THE UNIVERSITY OF ZAMBIA

SCHOOL OF AGRICULTURAL SCIENCES

2015/16 EXAMINATION PAPERS

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THE UNIVERSITY OF ZAMBIA

SCHOOL OF AGRICULTURAL SCIENCES

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THE UNIVERSITY OF ZAMBIA

FACULTY OF AGRICULTURAL SCIENCES
DEPARTMENT OF ANIMAL SCIENCE

SUPPLEMENTARY EXAMINATION QUESTIONS - 2015/16

COURSE: **AGA 2110 ANATOMY AND PHYSIOLOGY OF FARM ANIMALS**
DURATION: **THREE (3) HOURS**

INSTRUCTIONS: ***CAREFULLY READ INSTRUCTIONS FOR EACH SECTION***
ANSWER EACH SECTION IN A SEPARATE ANSWER BOOK
WRITE THE NUMBER OF EACH ATTEMPTED QUESTION
BEGIN EACH QUESTION ON A SEPARATE PAGE

SECTION A

INSTRUCTIONS: ***ANSWER QUESTION ONE AND ANY OTHER QUESTION FROM THIS SECTION***

QUESTION ONE

A. Briefly describe the following terms as used in anatomy and physiology of farm animals; **[10]**

i. Haemocytoblast
ii. Broad ligament
iii. Zymogen
iv. Proventriculus
v. Syrinx

B. With regard to farm animals only;
i. Name the basis for and briefly describe two adaptations of the respiratory system . **[4]**
ii. What are the types uteri found in farm animals? **[2]**
iii. Name the fluid compartments that make up total body water. **[2]**
iv. What is the role of organs accessory to the digestive system? **[2]**

QUESTION TWO

With regard to reproduction in farm animals,
i. What are the functions of the reproductive system? **[2]**
ii. Briefly discuss the two-cell two-gonadotrophin theory. **[4]**
iii. What are the stages of the oestrous cycle in cattle? **[4]**
iv. Name four organs commonly called accessory glands in male animals. **[4]**
v. When is puberty said to be attained in male and female animals. **[4]**
vi. Name they types of placentae. **[2]**

QUESTION THREE

With regard to the integumentary system of farm animals,

i. Use a labelled diagram to show the main features of this system. **[4]**
ii. Briefly describe two basis for thermoregulation. **[4]**
iii. What is the role of melanocytes? **[2]**
iv. Animals lose or gain heat in various ways. What do the subscripts

E, R, C, & G in the equation $M - E_E \pm E_R \pm E_C \pm E_G \pm S = 0$ represent? **[4]**

v. What are the types of feathers found in birds? **[2]**

vi. What two structures are associated with the integument? What role do these structures play? **[4]**

QUESTION FOUR

With regard to farm animals,

i. Name three components of blood and state their functions. **[6]**

ii. Using examples, state what prevents blood or lymph from flowing back in vessels? **[4]**

iii. By what three mechanisms is animal body pH regulated? **[3]**

iv. Using examples, state the difference between sterility and infertility. **[4]**

v. What is the difference between external and internal respiration? **[1]**

vi. What are the functions of microorganisms in ruminants? **[2]**

SECTION B

CHOOSE ANY TWO QUESTIONS FROM THIS SECTION AND WRITE THE ANSWERS IN A SEPARATE ANSWER BOOK. EACH QUESTION IS WORTH TEN (10) MARKS.

QUESTION ONE

Epithelial tissue covers the whole surface of the body. It is made up of cells closely packed and arranged in one or more layers. Describe in detail the two types of epithelial tissues and give examples of each of the two epithelial tissues.

QUESTION TWO

The cell is said to be a basic unit that makes up all tissues, organs and systems hence the properties of the cell are equated with those of life. List down the cell properties and give a brief account on three of the listed cell properties.

QUESTION THREE

Muscles can be divided into three main groups according to their structure, e.g.;

a) Smooth muscle tissue.
b) Skeletal muscle tissue.
c) Cardiac (heart) muscle tissue.

Write short notes on each of the three types of muscles mentioned above.

QUESTION FOUR

Write short notes on each of the following;

a) Endoskeleton
b) Classification of the skeletal bones
c) Functions of the bone

Be brief in your answering.

END OF EXAMINATION

COMPUTER NUMBER:.....

THE UNIVERSITY OF ZAMBIA
SCHOOL OF AGRICULTURAL SCIENCES
DEPARTMENT OF ANIMAL SCIENCE

AGA 2110 ANATOMY AND PHYSIOLOGY OF FARM ANIMALS

FINAL PRACTICAL EXAMINATION

WEDNESDAY, 21st SEPTEMBER 2016

Instructions: You are allowed three (3) minutes per question

Question One

Refer to specimen labelled 1

a. Identify the parts on the specimen labelled:

A. .....[1]

B. .....[1]

C. .....[1]

D. .....[1]

E. .....[1]

b. List two types of microscopes that are commonly used in the laboratory.

1. .....[1]

2. .....[1]

Question Two

(a) List the five basic senses found in farm animals

A. .....[1]

B. .....[1]

C. .....[1]

D. .....[1]

E. .....[1]

(b) List the components of taste

A. .....[1]

B. .....[1]

C. .....[1]

D. .....[1]

Question Three

a. You are provided with a Snellen chart. A normal eye is typically supposed to clearly see letter H of the last row of the chart at 3m from the chart. Using your hand, cover one eye to see at which distance you can clearly see letter H then calculate your visual acuity [2]

(b) What is visual acuity? [2]

.....

.....

(c) Briefly discuss why birds have better visual acuity than other vertebrates such as pigs? [2]

.....

.....

.....

.....

(d) Define near point. [2]

.....

.....

.....

.....

Question Four

(a) What is a reflex? [2]

.....
.....
.....

(b) How are deep reflexes tested? [2]

.....
.....
.....

(c) Stretching the muscle spindle in the quadriceps muscle by striking the patellar ligament with a reflex hammer is referred to as .....[2]

Question Five

a. Define the following

i. Heart rate [2]

.....
.....
.....

ii. Blood pressure [2]

.....
.....
.....
.....

iii. Cardiac output [2]

.....
.....
.....
.....

b. Calculate Cardiac output when heart rate is 137 beats/minute and stroke volume is 45mL/beat [2].

c. Name the equipment used to measure blood pressure. [2]

.....

Question Six

Examine the model provided.

a. Identify the regions of the vertebral column labelled A to E.

A. .....[1]
B. .....[1]
C. .....[1]
D. .....[1]
E. .....[1]

b. Write the names of the first two bones in region A

1. .....[1]
2. .....[1]

Question Seven

a. Identify the part labelled A. [2]

A. .....

b. What is the function of Extensors? [2]

.....
.....
.....

c. Most muscles have attachments to two different bones. The least movable attachment is called the .....[2]

Question Eight

Examine the specimen provided. Identify parts labelled A to G.

A. .....[1]
B. .....[1]
C. .....[1]
D. .....[1]
E. .....[1]
F. .....[1]

Question Nine

a. Identify parts labelled A to F.

A. .....[1]

B. .....[1]

C. .....[1]

D. .....[1]

E. .....[1]

F. .....[1]

b. What is the role of the part labelled F? [2]

.....

.....

.....

.....

Question Ten

a. Identify the parts labelled A to E.

A. .....[1]

B. .....[1]

C. .....[1]

D. .....[1]

E. .....[1]

b. Name three farm animal species in which these organs are found.

1. .....[1]

2. .....[1]

3. .....[1]

Question Eleven

a. View and name the specimen provided under the microscope.

.....[2]

b. What is the major function of the specimen shown in question 11 (a) above?

.....

.....[2]

Question Twelve

Identify the specimen provided and name the labelled regions. [5]

Specimen.....

A. .....

B. .....

C. .....

THE UNIVERSITY OF ZAMBIA
School of Agricultural Sciences
Department of animal Science
2016 ACADEMIC YEAR – SECOND HALF EXAMINATION
AGA 3212 – Applied Animal Nutrition

Date: Thursday 27th September 2016 (AM)

INSTRUCTIONS TO CANDIDATES:

a. Answer any **five (5)** questions from both Section A and Section B.
b. All Questions carry equal marks (20).
c. Use different answer books for each Section.

SECTION A – LIVESTOCK AND POULTRY FEED INGREDIETS

QUETSION ONE

A final year student formulated a diet for broilers using the ingredients as shown in the table below:

Ingredients	Kg
Maize	45
Soybean cake- low fat	24
No. 3 maize meal	17
Soybean cake- full fat	10
DCP	1.8
Limestone flour	1.2
DL-Methionine	0.2
Lysine	0.2
Broiler premix	0.3
Fine salt	0.3
Coccidiostant	0.01
Zinc Bacitracin	0.01

(i) Classify the ingredients used in the formula according to energy, protein, and mineral concentrates, as well as feed additives **(12 Marks)**

(ii) In brief, explain by giving the general characteristics of the feedstuffs, why you have classified them as such **(8 Marks)**

QUESTION TWO

Cassava meal, Sorghum, sunflower cake, and cotton seed cake are cheaper sources of carbohydrates and proteins when compared to Maize, soybean cake and fish meal, respectively.

(i) For each of the mentioned cheaper ingredient, describe at least two factors that limit their optimal use in monogastric feeding **(16 Marks)**

(ii) Explain with two reasons, why fish meal is sparingly used when feeding livestock **(4 Marks)**

QUESTION THREE

(i) What are feed additives? **(2 Marks)**

(ii) List down at least six classes of feed additives that you know. **(6 Marks)**

(iii) For each class listed in **(ii)** give an example and suggest how that additive is able to achieve the specific need it is included for in the ration.**(12 Marks)**

SECTION B – RATION FORMULATION

QUESTION FOUR

A) Explain the steps you may wish to consider before starting to formulate a ration for a given group of animals on your farm? **(8 Marks)**

B) After formulating your ration, what quality control measures are you supposed to consider to ensure your animals are receiving the right amount of nutrients required for them to meet their expected productive and reproductive performance? **(6 Marks)**

C) What other precautionary measures are you supposed to consider to ensure that you are protected from unwarranted charges or litigation cases about feed quality issues? **(6 Marks)**

QUESTION SIX

A) Assume you have 450kg cow that is expected to produce 13 litres of milk every day and the cows is mainly fed a basal diet consisting of 70% grass hay and 30% legume hay. The daily Dry Matter (DM) intake of the grass/legume mixture is fixed at 3.0% of its body weight. The grass hay has a DM content of 80% and contains 550g of Total Digestible Nutrients (TDN) and 60g of digestible Crude Protein (dCP) per kg dry matter, respectively. The legume hay has a DM content of 75% and a TDN and dCP contents of 450g and 120g per kilogram of dry matter. How much of the grass legume/mixture is this animal supposed to eat every day on as fed basis? What is the TDN and dCP concentration of the grass legume mixture when expressed on as fed basis?

B) If the requirements for animal body weight maintenance are 3400g TDN and 610g for dCP per day and that for each litre of milk containing a butter fat content of 3.5%, the animal needs is 470g TDN and 66g dCP. How much milk is this animal expected to produce by consuming the grass legume mixture each day?

C) You are requested to formulate a protein concentrate having 140g dCP per kg dry matter (DM) to increase milk production to expected levels using Maize meal, Barley meal, Cotton Seed Cake and Di-calcium Phosphate (DCP). You are reminded that the inclusion of DCP in the ration is fixed at 3%. How much of this concentrate is this animal expected to eat for it to produce the required amount of litres each day? What are the levels of Energy, Calcium and Phosphorus in this concentrate ration? The content of nutrients in feed ingredients required for ration formulation is given in Table 3.

Table 3: Content of nutrients in feed ingredients required for the formulation of the dairy concentrate ration.

Ingredient	Total Digestible Nutrients (g/kg DM)	Digestible Crude Protein (g/kg DM)	Calcium (%)	Phosphorus (%)
Maize Meal	800	84	0.03	0.3
Barley Meal	750	74	0.04	0.4
Cotton Seed Cake	700	294	0.2	1.0
Di-calcium Phosphate	0	0	24.0	18.0

QUESTION FIVE

A) Using a Pearson square, formulate a ration for growing quails to have 22% crude protein using Barley meal, Green Gram meal, Fish meal and Mineral/Vitamin premix. You are informed that Fish Meal and the Premix are fixed at 5 and 2.0% of dietary inclusions, respectively. What is the Energy, Calcium and Phosphorus concentration in the diet? If the nutritional requirements for growing quails are fixed at 3000 Kcal/kg for Energy, 22% for Crude protein, 0.6% for Calcium and 0.8% for total phosphorus, how effective is this ration in meeting nutritional requirements for the growing quails?

Table 1: Nutrient composition of feedstuffs required for the formulation of the Quail grower diet

Ingredient	Energy (Kcal/kg)	Protein (%)	Calcium (%)	Phosphorus (%)
Barley Meal	3200	12	0.03	0.3
Green Gram	2800	45	0.04	0.4
Fish Meal	2900	70	3.50	2.6
Premix	0	0	24.00	18.0

B) Using Algebraic expressions, formulate a pullet ration to have 18% Crude Protein (CP) using Maize Meal, Sorghum meal, Cotton Seed Cake, Fish Meal and a Vitamin/mineral premix. The inclusion levels for Sorghum, Fish Meal and the Premix are fixed at 18, 5 and 2.5%; respectively. What are the energy, Calcium and Phosphorus levels in the diet? Based on your knowledge of pullet nutrition, does this diet meet nutritional requirements for the layer pullets?

Table 2: Nutrient composition of feedstuffs required for the formulation of the pullet grower ration.

Ingredient	Energy (Kcal/kg)	Protein (%)	Calcium (%)	Phosphorus (%)
Maize meal	3300	8	.03	0.3
Sorghum meal	3000	12	.04	0.4
Cotton Seed Cake	2800	38	0.2	0.8
Fish Meal	2900	70	3.5	2.6
Pre-mix	0.0	0.0	24.00	16.00

THE UNIVERSITY OF ZAMBIA

THE SCHOOL OF AGRICULTURAL SCIENCES

Department of animal Science

2016 ACADEMIC YEAR – SECOND HALF EXAMINATION

AGA 4522 – Dairy and Rabbit Production

TIME ALLOWED: Three (3) hours only **Date: Thursday15th September 2016 (PM)**

INSTRUCTIONS TO CANDIDATES:

a. Answer any **five (5)** questions from both Section A and Section B.

b. All Questions carry equal marks (20).

c. Use different answer books for each Section.

SECTION A – Rabbit Production

Q. 1 Rabbit production is especially adapted to villages, small farms and in back-yards in urban areas where other types of livestock cannot be raised. A farmer from Mumbwa wishes to establish a rabbit unit at his 10 hectare farm. The farmer has learned that proper feeding is important in order to ensure that the bucks and does are healthy and produce healthy litters and that the fatteners grow and fattened well before marketing.

a) Design a rabbit hutch breeding record card for the farmer from Mumbwa;

b) Advise the farmer from Mumbwa where rabbit breeding stock can easily be purchased and the characteristics to look for in good breeding rabbits, both males and females; and

c) Discuss with farmer any five (5) the factors that may affect feed intake among his rabbits.

Q. 2 A good breeding routine is good management. Discuss any ten (10) breeding routine management practices that you like the farmer from Mumbwa to introduce in his rabbit unit in order to ensure that he gets maximum profits from the rabbit unit.

Q. 3 Rabbit meat is today consumed in most countries of the world. Rabbit meat has been described as tasty, of good quality and highly nutritious just like chicken meat. As a result rabbit meat is highly recommended for the aged, the sick and children. In addition, rabbits are small and very cheap to purchase and to house; therefore, the initial capital outlay is minimal because with scrap wood or bamboo can be used to construct rabbit hutches. Prepare notes on any other ten (10) reasons for raising rabbits in preference to other types of livestock in any district in Zambia.

SECTION B – Dairy Production

Q. 4 (a) An upcoming dairy farmer has approached you for information on how to succeed in the dairy farming business. As a dairy expert, explain to the farmer at least seven key factors that should be considered if one is to succeed with this type of livestock farming. (14 Marks)

(b) Describe at least three distinguishing characteristics that identify each of the following dairy breeds;

(i) Holstein Friesian (3 Marks)

(ii) Jersey (3 Marks)

Q. 5 Differentiate the following terms used in dairy production

(a) Steaming up and flushing (4 Marks)

(b) Gestation period and calving interval (4 Marks)

(c) Selection and culling (4 Marks)

(d) Artificial insemination and embryo Transfer (4 Marks)

(e) Milk persistency and lactation curve (4 Marks)

Q. 6 (a) Using Pearson square formulate a 38% crude protein dairy concentrate, using fish meal, maize meal, wheat meal and soybean meal. The crude protein composition of your ingredients is as follows: (12 Marks)

- Fish meal: 65%
- Maize meal: 8%
- Soybean meal: 40%
- Wheat meal: 17%

(b) Write short notes on the following;

(i) Signs of standing heat in a cow (2 Marks)

(ii) Importance of large rumen in dairy cows (2 Marks)

(iii) Different heat detection methods used in dairy farming (2 Marks)

(iv) Advantages of depositing semen in the cervix when doing artificial insemination (2 Marks)

END OF EXAMINATION

UNIVERSITY OF ZAMBIA
SCHOOL OF AGRICULTURAL SCIENCES
ANIMAL SCIENCE DEPARTMENT

2015/2016 ACADEMIC YEAR SECOND SEMESTER EXAMINATIONS

COURSE AGA 4532: PIG AND POULTRY PRODUCTION

DATE OF EXAMINATION: 20TH SEPTEMBER, 2016

DURATION: THREE (3) HOURS

INSTRUCTIONS TO CANDIDATES:

i. **Answer all questions.**
ii. **Marks for each question are as shown.**
iii. **Write the answers for each Section in separate answer books and mark books appropriately as Section A, B OR C.**

SECTION A POULTRY PRODUCTION

Q1. Imagine you are the Animal Production Officer for Chama District. One of your duties is to supervise poultry production activities in the district. The chairperson of a broiler unit (Tiyezyeko Production Unit) invites you to her group's chicken run. Outside the chicken run you see pools of stagnant water everywhere left by the rain. At the door of the building you are met with an irritating pungent smell coming from inside. Inside the building you notice the chicks are huddled up in the corners. The chicks have white feathers covering most of the body but still have yellow down feathers covering the head. The birds look weak and stunted and their droppings have stains in different variations of the colour red. The chairperson informs you that out of an initial 1000 chicks, 307 have so far died.

(25 marks)

i. What management practices do you suspect to have been neglected or poorly done in the care of the birds and their environment? Explain.

ii. Outline the biochemical processes that you expect to be taking place in the birds, in relation to your observations.
iii. What advice would you give the chairperson of Tiyezyeko Production Unit and her group members on the type of feed and vaccinations to be given to the broilers?

Q2. Compare and contrast the management of chickens reared under the 'traditional management system' and those reared under the 'intensive management system'. What consequences do the management practices utilized under the two systems have on the performance of the birds? **(20 marks)**

SECTION B PIG PRODUCTION

Q1 Name and explain the main signs that will indicate that a sow or gilt is on heat. **(12 marks)**

Q2 In piglet management there are essential routine management practices that have to be carried out. List the practices and briefly explain their relevance in good piglet management. **(18 marks)**

Q3 Briefly discuss the importance of herd records in pig production. **(10 marks)**

SECTION C ORGANIC PIG AND POULTRY PRODUCTION

Q1 You are the new inspector certifying organic pig and poultry production in Kanakantapa. You have come to do a standard inspection of Mr Phiri's organic animal husbandry programme. **(15 marks)**

i. Detail him on the main activities you would cover with him on this inspection.

ii. Enlighten him on the recommended origin of animals or birds, disease prevention and control measures for organic production.

END OF EXAMINATION

THE UNIVERSITY OF ZAMBIA
SCHOOL OF AGRICULTURE

2015 ACADEMIC YEAR
FINAL EXAMINATIONS

AGA4542: GAME RANCHING

TIME: THREE HOURS

INSTRUCTIONS: ANSWER **FIVE** QUESTIONS; QUESTION **ONE** AND ANY OTHER **FOUR** QUESTIONS. ILLUSTRATE YOUR ANSWER WHERE NECESSARY.

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1. Pemba Farms Ltd is considering establishing a game ranch in the Mumbwa District along the Kafue River. Initial investigations show that the range is suitable for Impala, Zebra, Wildebeest, Kudu and Buffalo. Ten per cent (10%) of the range is a steep hill and in addition only 60% of the range is within 6.5 km from water. Based on the information from the Ministry of Agriculture and Cooperatives in Mumbwa, the soils are generally suitable for game ranching. Furthermore, results from your preliminary estimates indicate that the production of key forage species averages about 800kg/ha of dry matter per year. The proposed farm is 10,000 ha in size. Assuming that allowable use is 40% of the total biomass and daily dry matter intake is 2% of the animal body weight,
   (a) Determine the number of 950 kg buffaloes you would stock as your base herd in the area.
   (b) Determine Animal Units / ha/month of the buffalo.
   (c) Determine number of hectares you would need to stock 200 zebras per year in this ranch.
   (d) Discuss limitations of this method in estimating stocking rate of wildlife species.

2. Discuss each of the following:
   (a) Characteristics of animal species suitability for a game farm in Zambia.
   (b) Difficulties associated with the translocation and restocking operations in Game Ranching.

3. Discuss management application of the following methods as used in wildlife and range management:
   (a) Bitterlich method.
   (b) King Census method.
   (c) Point centered quarter method.
   (d) Point-intercept method.

TURN OVER

4. (a) Compare and contrast the concepts of carrying capacity and stocking rate in the management of wildlife species.
   (b) Describe methods used in wildlife habitat improvement in a semi-arid environment.

5. Summarize each of the following:
   (a) *Ceratotherium simum.*
   (b) Contribution by Aldo Leopold to wildlife management.
   (c) Aerial census method.
   (d) Methods for capturing Nile crocodile for game ranching.

6. Discuss each of the following:
   (a) Main characteristics of a wildlife habitat.
   (b) Restoration of *Tragelaphus spekei* habitat.

7. Discuss each of the following:
   (a) Harvesting strategies in wildlife management.
   (b) Threats to wildlife conservation in Zambia.

8. Describe each of the following:
   (a) Procedure for establishing a game ranch in Zambia.
   (b) Protected Area System in Zambia.

