729133	2.09302	2.53948	2.86093	3.8834
20	0.256743	0.686954	1.325341	1.724718	2.08596	2.52798	2.84534	3.8495
21	0.256580	0.686352	1.323188	1.720743	2.07961	2.51765	2.83136	3.8193
22	0.256432	0.685805	1.321237	1.717144	2.07387	2.50832	2.81876	3.7921
23	0.256297	0.685306	1.319460	1.713872	2.06866	2.49987	2.80734	3.7676
24	0.256173	0.684850	1.317836	1.710882	2.06390	2.49216	2.79694	3.7454
25	0.256060	0.684430	1.316345	1.708141	2.05954	2.48511	2.78744	3.7251
26	0.255955	0.684043	1.314972	1.705618	2.05553	2.47863	2.77871	3.7066
27	0.255858	0.683685	1.313703	1.703288	2.05183	2.47266	2.77068	3.6896
28	0.255768	0.683353	1.312527	1.701131	2.04841	2.46714	2.76326	3.6739
29	0.255684	0.683044	1.311434	1.699127	2.04523	2.46202	2.75639	3.6594
30	0.255605	0.682756	1.310415	1.697261	2.04227	2.45726	2.75000	3.6460
inf	0.253347	0.674490	1.281552	1.644854	1.95996	2.32635	2.57583	3.2905

TABLE A.3

F Distribution: Critical Values of F (5% significance level)

ν_1	1	2	3	4	5	6	7	8	9	10	12	14	16	18	20
1	161.45	199.50	215.71	224.58	230.16	233.99	236.77	238.88	240.54	241.88	243.91	245.36	246.46	247.32	248.01
2	18.51	19.00	19.16	19.25	19.30	19.33	19.35	19.37	19.38	19.40	19.41	19.42	19.43	19.44	19.45
3	10.13	9.55	9.28	9.12	9.01	8.94	8.89	8.85	8.81	8.79	8.74	8.71	8.69	8.67	8.66
4	7.71	6.94	6.59	6.39	6.26	6.16	6.09	6.04	6.00	5.96	5.91	5.87	5.84	5.82	5.80
5	6.61	5.79	5.41	5.19	5.05	4.95	4.88	4.82	4.77	4.74	4.68	4.64	4.60	4.58	4.56
6	5.99	5.14	4.76	4.53	4.39	4.28	4.21	4.15	4.10	4.06	4.00	3.96	3.92	3.90	3.87
7	5.59	4.74	4.35	4.12	3.97	3.87	3.79	3.73	3.68	3.64	3.57	3.53	3.49	3.47	3.44
8	5.32	4.46	4.07	3.84	3.69	3.58	3.50	3.44	3.39	3.35	3.28	3.24	3.20	3.17	3.15
9	5.12	4.26	3.86	3.63	3.48	3.37	3.29	3.23	3.18	3.14	3.07	3.03	2.99	2.96	2.94
10	4.96	4.10	3.71	3.48	3.33	3.22	3.14	3.07	3.02	2.98	2.91	2.86	2.83	2.80	2.77
11	4.84	3.98	3.59	3.36	3.20	3.09	3.01	2.95	2.90	2.85	2.79	2.74	2.70	2.67	2.65
12	4.75	3.89	3.49	3.26	3.11	3.00	2.91	2.85	2.80	2.75	2.69	2.64	2.60	2.57	2.54
13	4.67	3.81	3.41	3.18	3.03	2.92	2.83	2.77	2.71	2.67	2.60	2.55	2.51	2.48	2.46
14	4.60	3.74	3.34	3.11	2.96	2.85	2.76	2.70	2.65	2.60	2.53	2.48	2.44	2.41	2.39
15	4.54	3.68	3.29	3.06	2.90	2.79	2.71	2.64	2.59	2.54	2.48	2.42	2.38	2.35	2.33
16	4.49	3.63	3.24	3.01	2.85	2.74	2.66	2.59	2.54	2.49	2.42	2.37	2.33	2.30	2.28
17	4.45	3.59	3.20	2.96	2.81	2.70	2.61	2.55	2.49	2.45	2.38	2.33	2.29	2.26	2.23
18	4.41	3.55	3.16	2.93	2.77	2.66	2.58	2.51	2.46	2.41	2.34	2.29	2.25	2.22	2.19
19	4.38	3.52	3.13	2.90	2.74	2.63	2.54	2.48	2.42	2.38	2.31	2.26	2.21	2.18	2.16
20	4.35	3.49	3.10	2.87	2.71	2.60	2.51	2.45	2.39	2.35	2.28	2.22	2.18	2.15	2.12
21	4.32	3.47	3.07	2.84	2.68	2.57	2.49	2.42	2.37	2.32	2.25	2.20	2.16	2.12	2.10
22	4.30	3.44	3.05	2.82	2.66	2.55	2.46	2.40	2.34	2.30	2.23	2.17	2.13	2.10	2.07
23	4.28	3.42	3.03	2.80	2.64	2.53	2.44	2.37	2.32	2.27	2.20	2.15	2.11	2.08	2.05
24	4.26	3.40	3.01	2.78	2.62	2.51	2.42	2.36	2.30	2.25	2.18	2.13	2.09	2.05	2.03
25	4.24	3.39	2.99	2.76	2.60	2.49	2.40	2.34	2.28	2.24	2.16	2.11	2.07	2.04	2.01
26	4.22	3.37	2.98	2.74	2.59	2.47	2.39	2.32	2.27	2.22	2.15	2.09	2.05	2.02	1.99
27	4.21	3.35	2.96	2.73	2.57	2.46	2.37	2.31	2.25	2.20	2.13	2.08	2.04	2.00	1.97
28	4.20	3.34	2.95	2.71	2.56	2.45	2.36	2.29	2.24	2.19	2.12	2.06	2.02	1.99	1.96
29	4.18	3.33	2.93	2.70	2.55	2.43	2.35	2.28	2.22	2.18	2.10	2.05	2.01	1.97	1.94
30	4.17	3.32	2.92	2.69	2.53	2.42	2.33	2.27	2.21	2.16	2.09	2.04	1.99	1.96	1.93
35	4.12	3.27	2.87	2.64	2.49	2.37	2.29	2.22	2.16	2.11	2.04	1.99	1.94	1.91	1.88
40	4.08	3.23	2.84	2.61	2.45	2.34	2.25	2.18	2.12	2.08	2.00	1.95	1.90	1.87	1.84
50	4.03	3.18	2.79	2.56	2.40	2.29	2.20	2.13	2.07	2.03	1.95	1.89	1.85	1.81	1.78
60	4.00	3.15	2.76	2.53	2.37	2.25	2.17	2.10	2.04	1.99	1.92	1.86	1.82	1.78	1.75
70	3.98	3.13	2.74	2.50	2.35	2.23	2.14	2.07	2.02	1.97	1.89	1.84	1.79	1.75	1.72
80	3.96	3.11	2.72	2.49	2.33	2.21	2.13	2.06	2.00	1.95	1.88	1.82	1.77	1.73	1.70
90	3.95	3.10	2.71	2.47	2.32	2.20	2.11	2.04	1.99	1.94	1.86	1.80	1.76	1.72	1.69
100	3.94	3.09	2.70	2.46	2.31	2.19	2.10	2.03	1.97	1.93	1.85	1.79	1.75	1.71	1.68
120	3.92	3.07	2.68	2.45	2.29	2.18	2.09	2.02	1.96	1.91	1.83	1.78	1.73	1.69	1.66
150	3.90	3.06	2.66	2.43	2.27	2.16	2.07	2.00	1.94	1.89	1.82	1.76	1.71	1.67	1.64
200	3.89	3.04	2.65	2.42	2.26	2.14	2.06	1.98	1.93	1.88	1.80	1.74	1.69	1.66	1.62
250	3.88	3.03	2.64	2.41	2.25	2.13	2.05	1.98	1.92	1.87	1.79	1.73	1.68	1.65	1.61
300	3.87	3.03	2.63	2.40	2.24	2.13	2.04	1.97	1.91	1.86	1.78	1.72	1.68	1.64	1.61
400	3.86	3.02	2.63	2.39	2.24	2.12	2.03	1.96	1.90	1.85	1.78	1.72	1.67	1.63	1.60
500	3.86	3.01	2.62	2.39	2.23	2.12	2.03	1.96	1.90	1.85	1.77	1.71	1.66	1.62	1.59
600	3.86	3.01	2.62	2.39	2.23	2.11	2.02	1.95	1.90	1.85	1.77	1.71	1.66	1.62	1.59
750	3.85	3.01	2.62	2.38	2.23	2.11	2.02	1.95	1.89	1.84	1.77	1.70	1.66	1.62	1.58
1000	3.85	3.00	2.61	2.38	2.22	2.11	2.02	1.95	1.89	1.84	1.76	1.70	1.65	1.61	1.58



KAPASA MAKASA UNIVERSITY
SCHOOL OF APPLIED SCIENCES AND OPEN LEARNING
DEPARTMENT OF AGRICULTURE AND AQUATIC SCIENCES
BACHELOR OF SCIENCE DEGREE
AA210/NR230 – REMOTE SENSING AND GIS

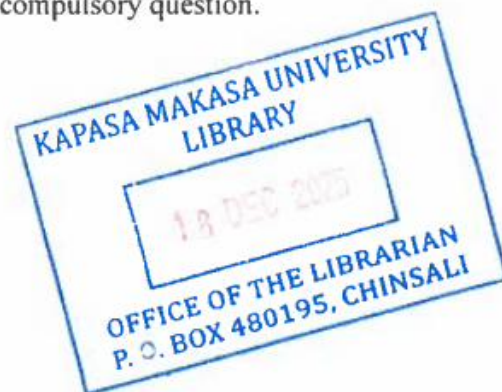
SESSIONAL EXAMINATION

DATE: 7 NOVEMBER 2025

TIME: THREE (3) HOURS

INSTRUCTIONS

- (a) Write your Student Identification Number on the Answer Booklet provided.
- (b) There two sections in this paper (A and B). **Section A** has one compulsory question.
- (c) Choose any four (4) questions from **section B**.
- (d) Start **each** answer on a new page.
- (e) No unauthorized materials are allowed
- (f) Write clearly and legibly.



DO NOT TURN OVER UNTIL YOU ARE TOLD TO DO SO.

