

THE UNIVERSITY OF ZAMBIA  
SCHOOL OF AGRICULTURAL SCIENCES  
INSTITUTE OF DISTANCE EDUCATION  
2019/2020 ACADEMIC YEAR

- AGC 2041 INTRODUCTORY CROP SCIENCE
- AGC 2042 SUSTAINABLE CROP PRDUCTION
- AGC 2052 PLANT PHYSIOLOGY
- AGE 2041 FUNDAMENTAL PRINCIPLES OF ECONOMICS
- AGF 2041 INTRODUCTORY FOOD SCIENCE AND NUTRITION
- AGG 2742 AGRICULTURAL METEOROLOGY, FOOD SECURITY AND  
CLIMATE CHANGE
- AGG 2851 ENVIRONMENTAL ETHICS IN AGRICULTURE AND LAND  
MANAGEMENT
- DHM 2021 FARM BUSINESS MANAGEMENT
- DLM 2032 STUDY AND COMMUNICATION SKILLS
- DLM 2121 LIVESTOCK NUTRITION AND FEEDLOTING
- DLM 2132 MECHANIZATION OF LIVESTOCK FARMS
- DLM 2221 LIVESTOCK HOUSING AND FARMSTEAD DESIGN AND  
LIVESTOCK INDUSTRY AND APPLICATIONS
- DLM 2232 LIVESTOCK REPRODUCTION



**THE UNIVERSITY OF ZAMBIA  
SCHOOL OF AGRICULTURAL SCIENCES  
DEPARTMENT OF PLANT SCIENCE**

**PROGRAMME: BACHELOR OF SCIENCE IN AGRONOMY - SECOND YEAR**

**2019/2020 ACADEMIC YEAR**

**AGC 2041: INTRODUCTORY CROP SCIENCE**

**FINAL EXAMINATION**

**INSTRUCTIONS:**

- 1) ANSWER QUESTION 1 AND ANY OTHER 4 QUESTIONS
  - 2) ADDITIONAL INSTRUCTIONS ARE GIVEN FOR EACH QUESTION
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**Question 1: Indicate whether the following statements are true or false [20 marks]**

- a) Legume plants have a wide range of uses including firewood, agroforestry, green manure, fodder, feed and oil extraction.
- b) The reproductive growth phase for crops is the period from seedling emergence to flowering and formation of fruits
- c) One of the distinguishing features between damage caused by a plant pathogen compared to that caused by an abiotic constraint is that the symptoms from the former will be uniformly distributed among plants in the field while that for the latter will be random.
- d) Respiration is the process by which plant cells break down carbohydrates and other biochemical molecules to produce energy for other biochemical processes
- e) The nightshade plants are a family of flowering dicotyledonous plants that ranges from annual and perennial herbs to vines, shrubs and trees, and includes a number of agricultural crops, medicinal plants, spices, weeds, nitrogen-fixing plants and ornamentals.
- f) The only aspects of light important in plant growth are duration and intensity
- g) To effectively control insect pests, you need to be able to kill or disrupt at least one of the four stages of insect growth such as the eggs, larva, pupa, adult or spore).
- h) Phosphorus is required particularly by the growing tip of the maize plant, hence its importance in root growth
- i) Classical Plant Breeding refers to the use of DNA-based techniques to select, cross or introduce traits into a desired variety
- j) Sweet potatoes and Irish potatoes are stem tubers while cassava is a root tuber

**Question 2 [20 marks]**

In order for any cropping enterprise to hold promise for success, the planted crop must, in the very least, germinate, respire and photosynthesise.

- a) Define germination, and list the four steps involved in the process [5 marks]
- b) Define photosynthesis and explain how it is important in plant growth [5 marks]
- c) What are the factors that may interfere with photosynthesis [5 marks]
- d) What is the role of respiration in plant growth? [5 marks]

**Question 3 [20 marks]**

Crops require several factors for normal growth and attainment of their yield potential. Give **five** factors necessary for plant growth, and for each explain their role in plant growth, and how inadequate amounts or levels of that factor might impair plant growth

**Question 4 [20 marks]**

Crops need to be protected from various diseases and pests if one is to obtain high yields and minimise losses.

- a. List the categories of microbes that might cause diseases on plants [4 marks]
- b. For two of the microbe groups listed in 4a, give a symptom expected to be unique to that group [4 marks]
- c. Give four ways in which you protect crops against insect damage [4 marks]
- d. How does insect damage differ from damage caused by microbes? [4 marks]
- e. How do weeds cause damage to plants? [4 marks]

**Question 5 [20 marks]**

You have been given a mature plant with all its plant parts intact. This is a new crop that is not present in Zambia. You have been told that this plant is from the family leguminosae/fabaceae and not from poaceae.

- a. What morphological features, unique to fabaceae/leguminosae do you expect to see on this plant? [8 marks]
- b. How is this plant expected to be different morphologically from poaceae? [8 marks]
- c. What is the importance of crop classification? [4 marks]

**Question 6 [20 marks]**

Cassava is one of the very important crops grown in Zambia, with various benefits/uses. Cassava has an ability to yield fairly well even under conditions that are below ideal for maize production.

- i. Explain the importance of cassava in Zambia and globally. [4 marks]
- ii. Even though the crop can be grown in marginal conditions, nutrient deficiencies may still show, when growth conditions are below optimal. How would you know that your cassava plant is deficient in
  - a. Phosphorous [4 marks]
  - b. Nitrogen [4 marks]
  - c. Potassium [4 marks]
  - d. Deficiency of a named micronutrient [4 marks]

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**END OF EXAM**

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## THE UNIVERSITY OF ZAMBIA

UNIVERSITY EXAMINATIONS – AUGUST/SEPTEMBER 2020

### AGC 2042 – SUSTAINABLE CROP PRODUCTION

INSTRUCTIONS: ANSWER ALL QUESTIONS AND WRITE LEGIBLY

TIME ALLOWED: 3 HOURS

TOTAL MARKS: 60

1. The groundnut (*Arachis hypogaea*) crop is the second most important crop in Zambia. [20 marks]
  - a. List two common diseases and discuss any two control measures for each one of them [6 marks]
  - b. List any 4 general indications of physiological maturity [4 marks].
  - c. Discuss any 4 agronomic practices that you can apply to minimize pre-harvest (field) aflatoxin contamination of kernels [10 marks].
  