END OF EXAMINATION

THE UNIVERSITY OF ZAMBIA
SCHOOL OF AGRICULTURAL SCIENCES

2016 END OF YEAR FINAL EXAMINATIONS

COURSE : AGA 4552 ANIMAL PRODUCTS AND BY PRODUCTS
DATE : THURSDAY, SEPTEMBER 29, 2016 09:00 HOURS
DURATION : 3 HOURS

SECTION A ANSWER ANY TWO QUESTIONS

1. Draw the reproductive organ of a hen and label it. Explain how the egg is formed. During its formation describe all possible defects that can occur. In your own words based on what you have learnt, also add some advisory information as to why it is not advisable to drink raw eggs (20 Marks)
2. You are a quality manager in a company producing organic eggs describe how you will ensure that the eggs going to the consumer market 5 kilometers away will be acceptable to potential customers (15 Marks).
   (b) Describe the following (5 Marks)
   (i) Egg substitutes and why they are on the market
   (ii) Egg yolk gelation and its prevention
   (iii) Mallard browning its causes and its prevention in egg technology
   (iv) Bacteria that fluoresce under UV light
   (v) Peewee in eggs
3. Outline the factors that affect the composition of milk. What are the sources of contamination of milk and how can these sources of contamination be minimized (20 marks)

SECTION B ANSWER ANY THREE QUESTIONS IN SEPARATE ANSWER BOOKLET

4. People eat meat for various reasons which include tradition, nutritive value, availability, wholesomeness, variety, satiety value, and social or religions customs. Meat is also a highly pleasing food for many people, and the consumption of it is a measure of societal status world over but the ultimate eating quality of meat is dependent on the palatability and nutritive value. Write short notes on;

   a) Palatability of meat

b) Juiceness of meat
c) Meat tenderness
d) Rigormortis
(20 marks)

5. Bones though a good source of calcium and phosphorus can be source of several dangerous diseases such as anthrax and botulism, therefore, it is important that before they are utilized, they are sterilized. Explain the different methods you can use to sterilize the bones in order to make them safe for use in livestock feeds. (20 marks)

6. In the production of hides/skins, it easier to control the sources of defects and faults if one is knowledgeable on the causes. Defects and faults are caused at different stages of the animal's life, and these degrade the quality of hides/skins. Explain how defects and faults may occur and how one can minimise their occurrence;
a) During the animal's life
b) During slaughtering and flaying
(20 marks)

7. Blood is a highly valuable source of protein for livestock nutrition which in many cases is simply wasted. Despite its usefulness in the livestock nutrition, blood has its limitations. Explain how two major limitations affects the use of fresh blood in stock feed and clearly outline the different ways in which Blood may be prepared in order to be of good use in animal nutrition (20 marks)

8. Curing is effected by dehydration of the hide/skin to create conditions unfavourable to microbial growth. Describe in detail methods you can use to ensure and assure a successful curing procedure (20 marks).

THE END

THE UNIVERSITY OF ZAMBIA
SCHOOL OF AGRICULTURAL SCIENCES

2015 ACADEMIC YEAR
FINAL EXAMINATIONS

AGA 5562: INTEGRATED AQUACULTURE AND FISH NUTRITION
THEORY PAPER

TIME: THREE HOURS

INSTRUCTIONS: ANSWER **FIVE** QUESTIONS. ANSWER QUESTIONS **ONE, TWO AND FIVE**. ANSWER **TWO** QUESTIONS **FROM EACH SECTION** AND THE **FIFTH** QUESTION FROM EITHER SECTION. ILLUSTRATE YOUR ANSWERS WHERE NECESSAR. USE **SEPERATE ANSWER BOOKS** FOR EACH SECTION.

SECTION A: Integrated Aquaculture

1. Justify the following practices or regulations in semi intensive aquaculture in Zambia:
   (a) Use of the common Carp (*Cyprinus carpio*).
   (b) Encouraging emerging fish farmers to produce their fingerlings and not buying them.
   (c) Preventing the farming of *Oreochromis niloticus* in the Mweu - Luapula Basin.
   (d) Keeping fish ponds dry for two weeks in between production cycles.
   (e) Discouraging disposal of water from fish ponds directly into streams and rivers.

2. A former Agriculture Extension Worker based in Kaoma, Western Province, Mr. Mwauluka has decided to start fish farming using semi-intensive, fish cum pig farming methods, after failing to become the area Member of Parliament in the 2016 elections. A preliminary survey of his farm indicated that he could use 3,000 m^2 for production ponds. The topography of the area where the production ponds are to be located is such that it is possible to have fish production ponds of the same size.
   (a) Suggest the **number** and **sizes** of production ponds that you would recommend.
   (b) Estimate the number of **fingerlings** per year and **pigs** needed for **production** ponds.
   (c) Estimate the area that would be required for **breeding** and **nursery** ponds.
   (d) Approximate the total annual water requirement for **production ponds** only.

3. *Oreochromis andersonii*, the three spot bream, is a cichlid species that is recommended for integrated farming in most parts of Zambia particularly in the Zambezi River Basin. Summarise the reasons for strongly recommending this fish species for aquaculture in areas indicated.

4. At Global level aquaculture is the fastest growing food production system with growth rate of 9.2 % per year. In Zambia aquaculture is still a small industry with an estimated annual out put of 21,000 tonnes. Suggest activities that need to be implemented to enhance the development of aquaculture in the country.

TURN OVER

UNIVERSITY OF ZAMBIA

SCHOOL OF AGRICULTURAL SCIENCES

DEPARTMENT OF ANIMAL SCIENCE

2015/2016 ACADEMIC YEAR SECOND SEMESTER

FINAL EXAMINATION

AGA 5712: ANIMAL HEALTH

TIME: THREE HOURS

INSTRUCTIONS:

1. Please read the instructions and each question carefully.
2. Answer ALL questions.
3. Write the answers to each question in a separate examination answer book.
4. All questions carry equal marks.

.....

1. Parasitic infections of farm animals can cause serious clinical disease, welfare problems and loss in production. Knowledge of a parasite's life cycle and species present in a particular geographic region is important in formulating prevention/control programs.
   a) Briefly outline the types of parasite life cycles. **(2 marks)**
   b) Outline the categorization of parasites that affect farm animals. **(4 marks)**
   c) Discuss the general effects of parasites on farm animals. **(4 marks)**
   d) List factors that contribute to the development parasites that are resistant to dewormers. **(4 marks)**
   e) Outline a control programme you would use for the barber pole worm in small ruminants at a farm. **(6 marks)**

2. Write short and concise/informative notes on any **four (4)** of the following:
   a) Clinical signs and postmortem lesions of erysipelas in pigs, (**5 marks**)
   b) Transmission and postmortem signs of Lumpy Skin Disease (**5 marks**)
   c) Epidemiology and clinical signs of Haemorrhagic septicaemia. (**5 marks**)
   d) Aetiology and Clinical signs of Foot and Mouth Disease (**5marks**)
   e) Epidemiology and control of brucellosis in cattle. (**5 marks**)

3. Write short and concise notes on any four (4) of the following
   a) Threshold tick control. (**5 marks**)
   b) Three host ticks (giving examples). (**5 marks**)
   c) Rhipicephalus appendiculatus. (**5 marks**)
   d) Effects of animal disease on human welfare. (**5 marks**)
   e) Direct and indirect losses associated with ticks in the livestock industry. (**5 marks**)

4. The following two (2) diseases are of major hindrance to ruminant production in Zambia. Discuss their aetiology, clinical signs, major postmortem finding, treatment and control.
   a) Heartwater. (**10 marks**)
   b) Gall Sickness. (**10 marks**)

.....

END OF EXAMINATION

THE UNIVERSITY OF ZAMBIA

SCHOOL OF AGRICULTURAL SCIENCES

2016 MID YEAR EXAMINATIONS

COURSE : AGA 6601-- BIOCHEMICAL TECHNIQUES AND INSTRUMENTATION

DATE : MONDAY, 07 MARCH 2016 09:00 HOURS

DURATION : 3 HOURS

INSTRUCTIONS : ANSWER ANY FIVE QUESTIONS

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1. Mention and explain the important factors to consider on laboratory samples under the following headings:

   i) Sampling ii) Sample Storage iii) Preparation for Analysis (20 marks).

2. In evaluation of chemical composition of feeds, outline the types of analyses that should be carried out and the importance of carrying out these analyses (25 marks).

3. Mention and explain any five Specialized Analytical Instrumentation methods and where they are normally applied (20 marks).

4. What are the basic principles involved in chromatography and what are the different types of chromatography that can be used in food/feed analysis. (20 marks).

5. Explain how immunoassays can be used in food/feed analysis. (20 marks).

6. What is the importance of vitamin analysis in feeds? To be quantitated by most methods, vitamins must be extracted from feeds. What treatments are commonly used to extract the vitamins? (20 marks).

THE END

The University of Zambia

School of Agricultural Sciences
Department of Plant Science
Second Year Examination for Bachelor of Agricultural Sciences
AGC 2110: FUNDAMENTALS OF PLANT SCIENCE
Final Examination 2015 /2016

Date: 8th September, 2016 Time: 14:00 –17:00 hrs

Answer ALL questions. Answers should be brief and concise. The marks to each question are indicated

Question 1. Water and Solute transport **(20 Marks)**

A. Water flows from the epidermis to the endodermis of the root through three (3) pathways namely, the apoplast, symplast and transmembrane pathway.

1. Briefly describe the apoplast pathway. **(4)**
2. Why is water movement in the apoplast pathway obstructed at the endodermis? **(4)**

B. Biological membranes contain transport proteins that facilitate the passage of selected ions and molecules.

1. Which membrane transport proteins and carry out active transport? **(2)**
2. Which membrane transport proteins and carry out both passive and secondary active transport ? **(2)**
3. Name the integral membrane proteins that form the selective water channels across the membranes of plant cells. **(4)**
4. State two (2) characteristics that distinguishes channels from the other membrane transport proteins. **(4)**

Question 2. Photosynthesis **(20 Marks)**

A. Plants use solar energy to oxidize water, thereby releasing oxygen (O_2) and reducing CO_2, and forming carbon compounds. The complex series of reactions that culminate in the reduction of CO_2 include the thylakoid and carbon fixation reactions.

1. In which parts of the chloroplast do the thylakoid and carbon fixation reactions take place respectively? **(2)**
2. The Carbon fixation reactions, also known as the Calvin Benson cycle, proceeds in three stages. **name** these three (3) stages. **(6)**

Atmosphere

Surface pressure	-	0.7-0.9 Kpa
CO_2	-	95.72%
N_2	-	2.7%
Argon	-	1.6%
O_2	-	0.2%
CO	-	0.07%
Water vapour	-	0.03%
NO	-	0.01%

There is water ice below the surface

B

Atmosphere

N_2	-	79.0%
O_2	-	20.97%
CO_2	-	0.03%

ii) The nutrient composition of one of the rocks on Mars is given in Figure1.

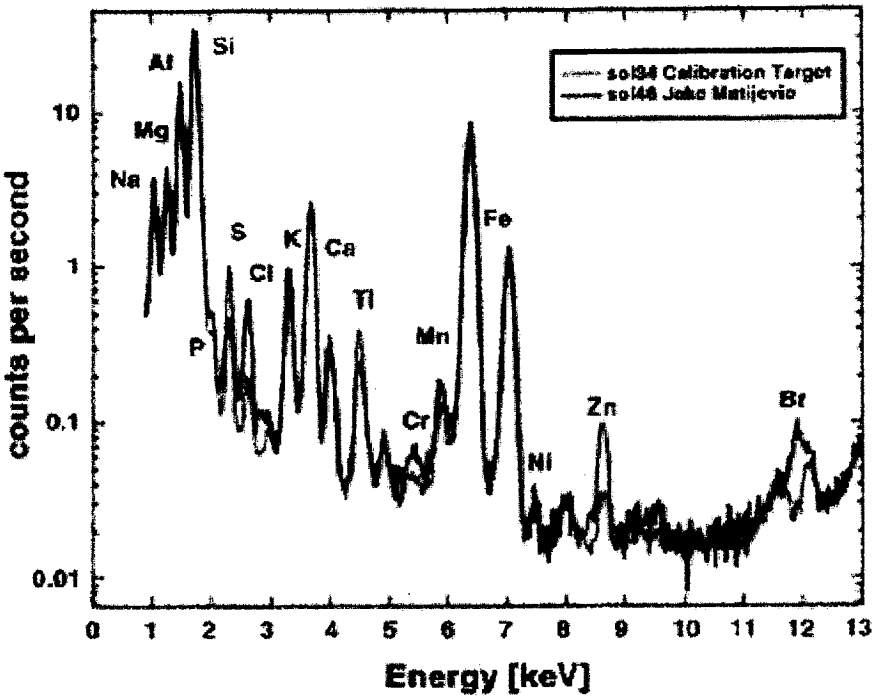


Figure 1: Mineral composition of one of the rocks on Mars

iii) Evidence of water in Mars history.

How could ancient planet Mars have been habitable especially for plant life? **(10)**

END OF EXAM

B. Land plants have developed mechanisms to reduce photorespiration such as C_4 photosynthetic carbon fixation and Crassulacean acid metabolism (CAM).

1. What is photorespiration? **(4)**
2. How do environmental conditions of temperature and concentration of CO_2 affect the balance between the Calvin Benson Cycle and photorespiration? **(4)**
3. Give 2 examples of C_4 and CAM plants. **(2)**
4. What general strategy/mechanism have C_4 and CAM plants adapted to reduce photorespiration? **(2)**

Question 3. Translocation in the Phloem **(20 Marks)**

The cells of the phloem that conduct sugars and other organic materials throughout the plant are called sieve elements. Mature sieve elements are unique among plant living cells because they lack many structures usually found in living cells

1. Name the organelles that are retained (found) in the sieve elements. **(4)**
2. Name three (3) different types of companion cells associated with sieve elements. **(6)**
3. What short term and long term mechanisms are employed to seal off damaged sieve elements? **(4)**
4. Distinguish between the source and the sink in plants and give an example of each. **(6)**

Question 4. Respiration **(20 Marks)**

Respiration is a biological process by which reduced organic compounds are mobilized and subsequently oxidized in a controlled manner to release energy (ATP) that is utilized by the cell for maintenance and development.

1. Name the three (3) phases/stages of Cellular respiration and where each phase/stage takes place in the cell. **(6)**
2. Discuss why anaerobic respiration is less efficient than aerobic respiration. **(10)**
3. What is the Pasteur effect? **(4)**

Question 5. Plant Growth Factors **(20 Marks)**

a) Explain how you would optimize crop growth factors in the small-scale farming sector **(10)**

b) Given:
   i) The atmosphere and temperature of planet Mars in A and the atmosphere of planet Earth in B:

A

Temperature

Maximum	-	-5°C
Minimum	-	-87°C
Mean	-	-46°C

THE UNIVERSITY OF ZAMBIA

School of Agricultural Sciences

Department of Plant Science

Third Year Examinations for the Bachelor of Agricultural Sciences

AGC 3135: Fundamentals of Plant Science

Date: 14th September 2016 Time: 09:00 –12:00 hrs

Instructions:

1. Answer all questions
2. Marks as indicated

QUESTION 1 (**15 Marks**)

a) What is Nutrient depletion? (**3 Marks**)
b) What method provides a measurement of the integrated effect of radiation, wind, temperature and humidity on evaporation from an open water surface? (**3 Marks**)
c) Which are the forms of elements taken up by plants? (**3** Marks)
d) Briefly describe factors limiting crop production in the small-holder farming sector. (**3 Marks**)
e) What is Vernalization? (**3 Marks**)

QUESTION 2 (**25 Marks**)

i. What is Reference Evapotranspiration? (**2.0 Marks**)
ii. List four methods for determining Reference Evapotranspiration. (**4.0 Marks**)
iii. Briefly describe the two most comprehensive methods for determining Reference Evapotranspiration. (**2.0 Marks**)
iv. Explain why they are comprehensive. (**7.0 Marks**)
v. Given the reference (ETo) and crop evapotranspiration (ETcrop) for Crops 1 and 2:

Crop 1			Crop 2		
ETo	=	15 mm	ETo	=	11 mm
ETo crop	=	6 mm	ET crop	=	10 mm

From your calculation of the crop coefficients, what was the stage of development of the 2 crops? (**10 Marks**)

QUESTION 3 (**25 Marks**)

An experiment was conducted on crop growth of maize and common bean in nutrient solution (Hydroponics) in the Greenhouse. The resulted obtained are given in Table 1.

Table 1: Parameters measured on maize and common bean in nutrient solution.

Crop	Treatment	Replication	Shoot biomass (gram)	Root biomass (gram)	Chlorophyll content
Maize	Full	1	0.562		
Maize	Full	2	0.579		
Maize	Minus P	1	0.259		
Maize	Minus P	2	0.258		
Common bean	Full	1		0.12	25.6
Common bean	Full	2		0.13	22.9
Common bean	Minus Mg	1		0.091	19.3
Common bean	Minus Mg	2		0.093	18.9

Key
Full – Full complement of 16 plant nutrient in nutrient solution

Discuss the results with respect to function of the elements in plant growth and development?

QUESTION 4 (15 Marks)

Explain how improved fallows in Agroforestry contribute to increased maize yields

QUESTION 5 (20 Marks)

i) Which are three phytohormones involved in processes of germination and senescence in plants? (5 Marks)

ii) Explain how these phytohormones in conjunction with external factors regulate these growth processes. (**15 Marks**)

END OF EXAM

THE UNIVERSITY OF ZAMBIA

SCHOOL OF AGRICULTURAL SCIENCES

DEPARTMENT OF PLANT SCIENCE

Third Year Examination for Bachelor of Agricultural Sciences

AGC 3312: Plant Pathology

2015/16 Final Examination

Date: 22th September 2016 Time: 14:00 – 17:00 hrs Venue: OMNIA 2

Instructions: The examination paper has a total of five (5) questions

Answer **Question 1** from section A and **any three (3)** from section B

Answer **Question 2** in Separate Booklet (If attempted)

SECTION A (40 Marks)

Question 1

a) Define the following terminologies as used in Plant Pathology (**12 marks**).
   i. Virulence
   ii. Inoculum
   iii. Canker
   iv. Facultative parasite
   v. Mosaic
   vi. Pathogenesis

a) Describe Systematic Acquired Resistance (SAR) clearly explaining how the gene for gene concept plays a role in a SAR defensive mechanism **(10 marks).**

b) Randomly wilting bean (*Phaseolus vulgaris*) plants were observed in a 1- hectare bean field at ZARI. You are a pathologist in a Legume Team. How would you critically carry out a plant disease diagnosis to determine the causal agent of wilting bean plants **(13 marks).**

c) List any five stages of a plant disease cycle **(5 marks).**

SECTION B (60 Marks)- CHOOSE ANY THREE QUESTIONS

Question 2

Describe any FOUR (4) cultural control methods and any FOUR (4) biological control mechanisms **(20 marks).**

Question 3

a) Explain any three symptoms associated with fungal pathogenic attack **(6 marks).**

a) Describe the use of Enzyme-linked Immunosorbent Assay (ELISA) clearly differentiating it from Direct Tissue blotting in plant diseases diagnosis. **(14 marks).**

Question 4

a. Explain three ways in which Nematodes cause diseases in crop plants **(6 marks).**

b. List four symptoms associated with plant viral infections **(4 marks).**

c. Explain the concept of "Plant Disease Tetrahedron" as used in plant pathology **(10 marks).**

Question 5

a) Discuss the six (6) basic components of Integrated Disease Management (IDM) in plants. **(12 marks).**

b) Explain how field Dodder *(Cuscuta spp)* causes parasitism in cereals clearly highlighting the mechanisms employed and how the process is initiated **(8 marks).**

END OF EXAMINATION

UNIVERSITY OF ZAMBIA
SCHOOL OF AGRICULTURAL SCIENCES
DEPARTMENT OF PLANT SCIENCE
Third Year Examinations for Bachelor of Agricultural Sciences
AGC 3412: INTRODUCTORY HORTICULTURE
Final Examination 2015/2016 Academic Year

Date: 7th September 2016 **Time: 14:00 – 17:00 hrs** **Venue: OMNIA 1**

Instructions: Answer all Questions.
Marks are as indicated.

1. Protected Cultivation.
   a. Briefly explain why farmers opt to grow crops under protected cultivation. **(5 marks)**
   b. Name the covering materials that are used in greenhouse construction. **(3 marks)**
   c. Orientation is one of the considerations as it affects climate control in the greenhouse. Discuss this statement. **(12 marks)**

2. Describe the harvesting of the following crops:
   a. Tomato (*Solanum lycopersicum)* **(14 marks)**
   b. Onion (*Allium cepa*) **(6 marks)**

3. Nursery Preparation
   a. List 4 factors that you would consider when selection a site for a nursery. **(4 marks)**
   b. Give the specifications/dimensions of the nursery bed for Cabbage (*Brassica oleracea variety capitata)*. **(3 marks)**
   c. Define and explain the importance of hardening seedlings on the nursery. **(4 marks)**
   d. Name the process that follows hardening. Clearly explain how the selected process is done. **(9 marks)**

4. Organic Fertilizers
   - **a.** On a farm, what are the raw materials that are utilized in making compost? Give examples. **(8 marks)**
   - **b.** Odours develop in compost making. What leads to the development of odours? Your answer should include a solution(s) to overcome this problem. **(3 marks)**
   - c. Discuss the pros and cons of farm yard manure. **(9 marks)**

5.
   - **a.** Briefly explain cultural method of controlling pests and diseases. **(3 marks)**
   - **b.** Briefly explain the areas under landscape horticulture. **(6 marks)**
   - **c.** A farmer suspects Aphids (*Aphis spp*) in his vegetable garden. How can you confirm the suspicion of the farmer? Explain clearly the remedial measures to be undertaken giving relevant examples. **(11 marks)**

End of Exam

UNIVERSITY OF ZAMBIA

School of Agricultural Sciences

Department of Plant Science

Fourth Year Examinations for Bachelor of Agricultural Sciences

AGC 4320: Principles and Application of Entomology

2015/2016 Final Examination

Date: 5th September, 2016 **Time:14:00-17:00hrs** **Venue: Other Rooms**

INSTRUCTIONS: There are two sections: Principles of Entomology and Applications of Entomology.
Answer **ANY TWO(2)** questions from each Section in a separate answer book
Marks as indicated

SECTION 1: Principles of Entomology

QUESTION 1 (25 MARKS)

The Swedish, Carl Linneaus, is known as the Father of taxonomy and proposed the system of binomial nomenclature in 1758.

i. Define taxonomy. (**1 mark**)

ii. What is binomial nomenclature? (**1 mark**)

iii. Scientific names for insects are written according to the rules of the International Code of Zoological Nomenclature. Suppose Tubalangilile wrote the name of insect species as prostephanus Truncatus (Horn)

   a. If the insect species name has the author's name in parenthesis (as the case above), what does it mean?(**2 marks**)

   b. Mention the rule(s) of writing scientific names that has been violated (**3 marks**)

   c. What is the correct way of writing the scientific name of the given insect species? (**2 marks**).

   d. What is the genus name for this insect species? (**1 mark**)

   e. Who is the first scientist to describe the insect species? (**1 mark**)

iv. Give an example of the classification of an insect of your choice that includes the seven (7) taxonomic hierarchy used in classifying insects. (**8 marks**)

v. What makes an animal an insect? (**6 marks**)

QUESTION 2 (25 MARKS)

With aid of diagram(s) discuss the generalized digestive system of insects.

QUESTION 3 (25 MARKS)

Insect's exoskeleton or integument plays an important role in their survival on the earth's surface. Discuss the various parts of the integument and their functions.

SECTION 2: Applications of Entomology

QUESTION 4 (25 MARKS)

A farmer spends K20/acre to apply a given pesticide for control of aphids on his crop. Through a reliable pest sampling system, it is estimated that there are 800 aphids injuring the crop. The unit value of the crop is K2000/acre while the percentage damage or loss is estimated at 10%.

i. Calculate the Economic Injury Level (EIL) (**10 marks**).
ii. Calculate the Economic Threshold (ET) (given that ET = 80% EIL) (**5 marks**).
iii. Discuss the pest sampling techniques used for pest sampling (**10 marks**).