SECTION A

Question One (Compulsory)

- a) A blackbody has a temperature of 7000 K. Using the Stefan-Boltzmann Law, calculate the total radiant energy emitted by the blackbody per unit area. **(2 marks)**
- b) The Planet Mercury has a blackbody temperature of approximately 440 K. Calculate the dominant wavelength of the Mercury's radiation. **(2 marks)**
- c) A photon has a wavelength of $0.2 \mu\text{m}$. Calculate the energy of this photon using Planck's equation. **(2 marks)**
- d) An electromagnetic wave has a frequency of $12 \times 10^{14} \text{ Hz}$. Calculate its wavelength in micrometer(μm). **(2 marks)**
- e) A sensor measures a radiant flux density of 600 W/m^2 from a blackbody. If the blackbody's temperature is 400 K, verify whether this measurement is consistent with the Stefan-Boltzmann Law. **(2 marks)**
- f) Earth has an average blackbody temperature of 300 K. Using Wien's Displacement Law, calculate the dominant wavelength of Earth's emitted radiation. **(2 marks)**
- g) Compare the energy of two photons: one with a wavelength of $0.1 \mu\text{m}$ (ultraviolet) and another with a wavelength of $0.8 \mu\text{m}$ (red light). Which photon has higher energy, and by how much? **(6 marks)**
- h) The surface of a star emits radiation with a dominant wavelength of 400 nm. Using Wien's Displacement Law, estimate the surface temperature of the star in Kelvins. **(2 marks)**

SECTION B

Question Two

List and discuss the four main types of image resolutions used in remote sensing. Explain the significance of each type of resolution in the context of remote sensing applications and give examples to illustrate your answers **(20 marks)**

Question Three

You have just finished performing a landuse classification and below is the confusion matrix that will help you validate your work. Show your working.

Classification Data	Urban	Forest	Agriculture	Bareland	Row Total
Urban	50	4	2	1	57
Forest	5	80	8	5	98
Agriculture	3	6	70	4	83
Bareland	2	10	10	40	62
Column Total	60	100	90	50	300

- Calculate the producer's accuracy for each class (Urban, Forest, Agriculture, Bareland). **(4 mark)**
- Calculate the user's accuracy for each class (Urban, Forest, Agriculture, Bareland). **(4 mark)**
- Calculate the omission error (%) for each class. **(4 mark)**
- Calculate the commission error (%) for each class. **(4 mark)**
- Compute the overall classification accuracy for the map. **(2 marks)**
- Identify which class has the highest omission error and give a one-sentence plausible explanation. **(2 marks)**

Question Four

You are provided with a Landsat 8 satellite image covering **Sumbu National Park in Zambia** and a shapefile of the park boundary. Using your knowledge of remote sensing and GIS operations in **ArcGIS**, answer the following questions.

- Explain the step-by-step process of computing the Normalized Difference Vegetation Index (**NDVI**) from the Landsat 8 image in ArcGIS. **(5 marks)**
- Describe how you would clip the NDVI raster to the park boundary in ArcGIS and explain the purpose of this step. **(3 marks)**

c) NDVI values are commonly classified into vegetation density ranges. Based on the following NDVI ranges:

- <0.1, 0.1–0.3, 0.3–0.5, 0.5–0.7, and >0.7

Explain what each class represents in terms of vegetation condition.

(3 marks)

d) A CSV file containing GPS coordinates of sample points has been provided. Change the points to decimal degrees (DD) format. 1: 12° 13' 51" S, 32° 05' 48" E; 2: 11° 57' 59" S, 32° 09' 55" E; 3: 11° 57' 45" S, 31° 51' 09" E 4: 12° 34' 37" S, 32° 45' 56" E; 5: 12° 48' 07" S, 32° 34' 58" E **(5 marks)**

e) When preparing the final NDVI map layout in ArcGIS, list and describe four essential cartographic elements that should be included to make the map professional and readable.

(4 marks)

Question Five

a) Define the following terms related to the interaction of Electromagnetic Radiation (EMR) with the atmosphere:

1. Absorption **(2 marks)**

2. Scattering **(2 marks)**

3. Refraction **(1 marks)**

b) Discuss the various types of scattering that occur when Electromagnetic Radiation (EMR) interacts with the atmosphere. Provide examples to illustrate each type of scattering. **(15 marks)**

Question Six

a) Define *Remote Sensing* and explain how it differs from direct ground observation. **(5 marks)**

b) Describe the two main types of remote sensing systems based on energy source, giving one example for each. **(6 marks)**

c) Define *satellite orbit* and briefly describe any two types of satellite orbits used in Earth observation. **(6 marks)**

d) Explain the term *spatial resolution* and why it is important in satellite image interpretation. **(3 marks)**

Question Seven

- a) Define the Normalized Difference Red Edge Index (**NDRE**) and state its formula. **(5 marks)**
- b) Explain how **NDRE** differs from **NDVI** and when it should be used. **(7 marks)**
- c) Define the Modified Soil Adjusted Vegetation Index (**MSAVI**) and explain why it is preferred at early growth stages. **(5 marks)**
- d) Briefly discuss one advantage of combining **NDVI** and **NDRE** in crop monitoring. **(3 marks)**

THE END

“Whether you think you can, or you think you can’t - you are right”

Good luck!

Formulae

Speed of light

$$c = \lambda \nu$$

c = constant speed of light (3×10^8 m/s)

λ = Wavelength

ν = frequency

Stefan-Boltzman Law

$$M_e = \sigma T^4$$

M_e = total emitted radiation from a blackbody (W m^{-2})

σ = Stefan-Boltzmann constant ($5.6697 \times 10^{-8} \text{ W m}^{-2} \text{ K}^{-4}$)

T = absolute temperature (degrees Kelvin)

Wien's Displacement Law

$$\lambda_{\text{max}} = k/T$$

λ_{max} = dominant wavelength

k = constant (2898 $\mu\text{m K}$)

T = absolute temperature (degrees Kelvin)

Energy of a photon

$$Q = h\nu$$

Q = energy of a quantum; joules (J)

h = Planck's constant, 6.626×10^{-34} J s

ν = frequency



KAPASA MAKASA UNIVERSITY

DEPARTMENT OF AGRICULTURAL AND AQUATIC SCIENCES

2025 SESSIONAL EXAMINATION

21ST OCTOBER, 2025

14:00-17:00

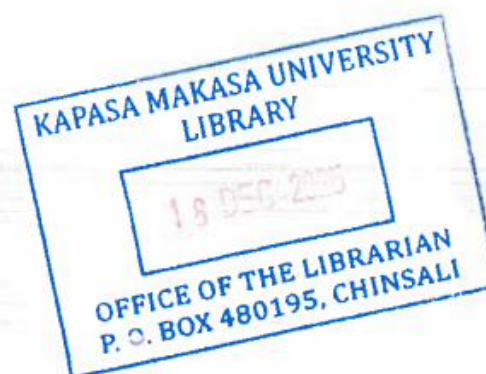
COURSE: PRINCIPLES OF CROP SCIENCE

CODE: AS 220

TIME ALLOWED: 3 HOURS

INSTRUCTIONS

- i. This question paper comprises seven (7) questions
- ii. You are required to ATTEMPT a total of five (5) questions
- iii. Each question carries **20 marks**
- iv. Question 1 in SECTION A is **COMPULSORY**
- v. Choose any 4 questions from SECTION B
- vi. Foreign materials are not allowed in the exam room



SECTION A

QUESTION 1 (compulsory)

A farmer in Mungwi district planted maize following the spacing of 0.9m X 0.25m.

- (a) Calculate the number of maize plants in the area of 100m X 100m. **10 marks**
- (b) Estimate the amount of fertilizer to be applied per plant if the farmer bought 8 X 25kg bags of fertilizer. **10 marks**

SECTION B

QUESTION 2

A small scale farmer comes to you for consultation on the oil crop to grow this farming season of 2024/2025.

- (a) What crops can you recommend? **6 marks**
- (b) What products can be produced from these oil crops? **5 marks**
- (c) What benefits do these oil crops give to the soil? **5 marks**
- (d) With examples mention some oil crops that can benefit the soil. **4 Marks**

QUESTION 3

- (a) Explain the process of Photosynthesis in plants. **15 marks**
- (b) List environmental factors that affect the rate of photosynthesis **5 Marks**

QUESTION 4

- (a) Discuss the process of Nodulation between root cell and bacteria. **6 marks**
- (b) What simple test can be done to check effectiveness of the rhizobium? **4 marks**
- (c) Describe biological nitrogen fixation in plants. **6 marks**
- (d) Why is synthetic nitrogen fertilizers application discouraged in modern agriculture?
4 marks

QUESTION 5

- (a) Define the four phases of maize life cycle. **8 marks**
- (b) What category of maize is available according to maturity? **6 marks**
- (c) Why is maize the widely grown crop in Muchinga province? **6 marks**

QUESTION 6

- (a) Define the plant cell. **4 Marks**

Explain the functions of the following parts:

- (b) Cell wall **4 marks**
- (c) Nucleus **4 marks**
- (d) Chloroplasts **4 marks**
- (e) Phloem **4 Marks**

QUESTION 7

- (a) What are stem cells? **5 Marks**
- (b) Explain the commercial use of the hormone auxin. **8 Marks**
- (c) Give reasons for plants producing secondary metabolites. **7 Marks**



KAPASA MAKASA UNIVERSITY
SCHOOL OF APPLIED SCIENCES
DEPARTMENT OF AGRICULTURE AND AQUATIC SCIENCES

2025 SESSIONAL EXAMINATION

31ST OCTOBER, 2025

09:00-12:00

ANIMAL BREEDING

AS 301

INSTRUCTIONS:

1. There are seven questions in total
2. Answer a Compulsory (CQ) in **Section A**
3. Answer any four (4) questions out of six in **Section B**
4. There are 100 marks allocated to this paper
5. Each question carries **20 marks**
6. Where possible, illustrate your answers
7. Time allowed: **Three 3 hours**
8. When answering follow further instructions in the answer book
9. Using any unauthorised document in the exam room is prohibited



SECTION A - Compulsory

Question 1

Study the information for the trait of weight on two parents and daughter

serial	Dam weaning weight	Offspring weaning weight
1	15.5	14
2	16	14.5
3	14.5	15.5
4	14	16
5	13	13

Required;

- Estimate the heritability for the trait of weight using regression method. (10 marks)
- Using repeated records
 - A daughter has mean milk yield from lactation 1 and lactation 2 as 800kg
 - Herd mean for milk yield in lactation 1 and 2 is 600kg
 - Predict her breeding value using the heritability you have calculated in part a. (4 marks)
- What is the difference between repeatability and heritability? (6 marks)

SECTION B (Choose any four questions)

Question 2

A dihybrid cross in cattle could involve tracking two traits, such as coat colour (black vs. red) and horn presence (polled/hornless vs. horned). The coat colour black is denoted by B, while the horn presence is denoted by H. Mr. Musonda a farmer in central province wishes to cross a black, polled bull (heterozygous for both traits) with a red, horned cow (homozygous recessive for both traits), Mr. Musonda doesn't understand much about animals because he is a lawyer who wishes to go into animal production, he needs clear explanation from you an expert from Kapasa Makasa on the following:

- a. The meaning of Dihybrid Cross (2 marks)
- b. Explain whether the two traits being tracked are qualitative or quantitative. (4 marks)
- c. The meaning of Alleles giving an example from the question.(4 marks)
- d. Give the parent's Genotypes in question that would be used in a dihybrid cross (note: do not draw a dihybrid cross) (6 marks)
- e. Predict the genotypic and phenotypic ratio for monohybrid cross for the trait of horns. (4 marks)

Question 3

State the meaning of the following

- a. Cross breeding (4 marks)
- b. Back crossing (4 marks)
- c. Out breeding (4 marks)
- d. Grading up (4 marks)
- e. Inbreeding (4 marks)

Question 4

- a. Explain the criteria used when selecting animal under the following methods for selection of a single trait.
 - i. Mass selection (3 marks)
 - ii. Pedigree selection (3 marks)
 - iii. Family /sib selection (3 marks)
 - iv. Progeny selection (3 marks)
- b. Define variation in a population of animals (2 marks)
 - i. Outline any three causes of variation (6 marks)

Question 5

The average milk yield of daughters of a bull A is 200lit and for Bull B is 2550lit in lactation. The herd mean is 200lit for Bull A and 220lit for bull B.