2. Zambia is subdivided into three agro-ecological regions based on climatic characteristics that have an impact on crop productivity [10 marks]
  - a. List any three general characteristics of the agro-ecological region I of Zambia? [3 marks]
  - b. In what ways can you cope with each of the crop production challenges associated with this region named in part (a) above? [3 marks]
  - c. Sorghum (*Sorghum bicolor*) and cowpea (*Vigna unguiculata*) are among the suitable crops for this region. Discuss any two adaptation mechanisms for each of these crops [4 marks]

3. Given that you have to grow maize in two locations, namely, Msekera Research Station in Chipata district and Misanfu Research Station in Kasama district [15 marks].
- In which location between the two would you expect to have a bigger challenge with maize cob rot? Give reasons for your answer [4 marks]
  - Give specific recommendations of maize seed varieties for each the two locations. Give reasons for your choice. [4 marks].
  - Calculate the amount of nitrogen you would apply in a lima as top dressing assuming that the recommended fertilizer application rate is 200 kg Urea (46% N) per hectare [3 marks].
  - Discuss two measures that you can apply to minimize the loss of nitrogen fertilizers due to leaching? [4 marks]
4. Finger millet (*Eleusine coracana*) is a traditional crop grown under the chitemene system of agriculture practiced mostly in agro-ecological region III of Zambia.[15 marks]
- What are the two major soil constraints to crop production associated with this region to which millet has adapted? [ 4 marks]
  - How does the chitemene, “slash and burn” system help to alleviate these challenges? [4 marks]
  - Give the recommended seed rate and briefly explain one method of planting finger millet [3 marks]
  - What is the recommended fertilizer application rate for commercial production of millet? [2 marks]
  - Briefly discuss one major pest of finger millet and some of the measures for its control [2 marks]

**END OF EXAMINATION!**



**UNIVERSITY OF ZAMBIA**  
**INSTITUTE OF DISTANCE EDUCATION**  
**Programme: Bachelor of Science in Agronomy**  
**FINAL EXAMINATION**  
**Course: AGC 2052 PLANT PHYSIOLOGY**

**Date:** August 2019

**Time:** Three hours- 09:00 to 12:00 hrs

- i. Answer any five (5) questions**
- ii. All questions carry equal marks**

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1. Describe any three (3) of the following;

- i. Cell wall.
- ii. Plasmadesmata.
- iii. Mitochondria.
- iv. Chloroplasts.

**[20 marks]**

2. Discuss plant development and how it is influenced by two growth regulators- auxins and gibberellins.

**[20 marks]**

3. Describe the following;

- i. Photoperiodism.
- ii. Xylem.
- iii. Stomata.

**[20 marks]**

4. Discuss the importance of water to plants and describe the three forces by which water moves between cells or short distances. **[20 marks]**

5. Photosynthesis is central in plant performance, discuss the following;

- i. Four factors that determine photosynthetic rate.
- ii. One photosynthetic system.
- iii. Photorespiration.

**[20 marks]**

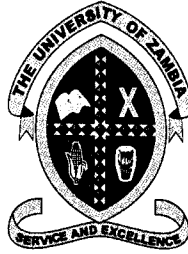
6. Plants commonly develop in environments that are not optimal, hence are usually subjected to various stresses during development. Discuss the following;

- i. High temperature stress.
- ii. Water stress.

**[20 marks]**

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**END OF EXAMINATION**



**THE UNIVERSITY OF ZAMBIA  
INSTITUTE OF DISTANCE EDUCATION**

**FINAL EXAMINATIONS  
2019/20 ACADEMIC YEAR**

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<b><u>PROGRAMMES:</u></b>	BACHELOR OF SCIENCE IN AGRONOMY AND BACHELOR OF SCIENCE IN AGRICULTURAL ECONOMICS
<b><u>COURSE NAME:</u></b>	FUNDAMENTAL PRINCIPLES OF ECONOMICS
<b><u>COURSE CODE:</u></b>	AGE 2041
<b><u>DURATION:</u></b>	THREE HOURS
<b><u>EXAMINER:</u></b>	DR CHEWE NKONDE

**INSTRUCTIONS TO CANDIDATE:**

1. Answer all five (5) questions.
2. This examination is worth 100 marks. Marks for individual questions are indicated in parenthesis next to each question.
3. Please be concise when answering the questions and write legibly.
4. Show all your work on quantitative questions to earn you partial credit.

1. The following demand schedule shows the price of bread per loaf and the quantities demanded by four separate consumers at each price.

Price of bread/loaf (K/loaf)	Quantity (loaves of bread)			
	Consumer 1	Consumer 2	Consumer 3	Consumer 4
50	0	0	0	1
45	1	0	0	2
40	2	1	0	3
35	3	2	1	5
30	4	3	2	10
25	5	4	3	15
20	10	9	8	20
15	15	14	13	30

- a) Using this demand schedule, compute the market demand at each price and thereafter construct a well labelled market demand diagram. **(10 marks)**
- b) Suppose COVID-19 negatively affects incomes of all consumers in this market, would this lead to a change in demand or a change in quantity demanded? Explain and show this change on another well labelled market demand diagram. **(10 marks)**
2. Your co-worker, Mr. Mackson Chirwa, has just completed reading a report that indicates that the price elasticity of demand for cars in Zambia is -5.3 and that the cross-price elasticity of demand for cars in terms of fuel prices is -2.5. The report further suggests that cars are normal goods among Zambians with college or university education. Mr. Chirwa does not understand these measures of elasticities and what it means when a good is described as a normal good. In simple but clear language that demonstrates that you have a good understanding of economics, explain to Mr. Chirwa the following:
- a) The concept of price elasticity of demand, how it is generally measured and interpreted. In your explanation to him, please interpret the price elasticity of demand for cars given in the report. **(8 marks)**
- b) The concept of cross price elasticity of demand, how it is generally measured and interpreted. In your explanation to him, please interpret the cross-price elasticity of demand for cars in terms of the price of fuel given in the report. **(8 marks)**
- c) The meaning behind the statement in the report that cars are normal goods among Zambians with college or university education. **(4 marks)**

3. Consider a University of Zambia Student whose utility is maximized by consuming internet bundles and food.

a) Explain the concept of utility maximization in the context of the student's choice of internet bundles and food. **(5 marks)**

b) If the student's monthly allowance increases by 50% while the unit price of internet bundles and food remain the same. Answer the following:

i. How would the change in income affect the slope of the budget line and the marginal rate of substitution? Explain. **(5 marks)**

ii. How would the change in income affect the overall position of the budget line? Explain and show this change on a clearly labelled graph. **(10 marks)**

4. Consider three years of data for a simple economy that produces only pizza. Q represents the quantity of pizza produced and P represents the unit price of pizza. Let the price be Kwacha per unit and assume that pizza is a consumer good.