QUESTION 5 (25 MARKS)

Despite being among the oldest pest control options, cultural control and Host Plant Resistance, still forms important components of current Integrated Pest Management (IPM) systems.

i. Discuss the major cultural control methods (**10 marks**)
ii. Discuss Host Plant Resistance as a pest management option (**7 marks**).
iii. Modification of insect behaviour through the use of semiochemicals is increasingly becoming an environmentally sound option for insect pest control. Explain how "Mating Disruption" and Attract and Kill" methods work in suppressing pest populations (**8 marks**).

QUESTION 6 (25 MARKS)

Imagine you have just discovered a **larval parasitoid** and a **baculovirus** in Zambia for potential control of the tomato leaf miner,*Tuta absoluta.*

i. Outline the qualities you would consider before using each of the two potential biological control agents (**16 marks**).
ii. Discuss the three components of biological control (**9 marks**)

xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxEND OF EXAMxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx

THE UNIVERSITY OF ZAMBIA
School of Agricultural Sciences
Department of Plant Science

Fifth Year Examinations for the Bachelor of Agricultural Sciences
AGC 5125: Sustainable Agriculture

Date: 16th September 2016 Time: 14:00 –17:00 hrs

Instructions:
1. Answer all questions
2. Marks as indicated

QUESTION 1 (**20 Marks**)

a) What are the 3 pillars of sustainability in agricultural production? (**4 Marks**)
b) Briefly describe the defining characteristics of the Agro-ecological Regions of Zambia. (**4 Marks**)
c) How is infrastructure important in determining sustainable agriculture? (**4 Marks**)
d) What are the possible uses and benefits of spirulina and its impact among the communities and societies in Zambia? How can it be promoted widely in the country? (**4 Marks**)
e) How does the external environment influence livelihoods? (**4 Marks**)

QUESTION 2 (**20 Marks**)

Explain the farming practices that constitute sustainable agricultural production

QUESTION 3 (**20 Marks**)

The term sustainable agriculture means an integrated system of plant and animal production practices having a site-specific (environment) application that will, over the long term satisfy human food and fiber needs, enhance environmental

quality and the natural resource base upon which the agricultural economy depends.

Explain how site specificity is important in determining sustainable agricultural production?

QUESTION 4 (**20 Marks**)

i) What comprises a livelihood? (**5 Marks**)
ii) Why are livelihood zones important in determining sustainable agriculture? (**15 Marks**)

QUESTION 5 (**20 Marks**)

How is livelihood analysis important in determining sustainable agriculture?

END OF EXAM

THE UNIVERSITY OF ZAMBIA

SCHOOL OF AGRICULTURAL SCIENCES

University examinations 2015 academic year

AGC 5220 PLANT BREEDING AND QUANTITATIVE GENETICS

DATE: WEDNESDAY SEPTEMBER 14TH 2016, PM. **TIME:** THREE HOURS

INSTRUCTIONS: Answer **Five** questions only. However these should include Question **3 which is a compulsory question**

1.0 Write short notes on the following **(20 Marks)**

1.0 Write short notes on the following:

a. Linkage drag
b. Protogyny
c. Invitro mutagenesis
d. Bridging crosses
e. Independent culling selection method

2.0 **a)** Give **one** example when auto-polyploidy and **one** example when allo-polyploidy is used in crop improvement

b) Discuss the use of Species re-synthesis in Plant Breeding and comment on the role of germplasm conservation efforts in this breeding approach.

3.0 What do you understand by the terms early generation and advanced generation selection in the improvement of self pollinated crops and what breeding objectives would compel the breeder to use any of these approaches.

ANSWER QUESTION 4.0 COMPULSORY QUESTION

4.0 Climate change is anticipated to cause frequent droughts and floods in some areas of the world. Both of these abiotic stresses lead to crop damage. Maize is easily damaged with water logging. When the crop is standing in water for prolonged periods, its leaves quickly turn yellow and the plant dies. It is said that "maize does not like to have its feet wet".

Water logging tolerance is measured using a Greenness Reflectance Meter which gives a reading of the Canopy Greenness Reflectance Measure (CGRM).

In the first year of a population Improvement Breeding Program in Maize, there was heavy downpour of rain which caused flood damage to maize, and so the Breeder decided to select primarily for tolerance to flooding that season with the objective of developing Open Pollinated **(OPV)** maize Varieties that will have **high yield potential** and **water logging tolerance** for export to Asia where monsoon rains cause extensive flooding.

a) **Clearly and comprehensively** elaborate your Breeding Programme to develop Open Pollinated maize **(OPV)** varieties with water logging tolerance and high yield potential. **(10 marks)**

Suppose the Mean Canopy Greenness Reflectance Measure (CGRM) of the base population after the base population was exposed to water logging for **3** days was **2.5** and the Breeder based his selection on the best **10%** (**i.e.,** $k = 0.1$, $i = 1.755$) of plants, which have a mean canopy greenness reflectance reading of **3.1.**

The phenotypic standard deviation for canopy greenness reflectance of the base population, after the critical **3** days period σ_p, was **5.71.** From past research it has been established that the heritability h^2 for water logging tolerance is **0.6.**

b) What was the expected response to selection for flood tolerance as measured by canopy greenness reflectance measure? **(5 marks)**

c) If canopy greenness reflectance readings are classified as shown in the table below, what was the classification of the new improved Open Pollinated Variety with respect to water logging tolerance compared to the base population? **(5 marks)**

Table 1. canopy greenness reflectance readings and its relation to water logging tolerance classification.

Canopy greenness reflectance measure	Water logging tolerance classification	Expected number of days crop can tolerate water logging
1 -4	Highly Susceptible	< 3 days
4-6	Moderately susceptible	3 - 5 days
6-8	Moderately tolerant	5 – 10 days
8 -10	Tolerant	10 – 15 days
>10	Highly Tolerant	>20 days

5.0 Biotechnology has great potential application in crop improvement. Briefly discuss some of the possible application of tissue culture techniques and genetic engineering in crop improvement

6.0 **a)** What do you understand by the term "heterosis or hybrid vigour" and how is it expressed in crop plants? **(5 marks)**

b) From studying the genetics of **oil** and the micronutrient **zinc** content in sunflower (a cross pollinated crop), using the **Generation Mean Analysis** approach, it was found that the most important gene action for both traits is **Dominance gene action.** The researcher further did simple correlation

SECTION II OPTIONAL

Answer only two questions.

Q2 (15 points)

a) Discuss endogenous seed dormancy pointing out how endogenous rhythms play a role.
b) What are the main issues that need to be addressed concerning the customer in seed marketing?

Q3 (15 points)

a) What are the differences between seed germination and seed vigor from a seed technologists' viewpoint?

b) Fill in the following table with details of pests of seed storage.

No.	Common name	Scientific name	Seed type affected
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			

Q4 (15 points)

a) Write short notes on the following:
   i. Dilution theory
   ii. Seed certification
   iii. Equilibrium moisture content
   iv. Seed priming
b) How do seeds differ from other agricultural inputs?

-END OF EXAMINATION-

analyses between oil content and zinc and between these two traits and yield and found out that the correlation coefficients were non significantly different from zero.

What do these results mean with regards to the direction of the improvement of these two traits in sunflower? **(15 marks)**

7.0 **a)** A newly employed plant breeder evaluated seven inbred lines using a 7x 7 half diallel with a view of studying the genetic inheritance for resistance to *Fusarium graminerum* in maize. A Partial ANOVA is given below

ANOVA for 7x7 half diallel for maize genotypes evaluated for their resistance to *Fusarium graminearum*

Source	df	SS	MS	F
Replication	3			
Genotypes	20	30.0	_____	
GCA	6	28.9	_____	
SCA	___	____	_____	
Error	____	_____	0.32	

i. Complete the table and determine if GCA and SCA effects were significant (8 marks)
ii. What further steps could follow arising from Q7 (i) (2 marks)
iii. Why is knowledge on GCA and SCA effects important to a breeder (2 marks)

b) Discuss the utilisation of molecular marker-assisted backcrossing (MAB) in crop improvement (8 marks)

----------END OF EXAMINATION----------

UNIVERSITY OF ZAMBIA

SCHOOL OF AGRICULTURAL SCIENCES

DEPARTMENT OF PLANT SCIENCE

FINAL EXAMINATION

COURSE NAME: PRINCIPLES OF SEED SCIENCE AND TECHNOLOGY

COURSE CODE: AGC5612

DATE: TUESDAY 6TH SEPTEMBER, 2016

TIME ALLOWED: THREE HOURS (09:00 – 12:00HOURS)

VENUE: OMNIA LECTURE THEATRES

INSTRUCTIONS

This paper has two sections. Section one is compulsory while section two has optional questions. Points for each question are indicated.

SECTION I COMPULSORY

Answer the whole question.

Q1 (30 points)

a) Diagrammatically describe a seed program from the Zambian perspective slotting in the different local players.

b) Discuss the concept of product life cycle.

UNIVERSITY OF ZAMBIA
SCHOOL OF AGRICULTURAL SCIENCES
DEPARTMENT OF PLANT SCIENCE
Fifth Year Examinations for Bachelor of Agricultural Sciences
AGC 5712: POSTHARVEST TECHNOLOGY
Final Examination 2015/2016 Academic Year

Date: 9th September 2016 **Time: 9:00 – 12:00 hrs** **Venue: OMNIA 3**

Instructions: There are two Sections, A and B.
Use a separate answer booklet for each Section.
Instructions are as given per Section.

Section A.

Answer any 3.

1) Give a general outline of a Quality Control program and why it is important to adopt quality control systems. **[15 marks]**

2) Describe objective methods of assessing maturity and in your answer, using Compositional factors as an Index, describe at least 4 parameters that used in determining maturity. **[15 marks]**

3) Answer the following: **[15 marks]**

   a. What are combination standards?

   b. Describe causes of physiological breakdown in horticultural commodities.

   c. The relationship between shelf life extending systems such Controlled atmosphere and volatile compound (aroma) production in harvested horticultural products.

4) Using Tomato (*Lycopersicon esculentum*), at Lusaka's Soweto market as an example, describe sourcing, retail and implications on postharvest losses of the commodity. **[15 marks]**

SECTION B

Answer all questions.

1.

a. Warming of fruit produce can occur during handling. Describe the measures to be undertaken to avoid warming of citrus fruit during the following:

i. Harvesting, and **(4 marks)**

ii. Transit. **(6 marks)**

b. When handling Carnations, a cut flower, Ethylene has to be managed properly to ensure maximum vase life both in short term and long term storage. Explain the measures that need to be undertaken to ensure maximum vase life of carnations. **(10 marks)**

2.

i. Outline the goal of harvesting. **(2 marks)**

ii. The pros and cons of using mechanical harvesting method. **(5 marks)**

iii. Plugging of stems of cut flowers is a major limitation to their vase life. Briefly discuss this statement giving relevant examples. **(6 marks)**

3. As the proprieter of Limoneira Citrus Packinghouse, explain the measures you would institute/put in place, to ensure maximum marketable yields in the Sorting section. **(22 marks)**

End of Exam

THE UNIVERSITY OF ZAMBIA
SCHOOL OF AGRICULTURAL SCIENCES
DEPARTMENT OF AGRICULTURAL ECONOMICS AND EXTENSION
FINAL-YEAR EXAMINATION FOR 2015/16 ACADEMIC YEAR

AGE 2122 : FUNDAMENTALS OF MACROECONOMICS
TIME : 3 HOURS

INSTRUCTIONS: ***ANSWER ALL QUESTIONS***

1. The following data refer to a hypothetical economy:

   C = 50 + 0.75Yd
   I = 100
   G = 40
   S = -50+ 0.25Yd
   T = 0.2Y
   X = 80
   M = 0.125 Yd
   Yf = 640

   (a) Find the equilibrium level of national income, using both the aggregate-demand and injections-leakages approaches? ***(5 marks)***

   (b) Is equilibrium level of national income below or above full employment national income? ***(5 marks)***

   (c) What fiscal measures would you recommend to close the gap between equilibrium national income and full employment national income? **(5 marks)**

   (d) Is the government pursuing an expansionary or contractionary policy? ***(5 marks)***

2. (a) The following table gives some figures from a forecast of real GDP and population done in 2000 in a hypothetical country.

Real GDP 2001 (billions) K9,558.6
Real GDP 2002 (billions) K9729.1
Population 2001 (millions) 279.1
Population 2002 (millions) 281.9

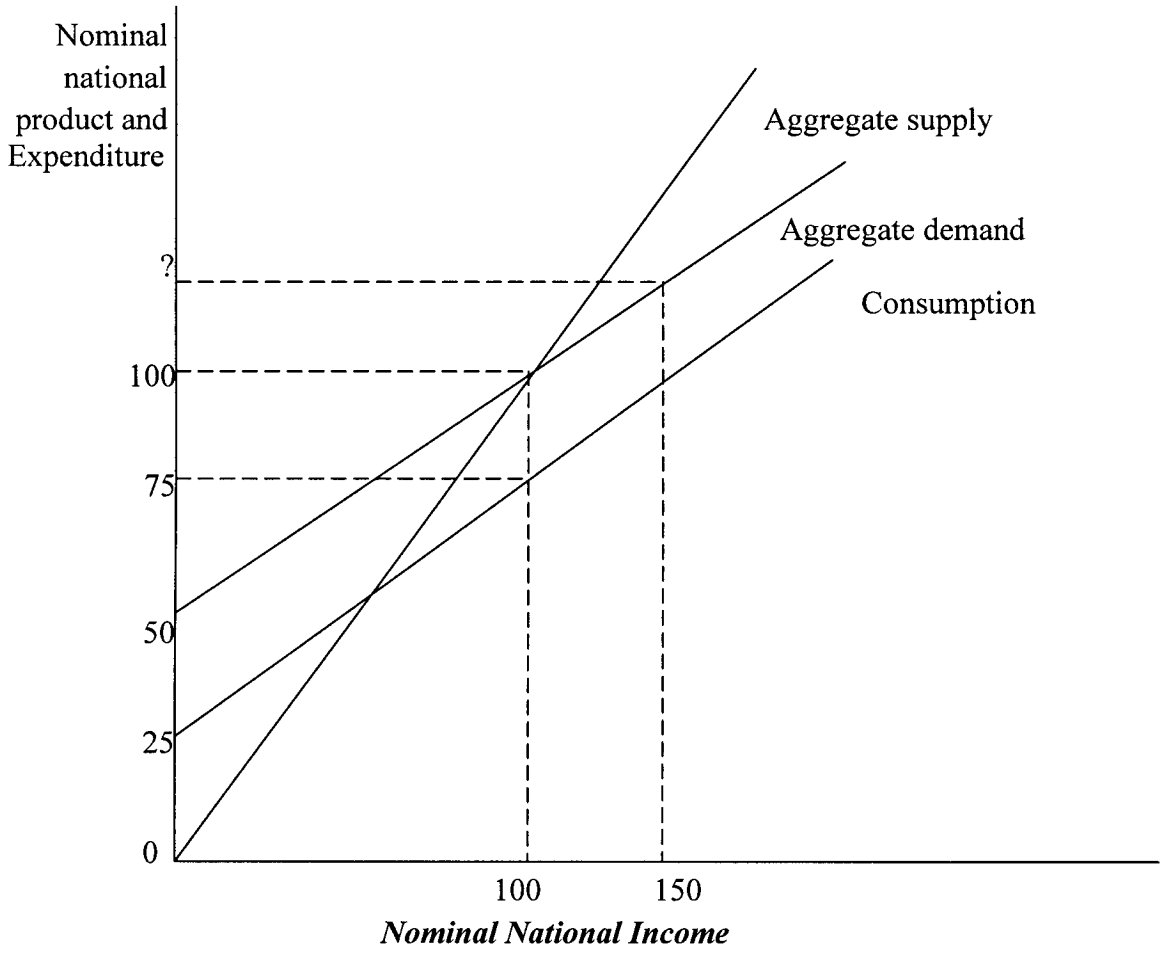
(i) What is per capita GDP projected to be in 2001 and 2002? ***(3 marks)***

(ii) Compute the forecast rate of change in real GDP and per capita real GDP between 2001 and 2002. ***(3 marks)***

(b) Explain what double counting is and how it can be avoided. ***(5 marks)***

(c) What is the difference between a recession and a depression? ***(5 marks)***

(d) Use the graph below to answer the following questions. Assume the simple multiplier is 2



(i) What is the slope of the ag gregate demand line? ***(1 mark)***
(ii) What is the marginal propensity to consume? ***(1 mark)***
(iii)If 150 is the target, is there a contractionary or expansionary gap? How much is it? ***(2 marks)***

3. a) What is the difference between comparative and absolute advantage ***(5 marks)***
b) Zambia and Botswana each produce wine and wheat as shown below:

Crop	**Zambia**	**Botswana**
Wine	100	64
Wheat	10	8

i) Which country has a comparative advantage in the production of wheat? ***(5 marks)***

ii) Which country has an absolute advantage in the production of Wine? ***(5 marks)***

iii) Explain in detail the functions of money. ***(5 marks)***

4. You are given the balance sheet of the central bank of Zambia below:

Bank of Zambia

Assets		Liabilities
Govt securities	K4000	K2000 Reserves
		K2000 Currency

a) Given that the money multiplier is 8, calculate the required reserve ratio. ***(1 mark)***

b) What is the money supply (M1)? ***(3 marks)***

c) What will be the value of loans by commercial banks given a required reserve ratio of 20% ***(3 marks)***

d) What is the new money supply (M1) ***(2 marks)***

e) Assuming there is inflation in the economy, what type of monetary policy would be carried by the central bank to sort out this problem? ***(1 marks)***

f) How can open market operations and the required reserve ratio be used in order to achieve this monetary policy objective? ***(4 marks)***

g) Show the effect on the commercial bank balance sheet when the central bank reduces the required reserves from K2000 to K1000? How will this affect the money supply (M1) ***(4 marks)***

h) List four (4) functions of the central bank. ***(2 marks)***

5. Explain what you understand by the following concepts

a) Discretionary fiscal policy ***(4 marks)***

b) Investment ***(4 marks)***

c) Required reserve ratio ***(4 marks)***

d) moral suasion ***(4 marks)***

e) comparative advantage ***(4 marks)***

UNIVERSITY OF ZAMBIA
SCHOOL OF AGRICULTURAL SCIENCES
FINAL EXAM FOR 2015 ACADEMIC YEAR
AGE 4222: INTERMEDIATE AGRIBUSINESS MANAGEMENT
TIME: THREE (3) HOURS

INSTRUCTIONS: ANSWER **ALL** QUESTIONS

1. Entrepreneurship and business development are important and vital activities in the socio economic development of Zambia. Entrepreneurship is for everyone, no matter what job or position you hold.

   a) Outline the role of entrepreneurship in agribusiness and socio-economic development of Zambia **(7Marks)**

   b) Discuss the motives and challenges of starting and running a new business **(18 Marks**

2. If you were introducing a new electronic dairy feeding system that would reduce costs by 20 to 25 percent.

   a) What pricing policy would you suggest? Give reasons for your choice **(10 Marks)**

   b) Would you stay with the policy indefinitely; explain your answer?**(5 Marks)**

   c) What promotional strategy would you use **(10 Marks)**

3. You are an Agribusiness Consultant and have been invited by Ministry of Agriculture to give a talk on "Business plan development" to cooperative members aspiring to apply for a grant to venture in fish farming. Prepare your speech noteshighlighting the importance of business planning and suggest a business plan format **(25 Marks)**

4. a) The decision of where to locate an agribusiness is a strategic issue. Discuss this statement **(10 Marks)**

   b) Highlight and briefly explain the factors you would consider when choosing the location of a fish processing plant in Zambia **(15 Marks)**

END OF EXAM

c) Who would gain and who would lose as a result of opening up trade between the two districts? Be sure to explain why the identified economic actors would gain or lose. **(4 pts)**

d) Now, suppose transfer costs were pegged at a fixed rate of K800/ton of beans. Would trade between the two markets be profitable? Show your work and explain. **(4 pts)**

4. Payment to cotton producers for each bale (bag) of cotton depends on several factors but the most critical ones are weight (kg) and percentage moisture content (%) of each bale. Hypothetically, we would expect that an increase in weight of a bale by one kilogram would have a positive effect on the payment received by farmers. On the other hand, we would expect that an increase in moisture content of a bale by one percent would have a negative effect on the payment received by farmers. Suppose you have data available on cotton transactions that enables you to run a linear regression to estimate the relationship between the dependent variable, which is the payment (in Kwacha/bale), and two independent variables, which are weight (kg/bale) and moisture content (%/bale). The table below reports your regression results:

Multiple Regression Results for Cotton Bales Payments			
Regression Statistics			
R Square	0.567		
Standard Error	23878.34		
F Test			
F	17.68		
Significance F	0.0001		
	Coefficients	*t Stat*	*P-value*
Intercept	55.68	2.19	0.037
Weight	2.21	4.76	0.0001
Moisture content	1.36	0.36	0.921

a) From the regression results, do weight and moisture content collectively help to explain the variation in the payment for cotton bales? Explain. **(4 pts)**

b) What is the effect of each independent variable on the dependent variable? Is each variable statistically significant? Explain. **(4 pts)**

c) Do these results support the hypotheses stated in the description above concerning the effect of each independent variable on the dependent variable? Explain. **(4 pts)**

d) From the regression results, write down the prediction equation. **(2 pts)**

e) In general, why do price analysts estimate or run regressions? **(3 pts)**

f) Explain why results from such a regression would be important in developing relevant extension information targeted towards cotton producers in Zambia. **(3 pts)**

5. Explain, with examples, the following agricultural marketing and pricing topical issues:

a) Price discrimination by an agricultural product supplier. **(5 pts)**

b) Individual negotiations price discovery system. **(5 pts)**

c) Analysis of survey data collected to assess price differences associated with quality. **(5 pts)**

d) Components of time series price data. **(5 pts)**

---------- **END OF EXAMINATION** ----------

SCHOOL OF AGRICULTURAL SCIENCES
DEPARTMENT OF AGRICULTURAL ECONOMICS AND EXTENSION

AGE 4142 – AGRICULTURAL MARKETING AND PRICING
FINAL EXAMINATIONS – 2015 ACADEMIC YEAR

DURATION: THREE HOURS

INSTRUCTIONS

1. Read the questions carefully and answer all the questions.
2. Points for each question are shown in parenthesis. Therefore, allocate your time appropriately.
3. Please write legibly.