- a. Predict the EBV of the milk yield for the bull A and bull B assuming that the heritability is 0.48 for both animals. (4 marks)
- b. Which one of the two, Bull A or Bull B would you choose for breeding? Give a reason for the answer. (4 marks)
- c. Estimate the genetic potential (performance) of the male progeny for bull A, if the EBV on record for a cow mated with Bull A was found to be 15lit. (4 marks)

- d. What do you understand by estimated breeding value and why is it important in Animal breeding.(4marks)
- e. What is the meaning of 0.48 heritability as related to inheritance? (4 marks)

Question 6

- Breed 1 is homozygous (fixed) for A: all animals have the genotype AA.
- Breed 2 is homozygous (fixed) for a: all animals have the genotype aa.
- Breed 1 is producing 96 eggs per year and breed 2 is producing 94 eggs per year.
- Cocks of breed 1 are mated to hens of breed 2.
- Their offspring with genotype Aa is expected to produce 95 eggs per year, the average of the two parent breeds, but they do produce 105 eggs per year.

Required

- a. Calculate the heterosis (4 marks)
- b. Calculate the heterosis percentage (4 marks)
- c. What do you understand by heterosis or hybrid vigour in animal breeding.(4 marks)
- d. Give four reasons for practicing cross breeding in animals (8 marks)

Question 7

Explain the following crossbreeding systems and their applicability in animal breeding

- a. Two way cross (5 marks)
- b. Three way cross (5 marks)
- c. Four way cross (5 marks)
- d. Two way rotation (5 marks)

END OF THE EXAMINATION



KAPASA MAKASA UNIVERSITY
SCHOOL OF APPLIED SCIENCES
DEPARTMENT OF AGRICULTURE AND AQUATIC SCIENCES

2025 SESSIONAL EXAMINATION

5TH NOVEMBER, 2025

14:00-17:00

ANIMAL NUTRITION

AS 310

INSTRUCTIONS:

1. There are seven questions in total
2. Answer a Compulsory Question in **Section A**
3. Answer any four (4) questions out of six in **Section B**
4. There are 100 marks allocated to this paper
5. Each question carries **20 marks**
6. Where possible, illustrate your answers
7. Time allowed: **Three 3 hours**
8. When answering follow further instructions in the answer book



SECTION A – Compulsory

QUESTION 1

Study the following tables below and use the information to answer the questions on formulation of a balanced diet for broiler grower chickens aged 4-5 weeks.

Table 1: Nutrient requirement table for broilers

Age	Energy kcal/kg ME	Crude protein %	Lysine%	Methionine%	Calcium%	Phosphorus%
0-3 weeks	3200	23	1	0.38	0.90	0.70
4-5 weeks	3000	21	1	0.38	0.90	0.70
5-7 weeks	2800	19	1	0.38	0.90	0.70

Table 2: The available ingredients and determine their composition in relevant nutrients

				Nutrients			
Ingredient Name	(%)	Energy (cal./kg)	Protein (%)	Lysine (%)	Methionine (%)	Calcium (%)	Phosphorus (%)
Maize meal		3350	8.8	.24	0.20	0.02	0.28
Soyabean meal		2230	44	2.93	0.65	0.29	0.65
oil		8000	-	-	-	-	-
DCP		-	-	-	-	26	18
Limestone		-	-	-	-	38	-
DL-methionine					98	-	-
Lysine				80			
Vit. premix*							
Min. premix*							
salt							

Assume premixes are recommended for inclusion at 0.05% of the feed for each of the two, vitamins and minerals and salt at any rate between 0.25% and 0.5% of the mixture.

Required

- Use Pearson Square or simultaneous equation to come up with inclusion levels. Set aside a 7% portion to accommodate other ingredients to make up for the short-falls, and addition of salt and premixes. (6 marks)
- Using the level of inclusion in (a) above, draw a table and determine all the deficiencies between animal requirements and available nutrients in the main ingredients i.e. soyabeans and maize. (10 marks)
- From your understanding what do the differences indicate from this calculation? Give a brief explanation on how you would resolve the differences meet the animal requirement. (Note: do not perform calculations) (4 marks)

SECTION B (Choose any four questions)

Question 2

- Briefly explain the fermentation of carbohydrates, proteins and fats in the rumen. (10 marks)
- summarise the enzymatic digestion of carbohydrates in non- ruminants. (5 marks)
- Give a reason why a farmer should not feed animals on lush pastures or too much concentrates in ruminant animals. (5 marks)

Question 3

The following information was obtained from proximate analysis procedure on Rhodes grass hay.

Component	As fed values	As fed %	%DM
Rhode grass hay	150g		
Moisture	10g		
Nitrogen	$1.5g \times 6.25 = 9.4$		
Ether extract	5g		
Crude fibre	15g		
Ash	12g		
Nitrogen free extractives	?		

- Calculate the NFE based on as fed values (5 marks)
- Convert As fed values to Dry matter % (5 marks)
- What do you understand by nitrogen free extractives (5 marks)

- d. Explain the reason why the value of nitrogen is multiplied by the factor of 6.25.
(5 marks)

Question 4

Formulate 100kg of feed for a steer with a 16% CP and 75% TDN ration which must include following fixed ingredients as shown in the table below;

Table 1

	Level of inclusion	% CP	TDN%
Silver leaf	10%	20.7	57
Rice bran	10%	14.0	66
Sugar cane molasses	3%	4.3	91
Cassava leaves	2%	21.0	63
Slack space	1%	-	-

Other main plant sources available on dry matter basis include;

Table 2

	DM%	%CP	TDN %
Maize	89	10	88
Groundnut meal	92	53.8	83
Groundnut haulms	91	10.9	58
Leucaena	90	18.4	57

Required

- a. Use a double Pearson square to find the proportions needed to mix the specified ration, express your answer both as- fed and on dry matter. (**Note: not write the table to show the balances**) (20 marks)

Question 5

The steer consumed 2.4 kg hay and excreted 1.20 kg faecal DM. If we assume that the GE content of hay and faecal was 27MJ/kg DM and 28MJ/kg DM, respectively.

- a. Calculate the digestibility of hay. (3 marks)
b. Calculate the digestible energy in MJ/kg. (3 marks)

- Calculate the Metabolisable energy (MJ/kg) that was available for use by the animal if on average, if ME of ruminants was estimated at 0.81 of digestible energy. **(3 marks)**
- The steer also generated heat (loss) through the metabolism of the gut microorganisms; this is estimated to amount to about 6% of ME intake. Calculate the net energy (MJ/kg) that was retained for maintenance and production **(3 marks)**
- Explain briefly the activities under maintenance and production in steers, in which net energy will be used. **(4 marks)**
- Outline any two factors that affects digestibility in farm animals. **(4 marks)**

Question 6

The student carried out a feeding trial in broiler chickens for 6 weeks. Chickens in experiment 1 feed on commercial feeds consumed 3kg feed and gained 2.2kg. While chickens fed on farm based formulated feed consumed 3.3kg and gained 1.8kg.

- Calculate the feed conversion ratio for the two experimental units **(3 marks)**
- Calculate the efficiency for the chickens for the two experimental units. **(3 marks)**
- Which feed will be preferred commercial feed or home based formulated feeds. Give a reason for your answer. **(4)**
- Outline main classes of feed additives **(10 marks)**

Question 7

The digestible nutritional values of Rhodes grass grown at Mr. Mulenga's farm, after conducting proximate analysis were as shown in the table below.

Nutrient	g/kg
DCP	23
DEE	9
DCF	129
DNFE	256

Required

- Calculate the TDN and advise Mr. Mulenga on the feeding of the Rhodes to the animals on his farm.
- Estimate the dry matter intake (DMI) if the dairy cattle weigh 350kg and produces 20kg of milk per day.
- Calculate ME (MJ/KgDM) (formula; $0.0152\text{DCP} + 0.0342\text{DEE} + 0.0128\text{DCF} + 0.0159\text{DNFE}$)
- Calculate total the ME for the feed consumed by the dairy animal (DMI)
- Using the feeding standards in the table blow, comment on the suitability of this feed on ME for the animal weighing 350 kg and giving 20kg of milk. **(20 Marks)**

Live mass (kg)	Milk (kg)	Dry matter (kg)	ME (MJ)	DCP (k)
350	10	9.8	89	765
	20	10.8	138	1285
	30	11.8	188	1805
400	10	11.0	94	780
	20	12.0	143	1300
	30	13.0	193	1820
450	10	12.3	98	790
	20	13.3	147	1310
	30	14.3	197	1830
500	10	13.5	103	800
	20	14.5	152	1320
	30	15.5	202	1840
550	10	14.8	108	805
	20	15.8	157	1325
	30	16.8	207	1845

Dry matter intake is derived from the relationship $DMI = 0.025M + 0.1 Y$ where M = livemass in kg and Y = yield of milk in kg. ME for maintenance is taken as $487 \text{ KJ M}^{-0.75}$; ME and DCP for milk production is taken from average Friesian Milk (36 g/kg butterfat and 86 g/kg solids non-fat) of 4.93 MJ ME/kg and $62 \text{ g digestible protein}$ and $30 \text{ g of tissue protein/kg}$ (Topps and Oliver, 1993).