	2015		2016		2017	
	Q	P	Q	P	Q	P
Pizza	1000	10	1500	10	1000	20

a) Using 2015 as the base year, compute the inflation rate in 2016 and 2017 using the GDP deflator method. **(8 marks)**

b) Using 2015 as the base year, compute the inflation rate in 2016 and 2017 using the CPI method. **(8 marks)**

c) Are the inflation rates you have computed using the two methods close or different? Explain why they are close or different. **(4 marks)**

5) Suppose Zambia's equilibrium GDP is \$25 billion, full employment GDP is \$50 billion and the MPC is 0.8. Answer the following questions:

a) Draw a properly labelled income-expenditure model for Zambia using the information provided above. **(5 marks)**

b) Based on the information provided, what economic problem do you think Zambia is facing? Explain. **(5 marks)**

c) Suppose the Zambian government decides to solve this problem using fiscal policy. How much should each policy tool be changed (in monetary terms) in order to achieve full employment GDP? Show your work clearly. **(10 marks)**

----- END OF EXAM-----



## THE UNIVERSITY OF ZAMBIA

UNIVERSITY EXAMINATIONS – AUGUST/SEPTEMBER 2020

AGF 2041 – INTRODUCTORY FOOD SCIENCE AND NUTRITION

INSTRUCTIONS: ANSWER ALL QUESTIONS AND WRITE LEGIBLY

TIME ALLOWED: 3 HOURS

TOTAL MARKS: 100

**SECTION A: Multiple choice/ True or False questions (0.5 marks each)**

1. All but one of the following may negatively affect the bioavailability of minerals in the body
  - A. Phytates
  - B. Oxalates
  - C. Polyphenols
  - D. Vitamin C
  
2. Pasteurization was first discovered and explained by
  - A. Louis Pasteur
  - B. Antoine van Leeuwenhoek
  - C. Robert Koch
  - D. Robert Koch and Louis Pasteur
  
3. **True or False.** Fungi are microorganisms with eukaryotic cells
  
4. The difference between gram positive and gram negative bacteria is
  - A. Gram-negative cells have a much weaker cell wall
  - B. Endotoxins are made by gram negative bacteria
  - C. Gram positive bacteria stain purple, while gram negative bacteria stain pink
  - D. All of the above
  
5. Protein denaturation is defined as
  - A. The unfolding of a protein unit to form a lipid
  - B. The opening up of the hydrophilic core to its surroundings
  - C. The breaking up of the native protein structure to expose the hydrophobic core to its surroundings

- D. All of the above
6. **True or False.** Yeasts and fungi are moulds
7. Bacteriophages are
- A. Viruses that infect bacteria
  - B. Bacteria that infect viruses
  - C. Viruses that infect moulds and bacteria
  - D. Moulds that infect bacteria
8. The undesirable change in a food that makes it unsafe for human consumption is referred to as
- A. Food decay
  - B. Food spoilage
  - C. Food loss
  - D. All of the above
9. Injury to the plant during propagation and harvesting can
- A. Improve the shelf life of the plant
  - B. Reduce the shelf life of the plant
  - C. Introduce microbes into the plant
  - D. B and C
10. Identify one nutrient that can be made from sunlight
- A. Vitamin A
  - B. Zinc
  - C. Vitamin D
  - D. Iron
11. Pathogens are not able to survive in yogurt because
- A. The temperature is too low for them to survive
  - B. The water activity is not enough for them to survive
  - C. The environment is too acidic for them to survive
  - D. The vapour pressure is too high for them to survive
12. **True or False.** Relative humidity is highly dependent on temperature
13. The amount of mucous produced in the duodenum (first part of the small intestines) is high because
- A. It must protect itself from pancreatic juice
  - B. It must protect itself from bacterial infection
  - C. It must moisten the food coming from the stomach
  - D. It must protect itself from acidic chyme
14. Thermophiles (heat loving microbes) are not able to survive at low temperatures because

- A. They die more rapidly at these temperatures
  - B. The changes in membrane structure affect the uptake and supply of nutrients, thus resulting in death
  - C. They are unable to swim at these temperatures
  - D. The psychrophiles (cold loving microbes) release toxins to kill them
15. The type of iron found in vegetables is called
- A. Heme iron
  - B. Ferrous iron
  - C. Non-heme iron
  - D. Sulphide iron
16. Dessication is used to control microbial growth by
- A. Removing water from microbial cells inactivate their metabolism
  - B. Using moist heat to destroy microbes
  - C. Using radiation to destroy microbes
  - D. Using both moist and dry heat to destroy microbes
17. Two (2) amino acids joined together are called a
- A. Dipeptide
  - B. Oligopeptide
  - C. Tripeptide
  - D. Polypeptide
18. Leaving equipment wet after cleaning is
- A. Desirable because it allows for a fresh scent on the equipment
  - B. Okay because the equipment will dry on its own eventually
  - C. Undesirable because it may cause washing problems after use
  - D. Undesirable because it may provide a medium through which microbes can grow
19. It is possible to stop enzymic reactions in vegetables during storage by
- A. Freezing
  - B. Blanching
  - C. Washing
  - D. Cutting
20. A substance is called an essential nutrient if
- A. It has a specific biological function
  - B. When removed from the diet, it will lead to a collapse in the normal functioning of the human body
  - C. When the omitted substance is reintroduced back into the diet before permanent damage is made, it will restore the normal biological functions of the human body
  - D. All of the above