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1. Suppose the inverse demand function for apples purchased by a typical household in Lusaka can be represented by the following equation:

$$P_1 = 1.5 + 0.8\,P_2 + 0.001\,INC - 0.1\,Q$$

where: Q = *annual number of apples purchased,* P_1 = *price per apple* ($K4$/*apple*), P_2 = *price per orange* ($K2$/*orange*), INC = *annual household income* ($K35{,}000$/*year*)

   a) Compute and interpret the following: (i) own-price elasticity of apples; (ii) cross-price elasticity of apples in terms of orange prices, and; (iii) price flexibility coefficient of apples. **(12 pts)**
   b) Are apples a normal or inferior good based on this demand function? Show your work. **(4 pts)**
   c) What is market demand? What variable would you add to the household demand function to derive the market demand for apples in Lusaka? Explain your choice of variable. **(4 pts)**

2. Differences between consumer retail prices and producer prices at farm gate exist because of marketing margins associated with agricultural products and services.
   a) Using a conceptual diagram of supply and demand, define marketing margins. **(3 pts)**
   b) Describe three (3) commonly used empirical measures of marketing margins. **(9 pts)**
   c) Suppose the retail price of pork is K60/kg and the farm gate price of pork is K25/kg. Assuming a 250 kg porker yields 150 kg of retail pork, compute and interpret the following: (i) farm to retail price spread, and; (ii) farmers' share of the retail price of pork. **(8 pts)**

3. Consider the market for beans in Solwezi which has the following excess supply $Q^{XS} = -100 + 0.1P$ and that for Lusaka which has the following excess demand $Q^{MD} = 250 - 0.15P$, where P is the price of beans per ton (Kwacha/ton).
   a) Suppose there was a ban on trade, what would be the price of beans in each market? **(4 pts)**
   b) Suppose the ban on trade was now lifted, compute and graphically depict the market clearing conditions and the direction of trade assuming there were no transfer costs. **(8 pts)**

The University of Zambia
2015/16 Examinations – September 2016

AGE 4311
Quantitative Methods in Agricultural Economics

Instructions: Answer Question 1 in Section A (35 Marks) and All three questions in Section B (65 Marks)

Time: Three (3) hours

Section A. (35 Marks)

Answer the following question in full. It is worth 35 points.

1. Use the attached Microsoft Excel Solver printout to answer the following questions.

   a) What is the optimal value of the objective function (3 marks)?

   Explain what this value means (2 marks)

   State the type of LP application this model represents (2 marks)

   b) How many (i) real activities (3 marks)

   and (ii) constraints does this model have? (3 marks)

   c) What is the optimum value of each of the real and slack activities? (7 marks)

   d) Explain the shadow prices associated with protein, energy and lysine (6 marks)

   e) Write out the algebraic model from which this output comes (9 marks)

Section B. (65 Marks)

Answer all questions in this section. The three questions are worth 65 Marks

2. Risk, uncertainty and probability are very important in every day decision making processes.

   a) Briefly, explain what you understand by the terms **Uncertainty** and **Probability**. How are the two linked? (6 marks)
   b) Answer the following questions on probability by simply stating whether the statement is **true** or **false**

      i. Probabilities of all the various possible outcomes of a trial must sum to one (2 marks)
      ii. The smaller the probability the less likely the event (2 marks).
      iii. Two or more events are **mutually exclusive** if only one event can occur at any one trial (2 marks).
      iv. Probabilities of **ME** events can be added to obtain the probability that one of a given collection of the events will occur (2 marks).
      v. If two events are **independent**, the occurrence of one event does not affect the probability of the other from occurring (2 marks).
      vi. Probability of two (or more) **independent events** occurring is equal to the product of the probabilities of the individual events (2 marks).
      vii. Probability of event B given that event A has occurred is called the **joint probability** (2 marks)

3. You have been hired on a ranch and your first managerial task is to mix two types of food, Brand X and Brand Y, for the cattle. If each serving is required to have 60 grams of protein and 30 grams of fat, where Brand X has 15 grams of protein and 10 grams of fat and costs K80 per unit, and Brand Y contains 20 grams of protein and 5 grams of fat, and costs K50 per unit. Set up algebraically the linear programme model and graphically (by showing all your calculations) determine how much of each type of the Brands should be used to minimize costs to the rancher **(Graph on the answer sheet – no need for graph paper)**. (25 marks).

4. A farm family has scarce resources of land, labour and fertilizer. They would like to determine how to allocate these resources between two competing crops – maize and wheat. They have 20 hectares of land, 72 units of labour, and 600 units of fertilizer. Maize requires four units of labour and 10 units of fertilizer per hectare. Wheat requires two units of labour and 40 units of fertilizer per hectare. Given expected prices, the family expects a gross margin of $60 per hectare for maize and $40 per hectare for wheat.
   a) Set up the algebraic linear programming problem (5 marks).
   b) Set up the initial tableau (3 marks).
   c) Use the simplex procedure to solve the problem. Complete all necessary tableaux and answer the following questions: (6 marks).
      i. What is the value of the objective function in the optimal solution? (1 mark).
      ii. What is the optimal quantity of each of the activities? (2 marks).
      iii. What is the optimal quantity of each resource used and not unsed? (3 marks).

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

Microsoft Excel Solver Printout for Question 1

Row units	Rows	Equation column	RHS values	Maize	Soyabeans	Sunflower
				0.35	0.08	0.57
ZK/tonne	Objective function	1,021,569		1,000,000	2,000,000	900,000
%	Protein	14	14	9.00	51.00	12.00
Kcal/kg	Energy	3,300	3,300	3,600.00	3,400.00	3,100.00
%	Lysine	1	1	0.20	3.20	0.50
Tonne	Weight	1	1	1.00	1.00	1.00

Microsoft Excel 9.0 Answer Report

Target Cell (Min)

Cell	Name	Original Value	Final Value
$C$4	Objective functio	0	1021569

Adjustable Cells

Cell	Name	Original Value	Final Value
$E$3	Maize	0	0.35
$F$3	Soyabeans	0	0.08
$G$3	Sunflower	0	0.57

Constraints

Cell	Name	Cell Value	Formula	Status	Slack
$C$5	Protein	14	$C$5>=$D$5	Binding	0.00
$C$6	Energy	3300	$C$6>=$D$6	Binding	0.00
$C$7	Lysine	0.61	$C$7>=$D$7	Not Binding	0.11
$C$8	Weight	1	$C$8=$D$8	Binding	0.00
$E$3	Maize	0.35	$E$3>=0	Not Binding	0.35
$F$3	Soyabeans	0.08	$F$3>=0	Not Binding	0.08
$G$3	Sunflower	0.57	$G$3>=0	Not Binding	0.57

Microsoft Excel 9.0 Sensitivity Report

Adjustable Cells

Cell	Name	Final Value	Reduced Cost	Objective Coefficient	Allowable Increase	Allowable Decrease
$E$3	Maize	0.35	0	1000000	1733333	184615
$F$3	Soyabeans	0.08	0	2000000	1E+30	1040000
$G$3	Sunflower	0.57	0	900000	171429	1E+30

Constraints

Cell	Name	Final Value	Shadow Price	Constraint R.H. Side	Allowable Increase	Allowable Decrease
$C$5	Protein	14	25490	14	24.00	1.50
$C$6	Energy	3300	353	3300	276.19	184.62
$C$7	Lysine	0.61	0	0.50	0.11	1E+30
$C$8	Weight	1	-500000	1.00	0.06	0.08

The University of Zambia
School of Agricultural Sciences
University Second Half Examinations – September 2016

AGE 4322
Applied Econometrics

Time: Three (3) hours
Instructions: There are four questions in this exam. Answer all questions.

1. A dataset of 722 working men was used to estimate the following equation

$$\widehat{edu} = 10.36 - 0.094\, sibs + 0.131\, meduc + 0.210\, feduc$$
$$R^2 = 0.210$$

where *educ* is years of schooling, *sibs* is number of siblings, *meduc* is mother's years of schooling, and *feduc* is father's years of schooling.

a) Does *sibs* have the expected effect? Explain in not more than two sentences. **[2 points]**

b) Holding *meduc* and *feduc* fixed, by how much does *sibs* have to increase to reduce predicted years of education by one year? (A noninteger answer is acceptable here.) **[6 points]**

c) Discuss the interpretation of the coefficient on *meduc*. **[4 points]**

d) Suppose that Man A has no siblings, and his mother and father each have 12 years of education. Man B has no siblings, and his mother and father each have 16 years of education. What is the predicted difference in years of education between B and A? **[8 points]**

2. Estimation of the model $y = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + e$ from a sample of 104 observations yields

$$(\mathbf{X'X})^{-1} = \begin{pmatrix} 5.0 & -1.4 & -2.0 \\ -1.4 & 20.0 & -7.5 \\ -2.0 & -7.5 & 45.0 \end{pmatrix} \qquad \mathbf{e'e} = 20 \qquad \hat{\boldsymbol{\beta}} = \begin{pmatrix} 4.8 \\ 4.0 \\ 3.6 \end{pmatrix}$$

where x_1 and x_2 are explanatory variables, and e is the error term. Assume $t_{crit} = 1.980$

a) Test for the statistical significance the slope coefficients? Show your work. **[15 points]**

b) Construct the 95% confidence interval for x_1. What does it communicate about the statistical significance of x_1? **[10 points]**

3. Answer the following short-answer questions.

a) Indirect least squares (ILS), 2SLS and 3SLS can all be used to estimate simultaneous equations models (SEMs). For each, state the circumstances under which it is appropriate for SEMs. **[6 points]**

b) Is it possible to estimate the parameters of an unidentified SEM? Explain. **[4 points]**

c) Compare and contrast 2SLS and 3SLS estimators for SEM systems? **[5 points]**

4. Mr. JM, an Economist, was hired by ICRAF, Chipata, to help identify the factors that affect the effectiveness of farmer trainers. Based on discussions with ICRAF staff and other knowledgeable people, Mr. JM used the number of farmers trained by the trainer as a measure of the latter's effectiveness (Y). He conducted a survey of 45 farmer trainers in Chipata district and collected responses on Y and several demographic and technical characteristics (Xs) of the trainer. Using his knowledge of econometrics and the data thus collected, Mr. JM was able to measure the relationship between Y and several explanatory variables (Xs). Answer the following questions based on Mr. JM's work.

   a) During specification analysis, Mr. JM tested for heteroskedasticity and multicollinearity.
      i) Why do you think he suspected these problems in his data? **[4 points]**
      ii) What are the consequences of using OLS in the presence of heteroskedasticity? **[4 points]**
      iii) Why should Mr. JM be concerned about multicollinearity? **[6 points]**

   b) In his analysis, Mr. JM found that the variance inflation factors (VIF) were as indicated in the attached computer printout. What conclusion can you draw from these results? **[4 points]**

   c) Using the Breusch-Pagan-Godfrey (BPG) test, Mr. JM found that heteroskedasticity was significant at $\alpha = 0.05$. Following this finding, Mr. JM used the EGLS estimator to obtain his parameter estimates. Answer the following questions based on the attached EGLS regression results.
      i) List the variables that are significant at $\alpha = 0.10$? **[6 points]**
      ii) For each of the significant variables in c(i), state whether their signs are in agreement with your *a priori* expectations. Explain your answers. **[6 points]**
      iii) Test whether the explanatory variables included in the model collectively explain a significant proportion of the variation in Y. **[8 points]**
      iv) What proportion of the variation in Y does the model explain? **[2 points]**

Edited SPSS Computer Printout
(JM Model)

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.808	.652	.586	1.67553

ANOVA

	Sum of Squares	df	Mean Square	F	Sig.
Regression	194.820	7	27.831	9.914	0.000
Residual	103.874	37	2.807		
Total	298.694	44			

Coefficients

Explanatory variable	Description of explanatory variable	Coefficients	Standard error	t	p-value	Collinearity Statistics Tolerance	VIF
Contact	Intercept	8.119	19.487	.417	.679		
X_1	Experience of the trainer in years	22.980	2.853	8.055	.000	.855	1.170
X_2	Number of adult members in the trainer's household	-1.759	1.357	-1.296	.203	.810	1.235
X_3	Age of the trainer in years	-.848	.447	-1.895	.066	.740	1.352
D_1	Sex dummy, equal to 1 if trainer is male	1.941	5.501	.353	.726	.859	1.164
D_3	Education dummy, equal to 1 if trainer reached secondary school	6.445	6.565	.982	.333	.746	1.341
D_5	Support dummy, equal to 1 if trainer receives support from any organization	-11.307	5.530	-2.045	.048	.858	1.166
D_7	Farm size dummy, equal to 1 if greater than 10 acres	6.722	8.472	.793	.433	.812	1.232

Critical Values of the *t* Distribution

		Significance Level				
1-Tailed:		**.10**	**.05**	**.025**	**.01**	**.005**
2-Tailed:		**.20**	**.10**	**.05**	**.02**	**.01**
Degrees of Freedom	1	3.078	6.314	12.706	31.821	63.657
	2	1.886	2.920	4.303	6.965	9.925
	3	1.638	2.353	3.182	4.541	5.841
	4	1.533	2.132	2.776	3.747	4.604
	5	1.476	2.015	2.571	3.365	4.032
	6	1.440	1.943	2.447	3.143	3.707
	7	1.415	1.895	2.365	2.998	3.499
	8	1.397	1.860	2.306	2.896	3.355
	9	1.383	1.833	2.262	2.821	3.250
	10	1.372	1.812	2.228	2.764	3.169
	11	1.363	1.796	2.201	2.718	3.106
	12	1.356	1.782	2.179	2.681	3.055
	13	1.350	1.771	2.160	2.650	3.012
	14	1.345	1.761	2.145	2.624	2.977
	15	1.341	1.753	2.131	2.602	2.947
	16	1.337	1.746	2.120	2.583	2.921
	17	1.333	1.740	2.110	2.567	2.898
	18	1.330	1.734	2.101	2.552	2.878
	19	1.328	1.729	2.093	2.539	2.861
	20	1.325	1.725	2.086	2.528	2.845
	21	1.323	1.721	2.080	2.518	2.831
	22	1.321	1.717	2.074	2.508	2.819
	23	1.319	1.714	2.069	2.500	2.807
	24	1.318	1.711	2.064	2.492	2.797
	25	1.316	1.708	2.060	2.485	2.787
	26	1.315	1.706	2.056	2.479	2.779
	27	1.314	1.703	2.052	2.473	2.771
	28	1.313	1.701	2.048	2.467	2.763
	29	1.311	1.699	2.045	2.462	2.756
	30	1.310	1.697	2.042	2.457	2.750
	40	1.303	1.684	2.021	2.423	2.704
	60	1.296	1.671	2.000	2.390	2.660
	90	1.291	1.662	1.987	2.368	2.632
	120	1.289	1.658	1.980	2.358	2.617
	∞	1.282	1.645	1.960	2.326	2.576

Examples: The 1% critical value for a one-tailed test with 25 *df* is 2.485. The 5% critical for a two-tailed test with large (> 120) *df* is 1.96.

UNIVERSITY OF ZAMBIA
SCHOOL OF AGRICULTURAL SCIENCES
DEPARTMENT OF AGRICULTURAL ECONOMICS AND EXTENSION
FINAL EXAMINATION FOR 2015 ACADEMIC YEAR

AGE 5162	:	**AGRICULTURAL FINANCE**
DATE	:	**28TH SEPTEMBER 2016**
TIME ALLOWED	:	**THREE HOURS**
INSTRUCTIONS	:	**ANSWER ALL QUESTIONS**

1. As the General Manager for GSM Estates (Pty), the Board of Directors has just approved your management proposal for the expansion of your Rice fields by another 5,000 hectares(where 1,500 hectares of the land will have to be reclaimed from the Barotse plains) and the purchase of 80 by 50 hectares Centre Pivots. However, the Board is opposed to your proposal to secure a loan from Commercial banks but has instead referred your management to other affordable and innovative sources of funding from the Capital markets.Using the knowledge you acquired from AGE 5162 course;

a. Recommend to the Board two suitable innovative sources of financing the above-proposed investment from the Capital markets, and explain your justification for each choice. **(15 marks)**

b. After re-submitting your recommended sources of financing the proposed investment to Ms. Kapya Eshiloni who was recently appointed Board Chairperson for GSM Estates (Pty), she now wants you to explain to her on how she can conclude from the Company's financial statements that it has a strong financial position. Using suitable examples, write short notes in response to the Board Chairpersons' request. **(9 marks)**

2 a.The common type or classification of agricultural finance or credit is one based on the loan repayment period: Discuss the types of credit under this type of classification and indicate the recommended use for each type of credit. **(12 marks)**

b. Briefly explain any two types of Loan Security applicable in agricultural financing or credit provision. **(6 Marks)**

3. a. Risk management is a continuing process of identifying, analyzing, evaluating, treating loss exposures and monitoring risk control resources to mitigate the adverse effects of loss. Explain the four measures that management can put in place to help mitigate the effects of exposure to agricultural risk. **(8 marks)**

b. The idea behind debt management is to minimize the amount of bad debt that the company will incur due to customers failing to honour their commitments to repay the total amount of the credit purchases, while at the same time ensuring that customers are not alienated in the company's quest for receiving money on time. Discuss the measures that management can use to improve debtor management. **(12 marks)**

4. GSM Estates (Pty) is considering incorporating a Subsidiary Company to be called GSM Agricultural Financial Services Ltd to deliver agricultural credit and financial services to Zambian farmers. You have been requested to identify current challenges with agricultural financing in Zambia that the new company could exploit in order to successfully penetrate the market.Briefly discuss any 5 challenges and recommend how the new company may address each of them in order to successfully supply financial services and credit to Zambian farmers. **(20 marks)**

5. a. Credit is required in every type of business and agriculture is no exception. Briefly discuss five needs for agricultural credit. **(10 marks)**

   b. Explain the classification of business investment decisions. **(8 marks)**

END OF EXAM

THE UNIVERSITY OF ZAMBIA
SCHOOL OF AGRICULTURAL SCIENCES
2015/16 ACADEMIC YEAR FINAL EXAMINATIONS

AGE 5172: AGRICULTURAL POLICY ANALYSIS
TIME: THREE HOURS
INSTRUCTIONS: Answer all questions

1. a) The demand and supply are the two sides of the market and prices are the signaling device that links the two together. For a commodity like maize and assuming conditions of perfect competition, explain by use of a diagram: (10 marks)

   i) The range of possibilities that the supply and demand curves together solve the allocation problem as the price of maize varies.
   ii) How the market solution will maintain the equilibrium if the price of maize is set either too low below or too high above the equilibrium price.

   b) The government may be justified to intervene in the market economy on account of market failure and on the grounds of non-efficiency reasons. What are the five **other** reasons that have been advanced for intervention in the market economy? (10 marks)

2. a) In the case of externalities where public good characteristics are important and the cost of corrective action is lower than the cost of initial distortion, describe five of the suggested interventions that may be appropriate as correction mechanisms for such type of externalities. (10 marks)

   b) The Bank of Zambia has maintained the policy interest rate at 12.75% per annum (i.e. as a base rate) and the Minister of Agriculture has announced a ban on export of maize grown in the 2015/16 season:

   i) Contrast the nature and type of these two policy instruments (4 marks)
   ii) Explain and discuss the implications of the implementation of the two policy interventions on the agriculture sector. (6 marks)

3. The following table shows the PAM results for a cotton commodity system constructed for Zambia:

	Total Revenue	Tradable Inputs	Domestic Resources	Profits
Private Prices	540.0	160.1	304.9	
Social Prices	900.0	319.7	433.9	
Transfers	-360.0	-159.6	-129.0	

Explain what the above PAM results mean by:

a) Determining and interpreting the profit figures for Private Prices, Economic Prices and Transfers. (3 marks)
b) Determining and interpreting the Nominal Protection Coefficient (NPC), Effective Rate of Protection (ERP) and Domestic Resource Cost Ratio (DRC). (9 marks)
c) Explain and discuss briefly the instances/situations when policy makers might use the PAM. (8 marks)

4. a) A suggested redefined pricing role of Food Reserve Agency (FRA) could be one of guaranteeing and defending producer price floors and consumer price ceilings in order to perform this function more effectively. Explain and illustrate by use of a diagram how such a new, limited market function of FRA would work. You may make appropriate assumptions in your explanation if appropriate. (14 marks)

b)Pan-territorial pricing is a common policy pursued by many African governments in the attempt to improve food security. What are the arguments which have been advanced in support of pan-territorial food crop pricing? (6 marks)

5. a) It has been argued that basic research is almost by definition a non-commercial activity since appropriability is expected to be low. Explain and illustrate by use of a diagram why this is so. (12 marks)

b) Africa's relatively low level of market infrastructure development and associated marketing inefficiencies and price spreads compared to Asia has been observed with concern. Describe four main reasons that are suggested to explain the phenomenon. (8 marks)

END OF EXAMINATION

THE UNIVERSITY OF ZAMBIA
UNIVERSITY EXAMINATIONS SEPTEMBER 2016
AGE 5442 - FARMING SYSTEMS AND LIVELIHOOD ANALYSIS

INSTRUCTIONS: ANSWER ALL QUESTIONS.
TIME: 3 HOURS

Question 1

(a) What is Farming Systems Research and Extension (FSRE)? Elaborate your answer by discussing the main objectives of FSRE; importance of FSRE in Small Scale Agriculture and the characteristics of FSRE **[10]**

(b) Clearly explain and elaborate on the FSRE process or procedures that are carried out by FSR teams from the developmental stages until dissemination of any innovation/technology. Use relevant examples to explain this. **[15]**

(c) **Contrast** between Conventional Research and Farming Systems Research. Expound on the differences related to **approach, objectives, experimental methods... etc. [10]** **[35 Marks]**

Question 2

(a) What are Rapid Rural Appraisal (RRA) and Participatory Rural Appraisal (PRA)? Elaborate by explaining the **characteristics, advantages and disadvantages (or "dangers")** associated with RRA and PRA. **[20]**

(b) Identify and clearly detail **three (3) of the tools and techniques** that are most commonly used for gender analysis. Cite relevant examples to illustrate the use and outcomes of these tools and techniques. **[15]** **[35 Marks]**

Question 3

(a) What is Wealth ranking? Explain the procedure you would typically undertake in conducting a participatory wealth ranking exercise in a rural community. Clearly elaborate on the **steps** and **precautions** when carrying out the exercise. **[15]**

(b) What is a Transect Walk? Explain the procedure you would typically undertake in conducting a transect walk exercise in a rural community. Clearly elaborate on the **steps,** and **precautions** when carrying out the exercise. Provide details including examples and a drawing of a transect walk diagram produced from a typical rural and agricultural community. **[15]** **[30 Marks]**

END OF EXAMINATION

THE UNIVERSITY OF ZAMBIA

SCHOOL OF AGRICULTURAL SCIENCES AGRICULTURAL

DEPARTMENT OF ECONOMICS AND EXTENSION

2015 FINAL YEAR EXAMINATION

AGE 5462: EXTENSION COMMUNICATION

TIME: THREE (3) HOURS

TOTAL MARKS: 100

INSTRUCTIONS: ANSWER ALL QUESTIONS. EACH QUESTION CARRIES 20 MARKS

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1. With practical examples, explain the meanings of the following main components in organizing extension services:
   a) Span of control.
   b) Formal organization charts.
   c) Work specialization
   d) Co-ordination (20 marks)

2. "Groups are importantly developed to provide numerous functions that benefit both individuals and organizations".
   a) Mention any two group functions for organizations (4 marks)
   b) Using the four stages of development, explain how groups are typically developed (16 marks)

3. Fully discuss the role a message plays in communication model and mention any three helpers an extension worker may use to avoid difficulties associated with incomplete information and poor presentation.

4. "The difficulties experienced in operationalizing the Agricultural Innovation System makesAgriculturalKnowledge and Information System in agricultural developmentthough simplistic a paradigm a useful concept"
   a) Explain the concept of Agricultural Innovation Systems (4 marks)
   b) Distinguish the differences between "agricultural knowledge system" and "agricultural information system" (8 marks)
   c) List the fourmain reasons being advanced for continued use of Agricultural Knowledge and Information System in agricultural development. (8 marks)

5. Using a diagram, illustrate anddiscuss the various adopter categories extension agents are often in contact with.

.....END.....