Dry matter intake is derived from the relationship $DMI = 0.025m + 0.1 y$ where m = livemass in kg and y = yield



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KAPASA MAKASA UNIVERSITY
SCHOOL OF APPLIED SCIENCE AND OPEN LEARNING

BACHELOR OF SCIENCE IN ANIMAL SCIENCE

AS321: FUNDAMENTALS OF MICRO AND MACRO ECONOMICS

SESSIONAL EXAMINATION

WEDNESDAY 22ND OCTOBER 2023

TIME: 3 HOURS

INSTRUCTIONS TO CANDIDATES

1. Write your Student Identification Number on the Answer Booklet provided. Your name must NOT appear anywhere on your answer booklet
2. You have FIVE (5) minutes of reading time. Use it to study the examination paper carefully to understand what to do in each question.
3. This paper consists of seven (7) questions:
4. Answer 5 questions and question 1 is compulsory.
5. Do NOT write in pencil (except for graphs and diagrams).
6. The marks shown against the requirement(s) for each question should be taken as an indication of the expected length and depth of the answer.
7. All workings must be done in the answer booklet.
8. Present legible and tidy work.
9. Cell Phones are NOT allowed in the Examination Room.

DO NOT TURN THE PAGE UNTIL YOU ARE TOLD TO DO SO

Question 1 COMPULSORY

- a. SKM enterprise engages in the monthly production and sale of Fresh Milk. The firm's fixed costs (e.g., cold storage, and permits) total K10,000, and the variable cost per unit (including labour, packaging, and transport) is K20. The firm sells each packet of Fresh Milk at K45.

Based on the cost structure provided, **Drive** the **Total Cost (TC)**, **Total Revenue (TR)**, and **Profit (π)** as functions of output quantity (Q). Clearly define all terms used. [6 Marks]

- b. Perform a **break-even analysis** by calculating the exact number of packets that must be sold for the firm to cover all costs. What does this point imply about the firm's short-run viability? [4 marks]
- c. If the demand Function is $D = 160 - 0.0025x$ and the Cost function is $C = 15x + 0.0025x^2$. Find the profit revenue-maximising output level [6 marks]
- d. If a household's disposable income has increased from K1, 200 to K2, 200 per week and consumption has increased from K900 to K1, 800. Compute the household's marginal propensity to consume (MPC) and interpret your result. [4 Marks]

[Total: 20 Marks]

Question 2

- a. An open economy is characterised as follows: Consumption (C) = $3200 + 0.75(Y - T)^2$; Taxes (T) = $0.2Y$; Investment (I) = $900 + 0.05Y$; Government Expenditure (G) = 1100; Exports (X) = 2400; and Imports (M) = $1800 + 0.3Y$.
- Derive the aggregate demand (AD) function, [5 Marks]
 - Calculate the equilibrium income (Y) level. [5 Marks]
 - Assume the government increases expenditure by 10%. Recalculate the new equilibrium income level and comment on the multiplier effect in the presence of a non-linear consumption function [5 Marks]
- b. State **five** factors that determine the internal country's national [5 Marks]

[Total: 20 Marks]

Question 3

Use a supply and demand diagram to analyze each of the following scenarios. Explain briefly. Be sure to show how both the equilibrium price and quantity change in each case.

- The economic downturn has led to more people staying home to watch movies, rather than going to a movie theatre. Show how this change in behaviour affects the market for microwave popcorn. [4 Marks]
- Suppose that drought conditions in agricultural regions increase the costs of irrigation. How would this affect the market for fruits and vegetables? [4 Marks]
- Recent technological advances have increased the number of female cows, which are essential for milk production. Surprisingly, farmers are not pleased with this development. Using a supply and demand diagram for the milk market, explain why farmers might be unhappy. [4 Marks]
- As a store manager selling generic soft drinks, you expect customer incomes to rise by 5% next month. If the income elasticity of demand for your product is -2.0 , estimate how much the demand for generic soft drinks will change to avoid surplus or shortage. [4 Marks]

[Total: 20 Marks]

Question 4

- (a) Mr. Mwanza keeps the daily cows, he pays each processing worker K80 per day. The cost of other variable inputs (e.g., packaging, water, electricity) is estimated at K0.20 per Litre of milk produced. The business pays K100 per day for rent.

Labour	Quantity (liters)	Variable Cost	Fixed Cost	Total Cost	Marginal Cost	AFC	AVC	ATC
0	0							
1	160							
2	400							
3	600							
4	720							
5	800							
6	840							

[12 Marks]

- (b) At Chinsali Market the same commodity Y as the demand and supply equations as follows

$$Q_d = 300 - 3P$$

$$Q_s = 100 + 5P$$

Where Q is the quantity and P is the price:

- Calculate the equilibrium price and quantity for this good. [2 Marks]
- Suppose that an increase in the consumer income resulted in the new demand equation $Q_d = 420 - 3P$. What is the new equilibrium price and quantity for this good. [4 Marks]
- Suppose the government enacts legislation that imposes a price ceiling equivalent to the original equilibrium price, what is the result of the legislation [2 Marks]

Question 5

- Distinguish between the Ceiling and floor prices based on the Producer and the customer. [4 Marks]
- Describe how fiscal policy can be used to deal with rising inflation and unemployment. [6 Marks]
- Assume the following data for a country: total population, 500; population under 16 years of age, 120; not in labour force, 140; unemployed, 36; part-time workers looking for full-time jobs, 10.
 - Calculate the size of the labour force [2 Mark]
 - Determine the official unemployment rate [2 Mark]
- State the Effects of unemployment in a country like Zambia [3 Marks]
- Explain how the concept of **economic choice** arises from scarcity, and evaluate how Zambian households and the government make choices under limited resources. [3 Marks]

[Total: 20 Marks]

Question 6

- a. You are managing a livestock improvement project and plan to purchase a milking machine costing K8,000 in the future. A local agricultural bank offers an annual interest rate of 10%, compounded quarterly. However, a 20% tax is charged on the interest earned.

Required:

- i. Determine the present amount that should be invested now to accumulate K8,000 at the end of 2 years, after accounting for the tax on interest. **[5 Marks]**
 - ii. If the purchase of the milking machine is postponed and made at the end of 5 years, compute how much should be set aside now, assuming the same interest rate and tax conditions. **[5 Marks]**
 - iii. You are the financial manager of Green Pastures Dairy Ltd, a company planning to expand its milk processing plant. The project requires K2,500,000 in financing. The management is considering raising the funds either through the money market or the capital market
 - (a) Define and explain the key differences between the **capital market** and the **money market** in terms of: Maturity period, Sources of funds, Purpose of borrowing **[6 Marks]**
 - (b) Identify two suitable financial instruments from each market that Green Pastures Dairy Ltd could use to raise the required funds, **[4 Marks]**
- [Total: 20 Marks]**

Question 7

The Finance; Minister Situmbeko Musokotwane on 26TH September 2025, presented the 2026 National Budget totalling **K253.1 billion**, highlighting a shift from crisis-era spending toward consolidation and prioritising continuity over sweeping new programs. The government also projects a reduction in the fiscal deficit—from about 3.1 % of GDP in 2025 toward 0.7 % by 2027. With that in mind, answer the following using analytical, policy-oriented reasoning.

- i. Define **expansionary vs contractionary** fiscal and monetary policies. **[4 Marks]**
 - ii. Given the government's stated intent to consolidate and reduce its deficit, describe a contractionary fiscal stance and its likely macroeconomic effects in Zambia (on growth, debt, and inflation). **[5 Marks]**
 - iii. The Bank of Zambia currently maintains its Monetary Policy Rate at **14.5 %** to tame inflation, while inflation has been declining from 16.5 % toward targets.

Explain how the central bank uses the policy rate to influence inflation and aggregate demand. **[5 Marks]**
 - iv. Outline any three (3) fiscal policy measures that the government may introduce in order to reduce the youth unemployment in Zambia **[6 Marks]**
- [Total: 20 Marks]**

The End of Examination



KAPASA MAKASA UNIVERSITY
SCHOOL OF APPLIED SCIENCE AND OPEN LEARNING

Course Title: INTRODUCTION TO AQUACULTURE

Course Code: AS 331

Date: 29th JULY, 2025

Duration: 3 HOURS

Total Marks: 100



General Instructions to Candidates:

1. Answer questions as instructed.
2. No unauthorized materials are allowed
3. No electronic devices allowed unless specified.
4. Start each answer on a new page.
5. Write clearly and legibly.

INSTRUCTIONS

-This paper has two sections (Section A and B) with a total of Seven (7) questions each carry 20 Marks.

-Section A is COMPULSORY (question 1)

-Attempt any Four (4) questions in section B

-Write your Student Identification Number (SIN) Clearly on the answer booklet provided.

SECTION A

QUESTION ONE

During your training in the Introduction to Aquaculture Course (AS 331), you undertook a visit to Kapasa Makasa University (KMU) Fish Farm as a way of exposure and solidifying the theoretical concepts that you learnt in class. As such, the following questions are based on the that visit to the farm and some concepts learnt in class.

- a) What type of culture facilities were found at the farm? [1 Mark]
- b) Using Scientific names, mention any two species of fish cultured at KMU. [2 Marks]
- c) What is aquaculture biosecurity? [3 Marks]
- d) State two measures of biosecurity found at the farm [2 Mark]
- e) What form of value addition is done or may be done at the farm? [2 Mark]
- f) If you are asked to improve biosecurity measures at the farm, what four (4) things would you implement? [4 Marks]
- g) What type of aquaculture is practiced at the fish farm? [4 Marks]
- h) A part from the production facilities, what other facilities are found at the farm? [2 Marks]

SECTION B

QUESTION TWO

- a) Define the following terms
 - i. Disease [1 Marks]
 - ii. Aquaculture [1 Marks]
 - iii. Exophthalmus [1 Marks]
- b) Why is it important from an aquaculture perspective to know or study reproductive diversity. [1 Marks]
- c) Explain briefly what would happen if one of the nodes of the aquaculture value chain is poorly operated or executed. [2 Marks]

- d) Discuss two biological factors that must be considered when selecting a fish species for farming. **[4 Marks]**
- e) Fish diseases cause significant financial loss to aquaculture business. List any five (5) living organisms that causes fish diseases and for each provide an example of a disease that it causes. **[10 Marks]**

QUESTION THREE

- a) Differentiate the following terms
- i. Fish and Fishes **[2 Marks]**
 - ii. Zooplankton and phytoplankton **[2 Marks]**
- b) In aquaculture, understanding puberty of your fish species is critical because both Early and Late puberty can be a problem. With examples, discuss the previous statement **[4 Marks]**
- c) Discuss three advantages and disadvantages of integrating fish with pig farming. **[6 Marks]**
- d) Nutritional requirements for fish vary from species to species and or fish to fish. Explain two (2) factors that affect nutritional requirements of fish. **[4 Marks]**
- e) In order to operate a fish hatchery, having quality and quantity broodstock is paramount. List any two sources of quality broodstock for hatcheries. **[2 Marks]**

QUESTION SIX

- a) Define the following terms
- i. Milt [1 Marks]
 - ii. Polyculture [1 Marks]
- b) A rich man wants to invest in fish farming in your village but he has no knowledge of the species that he can select for culturing (Farming). He went online to research and found out that there two species that could be farmed in your village. Species (A) has a Feed Conversion Ratio (FCR) of 3 while species (B) has a Feed Conversion Ratio of 1.8. He has heard from the village headman Mr. Chenda Weka that you recently graduate from Kapasa Makasa University (KMU) with a Bachelor's Degree in Animal Science and you took introduction to aquaculture. Using your knowledge of FCR, provide guidance on which one of the two species (A or B) would make a better fish for farming and why. [10 Marks]
- c) Discuss four (4) factors that may hinder entrepreneurial development [8 Marks]

QUESTION SEVEN

- a) Define the following terms
- i. Fingerling [1 Marks]
 - ii. Gametogenesis [1 Marks]
- b) Discuss two signs of dysfunctional in male fish [4 Marks]
- c) Briefly explain two methods of administering of feed to the fish [4 Marks]
- d) Discuss two importance of entrepreneurship to society [2 Marks]
- e) Discuss four (4) techniques that may be used to produce mono-sex Tilapia [8 Marks]

..... END OF EXAM.....