21. All but one of the following is a function of the skeletal system
- A. Protects, supports and allows body movement
  - B. Produces blood cells
  - C. Stores minerals
  - D. Stores vitamins
22. All but one of the following is a function of the plasma membrane
- A. Keeps toxic substances out
  - B. Contains receptors and channels that allow the passage of nutrients, metabolic substances, ions and wastes between organelles
  - C. Allows for the movement of protein from the nucleus to the ribosomes
  - D. Acts as a barrier/ separator of metabolic processes occurring in different organelles
23. Which one of the following macronutrients is directly involved in the caramelization process?
- A. Proteins
  - B. Lipids
  - C. Carbohydrates
  - D. Glycolipids
24. Mitochondria are called the power house of the cells because
- A. This is the site for DNA synthesis
  - B. It produces energy in the form of ATP
  - C. It ensures that all toxic substances are removed from the cell
  - D. All of the above
25. Which one of the following nutrients are indestructible by extremes of heat, pH, sunlight, etc
- A. Proteins
  - B. Vitamins
  - C. Minerals
  - D. Carbohydrates
26. The rough endoplasmic reticulum (RER) contains
- A. Ribosomes for the synthesis of protein
  - B. Ribosomes for the synthesis of DNA
  - C. Lysosomes for the synthesis of proteins
  - D. Receptors for the recognition of protein
27. Identify one (1) transport mechanism that requires a protein to move across a membrane
- A. Active transport
  - B. Simple diffusion
  - C. Facilitated diffusion
  - D. Pinocytosis

28. Bacteriophages are important to eliminate in the food industry because
- A. They are difficult to find
  - B. They may cause fermentation failure
  - C. They may cause a lime layer in beer making
  - D. All of the above
29. Food is largely absorbed in .....
- A. The large intestine
  - B. The small intestine
  - C. The stomach
  - D. The mouth
30. **True or False.** The gall bladder is used to make, store and concentrate bile
31. Water activity can act as
- A. An intrinsic factor determining the likelihood of microbial multiplication
  - B. A processing factor
  - C. An extrinsic factor
  - D. All of the above
32. Which one of the following statements about enzymatic browning is true?
- A. It causes fungi to start growing on fruits
  - B. It produces the brown color on fruits when it is cut open
  - C. It produces the brown color on bread during baking
  - D. It increases the shelf life of baked products
33. Your body needs vitamins and minerals because
- A. They give the body energy
  - B. They help carry out metabolic reactions
  - C. They insulate the body's organs
  - D. They withdraw heat from the body
34. Aflatoxin is produced by
- A. Aspergillus mould
  - B. Penicillium mould
  - C. Rhizopus mould
  - D. Alternaria mould
35. Amylase enzyme is unable to work in the stomach because
- A. HCl breaks it down into smaller units
  - B. Bicarbonate changes the pH to alkaline
  - C. HCl changes the pH to acidic
  - D. Protease enzymes are abundant in the stomach
36. The microbes that are most likely to survive in minced meat and sausage are
- A. Anaerobes

- B. Aerobes
  - C. Thermophiles
  - D. Mesophiles
37. **True or False.** Food biochemistry, food analysis, crop rotation and food chemistry all form part of food science and technology
38. Maltose is made up of
- A. Glucose and galactose
  - B. Glucose and fructose
  - C. Glucose and glucose
  - D. Glucose and sucrose
39. Humans are unable to digest fiber because
- A. They contain alpha bonds
  - B. They contain beta bonds
  - C. They are highly branched
  - D. They contain sulphur bonds
40. Excess glucose is stored in the form of
- A. Glycogen
  - B. Fat
  - C. Protein
  - D. A and B
41. All but one of the following statements is true about fiber
- A. Insoluble fiber is excreted as feces
  - B. Insoluble fiber is fermented by bacteria
  - C. Soluble fiber is fermented by bacteria
  - D. Soluble fiber increases satiety (state of feeling full)
42. Fermented dairy foods are recommended for people with lactose intolerance because
- A. Lactic acid bacteria use lactose to make lactic acid
  - B. Lactic acid bacteria denature lactose into a single strand
  - C. Lactic acid bacteria ensure that lactose is excreted
  - D. Lactic acid bacteria are unable to utilize lactose
43. All but one of the following statements is true about phospholipids
- A. They contain a phosphate group which is soluble in water
  - B. They contain three fatty acid groups just like triglycerides
  - C. They are an important component of cell membranes
  - D. They differ from triglycerides because they only contain two fatty acid groups
44. All but one of the following are found in both prokaryotic and eukaryotic cells
- A. Plasma membrane
  - B. DNA

- C. Flagella
  - D. Ribosomes
45. Fats are transported from the small intestines to the liver by
- A. Chylomicrons
  - B. Triglycerides
  - C. Phospholipids
  - D. Bad cholesterol
46. Inclusion bodies in the prokaryotic cell are used for
- A. Storing food
  - B. Protein synthesis
  - C. Protection barrier against toxic substances
  - D. Locomotion
47. Non-essential amino acids
- A. Are not important for the body
  - B. Can be synthesised by the body
  - C. Cannot be synthesised by the body
  - D. Are not absorbed in the small intestines
48. **True or False.** The ripeness of a fruit or vegetable is dependent on the rate of enzymic reaction
49. Fortification and enrichment differ because
- A. Both are not originally found in the product and therefore must be added to the food product
  - B. Enrichment requires that a nutrient is added back to the product after processing because it was lost during processing
  - C. Fortification requires that a nutrient is added back to the product after processing because it was lost during processing
  - D. Both are added to the product to enhance its nutrient composition even if that nutrient was originally found in the product
50. Preservatives are added to food for two (2) main reasons, namely
- A. Enhance food color and improve shelf life
  - B. Improve flavor and prevent oxidation
  - C. Prevent microbial growth and prevent rancidity (oxidation)
  - D. Prevent rancidity and improve color