THE UNIVERSITY OF ZAMBIA
SCHOOL OF AGRICULTURAL SCIENCES
Department of Agricultural Economics & Extension

FINAL EXAMINATION FOR 2015 ACADEMIC YEAR

AGE 5262 – INTERMEDIATE FARM MANAGEMENT

TIME : THREE HOURS

INSTRUCTIONS : ANSWER *ALL QUESTIONS*

Q1.

A Choma farmer acquired a combine harvester from A.F.E agricultural company with a K3, 000 loan. This loan is to be financed at 24% interest rate over a 10 years period. Two kinds of amortizations can be used in the repayment of this loan. Contrast the two methods by calculating payment, principal and interest of each of the 10 years period. Discuss the advantages and disadvantages of each plan.

Q2.

Write short notes, giving examples, on the following:

A. a system
B. management information system
C. preliminary controls
D. concurrent controls
E. feed back controls

Q3.

a. Mr. Mwansa borrows K1, 200 at 7% add-on interest to be repaid over a year with 12, monthly payments.
   i) What is the total interest charge on this loan?
   ii) What are the monthly payments on this loan?
   iii) What is the annual percentage rate of interest being charged?

b. Mr. Mwansa also acquires a tractor traded with a K6, 000 boot payment. It is financed by a dealer on a three year plan, with equal payments of K2, 450 at the end of each year

i) What is the interest charge on this loan?

ii) What is the annual percentage rate being charged on the finance plan?

Q4.

Mr. Lombe is considering replacing part of his worn out machinery and equipment. The total cost of this replacement is estimated to be K59, 000,000. He currently has K11, 000,000 that he could use for a down payment.

The income and expense information on the farmer shows that K10, 000,000 cash is available for debt servicing. Assume seven years repayment period 14% interest on loan is agreed with the lending institution. Comment on the farmer's repayment capacity. What negotiations would have to be made in order to improve this capacity? (Show your suggestions based on calculations).

Q5.

A. Discuss characteristics of agricultural labour. How would these characteristics help a manager to improve labour utilization?

B. Compensation packages for employees will include a cash salary plus different bonuses and various incentives. Discuss factors that affect compensation decision on many farm businesses.

THE UNIVERSITY OF ZAMBIA

SCHOOL OF AGRICULTURAL SCIENCES

2015/2016 ACADEMIC YEAR FINAL EXAMINATIONS

AGE 5272: PROJECT MONITORING AND EVALUATION

TIME: THREE (3) HOURS

INSTRUCTIONS: ANSWER QUESTION ONE AND ANY OTHER FOUR FOR A TOTAL OF FIVE. EACH QUESTION IS WORTH 20%.

Question One

A project will in most cases undergo a six stage cycle. List and discuss these stages of a project cycle, and also list key M&E activities conducted in these stages. (20 marks)

Question Two

i. What is a baseline survey? What purpose does it serve in a project M&E system? (10 marks)

ii. Write belief notes on the following;
   a. Project indicators (2.5 marks)
   b. Panel studies (2.5 marks)
   c. Project Results (5 marks)

Question Three

Discuss the following in detail;

i. The Vertical Logic of the Logical Framework (10 marks)

ii. Beneficiary Assessment (10marks)

Question Four

i. What is Financial Monitoring and why is it important? (10 marks)

ii. Discuss the following aspects of project stakeholders: Who are project stakeholders, what is a stakeholders analysis and what is the importance of stakeholders to a projects M&E system? (10 marks)

Question Five

Monitoring and Evaluation (M&E) is conducted at the project and sectoral levels. What is a sectoral analysis/review? What is the importance of sectoral analysis/review? Outline the stages involved in a typical sectoral analysis/review. (20 marks)

Question Six

i. What is Mono Method Bias? What are the dangers of Mono Method Bias? How can Mono Method Bias be avoided? (10 marks)
ii. What is a Key Informant interview? What factors should an Evaluator consider when selecting an individual to serve as a key informant? (10 marks)

END OF EXAMINATION

THE UNIVERSITY OF ZAMBIA
SCHOOL OF AGRICULTURAL SCIENCES
DEPARTMENT OF FOOD SCIENCE AND NUTRITION

2015 / 2016 ACADEMIC YEAR FINAL YEAR EXAMINATION

COURSE: AGF 3042
Instrumental Methods in Food Analysis - Practical

Date: 13th September, 2016 **Time:** 14.00 – 17.00 Hours

Duration: THREE (3) HOURS **Venue:** Other Rooms

INSTRUCTIONS TO CANDIDATES:

1. Answer **ALL** questions in this examination paper
2. All answers should be clearly numbered and written in the given answer sheets
3. All questions are allocated marks as **shown in brackets**
4. This examination will require students to view some specimen on assigned bench spaces - Instructions of when to view these specimen will be issued during the course of the examination

b. In your laboratory sessions, you used this specimen to analyse a sample. What was the purpose of this technique in that experiment? **(1 mark)**

4. Please answer the following questions about **specimen D** displayed on the counter.

a. What is **specimen D** called? **(1 mark)**

b. Identify the technique in which **specimen D** is used **(1 mark)**

c. You are asked to determine the presence of sodium and chloride ions in a fish sample. The rules are that you only use one technique for both analyses. What one (1) technique can you use to analyse these analytes? **(1 mark)**

5. On the counter is a specimen labelled **Specimen E.** Answer the following about this specimen.

a. What is **specimen E** called? **(1 mark)**

b. In what general technique is it used (full name and abbreviations)? **(1 mark)**

6. You will be directed to **Station F** where there will be an examiner who will grade you according to how you work with the given machine and other given materials. If there is anything to write down please do so on a given piece of paper. Marks will be allocated on how you handled the machine and the given samples, etc.
You are asked to analyse the **sample X** given on the counter in the **equipment F** at 680 nm. Please proceed to show how you would operate the machine and how you would measure the absorbance of the sample. (Do not pay attention to the examiner grading you. Concentrate on doing things as accurately as possible to earn maximum marks) **(6 marks)**

SECTION 1:

On the counters are displayed different specimen labeled A to E. Answer the following questions about each of these items.

You will have **two (2) minutes** or less at each station **(A to D)** and **three (3)** minutes at **E** before you are asked to move to the next. You will not have a chance to come back to these stations, please ensure that you remember what each specimen is before moving to the next.

1. Please answer the following questions about **specimen A** displayed on the counter.

a. What is **specimen A** called? **(1 mark)**

b. What is the name of the analytical technique in which **specimen A** is used (full name and abbreviations)? **(1 mark)**

c. Specimen A is specifically used for a variant of the technique that you have named in (b). Give the specific variation of the technique that **specimen A** is used for (normal or reversed). Explain what feature of the **specimen A** made you arrive at this answer. **(2 marks)**

2. Please answer the following questions about **specimen B** displayed on the counter.

a. What is **specimen B** called? **(1 mark)**

b. What technique is **specimen B** used for **(1 mark)**

c. **Specimen B** can be formulated in different concentrations in percentage (w/v). Assume that this specimen was made from 8 g of powder and 32 ml of TBE buffer. Calculate the concentration of this specimen and show all the steps. **(2 marks)**

3. Please answer the following questions about **specimen C** displayed on the counter.

a. What is **specimen C** called? **(1 mark)**

SECTION 2: Answer **ALL** questions in this section

1. You are given a vegetable sample suspected to have high levels of pesticides using a given technique that is suitable for volatile compounds. The pesticides are volatile.
   a. Determine what analytical technique you would use to quantify the pesticides in this sample and explain the principle of this technique. **(10 marks)**
   b. Draw a sketch of the equipment used in this technique and name all its essential parts **(6 marks)**
   c.
      i. For an analyst to determine the pesticides in the sample, one would have to replace a part of the named equipment with a certain part. What part would this be? Name that part that is specialized to quantify the pesticides. **(2 marks)**
      ii. In case of analysis of organic compounds such as fatty acids or other heat labile substances in the vegetable sample, what version of the part would you replace (similar to that named in (c. i)? **(2 marks)**

2.
   a. You are given two DSC thermograms of a native egg white sample and a high pressure treated egg white sample. What would be the difference between the graphs of the two thermograms and what could be the reason for the difference between the two thermograms? **(4 marks)**
   b. Draw a sketch of an endothermic DSC thermogram and on it label **four (4)** points / or information that can be generated or read off it. Briefly describe what each of the **four (4)** points or information mean. **(16 marks)**

3. Sample Y is given to you to analyse alongside a set of standards which all have a maximum absorbance in the electromagnetic spectrum at 510 nm. Determine the concentration of the unknown sample in **mg / 100 ml** using the absorbance reading

you recorded and the additional information given in **Table 1**. Note that you are required to use graph paper to calculate the concentration of sample **X**.

Table 1: Absorbance results standard solution samples used to prepare a standard curve

Standard	Tube / Flask #	Standard solutions Concentration mg/ml	Absorbance reading
Standard solutions	1	0.0	-0.004
	2	0.4	0.375
	3	0.8	0.738
	4	1.2	1.078
	5	1.6	1.437
	6	2.0	1.914
Sample X	Sample X	-	0.672

a. What is the concentration of the unknown sample in mg / 100 ml? **(8 marks)**

b. What is the analytical technique that was used to analyse the **sample Y** and describe the principle. **(10 marks)**

c. In the laboratory session you had, you used a certain method to prepare and analyse the cholesterol in the eggs. What was this method called? Briefly explain how it works (NB: Not the technique). **(2 marks)**

4. You are assigned to work in a laboratory that analyses immunological responses to groundnuts in human beings. You have been informed that there is some blood that was drawn from individuals that are suspected to have been exposed and are allergic to groundnuts.

   You analyse the blood samples using a given kit and obtain results shown in (**Figure 1**). **Table 2** shows selected data of some individuals' blood samples. Answer the questions associated with this analyses.

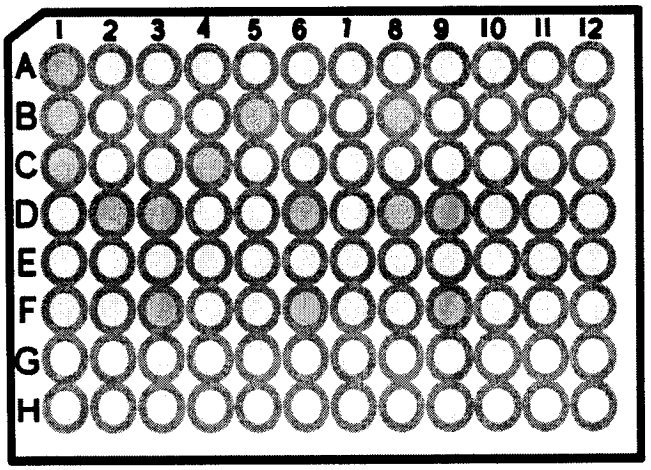

Figure 1: Kit used to analyse the blood samples of individuals allergic to groundnuts

Table 2: Results accompanying **Figure 1** for select wells of blood samples of individuals who are allergic to groundnuts

Sample type	Well #	Optical density reading	Colour of well (intensity of well colour)
Blood sample 1	D8	0.750	Deep yellow
	D9	0.795	Deep yellow
Blood sample 2	G11	0.273	Light yellow
	H11	0.259	Light yellow
Blood sample 3	F8	0.310	Light yellow
	F9	0.850	Deep yellow
Control 1	A1	1.024	Deep yellow
Control 2	B1	1.089	Deep yellow
Control 3	C1	1.032	Deep yellow

a. You are informed by your superior that the individual who donated **blood sample 2** is in a very critical condition in hospital while donor of **blood sample 1** proceeded to attend a conference in India and is in very good condition. From this information about the individuals (in **Table 2**) deduce which immunological technique that was used in this exercise (specific name). Explain the principle of this technique and why you have chosen this technique. **(10 marks)**

b. What can you deduce of the **blood sample 3**? **(2 marks)**

c. In the laboratory session you carried out on fish feed samples, outline the method you used to prepare the fish feed samples in detail. **(6 marks)**

d. Name **two (2)** other types of techniques that could have been used other than this one to get similar results **(2 marks)**

THE END

THE UNIVERSITY OF ZAMBIA
SCHOOL OF AGRICULTURAL SCIENCES
DEPARTMENT OF FOOD SCIENCE AND NUTRITION

2014/2015 ACADEMIC YEAR FINAL YEAR EXAMINATION

COURSE: AGF 3042
Instrumental Methods in Food Analysis - Theory

Date: 7th September 2016 **Time: 09.00 – 12.00 Hours**

Duration: THREE (3) HOURS **Venue: Omnia 1**

INSTRUCTIONS TO CANDIDATES:

1. There are two (2) sections in this examination paper, Sections 1 and 2
2. Answer **ALL** questions in **Section 1** and answer any **four (4)** questions in **Section 2**
3. Each question in **Section 1** is allocated marks as shown in **parenthesis**
4. **All** questions in **Section 2** carry equal marks of twenty **(20)** marks each

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SECTION 1: Answer ALL questions in this section in the provided booklet

1. In ion exchange chromatography, three types of separations are possible except one. Which is the odd one out? **(1 mark)**
    a. Cationic from anionic components
    b. Differently sized particles in solution
    c. Ionic from nonionic compounds
    d. Mixture of similarly charged species

2. You are asked to monitor the progression of sucrose in a TGA. Which of the following would be a scenario you would observe and be true of the reaction? **(1 mark)**
    a. The mass would decrease
    b. The mass would remain the same
    c. The mass would be fluctuating throughout the process
    d. The mass would increase

3. The refractive index (RI) is a ratio of _____ **(1 mark)**
    a. Sine of the refracted ray to the incident ray
    b. Sine of incident ray to the refracted ray
    c. Cosine of incident ray to the refracted ray
    d. Cosine of the refracted ray to the incident ray

4. Rhodamine is used in one of these immunoassays **(1 mark)**
    a. Particle counting immunoassay
    b. Fluorescence immunoassay
    c. Radio immunoassay
    d. Radial immunoassay

5. Polyacrylamide gels are prepared by polymerisation of acrylamide monomer and N-N' - methylene bis acrylamide crosslinker in the presence of: **(1 mark)**
    a. APS and β-mercaptoethanol
    b. APS and TEMED
    c. TEMED and β-mercaptoethanol
    d. Tris Buffer and EDTA

6. All the following are bending motions observed in MIR except _____. **(1 mark)**

   a. Scissoring
   b. Waving
   c. Twisting
   d. Wagging

7. All the following are main components of an HPLC except _____ **(1 mark)**

   a. Oven
   b. Pump
   c. Injector
   d. Column

8. Which of the following has the longest wavelength? **(1 mark)**

   a. UV
   b. γ-rays
   c. RF
   d. Vis

9. All the methods listed below are destructive methods except _____ **(1 mark)**

   a. Mass Spectrometry
   b. Differential Scanning Calorimetry
   c. Near Infra-Red Spectrometry
   d. Gas Chromatography

10. Intensity of colour increases proportionally with the sample concentration in all the following except: **(1 mark)**

    a. Liebermann–Burchard
    b. Flame Photometry
    c. Competitive ELISA
    d. Indirect ELISA

SECTION 2: Answer any four (4) questions in this section

1. Answer the following questions based on **figure 1** of a sample Z which was analysed by UV-Vis Spectrometry

   a. What is the molar absorptivity of compound Z at 295 nm and 348 nm, given the absorption spectrum shown in the figure 1 (obtained using a UV-Vis Spectrometer and a 1 mM solution of compound Z in a sample cell with a pathlength of 1 cm)? **(5 marks)**

   b. You have now decided to make quantitative measurements of the level of compound Z in different solutions. Based on the given spectrum, which wavelength will you use for your measurements? **(2 marks)**

   c. Give two (2) reasons why this is the optimum wavelength. **(3 marks)**

   d. Explain the principle of UV-Vis Spectrometry **(10 marks)**

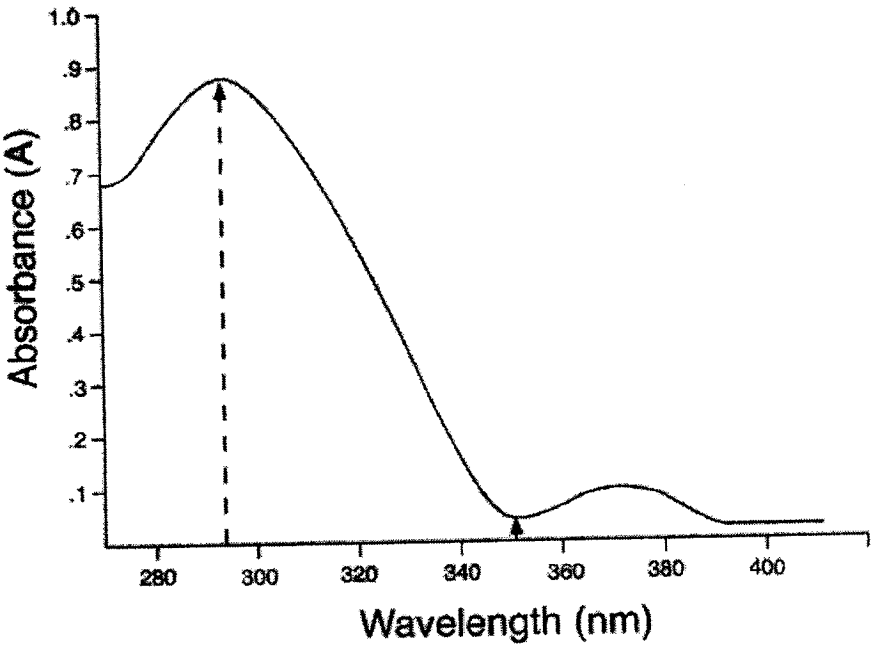

Figure 1: Absorption Spectrum for compound Z

11. The basic functions of mass spectroscopy include all the following except one. Which is the odd one out? **(1 mark)**

    a. Ionisation of molecules
    b. Excitation of atoms from their ground state
    c. Monitoring of separated and charged fragments
    d. Separation of charged ions and their fragments

12. What is the difference between a time domain spectra from a frequency domain spectra? **(2 marks)**

13. The gas (fuel) used for flame emission spectroscopy is _____ while that used for AAS is _____. **(1 mark)**

14. Draw schematic diagrams of both old and new monochromators of a UV – VIS spectrometer and label all the features **(5 marks)**

15. A sample containing 0.25 g of sucrose in 25 g solution is equivalent to _____ °Brix (show how you arrived at your final answer) **(1 mark)**

2. You are informed that xylose (a sugar) can be analysed by various techniques including HPLC and GC. Discuss the principles of these two techniques and explain why you think each of these can be used to analyse vitamin A.

(20 marks)

3. Answer the following questions based on **Figure 2**

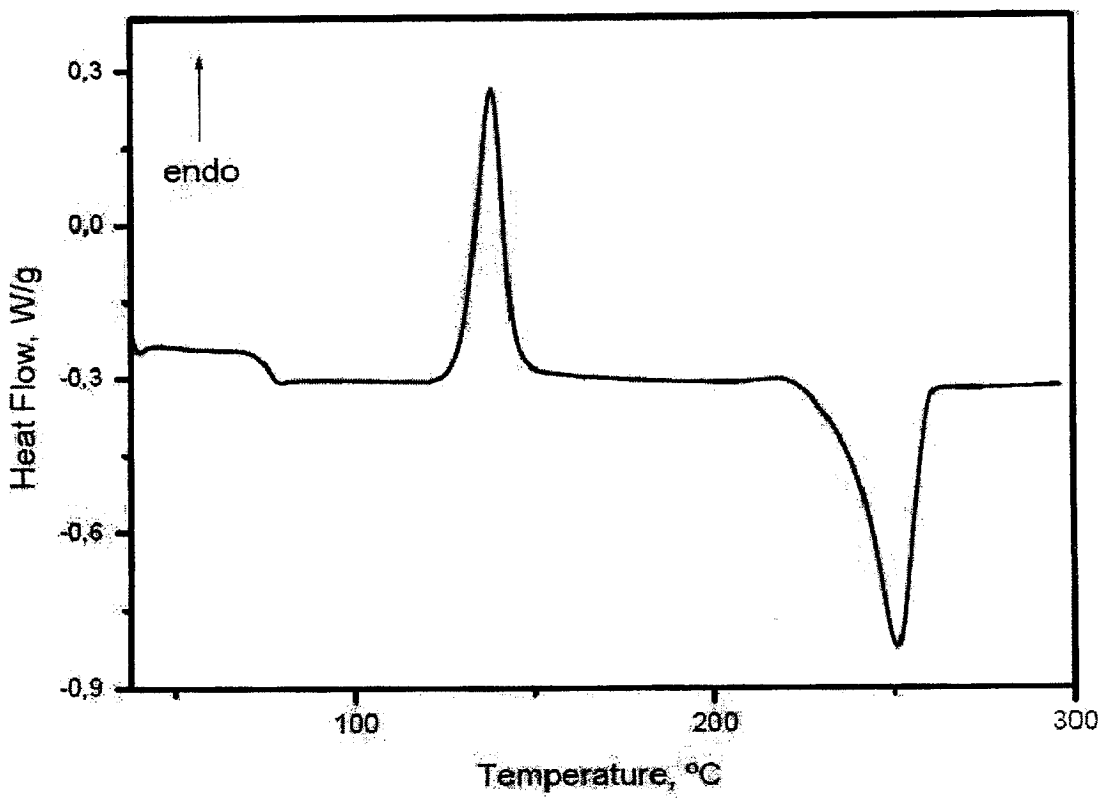

Figure 2: Spectrum of an unnamed instrumental method technique

a. Name the equipment that generated the spectrum shown in Figure 1 (in full)

(1 mark)

b. If you analysed lipids (or lipid based foods) and starch, this technique can give you valuable information about these macronutrients. List and briefly describe

THE UNIVERSITY OF ZAMBIA
SCHOOL OF AGRICULTURAL SCIENCES
DEPARTMENT OF FOOD SCIENCE & NUTRITION

2014/15 ACADEMIC YEAR END OF YEAR FINAL EXAMINATIONS

AGF 3100
General and Food Microbiology (Theory)

Date: Monday 26th September 2016
Time: 09:00-12:00hrs
Venue: Omnia II

Duration: THREE (3) HOURS

INSTRUCTIONS TO THE CANDIDATES:

1. **THIS PAPER CARRIES 100 MARKS AND HAS TWO (2) SECTIONS**
2. **ANSWER ALL THE QUESTIONS IN SECTION A AND ONE (1) QUESTION IN SECTION B.**
3. **ALLOCATED MARKS FOR EACH QUESTION ARE INDICATED IN THE BRACKETS.**

SECTION A
Answer ALL questions

Question 1

Write brief notes on any four (4) of the following:

a) Bacteriostatic and Bacteriocidal antibiotics **[5 Marks]**
b) Main methods of sterilization **[5 Marks]**
c) Gram positive and negative bacteria staining principle **[5 Marks]**
d) Processes of Bacteria genetic material exchange **[5 Marks]**
e) Importance of microorganisms in the food processing industry **[5 Marks]**
f) Adaptive immunity indicating how the immunity is introduced **[5 Marks]**

Question 2

Describe the general differences between a prokaryotic and a eukaryotic cell **[20 Marks]**

Question 3

a) What are yeasts and discuss their significance in food processing based on yeast growth and metabolism.
b) Microbial growth is an autocatalytic process, which is affected by a number of parameters. Discuss the major parameters that affect the growth and survival of micro-organisms in foods listing the factors influencing each parameter.