KAPASA MAKASA UNIVERSITY
SCHOOL OF APPLIED SCIENCE AND OPEN LEARNING

DEPARTMENT OF AGRICULTURAL AND AQUATIC SCIENCES

2025 SESSIONAL EXAMINATION

10TH NOVEMBER, 2025

09:00-12:00

Course Title: Poultry, Pig and Rabbit Production

Course Code: AS 350

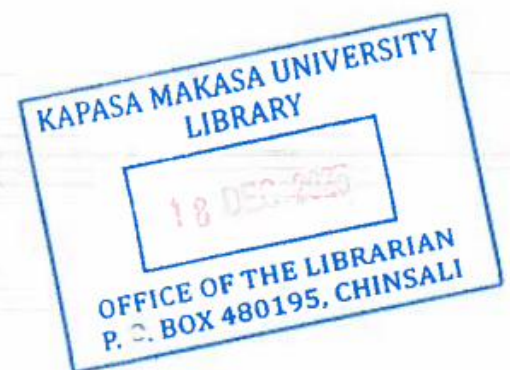
Duration: 3 Hours

General Instructions to Candidates:

1. Answer questions as instructed.
2. No unauthorized materials are allowed
3. No electronic devices are allowed unless specified.
4. Start **each** answer on a new page.
5. Write clearly and legibly.

Exam Instructions:

1. There are seven Questions in this paper answer five questions
2. Question one in section A is compulsory and choose any four questions in section B



SECTION A: COMPULSARY

QUESTION ONE

A. As a University of Kapasa Makasa graduate, you have been requested to present a paper to a farmer group, on poultry production in Zambia. Prepare brief notes on the optimum requirements and the importance of the following during incubation of eggs for your presentation:

- i. Temperature (4 Marks)
- ii. Humidity (2 Marks)
- iii. Turning of eggs (2 Marks)

B. A small holder farmer in Mulakupikwa area of Chinsali wants to establish a piggery with 4 Sows and 1 boar, wishes to construct a piggery unit to ensure efficient pig production. As a student studying a pig production course at Kapasa Makasa University, you are requested to give advice on the number and types of pens he can construct given the following common practices;

- The sow is taken to the farrowing pen 1 week before farrowing date
- Piglets are left in pen for 7 days after weaning
- The period for cleaning and disinfecting takes 2 weeks
- The length of lactation is 6 weeks, and
- Weaning- to- first service is estimated at 21 days.
- Following average gestation period 115days

Using the information provided above calculate the following: (show your work)

- i. Outline the types of pens required at the farm and determine the number of each kind of pen to be constructed (6 Marks)
- C. Explain the management practices needed for successful brooding management of day-old broiler chicks during the 24 hours before receiving chicks and the first week of brooding. (6 Marks)

SECTION B: CHOOSE ANY FOUR OF THE SIX QUESTIONS.

QUESTION ONE

- A. What can you advise a farmer who wants to invest in layer production on:
- the nutritional feeding requirements for different classes of layers. **(4 Marks)**
 - the general guidelines on collection of hatching eggs in the deep litter poultry house **(2 marks)**
 - the factors which could lead to failure to hatch for fertilized eggs during the last few days of incubation. **(2 Marks)**
- B. A breeding routine is also good management.
- Discuss the breeding routine that you would put in place at rabbit farm of your choice. **(4 Marks)**
 - What advise the farmer where to obtain breeding stock and what to look for in good breeding rabbits **(4 Marks)**
- C. What are the challenges of free-range 'scavenging' pig production system in Zambia and what can you advise farmers in order to improve pig production. **(6 Marks)**

QUESTION TWO

- A. Management of pullets during the rearing period from week 8 to week 20 is the most crucial period in layer and egg production. Discuss this statement. **(8 Marks)**
- B. Hygiene in the poultry is known to affect hatchability and the quality of chicks in the first week after hatching.
- Explain the major objectives for keeping poultry premises clean **(2 Marks)**
 - Discuss the criteria a poultry farmer needs to consider when selecting type of disinfectant to use **(4 Marks)**
- C. What can you advise a farmer who wants to invest in Pig production on the nutritional feeding of feeding of piglets from farrowing to eight weeks of age. **(6 Marks)**

QUESTION THREE

- A. Briefly explain the meaning and when the following practices are performed in poultry production.
- Candling **(2 Marks)**
 - De-beaking in layers **(2 Marks)**
 - Flock or mass mating system as applied in poultry production **(2 Marks)**
- B. Discuss the importance of record keeping in pig production **(6 Marks)**

C. What factors would you take into consideration in selecting good breeding rabbits? (6 Marks)

D. What is castration and its importance in pig production (2 Marks)

QUESTION FOUR

A. A smallholder farmer noticed most of the piglets die within a week from farrowing and a few are weaned. What do you think are the two main reasons for such performance and what could be your advice to the farmer (4 Marks)

B. Describe care of pregnant sow before farrowing and the newly born piglets (6 Marks)

C. Write notes on any four (4) the factors that may affect feed intake in rabbits. (4 Marks)

D. What can you advise a farmer who wants to invest in layer production on the nutritional feeding requirements for different classes of layers. (6 Marks)

QUESTION FIVE

A. Explain the feeding management of Sows before servicing, before farrowing and during lactation (6 Marks)

B. Discuss the rearing of piglets under the following headings;

i. Hand mating in pigs (2 Marks)

ii. Teeth clipping (4 Marks)

iii. Slaughter process of pigs (4 Marks)

C. List down any eight (8) bulky feeds that can be used to feed rabbits under the extensive system of management (4 Marks)

QUESTION SIX

A. Outline any three (3) main predisposing conditions to pre-weaning piglet mortality and that can be avoided. (6 Marks)

B. Stress is known to cause poor production in pigs. State the animals' physiological response to stress? (4 Marks)

C. Write short notes on the breeding management of the doe and test mating. (4 Marks)

D. The reasons/advantages of raising rabbits in preference to other livestock. (4 Marks)

E. What is the scavenging feed resource base for chickens (2 Marks)

End of the exam



KAPASA MAKASA UNIVERSITY
SCHOOL OF APPLIED SCIENCE AND OPEN LEARNING

Course Title: ANIMAL HEALTH AND DISEASE PREVENTION

Course Code: AS 401

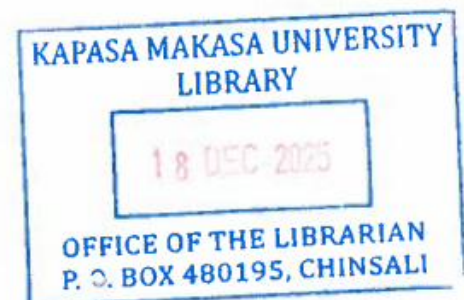
Date: 30th July, 2025 Time: 14:00 to 17:00

Duration: THREE (3) HOURS

Total Marks: 100

General Instructions to Candidates:

1. Answer questions as instructed.
2. No unauthorized materials are allowed
3. No electronic devices allowed unless specified.
4. Start each answer on a new page.
5. Write clearly and legibly.



Exam Instructions:

- i. Answer ALL questions in Section 1 (Compulsory)
- ii. Section 2 has Six (6) questions. Answer only four 4 of the Six (6) questions in Section B

SECTION A (ANSWER ALL QUESTIONS IN THIS SECTION)

- 1) a) On a mixed livestock farm in Chinsali, Muchinga Province a farmer keeps cattle, goats, and pigs. During the rainy season, several health issues emerge
- i) One **bull** that previously recovered from *brucellosis* appears healthy but continues to shed the bacteria in its semen without showing symptoms. What is the disease status of the bull known as? (2)
 - ii) A **farm worker** who assisted with calving without protective gear later tests positive for *brucellosis*. What type of infection does this case of brucellosis represent? (2)
 - iii) Several **cattle** develop fever and respiratory distress after being bitten by ticks. Laboratory tests confirm *East Coast fever*. What type of disease is East Coast Fever classified as in this case? (2)
 - iv) A **new calf** born on the farm shows signs of *Bovine Viral Diarrhea (BVD)*, which it acquired from its infected mother during pregnancy. What type of transmission does this represent? (2)
 - v) Meanwhile, *infectious bovine rhinotracheitis (IBR)* spreads rapidly among the herd through nasal discharge and shared water troughs. What type of transmission is occurring in this situation? (2)
- b) A cattle farm in Eastern Zambia has a herd of **200 animals**. In the month of February, an outbreak of **Haemorrhagic Septicaemia (HS)** occurs.
- By the end of the month, **40 animals** show clinical signs of the disease (e.g., fever, swelling, respiratory distress).
 - Of these, **10 animals** die due to complications from the disease.
 - **15 of the 40 cases** were already sick at the beginning of February, while the remaining **25 developed symptoms during the month**.
- Define Morbidity and calculate the **morbidity rate** for the herd during February. (2)
- Define Mortality and calculate the **mortality rate** for the herd during February. (2)
- Define Case fatality rate and calculate the **case fatality rate** for the outbreak. (2)
- Define Prevalence and calculate the **prevalence** of the disease at the end of February. (2)
- Define Incidence and calculate the **incidence** of HS during February. (2)