## SECTION B: Short answer questions

1. List three (3) fat soluble vitamins (3 marks)
2. List two (2) differences between cleaning/ disinfection and sterilization (2 marks)
3. Define the term "probiotics" (3 marks)
4. List five (5) ways in which vitamins may be lost during processing (5 marks)
5. Name three (3) instances when protein denaturation is considered desirable (3 marks)
6. Give two (2) reasons why it is easy to get a deficiency in water soluble vitamins such as vitamin C (2 marks)
7. Name three (3) naturally occurring pigments derived from plants and give the color provided by these pigments (3 marks)
8. Explain how application of fertilizer and pesticides may affect the mineral content of fruits and vegetables (3 marks)
9. Identify two (2) intrinsic factors in which moulds can survive and bacteria cannot (2 marks)
10. Briefly describe the *Maillard* reaction (4 marks)
11. Provide two (2) important functions of hydrochloric acid (HCl) in the stomach (2 marks)
12. List three (3) important functions of enzymes in food processing (3 marks)
13. Define the term "implicit factors" (3 marks)
14. Name and describe what is known as "bad cholesterol" (4 marks)
15. Explain the importance of bile in the digestion of fats. Where is it made? (3 marks)

## SECTION C - Essay questions

1. Lipid degradation in food is mainly achieved through lysis and oxidation.
  - a. Provide two (2) ways in which lipid oxidation may occur (2 marks)
  - b. Give one (1) difference between a saturated fatty acid and an unsaturated fatty acid (1 mark)
    - i. Which fatty acid is more susceptible to autoxidation and why? (2 marks)
  - c. Explain how antioxidants prevent or slow down lipid oxidation in food (4 marks)
  - d. Name the two (2) main structural components of triglycerides (1 mark)
2. Choose two (2) different intrinsic factors that you know and explain in detail how they affect the growth and multiplication of microorganisms (10 marks)
3. Describe in detail the digestion of carbohydrates in the mouth, stomach, small intestines and large intestines (10 marks)

**ALL THE BEST!**



THE UNIVERSITY OF ZAMBIA

UNIVERSITY EXAMINATIONS – AUGUST, 2020

AGG 2742: AGRICULTURAL METEOROLOGY, FOOD SECURITY AND  
CLIMATE CHANGE

**Time:** Three (3) Hours

**Instructions:** Answer **ALL** Questions

Total Marks: **100**

Non-programmable calculators are allowed

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1. The physical conditions of the earth's atmosphere affect biological processes. **[20 Marks]**
  - a. Briefly describe the physical structure of the earth's atmosphere [15 Marks]
  - b. What do you understand by the term 'Greenhouse effect'? [5 Marks]
  
2. Meteorology has a wide range of applications to various disciplines. **[20 Marks]**
  - a. Outline meteorological parameters that are measured at a standard meteorological station. [10 Marks]
  - b. Outline at least five applications of meteorology to agriculture. [10 Marks]

3. Impacts of climate change are evident in many physical and biological systems. Research into such systems helps us assess their sensitivity and vulnerability to changes in climate. **[20 Marks]**

- a. Define climate change. **[2 Marks]**
- b. What are the causes of the recent climate change? **[4 Marks]**
- c. List at least four potential impacts of climate change on agriculture. **[4 Marks]**
- d. How can we mitigate climate change? **[5 Marks]**
- e. What adaptation measures can be implemented on-farm to reduce the impacts of climate change? **[5 Marks]**

4. Food security is of primary importance to the stability and development of any country. **[15 Marks]**

- a. What do you understand by food security? **[5 Marks]**
- b. List at least three expected impacts of climate change on food security **[3 Marks]**
- c. How can Zambia ensure food security in the face of climate change? **[7 Marks]**

5. A farmer in Shandyongong (15° 13' 24" S and 27° 56' 34" E) wants to know if his borehole would be able to supply adequate irrigation water to his Tomato crop growing during the hot and dry period from August to November. For purposes of planning the farmer assumes that the daily crop water requirement is similar to the peak reference evapotranspiration amount around mid-October. Given that some of the weather parameters around mid-October are as in the table below,

Parameter	
Minimum Daily Air Temperature	20.7 °C
Maximum Daily Air Temperature	34.8 °C
Mean Daily Relative Humidity	38 %
Daily Shortwave Radiation	28 MJ m <sup>-2</sup> day <sup>-1</sup>
Average Daily Wind speed	3 m s <sup>-1</sup>
Air pressure	890 kPa
Daily Soil Heat Flux	0.3 MJ m <sup>-2</sup> day <sup>-1</sup>

Calculate the following:

**[25 Marks]**

a. Actual vapour pressure

[6 Marks]

b. Net radiation

[5 Marks]

c. Reference evapotranspiration

[9 Marks]

d. Volume of irrigation water required per day

[5 Marks]

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**END OF EXAMINATION**

## Constants and equations

$$\text{Solar constant} = 1368 \text{ W m}^{-2}$$

$$\text{Daily expected shortwave radiation} = 29 \text{ MJ m}^{-2} \text{ day}^{-1}$$

$$\sigma = 5.67(10^{-8}) \text{ W m}^{-2} \text{ K}^{-4}$$

$$e_o = 0.6108e \left( \frac{17.27T}{237.3 + T} \right)$$

$$\gamma = 0.0662 \text{ kPa}^\circ\text{C}^{-1}$$

$$R_s = \left( a + b \frac{n}{N} \right) R_a$$

$$a = 0.28$$

$$R_{ns} = R_s(1 - \alpha)$$

$$b = 0.47$$

$$R_n = R_{ns} - R_{nl}$$

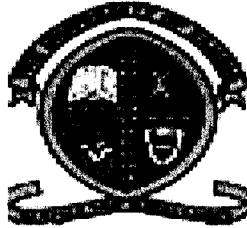
$$\alpha = 0.4$$

$$R_{nl} = \sigma \left( \frac{T_{max}^4 + T_{min}^4}{2} \right) (0.34 - 0.14(\sqrt{e_a})) \left( 1.35 \frac{R_s}{R_{so}} - 0.35 \right)$$

$$R_a = \frac{1}{\pi} S_o d_r [\omega_s \sin(\varphi) \sin(\delta_s) + \cos(\varphi) \cos(\delta_s) \sin(\omega_s)]$$

$$\Delta = \frac{4098 \left[ 0.6108e \left( \frac{17.27T}{237.3 + T} \right) \right]}{(T + 237.3)^2}$$

$$ET_o = \frac{0.408\Delta(R_n - G_o) + \gamma \frac{900}{T + 273} u_2 (e_s - e_a)}{\Delta + \gamma(1 + 0.34u_2)}$$