[20 Marks]

Question 4

Ebola virus disease (EVD), formerly known as Ebola haemorrhagic fever is a severe acute viral illness, often fatal in humans.

a) Name the family of the virus that causes Ebola virus disease?
b) Name the reservoir host of the Ebola virus
c) Mention at least 5 symptoms of Ebola virus disease
d) Briefly explain how, starting from the forest, an Ebola virus disease can break- out in the community. In your answer you should show how a person can get Ebola virus infection from foodstuffs.

e) Mention at least two methods that a person can use to prevent infection from Ebola virus

[20 Marks]

SECTION B

Answer any one (1) question

Question 5

a) Food spoils or deteriorates in a number of ways. Describe with examples at least three ways in which food can spoil **[6 Marks]**

b) Explain in detail how sodium chloride function as antimicrobial compounds in food preservation **[5 Marks]**

c) Explain in detail how weak acids function as antimicrobial compounds in food preservation **[5 Marks]**

d) Describe the relationship between pH and pK_a **[4 Marks]**

Question 6

a)

i. Explain in detail how ionizing radiation destroys microorganisms during radiation preservation of food **[5 Marks]**

ii. Describe two factors that influence the radiation resistance of microorganisms **[3 Marks]**

iii. Define radappertization **[2 Marks]**

b)

i. Briefly define **food intoxication, food infection** and **disease** with an example for each **[6 Marks]**

ii. There are several hurdles that an intestinal pathogen must overcome in the body in order to cause illness. Describe two (2) hurdles in detail, that must be overcome in order to demonstrate that an organism is a food borne pathogen **[4 Marks]**

END OF EXAMINATION

THE UNIVERSITY OF ZAMBIA

SCHOOL OF AGRICULTURAL SCIENCES
DEPARTMENT OF FOOD SCIENCE & NUTRITION

2015/16 ACADEMIC YEAR FINAL EXAMINATIONS

AGF 3412 – FOOD TOXICOLOGY

Date: 20th September, 2016
Venue: Other Rooms (FSN)
Time: 09.00 – 12.00 hrs

INSTRUCTIONS TO THE CANDIDATES:

1. THIS PAPER CARRIES 100 MARKS
2. ANSWER ALL THE QUESTIONS IN SECTION A AND ANSWER FOUR (4) QUESTIONS IN SECTION B
3. ALLOCATED MARKS FOR EACH SECTION ARE INDICATED IN THE BRACKETS

SECTION A: Answer all questions in this section [20 marks]

Choose the most appropriate answer and mark on the question paper. Submit the question paper with the examination answer book.

1. Which compounds are anti-nutritional factors?
   a. Glycosides
   b. Trypsin inhibitors
   c. Saponins
   d. Glucosinolates
   e. Haemaglutinins

2. Which of the following is NOT a characteristic of active transport.

   a. Blocked by saxitoxin
   b. Movement against a concentration gradient
   c. Exhibits a transport maximum
   d. Energy dependent

3. The primary site of kidney damage resulting from acute exposure to cadmium is the ...

   a. Glomerulus
   b. Proximal tubule
   c. Loop of henle
   d. Nephron

4. Select the statement that is most applicable to food intolerance.

   a) It is a food poisoning that causes symptoms in everyone who consumes the food.
   b) The body produces antibodies against the food or a component of the food
   c) It is an adverse reaction to a food or a component of the food that occurs every time an affected individual consumes the food
   d) It can be induced by the method of processing the food

5. Clostridium Botulinum
   a) Causes a food infection
   b) Causes a food borne intoxication
   c) Produces an enterotoxin called lecithinase
   d) Produces a heat labile enterotoxin

6. Match the toxic compounds (1-4) with the foods (a-d) in which they might be present.

1. Tetrodotoxin	a. apple
2. Ergotamine	b. mussels
3. Saxitoxin	c. puffer fish
4. Patulin	d. rye

3. a) Among the fundamental principles of food toxicology are absorption, distribution, metabolism and excretion (ADME) of xenobiotics.

i) Discuss in detail how metabolism affects the toxicity of compounds. **[7.5 marks]**

ii) Explain in detail how the urinary system functions in eliminating xenobiotics. **[7.5 marks]**

b) i) What is an acrylamide? **[1 mark]**

ii) How is it formed? **[2 marks]**

iii) What are the symptoms of acrylamide poisoning? **[2 marks]**

4. a) Plants contain secondary metabolites which they synthesize to protect themselves against herbivorous organisms. Therefore when humans consume plant based foods, they are exposed to these metabolites which may be toxic or merely give a bad taste.

i) Name three toxic secondary metabolites found in plant foods. **[3 marks]**

ii) Discuss in detail one of the above named naturally occurring toxic secondary metabolite in plants. **[10 marks]**

iii) Give the symptoms of the toxicant discussed in (iii) above **[3 marks]**

iv) What measures, if any, are available to mitigate or reduce poisoning from this toxicant? **[4 marks]**

SECTION B : Answer any four (4) questions
All questions carry equal marks

1. a) Define

i. ADI **[2 marks]**
ii. LD_{50} **[2 marks]**
iii. NOAEL **[2 marks]**
iv. *In vitro* toxicity testing **[2 marks]**

b) i) Differentiate between scombroid poisoning and puffer fish poisoning. **[6 marks]**

ii) List the symptoms of scombroid poisoning. **[2.5 marks]**

c) i) What is food intolerance? **[1.5 marks]**

ii) Give two symptoms of food intolerance. **[2 marks]**

2. a) i) What are food additives? **[2 marks]**

ii) What is hypervitaminosis A? **[2 marks]**

iii) Give the three major adverse effects of hypervitaminosis A **[5 marks]**

iv) What is the major cause of hypervitaminosis A. **[1 mark]**

b) i) What is food toxicology? **[2 marks]**

ii) Define a xenobiotic **[2 marks]**

iii) Differentiate between an absorbed dose and an administered dose. **[3 marks]**

iv) 'All substances are poisons'. Discuss this statement and its implication in Toxicology. **[3 marks]**

5. i) What are pesticides? **[3 marks]**

ii) Discuss one class of insecticides, giving the name, mechanism of action, advantages of its use, problems associated with its use and symptoms of poisoning if humans are exposed to it. **[12 marks]**

iii) Write short and concise notes (less than five lines) on the following

a) Pyrethroid pesticides **[1 mark]**

b) Phosphine **[1 mark]**

c) 2,4-dichlorophenoxyacetic acid **[1 mark]**

d) Nitrosamines **[1 mark]**

e) Heterocyclic aromatic amines **[1 mark]**

THE UNIVERSITY OF ZAMBIA
SCHOOL OF AGRICULTURAL SCIENCES
DEPARTMENT OF FOOD SCIENCE AND NUTRITION

2015/2016 ACADEMIC YEAR – FINAL EXAMINATIONS

COURSE: AGF 4052
Sensory Evaluation of Foods

Date: 23rd September 2016 **Time: 14.00 – 17.00 Hours**

Duration: THREE (3) HOURS **Venue: Omnia 2**

INSTRUCTIONS TO CANDIDATES:

1. There are two (2) sections in this examination paper, Section A and Section B.
2. **Each section** has three (3) questions. **Answer all questions in both sections.**
3. **Section A and Section B carry equal marks (50 marks).** The marks allocated are given at the end of each question.
4. Answers to the two sections should be given in separate booklets. Clearly label each booklet as Section A and Section B.
5. Find also attached **table T4** – Upper α-probability points of student's t-distribution, **table T5** – Upper α-probability points of χ^2-distribution and **table T6**-Upper α-probability points of F-distribution

SECTION A: Answer all Questions

QUESTION 1

(a) Define the following terms:

(i) Organoleptic **[1 mark]**

(ii) Anosmia **[1 mark]**

(iii) Viscosity **[1 mark]**

(iv) Ageusia **[1 mark]**

(v) Ordinal data **[1 mark]**

(b) In sensory evaluation,

(i) What are overall and attribute difference tests? **[2 marks]**

(ii) Briefly, describe how you as a sensory analyst would practically carry out any one of the overall difference tests and any one of the attribute tests **[2 marks]**

(iii) The definition of thresholds in sensory evaluation has various dimensions. Mention and adequately define two (2) terms used to define threshold. **[2 marks]**

(iv) In the Duo-trio-test, two forms of the test exist. Mention the two and explain the difference between the two forms of the test? **[2 marks]**

(v) State three differences between gustation and trigeminal perceptions? **[2 marks]**

QUESTION 2

A drink manufacturer wishes to replace his regular preservative, potassium sorbate, with a newly introduced preservative 'mwenge' on the Zambian market. It has been proven that the new preservative is as effective as the regular preservative in its preservative properties. The new preservative is also cheaper than the regular preservative. The company marketing the new preservative claims that the drinks made using 'mwenge' preservative tastes the same as that made using potassium sorbate. However, it's a known fact that both preservatives cause carryover taste effects when the drinks are tasted. The drink manufacturer would like to know if the drinks made using 'mwenge' preservative tastes the same as that made using potassium sorbate. Therefore, the drink manufacturer hires you as a Sensory Consultant. The drink manufacturer would like you to determine if the new 'mwenge' preservative can be used in place of potassium sorbate. Secondly, the drink manufacturer would like you to determine if the two types of drinks produced by the two preservatives can be distinguished by taste. To provide the drink manufacturer with the information

to his queries, you conducted a sensory test. In this sensory test, you obtained a total of 70 responses, 35 matched and 35 unmatched pairs, collected from 70 panelists. Each panelist evaluated either a matched pair (K-Sorbate/K-Sorbate or mwenge/mwenge) drinks or unmatched pair (K-Sorbate/mwenge or mwenge/K-Sorbate) drinks in a single session. Within the matched pairs, 20 panelists said the samples were the same and 15 panelists said the samples were different. On the other hand, in the unmatched pairs, 24 panelists said the samples were different and 11 panelists said the samples were the same.

(i) State with reason(s) what kind of sensory test you carried out to obtain this kind of data **[2 marks]**

(ii) Give advice, outlining your basis, to the drink manufacturer regarding his queries above **[10 marks]**

(iii) What decision is the drink manufacturer likely to make? **[3 marks]**

QUESTION 3

A peanut butter manufacturer plans to improve the spreadability of their peanut butter. You as a hired Product Researcher has proposed two (2) prototypes of peanut butter which you label as sample PB1 and sample PB2. The two prototypes have shown that they are more spreadable than the regular peanut butter (control). Sample PB1 requires more force to initiate spreading while sample PB2 initially spreads easily but reduces spreadability subsequently. The manufacturer wishes to know how different the prototypes are from the regular peanut butter (control) as perceived by his/her consumers. In order to achieve this, you as a product researcher decided to carry out a sensory evaluation test. A pre-weighed amount of peanut butter is placed in a cup. The same amount is weighed out for each sample. The test is performed by evaluating the spreadability of the peanut butter on a piece of biscuit previously proven to have the same surface smoothness for all pieces. The evaluation is limited to two samples at a time. All panelists receive the labeled control first and the test (prototype) sample second. The test uses 20 panelists who evaluate all the three possible pairs, which may be:

- Control vs product PB1
- Control vs product PB2
- Control vs Blind Control

The results obtained are shown in the table below.

Panelist	Blind Control	Prototype PB1	Prototype PB2
1	1	4	5
2	4	6	6
3	1	4	6
4	4	8	7
5	2	4	3
6	1	4	5
7	3	3	6
8	0	2	4
9	6	8	9
10	7	7	9

(a) State with reason(s) what kind of sensory test you carried out to obtain this kind of data. **[2 marks]**

(b) Are the prototypes, sample PB1 and sample PB2, significantly different from the regular peanut butter, (blind control sample)? **[5 marks]**

(c) Which sample is significantly more different from the regular peanut butter, sample PB1 or sample PB2? **[5 marks]**

(d) Did the panelists show significant differences in their scores? **[5 marks]**

(e) What decision(s) can you as a product researcher advise the peanut butter manufacturer to make from these results? **[3 marks]**

USEFUL INFORMATION FOR SECTION A

$LSD = t*SQRT(2*MS_E/n)$

where t= is the t-value for the level of significance of the ANOVA, SQRT= Square root, MS_E= Error Mean Square for the ANOVA and degrees of freedom being equal to the degrees of freedom of the error term (df_E).

SECTION B: ANSWER ALL QUESTIONS

QUESTION 1

On the influence of psychological factors define the following **[10 Marks]**

(a) Halo effect

(b) Expectation error

(c) Stimulus error

QUESTION 2

(a) Look at the two samples of Mango juice in the table given

The numbers used in the table represent intensity ratings on a 15-cm scale where Zero means no detectable attribute is felt upon drinking the Mango juice and 15 cm means a very large amount of the attribute is felt. Using descriptive analysis narrative, explain how you would convince a potential consumer that these juices are not the same even though they are both called mango juice. In your opinion which one would be a better buy **[17 Marks]**

Table. Sensory characteristics of two Mango Juice Samples

Characteristic	Sample A	Sample B
Sweetness	9.5	5.2
Acid flavor	3.1	6.5
Mango flavor	6.5	13.5
Yellow colour	4.5	4.5
After test	2.5	1.6

(b) Descriptive analysis methods are also known as sensory pictures. Mention 3 situations where such methods are used in industry and what are they meant to achieve **[3 Marks]**

QUESTION 3

Here is a company scenario whose products you need to analyse and make an informed conclusion.

Name of the project: Improved Beef burger

Problem situation: Responding to consumer requests for a burger with more beef. A product development team from a Company called Beef Burger Deluxe have developed a burger with more beef using an attribute difference test as a guide.

The Marketing Department has to confirm whether the product (prototype) the company currently developed is indeed preferred than their product already on the market, which is not doing badly. Describe using a paired preference test (qualitative affective tests) how you would logically go about ascertaining whether the prototype is indeed better than their product already on the market **[20 Marks]**

END

THE UNIVERSITY OF ZAMBIA
SCHOOL OF AGRICULTURAL SCIENCES
DEPARTMENT OF FOOD SCIENCE & NUTRITION

BACHELOR OF FOOD SCIENCE AND TECHNOLOGY

FOOD ENGINEERING
AGF 4210

2015-2016 END OF YEAR EXAMINATIONS

DURATION: THREE (3) HOURS **VENUE: OTHER ROOMS**

INSTRUCTIONS TO THE CANDIDATES:

1. PLEASE READ THE INSTRUCTIONS AND EACH QUESTION CAREFULLY.
2. THIS PAPER HAS SECTION **A** & **B** AND CONTAINS **6** QUESTIONS
3. ANSWER ANY **2** QUESTIONS FROM SECTION **A** AND ANY **2** FROM SECTION **B**
4. **EACH** QUESTION CARRIES **25 MARKS**.

SECTION A (ANSWER ANY 2)

1. Skim milk is prepared by the removal of some of the fat from whole milk. This skim milk is found to contain 90.5% water, 3.5% protein, 5.1% carbohydrate, 0.1% fat and 0.8% ash. If the original milk contained 4.5% fat.
   a) Draw and label the process flow diagram **(5 marks)**
   b) calculate its composition assuming that fat only was removed to make the skim milk and that there are no losses in processing **(12 marks)**
   c) State the laws of conservation of mass and energy as applied in most unit operations in Food Engineering **(8 marks)**

2. A liquid fermentation medium at 30°C is pumped at a rate of 2000 Kg/h through a heater, where it is heated to 70°C under pressure. The waste heat water used to heat this medium enters at 95°C and leaves at 85°C. The average heat capacity capacity of the fermentation medium is 4.06 KJ/Kg.K, and that of water is 4.21 KJ/Kg.K. The fermentation stream and the water stream are separated by a metal surface through which heat is transferred and do not physically mix with each other.
   a) Calculate the amount of heat added to the fermentation medium **(5 points)**
   b) In the initial design phase of reactors in a food processing plant, there are important design considerations of particular concern. Briefly discuss these considerations. **(6 points)**
   c) Batch and CSTR reactors are commonly used in the brewing industry. Describe each of them and state their advantages and disadvantages. **(9 points)**
   d) Classify the reactors based on the reactants phase. **(5 points)**

3. a) Calculate the greatest pressure in a spherical tank, of 2 m diameter, filled with peanut oil of specific gravity 0.92, if the pressure measured at the highest point in the tank is 70 kPa **(5 marks)**
   b) Separations based on sedimentation are commonly used in the food industry, describe the principal and give examples of food products that can be separated by this method. **(6 marks)**

Tab. I Vapour liquid Equilibrium Data for Methanol water, p=1atm, mole %		
Methanol Liquid	Methanol Vapour	Temperature, C
0.0	0.0	100.0
2.0	13.4	96.4
4.0	23.0	93.5
6.0	30.4	91.2
8.0	36.5	89.3
10.0	41.8	87.7
15.0	51.7	84.4
20.0	57.9	81.7
30.0	66.5	78.0
40.0	72.9	75.3
50.0	77.9	73.1
60.0	82.5	71.2
70.0	87.0	69.3
80.0	91.5	67.6
90.0	95.8	66.0
95.0	97.9	65.0
100.0	100.0	64.5

6. A single effect evaporator is to be used to concentrate a food solution containing 15% (by mass) dissolved solids to 50% solids. The feed stream enters the evaporator at 291 K with a feed rate of 1.0 kg s^{-1}. Steam is available at a pressure of 2.4 bar and an absolute pressure of 0.07 bar is maintained in the evaporator. Assuming that the properties of the solution are the same as those of water, and taking the overall heat transfer coefficient to be 2300 W $m^{-2}K^{-1}$, calculate the rate of steam consumption and the necessary heat transfer surface area. Working in units of kg s^{-1}.

(25 marks)

END OF EXAMINATION

c) What is Grass Transition Temperature? Why is it important in the storage of powdered food products? Is this tool useful to multi component powders? **(6 marks)**

d) Describe problems that occur during handling, storage and transportation of powdered food products and why? How can each of these problems be avoided or solved? **(8 marks)**

SECTION B (ANSWER ANY 2)

4.

a) Describe the difference in the mechanism of operations between the forced circulation crystallizer and the Forced-circulation Evaporator. Use sketches to illustrate. **(5marks)**

b) List the factors that determine the rate of crystal growth, write all the necessary equations. **(5 marks)**

c) List 5 characteristics of an Ideal crystallization solvent. **(5 marks)**

d) Sketch two types of crystallizers and briefly describe their mechanism of operation. **(10 marks)**

5. We are separating a mixture of methanol and water in a flash drum at 1 atm pressure. Equilibrium data are listed in Table I.

a) Feed is 60 mol% methanol, and 40% of the feed is vaporized. What are the vapor and liquid mole fractions and flow rates? Feed rate is 100 kmol/h. **(5 marks)**

b) Repeat part a for a feed rate of 1500 kmol/h. **(5 marks)**

c) If the feed is 30 mol% methanol and we desire a liquid product that is 20 mol% methanol, what V/F must be used? For a feed rate of 1000 kmol/h, find product flow rates and compositions. **(10 marks)**

d) We are operating the flash drum so that the liquid mole fraction is 45 mol% methanol. L = 1500 kmol/h, and V/F = 0.2. What must the flow rate and composition.**(5 marks)**

THE UNIVERSITY OF ZAMBIA

SCHOOL OF AGRICULTURAL SCIENCES

DEPARTMENT OF FOOD SCIENCE AND NUTRITION

AGF 4300 – FOOD PROCESSING AND PACKAGING

2015/16 EXAMINATION

Date: **9th September, 2016**

Venue: **Omnia 1**

Time: **14.00 – 17.00 hrs**

Instructions:

Answer a total of five **(5) questions**

Answer all four **(4)** questions in Section A and **any one (1)** question of your choice from section B.

All questions carry equal marks and allocated marks are shown in brackets at the end of each question.

The examination is three hours.

SECTION A: Answer all questions in this section

1. a) i) What is food irradiation? **[2 marks]**

ii) Describe the irradiation processing of food. **[4 marks]**

iii) Why is irradiated food unpopular with the general public? **[1 mark]**

iv) State three applications of irradiation processing. **[3 marks]**

b) Freezing is a method of preservation which can minimize changes in food quality. What four changes can occur in foods during freezing, frozen storage and thawing which can reduce food quality and safety? **[4 marks]**

c) i) Compare aseptic processing with conventional canning. **[2 marks]**

ii) List the two main reasons for blanching vegetables before freezing. **[2 marks]**

2. a) List and discuss three methods of food preservation studied in this course that give shelf-lives of six months and above, indicating **why** the methods work. **[10 marks]**

b) Write short and concise notes on the following (less than five lines)

i. lethal value **[2 marks]**
ii. wet bulb temperature **[2 marks]**
iii. D value **[2 marks]**
iv. Fourier's law for heat conduction **[2 marks]**
v. Multiple effect evaporation **[2 marks]**

3. When food deteriorates, it loses the desirable qualities. Below is a list of attributes; for each attribute, show the undesirable effect that occurs. **[20 Marks]**

   a. Texture
   b. Flavor
   c. Colour
   d. Appearance
   e. Nutritive value

4. Describe in detail where the following types of packaging are used and state their advantages and disadvantages **[20 Marks]**

   a. Aseptic packaging
   b. Modified Atmosphere Packaging MAP
   c. Vacuum Packaging
   d. Controlled Atmosphere (CP)

Section B

Answer any one (1) question of your choice in this section

5. a) What kind of data is required to determine the D value for a particular microorganism in a particular medium at a particular temperature? **[10 marks]**

   b) How are thermal processes optimized towards the inactivation of microorganisms while at the same time maintaining the nutritional factors? **[4 marks]**

   c) If the D value at 120°C is 1.2 minute, what F value would be required to achieve 6 log-cycle microbial death at 120°C? **[6 marks]**

6. You are a producer of Potato crisps. Describe in detail how you would package potato crisps to ensure that they reach the consumer in the best form. In your explanation take note of what you learnt about the spoilage or loss of quality of a product like this one. **[20 Marks]**

THE UNIVERSITY OF ZAMBIA

SCHOOL OF AGRICULTURAL SCIENCES

DEPARTMENT OF FOOD SCIENCE AND NUTRITION

AGF 4422 Water and Food Waste Treatment Final Examination

INSTRUCTIONS

Answer all 5 Questions

Each question carries 20 Marks

Duration of the Examination is (3) three hours

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1. (a)What prompted the development of environmental Legislation and Regulations **(5 marks)**

   (b) Name and describe 3 methods of removing air pollutants such as Volatile Organic Compounds (VOC) or odorous compounds **(5 marks).**

   (c) What are GMOs? What is their purpose and usefulness in agriculture specifically (plant, animal weed management and crop nutrition **(10 marks).**

2. Describe the role of GMOs in Waste management and the role of genetic engineering in waste water treatments. Compare natural genetic exchange and genetic engineering **(20 marks).**

3. Describe Bi-filters and Scrubbers. What are the advantages and disadvantages of each **(20 marks).**

4. In your own words explain why it is cheaper to use a community of microorganisms to clean water and waste water compared to chemicals (**12 marks).**

   (b) What is a patent? Briefly describe the steps one has to follow in order to get one. Which thins are not patented **(8 marks).**

5. Compositing is one of the best methods of waste disposal as it can turn unsafe organic products into useful soil conditioner.

   a) Give two types of windrow designs that are commonly used in compositing **(4 marks)**

   b) Describe passively and actively aerated windrows **(6 marks)**

   c) Outline in brief how the monitoring of the compositing activity is done **(5 marks)**

   d) Discus five factors that affect the compositing process **(5 marks)**

THE UNIVERSITY OF ZAMBIA
SCHOOL OF AGRICULTURAL SCIENCES
DEPARTMENT OF FOOD SCIENCE AND NUTRITION

2015/2016 ACADEMIC YEAR – FINAL EXAMINATIONS

COURSE: AGF 5310
Technology of Plant Products and Beverages

Date: 12th September 2016 **Time: 09.00 – 12.00 Hours**

Duration: THREE (3) HOURS **Venue: Omnia 2**

INSTRUCTIONS TO CANDIDATES:

1. There are **three (3)** sections in this examination paper, Section A, Section B and Section C.
2. **SECTION A** has four (4) questions. **Answer any two (2) questions in this section.**
3. **SECTION B** has one (1) question. **Answer the question in this section.**
4. **SECTION C** has one (1) question. **Answer the question in this section.**
5. Section A carries 50 marks, while Sections A and B carry 25 marks each. The specific marks allocated are given at the end of each question.
6. Answers to the **three (3)** sections should be given in separate booklets. Clearly label each booklet as Section A, Section B and Section C.