SECTION B (ANSWER ONLY ONE (1) OF THE FOLLOWING TWO QUESTIONS)

- 1)
 - a) Define *animal health* and explain its significance in livestock production. (2)
 - b) Briefly describe **four (4)** major types of livestock diseases. For each provide **one relevant example**. (8)
 - c) Briefly describe **five (5)** key factors that influence animal health in livestock systems. (10)

- 2) The Ministry of Fisheries and Livestock in Zambia is concerned about the spread of *African Swine Fever (ASF)* in the country's pig population. To enhance early detection and response, the Ministry has implemented a national surveillance system. District offices routinely submit weekly, monthly, and quarterly reports to the central surveillance team for trend analysis and outbreak detection. When signs indicative of ASF are reported from a district, a response team comprising national, provincial, and district experts is mobilized to investigate and implement control measures.
 - a) Define *surveillance* in the context of animal health and explain its overall purpose in disease control. (4)
 - b) Based on the scenario, describe how **passive surveillance** is conducted and how the information is used for ASF monitoring.
 - c) Based on the scenario, describe how **active surveillance** is conducted and how the information is used for ASF control. (4)
 - d) Briefly explain three (3) key steps involved in the **outbreak investigation** process following suspected ASF cases. (4)
 - e) Define *disease eradication* and explain what **ASF eradication** would involve at the national level. (4)
 - f) Identify and briefly explain three (3) potential challenges to effective ASF surveillance and response in Zambia. (4)

- 3)
 - a) Define *livestock disease causation* and explain its relevance in managing animal health.. (2)
 - b) What are *disease theories* in animal health? Provide a concise definition and their role in understanding disease processes. (2)
 - c) Briefly describe **three (3)** major disease theories used to explain and manage animal diseases. Support each theory with one example. (6)
 - d) State and explain **four (4)** key reasons why understanding disease theories is important for livestock health management. (5)

- e Using relevant examples, describe how the **interaction between the agent, host, and environment** contributes to the causation of livestock disease. (5)

- 4) Mrs. Banda operates a mixed livestock farm in Central Zambia, keeping 60 dairy cattle and 40 goats. During the rainy season, she notices a drop in milk production, coughing in some animals, and a few cases of abortion in goats. A veterinary officer visits the farm and identifies poor fencing, shared water sources with neighboring farms, and no recent vaccination records. The officer also notes that new animals were introduced into the herd without quarantine. Mrs. Banda expresses concern about disease spread and wants to improve her herd health program.

Instructions: Using the scenario above, answer the following:

- a) Define *herd health* and explain its importance in livestock production. (4)
- b) Identify and describe **two (2)** farm biosecurity weaknesses present in the scenario. Suggest one improvement for each. (4)
- c) Explain the role of **vaccination** in herd health and name **two (2)** diseases that could be prevented through vaccination in this context. (4)
- d) Outline the key steps involved in conducting a **risk analysis** for disease introduction and spread on Mrs. Banda's farm. (8)
- 5) Mr. Zulu operates a commercial piggery in Chinsali, Muchinga Province, Zambia, with over 300 pigs. In April 2025, several pigs begin showing signs of high fever, loss of appetite, and sudden death. Suspecting **African Swine Fever (ASF)**, he reports the incident to the District Veterinary Office. Upon investigation, it is discovered that:
- The pigs were recently moved from another district (Kabwe) without proper veterinary clearance.
 - The animals were not tagged or registered under any traceability system.
 - The farm lacks quarantine facilities and has no records of animal movement.
 - Veterinary officers invoke provisions under the **Animal Health Act No. 27 of 2010** to restrict movement, declare a quarantine zone, and begin disease control measures
 - The **Animal Identification and Traceability Act No. 2 of 2024** is also applied to trace the origin and movement of the infected pigs and identify other farms at risk.

Using the scenario above, answer the following questions

- a) Explain the purpose of the **Animal Health Act No. 27 of 2010** and describe **two (3)** powers it grants veterinary authorities during a disease outbreak. (4)
- b) Describe the role of the **Animal Identification and Traceability Act No. 2 of 2024** in managing this outbreak. Include **two (2)** specific provisions that apply in this case. (4)
- c) Identify and explain **three (3)** legal or biosecurity breaches committed by Mr. Zulu under the two Acts. (4)
- d) Discuss how integrating both Acts enhances Zambia's ability to prevent and control livestock disease outbreaks. (4)

- e) Suggest **two (3)** recommendations to improve compliance with these laws among livestock farmers in rural areas. (4)
- 6) In Northern Zambia, a rural community near a game reserve experiences an outbreak of *anthrax* in both livestock and wildlife during the dry season. Several cattle die suddenly, and villagers report skin lesions after handling carcasses. The local health clinic also records a spike in human cases with fever and swelling. Investigations reveal that:
- Livestock graze near contaminated water sources shared with wildlife.
 - There is no vaccination history for anthrax in the area.
 - Carcasses were not properly disposed of, attracting scavengers and increasing environmental contamination.
 - The veterinary and public health departments respond jointly, involving environmental officers, local leaders, and NGOs to contain the outbreak.
- a) Define the **One Health approach** and explain its relevance in managing zoonotic disease outbreaks like anthrax (4)
- b) Identify and describe **four (4)** key components of livestock disease control demonstrated or lacking in the scenario. (4)
- c) Explain how **intersectoral collaboration** contributed to the response in this case. Mention at least **three (3)** sectors or stakeholders involved. (4)
- d) Discuss **three (3)** challenges that may hinder effective implementation of One Health strategies in rural livestock communities. (4)
- e) Propose **two (2)** long-term strategies to prevent future outbreaks of anthrax in this region, based on One Health principles. (4)



KAPASA MAKASA UNIVERSITY

**SCHOOL OF APPLIED SCIENCE AND OPEN LEARNING
DEPARTMENT OF AGRICULTURAL AND AQUATIC SCIENCES
BACHELOR OF ANIMAL SCIENCE**

**COURSE CODE: AS 411: ANIMAL PRODUCTS AND BY-PRODUCTS
EARLY SESSIONAL FINAL EXAMINATION 2025**

**DATE: 31st July 2025
DURATION: 3 Hours**

**TIME: 14:00 – 17:00 hours
MARKS: 100**

INSTRUCTIONS

1. There are seven Questions in this paper answer five questions
 2. Question one in section A is compulsory and choose any four questions in section B
 3. Please write as clearly as possible as illegible handwriting cannot be marked.
 4. Number the answers to the questions clearly before answering
 5. Do not write in pencil (except for graphs and diagrams)
-



Section A: Compulsory.

Question one:

- a) Pale soft exudative (**PSE**) and dark firm and dry (**DFD**) meat is common in pork and beef respectively.
 - i. Explain the physiological, biochemical and physical events leading to such conditions (8 marks)
 - ii. What measures do think the slaughter facility operators should take to avoid yielding abnormal carcasses (4 marks)
- b) Among the important characteristics of fresh meat is its water holding capacity (**WHC**).
 - i. Outline the factors that affect **WHC** of meat (6 marks)
 - ii. What is the significance of **WHC** in meat (2 marks)

Section B: choose any four of the six questions

Question one

Aroma and flavor are among the characteristics of palatability of meat.

- a) Describe the psychological and physiological events associated with these characteristics (8 marks)
- b) Identify and describe factors that may lead to undesirable changes in aroma and flavor. (6 marks)
- c) Briefly describe the nutritive value of meat (6 marks)

Question two

Despite more than 70% of cattle hides produced by small holder farmers in Zambia, only 20% of the hides reach the tanneries may be graded I or II. The rest are lowly graded.

- a) Mention and explain the causes of the damages to the hides and skins which makes tanners not to buy these hides and skins (8 marks)
- b) What advice would give to the small holder livestock farmers and slaughter houses to get full benefit of hides? (6 marks)
- c) Explain the use of bone meal and blood meal in livestock production (6 marks)

Question three

- a) What is rigor mortis as applied in meat? (2 marks)
- b) Identify and explain the factors that influence the development of rigor mortis (8 marks)
- c) Explain how the degree of macular activity prior to slaughter affects rigor mortis. (4 marks)
- d) Tenderness is an important factor in the eating quality of meat, briefly explain the factors that affect tenderness. (6 marks)

Question four

- a) Churning is a crucial stage in the production of milk butter. Explain this process and why it is important (6 Marks)
- b) Explain the processes of milk coagulation during cheese making and how it affects the final product. (6 marks)
- c) Identify and explain the main functions of yogurt culture (6 marks)

Question five

- a) Discuss the differences between pasteurization and UHT processing in milk and state the effects of these treatments on the nutritional quality of the products (8 marks)
- b) Name the yoghurt culture bacteria and explain their growth mechanisms in milk (6 marks)
- c) Identify and discuss two harmful and two beneficial microorganisms of milk, indicating how they affect the quality of specific products. (6 marks)

Question six

- a) Despite being perishable, eggs are an essential food for mankind.
 - i. Discuss their nutrient content (4 marks)
 - ii. Describe the quality parameters that are used for their retail? (4 marks)
 - iii. Identify and discuss the egg properties used in food industry (6 marks)
- b) Definition of meat according to the laws of Zambia (2 marks)
- c) Briefly explain how a dairy animal can contaminate milk and what remedial measures can be taken to avoid contamination of milk by the dairy cow (4 marks)



KAPASA MAKASA UNIVERSITY
SCHOOL OF APPLIED SCIENCES
DEPARTMENT OF AGRICULTURE AND AQUATIC SCIENCES

2025 SESSIONAL EXAMINATION

30TH OCTOBER, 2025

09:00-12:00

APPLIED ANIMAL REPRODUCTION

AS 421

INSTRUCTIONS:

1. There are seven questions in total
2. Answer a Compulsory (CQ) in **Section A**
3. Answer any four (4) questions out of six in **Section B**
4. There are 100 marks allocated to this paper
5. Each question carries **20 marks**
6. Where possible, illustrate your answers
7. Time allowed: **Three 3 hours**
8. When answering follow further instructions in the answer book

**KAPASA MAKASA UNIVERSITY
LIBRARY**

18 DEC 2025

**OFFICE OF THE LIBRARIAN
P. O. BOX 480195, CHINSALI**

SECTION A- Compulsory

Question One

A). What is oestrus and how would you differentiate the different phases of oestrus in farm animals (8 Marks)?

B). What are the main techniques used in detecting heat in farm animals and how applicable is each technique to the Zambian situation (12 Marks)?

SECTION B – Choose any 4 questions

Question Two

A). Explain the key hormonal secretions in females and the effect of each hormone on the reproductive system of a cow during the oestrus cycle (8 Marks)?

B). Explain the role of the hypothalamus in coordinating secretions of reproductive hormones from the gonads through the pituitary gland (12 Marks)?