**The University of Zambia  
School of Agricultural Sciences**

**IDE EXAMINATIONS- AUGUST 2020  
BSC IN AGRONOMY**

**AGG 2851: ENVIRONMENTAL ETHICS IN AGRICULTURE AND LAND MANAGEMENT**

**Time: 3:00 hours**

**Total marks: 100**

**Instruction: Answer all questions**

**Q1.** Environmental ethics is the discipline that studies the moral relationship of human beings, and also the value and moral status of the environment and its non-human contents

- a. Briefly discuss the main principles of environmental ethics? **(9 marks)**
- b. How do these principles (discussed above) relate to sustainable land management? **(10 marks)**
- c. List the principles of sustainable land use **(6 marks)**

**Q2.** The environment is said to be made up of 4 spheres

- a. What are these spheres? **(4 marks)**
- b. Briefly discuss the interaction among these (four) 4 spheres **(16 marks)**

**Q3.** There are three main ethical perspectives of environmental science. List and briefly discuss these perspectives of environmental science **(15 marks)**

**Q4.** The National Biodiversity Strategy and Action Plan (NBSAP) is intended to define the current status of biodiversity in Zambia

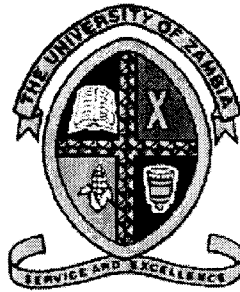
- a. What is your interpretation of biodiversity? **(5 marks)**
- b. What are the main threats to biodiversity in Zambia? **(15 marks)**

**Q5.** Provide an outline of ethical guidelines in the use of animals in science **(10marks)**

**Q6.** Environmental ethics in agriculture has become an important discipline in modern science.

- a. Explain the role of environmental ethics in agriculture **(5 marks)**
- b. How does agriculture contribute to environmental degradation? **(5 marks)**

**END OF EXAM**



**THE UNIVERSITY OF ZAMBIA  
INSTITUTE OF DISTANCE EDUCATION**

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**DIPLOMA IN LIVESTOCK MANAGEMENT IN THE TROPICS**

**END OF SECOND YEAR EXAMINATION**

**COURSE : DHM 2021 MODULE 13 FARM BUSINESS MANAGEMENT**

**DATE : AUGUST 2020**

**DURATION : 3 HOURS**

**INSTRUCTIONS: ANSWER ANY FIVE QUESTIONS**

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1. Farm records are power tools which are very helpful to us in decision making because they enable us to identify the strong and weak points of the farm business.
  - a). Identify the different types of farm records, their use and purpose (9 marks).
  - b). Explain the types of accounting systems (5 marks).
  - c). The balance sheet has the following features:(i) Current Assets, (ii)Fixed Assets and (iii) Liabilities. Explain the meaning of these features and give examples of each feature (6 marks).
  
2. Farming is a business that requires us to make decision in a risk environment every day. The consequences of our decisions are generally not known to us at the time we are making decisions. When we invest our money in capital investments we expect to get more than was invested in the project but sometimes this is not the case. The outcome from our decisions may be worse off than what we had expected. The sources of risk in agriculture are many
  - a). Identify and explain the sources of risks (8 marks).
  - b). Describe the strategies are that can be used to reduce risks and uncertainty (12 marks).
  
3. The primary purpose of the enterprise budget is to estimate the costs and returns and subsequently the profit of a particular enterprise on per unit basis. What is the meaning of the following terms used in enterprise budgeting (please give examples);
  - i. Revenue (5 marks).
  - ii. Variable costs (5 marks).
  - iii. fixed costs (5 marks).
  - iv Interest (5 marks).

4. A farmer in Chisamba wants to venture into broiler production in September this year. They will start by keeping 200 broilers. They collected the following information concerning broiler production
- Cost of day old chicks K4/chick
  - Feed Required
    - Broiler starter 4 x 50 kg bags each bag costs K240
    - Broiler Grower 6 x 50kg each bag costs K230
    - Broiler finisher 6 x 50 kg each bag costs K225
  - Cost of labour K400 per month
  - Number of workers 1
  - Cost of water K20 (per batch)
  - Cost of litter K120 (per batch)
  - Drugs and disinfectants K100 (per batch)
  - Electricity K90 (per batch)
  - Interest 10%
  - DIRTI K135
- The chickens will be raised over a period of 6 weeks and it will take 2 weeks to sell all the chickens at K42 per chicken. Only 5 chickens are expected to die during the rearing period
- From the information given above
- i. prepare the enterprise budget for the Women cooperative Society (10 marks).
  - ii. What will be the break even price of the chickens (5 marks).
  - iii. Advise the women whether they should go ahead with this enterprise (5 marks).
5. We usually purchase fixed assets because they are helpful to us in the production of farm produce. However their use in the production process over time causes them to depreciate and this depreciation is considered as an expense in farm business because it is a direct result of our use of the asset in farm production.
- a). What is depreciation and what are the two types of depreciation (8 marks).
  - b). Mention and explain any two methods used to calculate Depreciation (12 marks).
6. The success or failure of a farm business rests primarily on its management. If the available resources are not utilized effectively then the farm business will definitely fail.
- a). Define farm management (5 marks).
  - b). Explain the scope of farm management (5 marks).
  - c). What are the general functions of farm management (5 marks).
  - d). The selection of alternatives that we are going to analyze is the third step in forward planning in management. If our farm business is going to be successful in forward planning, there is need for us to carefully analyze the alternatives that are available. What are the factors that hinder success when identifying other business alternatives? (5 marks).