SECTION A: Answer any two (2) questions in this section

Question 1

a. Describe or answer the following questions in 5 lines or less:

i. Teosinite **[2 marks]**

ii. Groat **[2 marks]**

iii. What makes *Zea mays everta* a superior movie theatre snack compared to its relative, *Zea mays* **[2 marks]**

iv. Name **two (2)** grains that are commonly used in the brewery industry and distilled alcohol industry **[2 marks]**

v. Describe **two (2)** uses of rice **[2 marks]**

b. Describe the anatomical parts of maize and explain the nutritional composition of these parts. Support your answer with sketches, if necessary **[10 marks]**

Question 2

a. Compare and contrast the following sets of terminologies briefly giving two points for each:

i. Seeding versus shocking

ii. Miraculin and stevia

iii. Bagasse and molasses

iv. Sulphitation and carbonation **[10 marks]**

b. Describe the processing of HFCS from raw materials to the final product. In your discussion, include the uses of this product. **[10 marks]**

Question 3

a. Dry milling of maize and wheat have numerous similarities as well as some differences. Outline and briefly discuss **three (3)** differences: one related to a preparatory process(es), another related to the use of a given equipment and also another related to the end-products obtained **[20 marks]**

Question 4

a. Tubers are very important food crop products consumed in many parts of the world. However, some tubers pose a threat to human beings because of the possession of toxic products in them. Citing three (3) tubers, discuss the toxicities associated with these products and what human beings can do to avoid or prevent poisoning with each class of toxic substances. **[12 marks]**

b. Using a flow chart, show how potatoes are used to process starch industrially. **[8 marks]**

SECTION B: Answer the question.

Question 1

a. Explain the manufacturing process of frozen chibwabwa with aid of a flow diagram and highlight the type of equipment used during the process. **[12 marks]**

b. Explain the principle of fermentation in black tea manufacturing and its effect on the quality of made tea. **[4 marks]**

c. Illustrate the coffee manufacturing process. **[5 marks]**

d. Solom Canning Company approaches you with a problem of their cans corroding and carving inwards after thermal treatment and subsequent storage. Diagnose the problem and offer possible solutions. **[4 marks]**

SECTION C: Answer the question.

Question 1

(a) Explain the following terms in oil and fats processing and state their importance:

(i) Acid degumming **[2 marks]**

(ii) Interesterification **[2 marks]**

(iii) Wet rendering process **[2 marks]**

(iv) Desolventizing-Toasting process **[2 marks]**

(v) Hydrogenation **[2 marks]**

(b) With the help of flow diagrams, briefly explain the Dry and Lanza Fractionations of edible oils. What are the differences in the two fractionation methods? How useful would the products from fractionation of oils be to Zambia? **[15 marks]**

END OF EXAMINATION

THE UNIVERSITY OF ZAMBIA
SCHOOL OF AGRICULTURAL SCIENCES
DEPARTMENT OF FOOD SCIENCE AND NUTRITION

2015/2016 ACADEMIC YEAR FINAL YEAR EXAMINATION

COURSE: AGF 5332
Technology of Meat and Fish Products

Date: 8th September 2016 **Time: 14.00 – 17.00 Hours**

Duration: THREE (3) HOURS **Venue: Omnia 3**

INSTRUCTIONS TO CANDIDATES:

1. There are three (3) sections in this examination paper, Sections 1, 2 and 3
2. Answer **Five (5) questions** in total
3. **All questions in Section 3 are compulsory**
4. Marks allocated for each question are given at the end of each question - **All** questions carry equal marks (**20 marks each**)
5. Answers to the three (3) sections should be written in separate booklets

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SECTION 1:

Answer a total of two (2) questions in this section (section 1) in a separate booklet

1. Answer each of the following questions in at least 1 to 3 lines or in form of a well labeled diagram, as appropriate

    a.

        i. Briefly explain why there is variability of vitamin A, lipids and carbohydrates in meat **[6 marks]**

        ii. What is DFD meat? **[2 marks]**

        iii. Compare and contrast the slaughter of large livestock (e.g. a cow) and birds (e.g. ducks or chickens). Cite two (2) comparisons and two (2) contrasts for each. **[4 marks]**

    b. Give **one (1)** example (species and genus) of the following microorganisms used in meat fermentation and one (1) role it plays during meat fermentation for each of the listed microorganisms:

        i. Pediococcus species **[4 marks]**

        ii. Yeasts **[4 marks]**

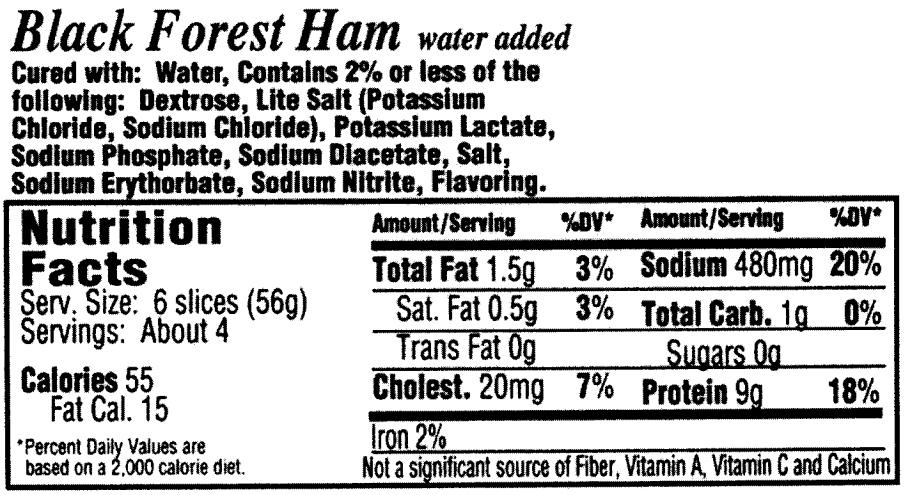
2. Figure 1 is a label of a cured meat product showing various ingredients used in its formulation. Briefly discuss at least **two (2)** of roles of each of these ingredients listed below: **[20 marks]**

    a. Sodium erythrobate

    b. Sodium nitrite

    c. Sodium chloride

    d. Sodium phosphate



Black Forest Ham *water added*

Cured with: Water, Contains 2% or less of the following: Dextrose, Lite Salt (Potassium Chloride, Sodium Chloride), Potassium Lactate, Sodium Phosphate, Sodium Diacetate, Salt, Sodium Erythorbate, Sodium Nitrite, Flavoring.

Nutrition Facts

Serv. Size: 6 slices (56g)
Servings: About 4

Calories 55
Fat Cal. 15

*Percent Daily Values are based on a 2,000 calorie diet.

Amount/Serving	%DV*	Amount/Serving	%DV*
Total Fat 1.5g	3%	**Sodium** 480mg	20%
Sat. Fat 0.5g	3%	**Total Carb.** 1g	0%
Trans Fat 0g		Sugars 0g	
Cholest. 20mg	7%	**Protein** 9g	18%

Iron 2%

Not a significant source of Fiber, Vitamin A, Vitamin C and Calcium

Figure 1; Label of Black Forest Ham

3. Discuss the concept of conditioning or ageing of meat. In your discussion, highlight the physical, chemical and endogenous methods used in the ageing process.

[20 marks]

SECTION 2:

Answer a total of **two (2)** questions in this section in a separate booklet

Answer **Question 1** (compulsory) and **any other** question of your choice from this section

1. Answer the following compulsory question

   a. A commonly used chemical method for assessing fish quality is total volatile bases (TVB).

      i. What constitutes total volatile bases? **[2 marks]**

      ii. How is TVB measured? **[1 mark]**

      iii. How do the volatile bases measured in assessing fish quality come about in the fish? **[4 marks]**

   b. Compare and contrast between gaspé and kench curing of fish **[4 marks]**

   c. Write short and concise notes

      i. Chilled sea water **[1.5 marks]**

      ii. Lorenzen method **[1.5 marks]**

      iii. Salting **[1.5 marks]**

      iv. Smoking **[1.5 marks]**

      v. *Clostridium Botulinum* type E **[1.5 marks]**

      vi. Loss of nutritional quality in frozen fish **[1.5 marks]**

2.

   a. What is rigor mortis **[2 marks]**

   b. Discuss the factors that affect onset and resolution of rigor mortis in fish **[4 marks]**

c. Trimethylamine oxide (TMAO) is a component of the non-protein nitrogen fraction of fish. It can be reduced by bacteria and by enzymes during the post mortem changes occurring in fish.

i. Discuss and differentiate between the reduction of TMAO by bacteria and by enzymes, showing the reactions that occur. **[10 marks]**

ii. State the function of TMAO in fish **[4 marks]**

3.

a. Describe all the unit operations that need to be performed on a canned fish product before it is availed on the supermarket shelf. **[15 marks]**

b. Write short and concise notes on the following

i. Torry scheme **[2.5 marks]**

ii. Quality index method (QIM) **[2.5 marks]**

SECTION 3:

This question is compulsory – Answer it in a separate booklet

1. *Cryptosporidium parvum* is a spore forming protozoa. Why is the microorganism an extremely important emerging pathogen in humans? **[8 marks]**
2. Influenza viruses are a common cause of respiratory disease in humans around the world.
    a. List four (4) animals in which the influenza viruses cause clinically important disease **[2 marks]**
    b. What is meant by species barrier and what can contribute to a virus crossing the species barrier? **[4 marks]**
    c. Explain the role of pig in human influenza infections **[6 marks]**

END OF EXAMINATION

THE UNIVERSITY OF ZAMBIA
SCHOOL OF AGRICULTURAL SCIENCES
DEPARTMENT OF FOOD SCIENCE AND NUTRITION

2015/2016 ACADEMIC YEAR – FINAL EXAMINATIONS

COURSE: AGF 5432
Food Safety and Quality Management

Date: 5th September 2016 **Time: 09.00 – 12.00 Hours**

Duration: THREE (3) HOURS **Venue: Omnia 1**

INSTRUCTIONS TO CANDIDATES:

1. There are two (2) sections in this examination paper, Section A and Section B.
2. **SECTION A** has five (5) questions. **Answer all questions in this section.**
3. **SECTION B** has four (4) questions. **Question one (1) is compulsory** and then, answer **any other two (2)** questions of your choice out of the remaining three questions.
4. Each section carries 50 marks. The marks allocated are given at the end of each question.
5. Answers to the two sections should be given in separate booklets. Clearly label each booklet as Section A and Section B.

SECTION A

Questions 1

Brief explain the seven principles of Quality Management according to ISO 9001:2015 and their importance in quality management ***(14 marks)***

Questions 2

Quality management system according to ISO 9001:2015 requires that an organisation does analysis of the context within which the organisation is operating in order to implement an effective quality management. Describe any four external and four internal issues that have to be considered when analysing the organisation context ***(8 marks)***

Questions 3

Brief explain the Seven principles of Hazard Analysis and Critical Control Point (HACCP) ***(7 marks)***

Questions 4

A food processing company would like to implement Hazard Analysis and Critical Control Point (HACCP) in its processing plant in order to control food hazards and has requested you for an advice on the steps it needs to take in the implementation of the system. In logical sequence, give the first five steps that the company has to follow in order to effectively implement HACCP system. ***(10 marks)***

Questions 5

A company producing High Energy Protein Supplement (HEPS) has been given a tender to supply HEPS to hospitals over a one year period. HEPS, is an extruded Maize-Soya Blend (MSB), consisting of maize, soya and sugar, fortified with vitamins and minerals and is prepared simply by mixing with water and cooking as a porridge. The tender also specifies the levels of each of ingredient that should be contained in the HEPS and that the product should not cause harm the young, old, the pregnant and the immune-compromised

a) Which management system (s) would you advise the company to implement in order to consistently provide milk that meet the requirements of the tender? ***(5 marks)***

b) Why would you advise the company to implement management system(s) you have indicated in 5(a) above? ***(6 marks)***

SECTION B

QUESTION 1 (COMPULSORY QUESTION)

What do you understand by the term SPS Agreement? State five (5) of its important articles and briefly explain with help of an example, how each article relates to the role of the WTO in facilitating international trade of agricultural and food products

[20 marks]

CHOOSE ANY TWO (2) QUESTIONS FROM QUESTIONS 2 TO 4.

QUESTION 2

(a) What do you understanding by the following terms in food safety and quality management field:

(i) Hazard ***[2 marks]***
(ii) ALARA ***[2 marks]***
(iii) Microbiological criteria ***[2 marks]***
(iv) Integrated Food Chain Surveillance ***[2 marks]***
(v) Farm-to-fork concept ***[2 marks]***

(b) Outline the basic framework of risk analysis in food safety ***[5 marks]***

QUESTION 3

State and define the two major types of foodborne disease surveillance systems including an outline of their characteristics. For each, state and explain a vivid example from the Zambian environment (may not necessary be from among foodborne disease surveillance systems) ***[15 marks]***

QUESTION 4

State five major food safety related Acts (Zambians Laws) in the Zambian Food Safety System and briefly explain how they relate to the food safety system in Zambia. For each of the five Acts you have stated, state the institutional framework in tabular form stating the Act, the Ministry responsible for the Act and the Government Agency or Agencies responsible for the implementation of the Act.

[15 marks]

END

THE UNIVERSITY OF ZAMBIA
SCHOOL OF AGRICULTURAL SCIENCES
DEPARTMENT OF FOOD SCIENCE AND NUTRITION

2015/2016 ACADEMIC YEAR – FINAL EXAMINATIONS

COURSE: AGF 5432
Food Safety and Quality Management

Date: 5th September 2016 **Time: 09.00 – 12.00 Hours**

Duration: THREE (3) HOURS **Venue: Omnia 1**

INSTRUCTIONS TO CANDIDATES:

1. There are two (2) sections in this examination paper, Section A and Section B.
2. **SECTION A** has five (5) questions. **Answer all questions in this section**.
3. **SECTION B** has four (4) questions. **Question one (1) is compulsory** and then, answer **any other two (2)** questions of your choice out of the remaining three questions.
4. Each section carries 50 marks. The marks allocated are given at the end of each question.
5. Answers to the two sections should be given in separate booklets. Clearly label each booklet as Section A and Section B.

SECTION A

Questions 1

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A food processing company would like to implement Hazard Analysis and Critical Control Point (HACCP) in its processing plant in order to control food hazards and has requested you for an advice on the steps it needs to take in the implementation of the system. In logical sequence, give the first five steps that the company has to follow in order to effectively implement HACCP system. ***(10 marks)***

Questions 5

A company producing High Energy Protein Supplement (HEPS) has been given a tender to supply HEPS to hospitals over a one year period. HEPS, is an extruded Maize-Soya Blend (MSB), consisting of maize, soya and sugar, fortified with vitamins and minerals and is prepared simply by mixing with water and cooking as a porridge. The tender also specifies the levels of each of ingredient that should be contained in the HEPS and that the product should not cause harm the young, old, the pregnant and the immune-compromised

a) Which management system (s) would you advise the company to implement in order to consistently provide milk that meet the requirements of the tender? ***(5 marks)***

b) Why would you advise the company to implement management system(s) you have indicated in 5(a) above? ***(6 marks)***

SECTION B

QUESTION 1 (COMPULSORY QUESTION)

What do you understand by the term SPS Agreement? State five (5) of its important articles and briefly explain with help of an example, how each article relates to the role of the WTO in facilitating international trade of agricultural and food products

[20 marks]

CHOOSE ANY TWO (2) QUESTIONS FROM QUESTIONS 2 TO 4.

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(i) Hazard ***[2 marks]***
(ii) ALARA ***[2 marks]***
(iii) Microbiological criteria ***[2 marks]***
(iv) Integrated Food Chain Surveillance ***[2 marks]***
(v) Farm-to-fork concept ***[2 marks]***

(b) Outline the basic framework of risk analysis in food safety ***[5 marks]***

QUESTION 3

State and define the two major types of foodborne disease surveillance systems including an outline of their characteristics. For each, state and explain a vivid example from the Zambian environment (may not necessary be from among foodborne disease surveillance systems) ***[15 marks]***

QUESTION 4

State five major food safety related Acts (Zambians Laws) in the Zambian Food Safety System and briefly explain how they relate to the food safety system in Zambia. For each of the five Acts you have stated, state the institutional framework in tabular form stating the Act, the Ministry responsible for the Act and the Government Agency or Agencies responsible for the implementation of the Act.

[15 marks]

END

THE UNIVERSITY OF ZAMBIA
SCHOOL OF AGRICULTURAL SCIENCES
DEPARTMENT OF FOOD SCIENCE & NUTRITION

2015/16 ACADEMIC YEAR END OF YEAR FINAL EXAMINATIONS

AGF 5342
Technology of Fermented Products

Date: Monday 27th September 2016
Time: 14:00hrs
Venue: Omnia III Lecture Theatre

Duration: THREE (3) HOURS

INSTRUCTIONS TO THE CANDIDATES:

1. THIS PAPER CARRIES 100 MARKS AND HAS TWO (2) SECTIONS.
2. ANSWER ALL THE QUESTIONS IN BOTH SECTIONS.
3. ANSWER THE TWO SECTIONS IN SEPARATE ANSWER BOOKLETS.
4. ALLOCATED MARKS FOR EACH QUESTION ARE INDICATED IN THE BRACKETS.

SECTION 1: Answer all questions

1. Explain in detail with aid of flow diagram, the manufacturing of pickled cucumber by natural fermentation. **[14 marks]**
   a. Give the disadvantages of this method **[3 marks]**
   b. Describe the control measures that can be put in place to prevent the stated disadvantages in (a) from occurring. **[3 marks]**

2.
   a. Describe the kefir manufacturing process with aid of a flow diagram and explain the role of the cultures during in the fermentation. **[12 marks]**
   b. Discuss the antibiosis of the yoghurt cultures. **[4 marks]**
   c. Name the aroma compound found in yoghurt. **[1 mark]**
   d. List three (3) LAB species that produce it. **[3 marks]**
   e. Give the pathway that produces the most of it during yoghurt fermentation. **[2 marks]**

3. Wine is an important beverage in the food industry with a very rich history. Its production has evolved over centuries.
   a. Explain the manufacturing process of white wine. **[12 marks]**
   b. Simuko Wineries Limited approaches you with a problem of their white wine having a brownish colour. Discuss the possible causes and offer solutions. **[4 marks]**
   c. Explain malo-lactic fermentation and its application. **[4 marks]**

SECTION 2: Answer all questions in a separate booklet.

1. Identify the main raw materials used to produce soy sauce and describe their main purpose in the process **[10 marks]**

2. Explain gari processing **[10 marks]**

3. Identify the different operation stages of beer brewing and give one (1) or two (2) principle objective(s) of each stage **[20 marks]**

END OF EXAMINATION

THE UNIVERSITY OF ZAMBIA

SCHOOL OF AGRICULTURAL SCIENCES
DEPARTMENT OF FOOD SCIENCE & NUTRITION

2015/16 ACADEMIC YEAR FINAL EXAMINATIONS

AGF 5625 – PROCESSING AND PRESERVATION OF ANIMAL PRODUCTS

Date: 6th September, 2016

Venue: Omnia 2

Time: 09.00 – 12.00 hrs

INSTRUCTIONS TO THE CANDIDATES:

1. THIS PAPER CARRIES 100 MARKS
2. ANSWER ALL THE QUESTIONS IN SECTION A AND CHOOSE ONE QUESTION FROM SECTION B
3. ALLOCATED MARKS FOR EACH SECTION ARE INDICATED IN THE BRACKETS

SECTION A: **Answer all questions in this section.**

All questions carry equal marks

1. For the purpose of canning, fish products are divided into three (3) pH groups.

   a) Discuss the pH groups, giving examples of the fish products that are found in each group. **[10 marks]**

   b) How does the pH affect the heat processing that is applied to the food? **[2 marks]**

   c) Write short and concise notes in less than five lines

   i) Gaspe curing **[1 mark]**

   ii) freeze drying **[1 mark]**

   iii) Kench curing of fish **[1 mark]**

   iv) Modified atmosphere packaging **[1 mark]**

   v) Gaping **[1 mark]**

   vi) Immersion freezer **[1 mark]**

   vii) Cold smoking **[1 mark]**

   viii) Loss of nutritional quality upon smoking of fish **[1 mark]**

2.

(a) Describe how eggs are graded and quality standards that eggs are subjected to. **[10 Marks]**

(b) Why are grades and quality standards essential? What is obtaining in Zambia currently? **[10 Marks]**

3. a) Explain the cheese manufacturing process in detail with aid of a flow diagram and highlight the importance of each step. **[14 marks]**

b) Lubi Dairy Products Limited approaches you with a problem of bulging UHT milk packs. Discuss the possible causes and offer solutions to the problem. **[6 marks]**

4. (a) Describe three ways of muscle fiber classification. **[10 Marks]**

(b) There are more than 20 different proteins that are associated with myofibril. It is also said that six of these account for approximately 90% of the total myofibril proteins. Name these six and briefly describe their functions. **[10 Marks]**

SECTION B Choose any one questions

1. a) Fish proteins are divided into three groups. Discuss the three groups of proteins giving the names and approximate quantities of each of these in fish. **[6 marks]**

b) Autolysis, which is akin to self-digestion, involves two sets of enzymes; the muscle enzymes and the digestive enzymes.

i) **List** the four autolytic processes that are carried out by muscle enzymes. **[4 marks]**

ii) Discuss in detail the process that leads to an increase in the flavour enhancing compounds in fish post mortem. **[10 marks]**

2. a) Discuss the importance of cream ripening in butter making. **[8 marks]**

b) Compare the nutritional value of pasteurised, UHT and sterilised milk. **[7 marks]**

c) Discuss the differences between human and cow's milk. **[5 marks]**

3. Draw the egg of a chicken and label the vital parts. Describe the following.

(a) The part that are rich in proteins
(b) The parts that are rich in fat and fat soluble vitamins
(c) The parts that are rich in cholesterol
(d) The parts that are contamination prone
(e) The parts which are indicators of staleness or lack of freshness

[20 Marks]

4. a) What is the chemical composition of meat? **[8 Marks]**

b) Describe the three groups into which the meat proteins are divided **[8 Marks]**

c) What is the significance of meat in the human diet **[4 Marks]**

END OF EXAMINATION

THE UNIVERSITY OF ZAMBIA

SCHOOL OF AGRICULTURAL SCIENCES AGRICULTURAL

DEPARTMENT OF ECONOMICS AND EXTENSION

2015 FINAL YEAR EXAMINATION

AGG 3822: AGRICULTURAL EXTENSION

TIME: **THREE (3) HOURS**

TOTAL MARKS: **100**

INSTRUCTIONS: **ANSWER ANY FIVE QUESTIONS. EACH QUESTION CARRIES 20 MARKS**

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1. Describe the five sequential management functions indicating how these help in the design and operational efficiency of an extension organization (20 marks)

2. The Training and Visit is one of Zambia's many Extension Approaches used.
   a) Explain in terms of its objective, approach and clientele (12 marks)
   b) Discuss its major merits and demerits (8 marks)

3. Define the term diffusion and state the major roles the three known elements play in the diffusion of innovation process (20 marks).