Question Three

A). What are the main causes of infertility in males and how can such causes be minimized to improve the reproductive performance of animals under your care (8 Marks)?

B). Abortions are a major cause of reproductive failure in farm animals, explain some of the management factors that may be associated with increased abortions in farm animals (12 Marks)?

Question Four

A). Explain what you understand by assisted animal reproduction technologies and briefly explain which of the technologies that you know may be applicable to Zambia (8 Marks)?

B). Explain the techniques used for semen collection in bulls and the methods used for long term preservation and how would you know the semen preserved is of good quality (12 Marks)?

Question Five

- A). What are the key differences between multiple ovulation and embryo transfer and in vitro fertilization as assisted animal reproduction techniques **(8 Marks)**?
- B). Dystocia is one of the reproductive failures whereby the foetus fails to pass through the birth canal. Explain the management steps you may with to take on the farm to avoid or minimize occurrence of dystocia incidences on your farm **(12 Marks)**?

Question Six

- A). Explain the importance of animal housing in promoting reproductive performance of animals and how animal housing can influence fertility of animals on the farm **(8 Marks)**?
- B). Explain in detail on how you can protect animals from high ambient temperatures to boost their reproductive performance under global warming and effects of climate change **(12 Marks)**?

Question Seven

- A). Explain the effects of poor ventilation in intensive poultry and pig production and how can you minimize such effects on animal reproductive performance **(8 Marks)**?
- B). Explain the role of the parathyroid hormone in the regulation of calcium and phosphorus metabolism in the laying chicken and how does this interaction involve the thyroid gland **(12 Marks)**?



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SCHOOL OF APPLIED SCIENCES AND OPEN LEARNING
DEPARTMENT OF AGRICULTURAL AND AQUATIC SCIENCES
BACHELOR OF ANIMAL SCIENCE

2025 SESSIONAL EXAMINATION

23RD OCTOBER, 2025

09:00-12:00

Course Title: Beef, Dairy and Small Ruminant Production

Course Code: AS 430

Duration: 3 Hours

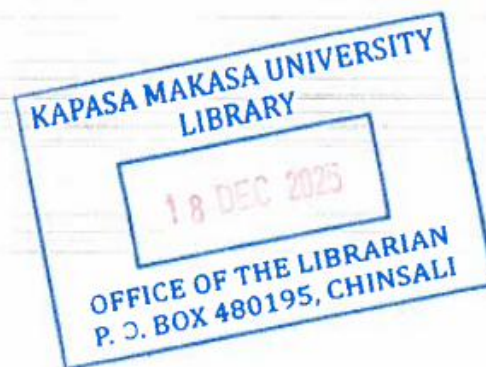
Total Marks: 100

General Instructions to Candidates:

1. Answer questions as instructed.
2. No unauthorized materials are allowed
3. No electronic devices are allowed unless specified.
4. Start **each** answer on a new page.
5. Write clearly and legibly.

Exam Instructions:

1. There are seven Questions in this paper answer five questions
2. Question one in section A is compulsory and choose any four questions in section B



SECTION A: COMPULSORY QUESTION.

QUESTION ONE.

A. During a 2023 livestock survey, a smallholder livestock farmer in Mulakupikwa area of Chinsali district recorded the following characteristic for his herd of beef cattle; Boran bulls 3, Angoni Cows 90, Heifers 40, steers 20 and 8 oxen. During the same period, he had 72 calves all born on the farm between September and November representing 80% calving percentage. Comment on the performance of his herd and offer any advice in terms of:

- i. Breeding Ratio.
- ii. Breeding system or breeding type
- iii. Breeding season

(Total: 8 Marks)

B. Feeding of a dairy cow is critical for the success of milk production. Describe the feeding management of a dairy cow 6-8 weeks before parturition or pre partum period and early lactation period.

(4 Marks)

C. Describe the twice-a-year breeding season for small ruminants used in Zambia and also mention the breeds of sheep and goats that may be recommended to suit the level of management.

(8 marks)

SECTION B: ANSWER ANY FOUR QUESTIONS

QUESTION ONE

A. The indigenous beef breeds of cattle are said to be very well adapted to rear in Zambia. Describe four characteristics which make them more suitable to rear in Zambia. Mention any two (2) indigenous breeds of cattle found in Zambia

(9 Marks)

B. Explain the significance of castration, weaning and hoof trimming in goat production. When are these operations done?

(3 Marks)

C. The problem of low dairy production and productivity is associated with poor fertility. Briefly write short notes on four major factors which can cause poor fertility and what remedial measures can you take to correct the problems

(8 Marks)

QUESTION TWO

- A. List and explain three livestock breeding related problems that are common among the traditional farmers. Suggest ways of correcting them. **(6 Marks)**
- B. Briefly explain any four factors you need to consider on site selection for feedlot, and also state the management activities of a feedlot in order to keep animals health, achieve good feed conversion and satisfactory growth rate. **(8 Marks)**
- C. The future profitability of the dairy herd depends on the successful production of calves, of which female calves provide as replacement stock to the dairy herd. Discuss three (3) parameters a farmer can utilize to measure the reproductive productivity of his dairy herd. **(6 Marks)**

QUESTION THREE:

- A. The causes of “compensatory growth” in beef cattle in Zambia and explanations for its occurrence. **(6 Marks)**
- B. Milk has been described as the “nature’s most perfect food”. Write notes on any four (4) physiological factors that may affect the composition of milk on a dairy herd and suggest any management practices to ensure production of good quality milk. **(8 Marks)**
- C. It is mainly a common practice that ewes or does are bred at 10 to 12 months of age and weighing 25 – 41 kg despite coming into heat for the first time at an early age of 6-8 months. Explain why this practice is important in goat breeding. **(6 Marks)**

QUESTION FOUR

- A. Explain the use of birth weight as the measures of productive efficiency in beef cattle, and state the factors that affect birth weight. **(4 Marks)**
- B. The advantages of rearing sheep and goats together in Zambia as compared to either of them with any other types of livestock. **(6 Marks)**
- C. Write notes on the following:
- i. The Nutritive Value of the Zambian Veldt (Range) and the need for supplementation **(6 Marks)**
 - ii. The milk ejection process. **(4 Marks)**

QUESTION FIVE

- A.** Discuss how the physiological state of the animal and digestibility of feeds influence feed intake in sheep and goats in Zambia **(4 Marks)**
- B.** The intensive beef production system requires that the cattle are kept in confinement and high-quality feed. Discuss ranching and finishing Steers on concentrates in the feedlot under intensive system **(8 Marks)**
- C.** Explain the steps you would take in maintaining clean and sanitary conditions on the dairy farm for the production of high-quality milk that is free of physical, chemical and microbial contaminations. **(8 Marks)**

QUESTION SIX

- A.** Briefly explain any four tests to be done on milk up delivery at a milk collection and state the reasons for such tests? **(4 Marks)**
- B.** Discuss how and why feeding Urea and poultry manure is important in ruminant diets **(6 Marks)**
- C.** Milk has been described as the “nature’s most perfect food”. Write notes on any five (5) physiological factors that may affect milk yield on a dairy herd of your choice in Zambia. **(10 Marks)**



KAPASA MAKASA UNIVERSITY

DEPARTMENT OF AGRICULTURE AND AQUATIC SCIENCES

2025 SESSIONAL EXAMINATION

FARM MANAGEMENT AND AGRICULTURAL EXTENSION

AS 440

4TH NOVEMBER, 2025

14:00-17:00



INSTRUCTIONS:

1. There are seven questions in total
2. Answer a Compulsory Question in **Section A**
3. Answer any Two (2) questions out of 3 in **Section B (Farm Management)**
4. Answer any Two (2) questions out of 3 in **Section C (Extension)**
5. Use **TWO** different answer booklets, 1 for Farm management and another for Extension
6. There are 100 marks allocated to this paper
7. Each question carries **20 marks**
8. Where possible, illustrate your answers
9. Time allowed: **Three (3) hours**
1. Cell Phones are **NOT** allowed in the Examination Room.

DO NOT TURN THE PAGE UNTIL YOU ARE TOLD TO DO SO

QUESTION 1 (COMPULSORY)

Question 1 a. (Farm Management)

- i. What is Linear Programming and how can it be used in Agribusiness or in Farm planning
(3 marks)
- ii. Explain 3 assumptions that should hold for one to rely on the optimal solution of linear programming (3 marks)
- iii. State the financial ratios that are used to analyze the liquidity and solvency position of the business (4 marks)

Question 1 b. (Extension)

A new, highly effective and efficient, but somewhat costly fisheries/animal science technology has been presented to a group of smallholder farmers in mugubudu village who mainly depend on traditional methods to carry out their activities. Three years after its introduction, the rate of adoption is still under 8%.

Using Diffusion of Innovation Theory, examine the possible factors contributing to the low adoption rate. Subsequently, formulate a three-phase extension strategy by incorporating all approaches to expedite the adoption process. Provide justification for each phase.

(10 marks)

SECTION B- Farm Management (Answer any TWO (2) Questions)

QUESTION TWO

- a) Calculate the diesel requirement per hour of a tractor with 120 horse power given that the current price of diesel is K23.06, and what will be the lubrication requirements of the same machine per hour (6 marks)
- b) Explain the used of partial budgeting in farm planning (4 marks)
- c) A farmer is considering the purchase of a combine Harvester to use in his 100 Ha maize field, the proposed investment will result in the following changes in the farm cost structure:

Fixed Costs

Depreciation	8000
Interest	4000
Taxes and insurance	200s

Variable Costs

Repairs	700
Operating costs	540
Labour	450

This investment does not bring additional income but the cost will reduce by the amount of hiring the combine harvester, the amount is 10,000 annually.

The figures are in USD should the farmer go ahead with the proposed change? Justify your answer

(10 marks)

QUESTION THREE

- a) When you are a manager on the farm your work involves making decisions so that you drive the agenda of the farm business. Can you explain 3 areas where you have to make decisions and what kind of decisions are involved **(6 marks)**
- b) Explain the law of diminishing marginal returns and in which state of production does it occur **(4 marks)**
- c) Define risk and certainty and explain 6 ways you can mitigate against risk in farm business **(10 marks)**

QUESTION FOUR

KMU has a business wing which is aquaculture and ranching on the university farm. The university has observed a shortage of eggs in the area and see this as a business opportunity, the University has further done an analysis of the Egg enterprise and discovered that this enterprise has the following cash streams annually, -530,000, 1.2 million, 1.4million, 1.8million and 2.1 million. The total capital outlay to undertake this business is 1.6 million to be invested in year one.

The university has engaged you to advise if they can go ahead with the investment, using NPV and the cost of capital being 22% what advice are you going to give?