**THE END**

**THE UNIVERSITY OF ZAMBIA**  
**DISTANCE EDUCATION EXAMINATIONS 2019/20**  
**DIPLOMA IN ANIMAL HEALTH AND MANAGEMENT IN THE TROPICS**  
**DLM 2032 STUDY AND COMMUNICATION SKILLS COURSE**

**TIME: THREE HOURS**

**100 MARKS**

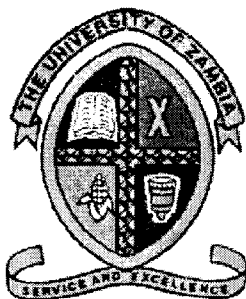
**INSTRUCTIONS**

**There are six questions in this paper. Answer questions ONE and any other Three.**  
**Question one is compulsory**

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1. You have been invited by a group of farmers to explain how they can prevent their cattle from the ravaging Foot and Mouth Disease in your operational block. You are required to reply through their Local representative and leaders ( Councilor and Chief) write a letter and design notices , memoranda to nearby camp officers to join and draft the speech you are going to use (40 Marks).
2. Managing time is a vital skill in one's studies. Explain how one can achieve good time management practices as a distance studies student. Analyse some of the problems that you would not want new students to experience.( 20Marks)
3. A library is essential for every successful study activity. Show how one can be assisted to locate reading material in a library.(20 Marks).
4. Explain how a well maintained diary can enhance your operations as a field worker (20 Marks).
5. Compare upward to down ward communication directions in an organisation ( 20 Marks).
6. Show how verbal and non verbal communication can be used jointly in your work as an Assistant Veterinary officer.

**END OF THE EXAMINATION**



**THE UNIVERSITY OF ZAMBIA  
INSTITUTE OF DISTANCE EDUCATION**

**DIPLOMA IN LIVESTOCK MANAGEMENT IN THE TROPICS  
SECOND YEAR END OF YEAR EXAMINATION**

**COURSE : DLM 2121 LIVESTOCK NUTRITION AND FEEDLOTING**  
**DATE : AUGUST 2020**  
**DURATION : 3 HOURS**  
**INSTRUCTIONS : ANSWER ALL QUESTIONS.**  
**ALL QUESTIONS CARRY EQUAL MARKS**  
**ANSWER EACH SECTION IN SEPARATE SET OF ANSWER BOOKLETS**

**SECTION A: MODULE 14 – LIVESTOCK FEEDING**

1. Why are the following feedstuffs restricted when formulating rations for poultry?  
i). cottonseed cake ii) sunflower cake iii) red sorghum iv) fish meal v) Cassava  
[10 marks].
  
2. The proximate analysis of a sample of Sunflower cake indicates the following figures (in % of FM):  
Carbohydrates 56%  
CP 29%  
NFE 16%  
OM 87%  
DM 91%  
  
Questions:
  - a. What is the percentage of Ashes of the sunflower-cake (in FM)?
  - b. What is the percentage of CF of the sunflower-cake?
  - c. Do you consider the percentage of CF high or low?
  - d. What is the percentage of EE of the sunflower-cake?
  - e. What is the moisture content of the sunflower-cake?
  
3. What is the significance of using urea-mollasses block in the nutrition of cattle, sheep and goats. [10 marks].
  
4. Outline the feeding regime of the broiler chickens and pigs and explain why the animals should be fed that way. [10 marks].

5. Using the Pearson Square formulate 100kg of Layers Mash containing 17% Crude Protein(CP) using Maize meal with 7.4 % CP and Soya cake with 40 %CP. Please show all the calculations. [10 marks].

## **SECTION B: MODULE 15 – FEEDLOTING CATTLE**

6. Briefly discuss:

- a) The aim and specific objectives of learning how to feedlot ruminant animals [5marks].
- b) The common practices for finishing cattle for the market while comparing their advantages and disadvantages [5 marks].

7. Describe the main biological characteristics of cattle that affect their response to feeding in a feedlot [10 marks].

8. Discuss in detail:

- a) Factors that affect profit margin in feedlot operation [5 marks].
- b) Processing and adapting animals to feedlots [5 marks].

9. Explain how manure disposal, fly control and digestive disorders should be managed in a feedlot [10 marks].

10. Discuss in detail how a feedlot enterprise is managed [10 marks].

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END OF EXAMINATION



**THE UNIVERSITY OF ZAMBIA**  
**Institute of Distance Education (IDE)**  
**Diploma in Livestock Management**

**COURSE DLM 2132 – Mechanization of Livestock Farms**

**Time Allowed: Three (3) Hours Only**

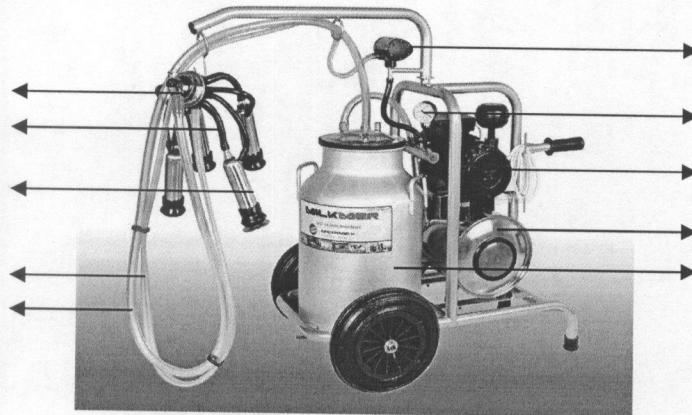
**Date: 28<sup>th</sup> August 2020**

**Instructions to Candidates:**

- a. All Questions carry equal marks (25).
  - b. Answer any four (4) questions and clearly show all the calculations.
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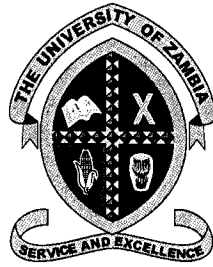
- Q. 1** Farm mechanisation involves the use of heavy machinery such as tractors in land preparation, planting of crops and pastures, harvesting and storage of crops, including hay and silage. Mechanisation implies that less labour is employed on the farm. Indicate any ten (10) advantages of mechanised farming.
- Q. 2**
- a. Hand milking is the cheapest method of removing milk from the cow's udder after the milk-let-down process has been initiated. In addition, hand milking causes little damage to the udder and teats of dairy cows. Discuss any ten (10) practices that a good herdsman using hand milking in heard of 20 dairy cows must carryout in order to produce clean milk.
  - b. Discuss any form of mechanization that can be introduced on a dairy farm of your choice in the process of hay and silage making.
- Q. 3** Milk is produced and stored in the cow's udder. Proper and efficient methods of milk removal from the udder should be used. However, the cow must be stimulated to let-down her milk before milk can be removed from the cow's udder.
- a. What is the milk let-down or ejection process?
  - b. Discuss the conditions on a dairy farm of choice factors that lead to the initiation milk let-down or ejection process.
  - c. Discuss the reasons why it is important to quietly milk the dairy cow.