(20 marks)

SECTION C: AGRICULTURAL EXTENSION (Answer any TWO questions)

QUESTION 5

- a. Explain why Agricultural Extension is classified as an informal type of education and discuss the unique benefits that this classification offers in working with adult farmers. **(6 marks)**
- b. Compare and contrast the core principles, strengths, and weaknesses of the Farm Visits (FV) and Methods and Results Demonstration (MRD) System approach. Imagine you are appointed to lead a team of extensionists with the sole purpose to reform a national extension system, which model's philosophy would you choose and advance as the foundation, and explain why? **(14 marks)**

QUESTION 6

- a. In details, discuss various perceived attributes that should be encompassed by an innovation and their effect on the rate of adoption. Illustrate your answer with a hypothetical and clear example of an innovation/technology you can think of in relation to your specialty. **(8 marks)**
- b. It is a known fact that women farmers in most rural areas are mainly responsible for post-harvest handling of most farming produce and products be it crops, fish or animal products but they are systematically excluded from formal extension training due to cultural norms, tradition, values and timing constraints.

As a trained extension expert, develop a comprehensive, gender-sensitive extension program to address post-harvest losses being encountered. Your answer must specifically detail the methods used in designing the said extension program and the role of Participatory Rural Appraisal (PRA) in the planning phase.

(12 Marks)

QUESTION 7

- a.** Discuss the arguments for and against the privatization of agricultural extension services, meaning moving from purely public to private/NGO-led services.

Further, discuss clearly and concisely under what specific conditions is a public sector extension service still indispensable, paying particular attention to smallholder farmers demands **(12 marks)**

- b.** Explain in details the extension teaching methods according to their forms which are commonly used by extension professionals to enhance adoption of an innovation /technology. **(8 marks)**

THE END OF THE EXAMINATION



KAPASA MAKASA UNIVERSITY
SCHOOL OF APPLIED SCIENCES
DEPARTMENT OF AGRICULTURE AND AQUATIC SCIENCES

2025 SESSIONAL EXAMINATION

21ST OCTOBER, 2025

09:00-12:00

LIVESTOCK ECONOMICS AND ENTREPRENEURSHIP
AS 450

INSTRUCTIONS:

1. There are seven questions in total
2. Answer a Compulsory Question in **Section A**
3. Answer any Two (2) questions out of 3 in **Section B (Economics)**
4. Answer any Two (2) questions out of 3 in **Section C (Entrepreneurship)**
5. Use **TWO** different answer booklets, 1 for economics and another for Entrepreneurship section
6. There are 100 marks allocated to this paper
7. Each question carries **20 marks**
8. Where possible, illustrate your answers
9. Time allowed: **Three 3 hours**

1. Cell Phones are NOT allowed in the Examination Room.

DO NOT TURN THE PAGE UNTIL YOU ARE TOLD TO DO SO



SECTION A (COMPULSORY)

QUESTION 1 A. (Economics compulsory)

Given the production function of beef production is given by

$$Y = 18X_1 - X_1^2 + 14X_2 - X_2^2$$

- a) Calculate the combination of the two inputs hay and forage that will maximize an enterprise profit (5 marks)
- b) Calculate the yield of beef in Kgs at profit maximization (5 marks)

QUESTION 1(b- Entrepreneurship compulsory)

Some experts contend that entrepreneurs are economic agents that are both born and made and whose behaviors have a lot to do with influences of the social environment in which they have lived and are found. Discuss this entrepreneurship model in details.

[10 Marks]

SECTION B- Economics, Choose 2 questions

QUESTION 2

Using a well labeled diagram show and explain how the equilibrium is restored in the long run if the demand for eggs goes up in the market, ensure to show both scenarios at an individual farm level and the market. (20 marks)

QUESTION 3

- a) Given the production function of pork as $Y = X^2 - \frac{1}{30}X^3$, Calculate the TPP, APP and MPP of milk in liters (10 marks)
- b) With the aid of a well labelled diagram show the 3 stages of production, state the profit maximizing region and also explain the relationship between the total physical product and the average physical product and the marginal physical product. (10 marks)

QUESTION 4

i) ANK Farms is engaged in the production of tomatoes and pock, using the product-product relationship

explain how the profit can be maximized on the farm (15 marks) Hint: use a diagram

ii) If ANK Farms want to introduce a third enterprise on the farm say broiler chicken production state the equi-marginal principle that will maximize the net farm income (5 marks)

SECTION C – Entrepreneurship, Choose any 2 questions

QUESTION 5

A friend comes to you complaining about the attitude of middle-aged persons preferring quick start methods as opposed to robust innovative startups. As an Entrepreneurship expert, share your notes on Quick Start methods with your friend to demonstrate why middle-aged persons like them clearly stating the pros and cons.

[20 Marks]

QUESTION 6

Emelda Kapasa Musonda is having challenges in selling her goats. She has plans to change her business model. However, she has been advised to conduct a feasibility study on her new proposed model.

a) Describe the stages of a feasibility Analysis.

[10 Marks]

b) Advise Emelda Kapasa Musonda on three empowerment Programs the Government of the Republic of Zambia gives to youths under the Ministry of Youth , Sport and Culture [5 Marks]

c) Discuss at least five sources of funding Emelda Kapasa Musonda may resort to if she needed funding. [5 Marks]

[TOTAL 20 Marks]



KAPASA MAKASA UNIVERSITY

SCHOOL OF APPLIED SCIENCE AND OPEN LEARNING

Course Title: GAME RANCHING AND APICULTURE

Course Code: AS 461

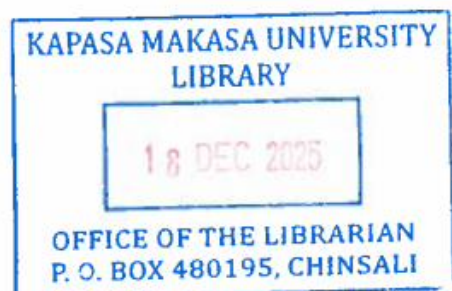
Date: 29th JULY, 2025

Duration: 3 HOURS

Total Marks: 100

General Instructions to Candidates:

1. Answer questions as instructed.
2. No unauthorized materials are allowed
3. No electronic devices allowed unless specified.
4. Start each answer on a new page.
5. Write clearly and legibly.



INSTRUCTIONS

-This paper has THREE sections (Section A,B and C) with a total of Seven (7) questions each carry 20 Marks.

-Section A is COMPULSORY (Question 1A and 1B)

-Attempt any TWO (2) questions in section B

-Attempt any TWO (2) questions in section C

USE TWO SEPARATE ANSWER BOOKLETS FOR EACH SECTION

-Write your Student Identification Number (SIN) Clearly on the answer booklet provided.

SECTION A (COMPULSORY)

QUESTION 1 (A)

- I. With an example define Private Wildlife Estate. **= 1 mark**

- II. The success of Game Ranching relies on careful planning, a commitment to ethical and justifiable management practices. Outline the four objectives of Game ranching in Zambia
= 2 marks

- III. The future of game ranching in Zambia is promising, driven by trends in ecotourism, conservation, technology and market demand. However, there is need to promote the participation of local communities in the management and ownership of Game Ranching and farming operations, if the indigenous Zambians were to realize maximum benefits from wildlife. Discuss the **actions** and **strategies** that should be undertaken to **encourage** and **empower** local communities to participate in the establishment and management of Game Ranching in Zambia. **=7 marks**

QUESTION 1 (B)

- (a) Define marketing in the context of apiculture [2 marks]
- (b) Explain with examples the **4Ps** of marketing bee products making reference to the local context [8 marks]

SECTION B: Choose Any TWO Questions from this section.

QUESTION TWO

- I) In line with the Zambia Wildlife Act number 14 of 2015 and also the Private Wildlife Estates Regulations of 2017, distinguish Game Ranch from Game Farm.
= 2 marks
- II) In exercise of the powers contained in the Zambia Wildlife Act number 14 of 2015 and also the Private Wildlife Estate regulations of 2017, the Director of the Department of National Parks and Wildlife (DNPW) has the rights to confiscate any wildlife animals that are kept in a Game Ranch if he finds it fit to do so. Mention the three reasons that may compel the Director of DNPW to the seizure of wild animals in the Game Ranches.
= 3 marks
- III) All that we know today as domestic livestock was once upon a time free roaming wild animals. It was through rigorous and crude efforts that made mankind the livestock guard of today. The study of wild animal behavior, feeding habits, breeding, capture and care, is an indication that man is still looking for more domestication candidates. Discuss the **three methods** that are used to capture wild animals and also the **reasons** for wild animal capture and care in wildlife management today. **= 15 marks**

QUESTION THREE

- I) Birds are a diverse group of warm blooded vertebrates belonging to the class Aves. They exhibit several general characteristics that distinguish them from other animals such as mammals and reptiles. Outline the characteristics of birds that enable them to explore different environments by flying. **= 10 marks**
- II) Water resources is essential requirement for both plant and animal species survival in an ecosystem. Outline factors influencing water intake of wild animals in Game Ranch ecosystem. **= 10 marks**

QUESTION FOUR

- I) Conservation plays a crucial role in protecting the environment and ensuring sustainable resources use, it also presents challenges that need to be carefully managed to balance ecological goals with social and economic considerations.
Discuss the advantages and disadvantages of conservation in Game Ranch Management. **= 10 Marks**
- II) Distinguishing a cheetah (*Acinonyx jubatus*) from a leopard (*Panthera pardus*) has been a very big challenge to many hunters in the field due to some closely morphological similarities. As a professional hunter who has been assigned by the hunting outfitter to accompany a client for hunting a leopard which is closely resemble a cheetah, explain to the client the differences between the two Apex predators from each other with references to their morphological appearance, habitat preference, social behavior and feeding strategies. **= 10 marks**

SECTION C: Choose Any TWO Question from this section

QUESTIONS

- (a) Explain briefly the many stages involved in the honey making process by bees [10 marks]
(b) Using the rules of taxonomy and nomenclature, State **Five (5)** important bee forage species that need to be within the vicinity for prime honey production.
[10 marks]

QUESTION 6

(a) Discuss European foul brood disease under the following themes;

- | | |
|------------------------|-----------|
| I. Nature | [5 marks] |
| II. Impacts | [5 marks] |
| III. Remedial measures | [5 marks] |

(b) Write short notes on bee poisoning [5 marks]

QUESTION 7

Attempt one question in apiculture from this section.

Question 1

- (a) Describe using examples and illustrations the communication phenomenon in bees being social insects [10 marks]
- (b) State **Ten (10)** beekeeping protective clothing/basic equipment that are essential when venturing into beekeeping [10 marks]