- Q. 4** a. Hand milking is the cheapest method of removing milk from the cow's udder. In addition, hand milking causes little damage to the udder and teats of dairy cows. Discuss any ten (10) practices that a good herdsman must carry out in order to produce clean milk on any farm of your choice with the use of hand milking.
- b. Complete labeling the ten (10) parts of the portable bucket milking machine pointing away by the arrows (and label them as **a, b, c, d** and **e** on the left from top to bottom; and **f, g, h, i** and **j** on the right from top to bottom) and indicate their functions



- Q. 4** a. A group of emergent farmers from the Eastern Province would like to speed up the process of milking their cows by purchasing milking machines. Discuss with the group of emergent farmers the advantages and disadvantages of the use of machine milking on any farm.
- Q. 5** Write notes on the following:
- a. Any five (5) advantages of the use of Automatic milking systems (AMS) or robotic milking; and
- b. Any five (5) disadvantages of machine milking.

**THE END OF EXAMINATION**



**THE UNIVERSITY OF ZAMBIA**  
**Institute of Distance Education (IDE)**  
**Diploma in Livestock Management**

**COURSE DLM 2221 – Livestock Housing and Farmstead Design and Livestock  
Industry and Applications**

**Time allowed: Three (3) hours only**

**Date: 19<sup>th</sup> August 2020**

**Instructions to candidates:**

- a. All Questions carry equal marks (20).
  - b. Answer any five (5) questions, at least two from each section.
  - c. Answer each section in separate set of answer booklets.
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**Section A: Dairy Housing and Farmstead Design**

1. The farmstead is the centre of all the farming activities. The farmstead includes the farm house, the place where livestock are housed and cared for, and where the crops are processed and stored. Discuss any ten (10) factors that you would take into consideration when selecting the site to construct the farmstead and farm buildings.
2. When constructing a new dairy farm, the milking parlour should have a high quality concrete floor and metal railings for durability and ease of cleaning.
  - a. Discuss the common types or designs of milking parlours;
  - b. Mention the functions and reasons of any five (5) structures that should be found close to the milking parlour; and
  - c. Mention the functions and reasons of any five (5) structures that should be at least 30 metres from the dairy unit and give reasons.
3.
  - a. Pig houses should be simple, open sided structures to provide maximum ventilation, shade and protection to the pigs. Discuss the most common types or designs of pig houses.
  - b. Poultry houses should provide a good environment, protection from predators, theft and exclude rodents and wild birds. Discuss the most common types or designs of poultry houses and give the advantages of their use.

## **Section B: Livestock Industry and Applications**

4. Zambia's ability to capture the potential economic benefits of expanded livestock industry is constrained by gaps in productivity and price competitiveness. The livestock industry in Zambia has the greatest potential of becoming a major Foreign Exchange (Forex) contributor to the national treasury.
  - a) Give reasons as to why the livestock industry has great potential for growth in Zambia; and
  - b) What would it take for the industries to achieve their potential.
  
5. Zambia is endowed with a several indigenous livestock species that provide a wide range of social and economic importance in the lives of the local people. In recent years, the survival of the local breeds has been on the increase.
  - a) Outline the importance of the local livestock breeds in the livestock industry in Zambia;
  - b) What are the major threats to the survival of the local livestock breeds in Zambia? and
  - c) What are the benefits of inclusion of exotic cattle breeds in the beef/dairy industry in Zambia?
  
6. The global livestock sector is growing faster than any other agricultural sub-sector. It provides livelihoods to about 1.3 billion people and contributes about 40 percent to global agricultural output. But such rapid growth exacts a steep environmental price, according to the FAO 2006 report, "*Livestock's Long shadow—Environmental Issues and Options*".
  - a) Describe the various environmental issues that affect the livestock industry; and
  - b) Advise on appropriate remedies for each environmental issue.
  
7. Marketing livestock products involves various types of markets and the players involved.
  - a) Outline the different type of markets and market players involved in the livestock industry; and
  - b) What has been the impact of the ban on live animal movement on the marketing of beef and beef products)?

**THE END OF EXAMINATION**

**THE UNIVERSITY OF ZAMBIA**  
**SCHOOL OF VETERINARY MEDICINE**  
EXAMINATIONS-2020 ACADEMIC YEAR  
LIVESTOCK REPRODUCTION (DLM 2232)

**TIME: THREE (3) HOURS**

**INSTRUCTIONS:**

1. Answer **ALL** questions in section **A** and **TWO** questions in section **B**
  2. Write as clearly as possible as poor handwriting cannot be marked
- 

**SECTION A, answer ALL questions**

**QUESTION 1**

What is gametogenesis? Describe the process of gametogenesis in the male and female animal. [20 marks]

**QUESTION 2**

Briefly discuss:

- a) The important management factors that should be considered during periparturient period [5 marks].
- b) The aim and specific objectives of learning how to manage cows and their calves [5 marks].
- c) Important management factors that should be considered in order to keep a lactating (milking) and pregnant cow in good body condition and high milk production with minimum loss of body condition [5 marks].
- d) The body condition during the different stages of lactation and pregnancy of a cow without concentrate supplementation and a calving interval of 12 months [5 marks].

**QUESTION 3**

Explain the processes involved in parturition and the associated problems of parturition [20 marks]

**SECTION B answer any TWO questions**

**QUESTION 4**

Briefly discuss:

- a) Dystocia [5 marks].
- b) Signs of parturition [5 marks].
- c) The periparturient period and important management factors that should be considered during this period [5 marks].
- d) Methods of rearing calves [5 marks]

**QUESTION 5**

Write notes to show your understanding of the following:

- a) Infertility in livestock [5 marks]
- b) Artificial insemination and embryo transfer [5 marks]
- c) Male accessory sex organs [5 marks]
- d) Reproductive hormones [5 marks]

**Question 6**

- (a) Describe in detail the anatomy of the bull's and cow's reproductive systems [15 marks]
  - (b) How would you assess a bull for breeding soundness? [5 marks]
- 

**END OF EXAMINATION**