4. With an aid of a diagram, chronologically outline the steps in the Adoption process and clearly indicate the usefulness of each step to influencing farmer behavior.

5. "Message is one element in the communication model'' Briefly explain what a message is and mention any three helpers commonly used to avoid difficulties associated with incomplete information, poor presentation, or other reasons.

6. Using practical examples, distinguish the differences between "agricultural knowledge system" and "agricultural information system" and state the reasons why Agricultural Knowledge and Information System is important in agricultural development.

.....END.....

THE UNIVERSITY OF ZAMBIA
SCHOOL OF AGRICULTURAL SCIENCES
DEPARTMENT OF FOOD SCIENCE & TECHNOLOGY

BSc Human Nutrition

ANATOMY AND PHYSIOLOGY
AGN 2110

Date: 28th September, 2016 Time: 09.00-12.00hrs

Duration: THREE (3) HOURS Venue: Other Rooms

INSTRUCTIONS TO THE CANDIDATES:

1. THIS PAPER CARRIES 100 MARKS AND HAS THREE SECTIONS A, B and C

2. ANSWER ALL THE QUESTIONS IN ALL SECTIONS. ANSWER SECTIONS A AND B IN A SINGLE BOOKLET AND SECTION C IN A SEPARATE BOOKLET

3. ALLOCATED MARKS FOR EACH SECTION ARE INDICATED IN THE BRACKETS

SECTION A: Choose the best answer **[30 Marks]**

1. _____separates the body into Anterior and Posterior parts.
   A. Sagittal
   B. Frontal
   C. Median
   D. Horizontal

2. According to the terms of relation or position, closer to the origin of a structure and further away from the origin of a structure is termed as _____.
   A. Posterior; anterior
   B. Medial; lateral
   C. Superficial; deep
   D. Proximal; distal

3. According to the terms of relation or position, towards the head and towards the tail (feet) termed as _____.
   A. Superficial; deep
   B. External; internal
   C. Supine; prone
   D. Cephalad; Caudad or superior; inferior

4. A dividing wall or a partition is _____.
   A. Sac
   B. Sinus
   C. Space
   D. Septum

5. A peristaltic rush which results in a failure to absorb enough colon water results in _____.
   A. Constipation
   B. Diarrheoa
   C. Cramps
   D. Flatus

6. Which structure contains the lowest amount of oxygen?
   A. Pulmonary vein
   B. Aorta
   C. Vena cava
   D. Right ventricle

7. The pulmonary semilunar valve prevents a back-flow of blood into the _____.
   A. Pulmonary artery
   B. Right ventricle
   C. Left ventricle
   D. Right atrium

8. The shortest section of the intestines is the _____.
   A. Ileum
   B. Duodenum
   C. Jejunum
   D. Colon

9. The finger-like extensions inside the small intestine are called _____ and increase the surface area.
   A. Microvilli
   B. B. Villi
   C. C. Lacteals
   D. D. lumens

10. The myocardium would be the thickest in the _____.
   A. left atrium
   B. left ventricle
   C. right atrium
   D. right ventricle

11. What is a mature gamete called?
   A. Oogenesis
   B. Ovary
   C. Ovulation
   D. Ova

12. Which cells produce testosterone?
   A. Interstitial cells
   B. B. T-cells
   C. C. Sertoli cells
   D. D. Sustentacular cells

13. In the female, what is the correct term for the production of gametes called?
   A. Oogenesis
   B. Ovary
   C. Ovulation
   D. Oocytation

14. Which of the following is NOT considered part of the male genital duct system?
    A. Rete testis
    B. Tubuli recti
    C. Seminal vesicles
    D. Ductus deferens

15. Which of the following is true about structure of the penis?
    A. Has one corpus cavernosa and one corpus spongiosum
    B. Has one corpus cavernosa and two corpora spongiosum.
    C. Has two corpora cavernosa and one corpus spongiosum
    D. Has two corpora cavernosa and two corpora spongiosum

16. Which one of the following are the earliest cells of spermatogenesis?
    A. Primary spermatocytes
    B. Spermatogonia
    C. Spermatids
    D. Spermatozoa

17. Which of the following is NOT a function of a hormone?
    A. Regulates chemical composition and volume of the internal environment
    B. Regulates metabolism
    C. Regulates glandular secretions
    D. Produces electrolytes

18. Which of the following accessory glands is not paired?
    A. Prostate
    B. Seminal Vesicular gland
    C. Bulbourethral gland
    D. Cowpers glands

19. Fertilization of an ovum by a spermatozoon occurs in the
    A. cervix
    B. fallopian tube
    C. ovary
    D. uterus

SECTION C [52 Marks]

Question 1

Plasma is the liquid part of blood and is approximately 91% water. with this information, briefly discuss the composition of plasma. **(2 marks)**

Question 2

Write short notes on basophils. **(4 marks)**

Question 3

Discuss the mechanism of transport of carbon dioxide in the body. in your discussion, use the alveoli as the point of exit and the body tissues as the point of origin. **(8 marks)**

Question 4

Describe the mode of action of testosterone and its effects on its target organs. **(10 marks)**

Question 5

Apart from the ABO blood group system, another important system is the Rh system. With this in mind, state the disease associated with the Rh system if any, and give a concise discussion on the disease.

(10 marks)

Question 6

Discuss the ovarian cycle with respect to the various hormonal interaction involved. **(18 marks)**

.....END OF EXAMINATION.....

2. a) Discuss the importance of cream ripening in butter making. **[8 marks]**

b) Compare the nutritional value of pasteurised, UHT and sterilised milk. **[7 marks]**

c) Discuss the differences between human and cow's milk. **[5 marks]**

3. Draw the egg of a chicken and label the vital parts. Describe the following.

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[20 Marks]

4. a) What is the chemical composition of meat? **[8 Marks]**

b) Describe the three groups into which the meat proteins are divided **[8 Marks]**

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END OF EXAMINATION

26. The _____ part of the stomach is the area that is connected to the esophagus.

A. cardiac
B. pyloric
C. fundus
D. body

27. Which of the following maintains the patency (openness) of the trachea?

A. surface tension of water
B. surfactant
C. cartilage rings
D. pseudostratified ciliated epithelium

28. Which respiratory-associated muscles would contract if you were to blow up a balloon?

A. diaphragm would contract, external intercostals would relax
B. internal intercostals and abdominal muscles would contract
C. external intercostals would contract and diaphragm would relax
D. diaphragm contracts, internal intercostals would relax

29. The nose serves all the following functions except _____.

A. as a passageway for air movement
B. as the initiator of the cough reflex
C. warming and humidifying the air
D. cleansing the air

30. The exchange of gases and nutrients between blood and tissues is a major function of:

A. arterioles
B. . arteries
C. capillaries
D. veins

20. The adrenal glands consist of _____.
    A. the inner and outer layer of the kidney
    B. the inner medulla and the outer cortex
    C. lower adrenal and upper paradrenal sections
    D. ACTH and BCTH sections

21. Accessory organs of the gastrointestinal tract (GIT)
    A. Form the long tube of the digestive system
    B. An example is the oral pharynx
    C. Has both mechanical and chemical function
    D. Function mainly to soften the food

22. All of the following structures are components of the urinary system except

    A. kidneys
    B. ureters
    C. urethra
    D. gallbladder

23. What structure rests on the superior pole of each kidney?

    A. spleen
    B. transverse colon
    C. adrenal gland
    D. duodenum

24. The outer layer of the kidney, just internal to the fibrous capsule, is the renal

    A. medulla
    B. column
    C. pelvis
    D. cortex

25. Components of a nephron include

    A. a renal corpuscle
    B. proximal and distal convoluted tubules
    C. a nephron loop
    D. all of the above

THE UNIVERSITY OF ZAMBIA
SCHOOL OF AGRICULTURAL SCIENCES
DEPARTMENT OF FOOD SCIENCE AND NUTRITION

2015/2016 ACADEMIC YEAR FINAL YEAR EXAMINATION

COURSE: AGN 2212
Principles of Human Nutrition

Date: Friday 16th Sept 2016 **Time: 09.00 – 12.00 Hours**

Duration: THREE (3) HOURS **Venue: OMNIA 2**

INSTRUCTIONS TO CANDIDATES:

1. **This paper consists of Section A and Section B. Answers to each section should be in separate booklets**
2. **Please read the guidance for each section carefully; answer ALL questions**
3. Each question is allocated marks as shown in **parenthesis**

SECTION A

Section A has a total of **ten (10)** questions
Each question carries **4 marks**
Answer **ALL** questions in this section
You should take about **one (1)** hour for this section; allow about **five (5)** minutes for each question

1.
   a. Define antioxidants **(1 mark)**
   b. List two (2) principle vitamins with antioxidant activity and indicate the consequence of not having antioxidants in the body **(3 marks)**

2. Alcohol is a beverage that is regularly consumed by many people.
   a. How many kilojoules per gram are there in alcohol? **(1 mark)**
   b. Briefly discuss the breakdown of alcohol to less toxic substances and indicate where, in the body, this transformation occurs **(3 marks)**

3. Define bioavailability and identify factors that affect bioavailability of vitamin A **(4 marks)**

4. Answer the following questions:
   a. What is the difference between a tertiary protein and a quaternary protein? **(3 marks)**
   b. Give one (1) example of a tertiary protein and one (1) example of a quaternary protein **(1 mark)**

5. Mark the following statement **TRUE** or **FALSE**
   a. Minerals are organic compounds that are required for optimal health **(1 mark)**
   b. Minerals are an excellent source of energy **(1 mark)**
   c. Vitamin A, D, E, and K are stored in body fat **(1 mark)**
   d. It is very easy for the body to accumulate toxic levels of water soluble vitamins **(1 mark)**

6. Lipids are broken down into fatty acids and glycerol. Briefly discuss the fate of glycerol in the human body. **(4 marks)**

7.

   a. Define phytochemicals **(1 mark)**
   b. Identify two types of phytochemicals and for each give two health benefits **(3 marks)**

8. Lactose intolerance is a common condition in some regions of the country causing discomfort in individuals that have this condition.

   a. What enzyme is affected in individuals who are lactose intolerant? **(1 marks)**
   b. List **three (3)** remedies to this condition (lactose intolerance) **(3 marks)**

9. Iron plays a critical role in overall cell function and neural development. Identify two (2) causes of iron deficiency and recommend two (2) strategies for increasing the amount of iron absorbed from food **(4 marks)**

10.

   a. Stachyose, an oligosaccharide, is made up of one (1) _____, a _____, and two (2) _____ sugar moieties **(3 marks)**
   b. Name one (1) food source of an oligosaccharide. **(1 mark)**

THE UNIVERSITY OF ZAMBIA
SCHOOL OF AGRICULTURAL SCIENCES
DEPARTMENT OF FOOD SCIENCE & NUTRITION

BSc Human Nutrition

Nutrition Communication and Health Promotion
AGN 3510
2015-16

Date: 22nd September 2016 **Time: 9.00-12.00 hours**

Duration: THREE (3) HOURS **Venue: Omnia 1**

INSTRUCTIONS TO THE CANDIDATES:

1. **THIS PAPER CARRIES 150 MARKS AND HAS TWO SECTIONS, A & B**

2. **ANSWER ALL QUESTIONS IN SECTION A**

3. **ANSWER ONLY FOUR (4) QUESTIONS IN SECTION B**

4. **ALLOCATED MARKS FOR EACH SECTION ARE INDICATED IN THE BRACKETS**

Section A: (TOTAL 50 MARKS)

Answer ALL questions in this section

1. Identify any TWO (2) health promotion actions outlined in the Ottawa Charter**(5 MARKS)**

2. Give one (1) advantage and one (1) disadvantage of being part of nutrition advocacy alliance? **(5 MARKS)**

3. From the ethics of scientific writing perspective, state TWO (2) common forms of plagiarism? **(5 MARKS)**

4. **a.** Describe THREE (3) main factors to be considered in good public speaking **(3 MARKS)**

   b. Using ONE (1) answer from 4a. give an example of how the effectiveness of the speech could be affected? **(2 MARKS)**

5. What does the acronym 'READS' stand for in the context of motivational interviewing? **(5 MARKS)**

6. What is 'tertiary' literature and who is it aimed at? **(5 MARKS)**

7. What is a 'patient centred approach' to health care? **(5 MARKS)**

8. **a.** There are THREE (3) main forms of verbal communication, what are these? **(3 MARKS)**

   b. Give ONE (1) example of each type of verbal communication **(3 MARKS)**

9. In health behaviour change there are two types of theoretical model, state what these are and give an example for each? **(4 MARKS)**

10. **a.** In Health Needs Assessments, populations can be identified as people sharing one or more KEY characteristics. Name one (1) of these characteristics and provide an example? **(2 MARK)**

    b. Why is there a need to carry out a Health Needs Assessment? **(3 MARKS)**

Section B: (TOTAL 100 MARKS)

Answer ONLY four (4) questions in this section

1. **a.** What is 'Social Communication'? **(3 MARKS)**

   b. How is social communication linked to nutrition education? **(2 MARKS)**

   c. The scheme for planning nutrition education is based on a theoretical framework, consisting of four phases. Outline these phases and describe the key activities that take place during each phase. (**20 MARKS**)

2. **a.** List FIVE different factors that affect food choice, giving an example for each **(10 MARKS)**

   b. Discuss why identifying factors that affect food choice within a community is important when developing health promotion Information, Education and Communication (IEC) materials. **(15 MARKS)**

3. **a.** List FIVE (5) barriers to effective communication and state HOW these can be reduced when communicating with patients? **(10 MARKS)**

   b. What are the SIX (6) stages of the communication cycle? **(6 MARKS)**

   c. Discuss the communication process at each of the SIX (6) stages and the KEY consideration(s) needed to ensure effective communication at each stage **(9 MARKS)**

4. Positive Deviance Methodology consists of five basic steps carried out by members of the community. Name each of these steps and DESCRIBE what is carried out at each step, using a suitable example to illustrate your answer? **(25 MARKS)**

5. **a.** Campaigning is one part of an advocacy toolbox. State TWO (2) strategies that can be used in an advocacy CAMPAIGN giving an example for each. **(5 MARKS)**

b. Breastfeeding exclusively for the first 6-months of a child's life is a key nutrition message that fits into the *'1st 1000 most critical days'* campaign for Zambia. Using this message give a detailed example of what you would do at each of the following steps of an advocacy plan **(20 MARKS)**:

- *Research and Analysis*
- *Networking and Alliance building*
- *Lobbying*
- *Exposure Visits*

THE UNIVERSITY OF ZAMBIA
SCHOOL OF AGRICULTURAL SCIENCES
DEPARTMENT OF FOOD SCIENCE & NUTRITION

BSc HUMAN NUTRITION PROGRAMME

AGN 4122: NUTRIENT AND DRUG INTERACTIONS

2015-2016

DATE: 12/09/2016 **TIME: 14:00-17:00**

DURATION: THREE (3) HOURS VENUE: Food Science and Nutrition

1. **THIS PAPER CARRIES 100 MARKS AND HASTHREE SECTIONS: A, B, and C.**
2. **ANSWER ALL THE QUESTIONS IN SECTION A *(20 MARKS)***
3. **ANSWER ALL THE SHORT ANSWER QUESTIONS IN SECTION B *(20 MARKS)***
4. **THERE ARE THREE (3) QUESTIONS IN SECTION C, *ANSWER ALLTHE THREE (3) QUESTIONS (60 MARKS)***
5. **ALLOCATED MARKS FOR EACH SECTION ARE INDICATED IN THE BRACKETS**

Please answer the following multiple-choice question by choosing ONLY 1 answer. Circle the correct response.

1. **`Which answer is an example of a functional food (1)**

	a)	Vitamin B12 injection to treat megaloblastic anemia
	b)	Probiotic yogurt alleviating constipation
	c)	Vegetable intake meeting folate requirements
	d)	Vitamin C tablets helping to avoid a cold

2. **Which of the following statements about the quality of nutritional supplements is true (1)?**

	a)	Supplement quality if legislated by the FDA
	b)	Supplements always contain exactly what the label indicates
	c)	Supplements can have inadequate amount of active components
	d)	Supplements are classified as drugs and must therefore get tested

3. **During retrospective medical nutrition you: (1)**

	a)	Consider the timeline and onset of symptoms
	b)	Formulate a plan to avoid a potential interaction
	c)	Advise the medical team that a possible interaction may occur
	d)	Only consider medication the patient takes chronically

4. **Are the following statements True (T) or False (F) (2)**

T / F	**a)**	Tart cherries are one of the highest sources of flavanoids which have been shown help manage gout.
T / F	**b)**	Medical Nutrition Therapy includes subjective assessment of the following: anthropometry, biochemistry, clinical and diet
T / F	**c)**	Supplementing a patient with carotenoids and vitamin E for CVS will have adverse effects
T / F	**d)**	Dietary supplements are routinely tested for use in pregnant women or nursing mothers

5. **Which of the following is NOT an example of a nutritional supplement? (1)**

	a)	Omega 3 rich fish oil
	b)	Calcium tablets
	c)	Ginger – enriched shampoo
	d)	Garlic tablets

6. **Which answer is NOT an example of an ergogenic aid? (1)**

	a)	Caffeine improves concentration in a tennis player
	b)	A new swimsuit helps a swimmer to swim faster
	c)	Omega-3 capsules improve blood cholesterol levels
	d)	Protein supplements help an athlete to build more muscle

7. **Which of the following statements about the quality of nutritional supplements is true? (1)**

	a)	Supplement quality is legislated by the FDA
	b)	Supplements always contain exactly what the label indicates
	c)	Supplements can have inadequate amounts of active components
	d)	Supplements are classified as drugs and must therefore get tested

8. **Which of the following statements about insulin is INCORRECT? (1)**

	a)	Insulin can be synthetically made or extracted from pork pancreas
	b)	Insulin is usually administered subcutaneously
	c)	Insulin can be used in the treatment of gestational diabetes
	d)	Insulin should never be given with other anti-diabetic drugs

9. **Which statement about ethanol is INCORRECT?(1)**

	a)	Ethanol can increase the gastric-irritant effect of NSAIDs
	b)	Ethanol can contribute to hypoglycemia in diabetics
	c)	Ethanol can enhance hepatotoxicity of drugs
	d)	Ethanol is a macronutrient which contributes 4kcal/g

10. **All the following factors make nutrient-drug interaction more likely, EXCEPT for...(1)**

	a)	Polypharmacy
	b)	Pharmacophobia
	c)	Enteral feeding
	d)	Renal failure

11. **Bioavailability is...(1)**

	a)	the fraction of drug that becomes available for use
	b)	always 50% for IV drugs
	c)	the biotransformation of a drug in the liver
	d)	the fraction of drug eliminated after 24 hours

12. **Enteral feeding reduces phenytoin blood concentration by 75%. This can be explained as ...(1)**

	a)	a pharmacokinetic effect
	b)	Phenytoin acts as the precipitant agent
	c)	This is an example of nutrition affecting drug metabolism
	d)	Enteral feeding acts as the object agent

13. **Enteric coating on a tablet can be used to... (1)**

	a)	prevent a drug from being broken down by stomach acid
	b)	prevent the stomach mucosa from the drug's irritant effect
	c)	slow down the absorption of a drug
	d)	All of the above

14. **All the following factors make nutrient-drug interaction more likely, EXCEPT for... (1)**

	a)	Polypharmacy
	b)	Pharmacophobia
	c)	Enteral feeding
	d)	Renal failure

15. Which drug would you not give through a naso-jejunal tube?(1)

	a)	An anti-acid
	b)	Paracetamol
	c)	Amlodipine
	d)	An anti-convulsant

16. Which of the following is NOT a possible cause of hypoalbuminemia?(1)

	a)	Albumin binding to therapeutic agents
	b)	Reduced albumin synthesis
	c)	Increased albumin excretion
	d)	Albumin forms part of the acute phase response

17. The term Pharmacodynamics refers to which of the following (1):

	a)	The study of the time course of the drug in the body involving the absorption, distribution, metabolism and excretion of the drug.
	b)	The study of the biochemical and physiological effect of the drug.
	c)	The metabolism of the drugs (oxidation, reduction, hydrolysis and conjunction).
	d)	The study of the quantitative changes in drug movement.

18. A drug with a narrow therapeutic range (1)

	a)	Has a big difference between toxic and therapeutic doses
	b)	Is less prone to nutrient-drug interactions
	c)	Requires the blood levels to be monitored closely and dosage adjustments made according to those levels
	d)	small differences in **dose** or blood concentration may **not** lead to **dose** and blood concentration dependent, serious **therapeutic** failures or adverse drug reactions.

19. Which one of the following statements about corticosteroids in INCORRECT? (1)

	a)	Corticosteroids can cause sodium and water retention
	b)	They are used as immunosuppressants
	c)	They are likely to cause increased appetite and weight gain
	d)	They are likely to cause hyperkalemia and hypercalcemia

20. Your patient has heartburn and a low vitamin B12 blood levels. He has been using anti-acids for a long time. He tells you that he loves eating meat but he does not like eating vegetables. His B12 levels is likely because of his: (1)

	a)	Long-term use of anti-acids for his heartburn
	b)	Low vegetable intake
	c)	Excessive use of aspirin, often on an empty stomach
	d)	Daily iron supplements that binds with Vitamin B12 in his stomach

SECTION B

There are **TWO (2)** questions - Answer **ALL** questions in this section
Answer question 1 in a separate booklet(s) and question 2 in another set of separate booklet(s)
Each question carries **30 marks**.
You should take about two hours for this Section; each question should take about one (1) hour to complete.

1.

a. pH is an important factor associated with the digestion of different nutrients in the human body. Discuss how pH variation along the human alimentary system influences the digestion of different nutrients. In your discussion, include a section of how the body adjusts the different pH levels in different sections of the alimentary canal. **(15 marks)**

b.

i. Name **two (2)** omega 3 fatty acids and **two (2)** omega 6 fatty acids **(2 marks)**

ii. Give three (3) sources of omega 3 fatty acids and list any two purposes of these omega 3 fatty acids **(3 marks)**

iii. Describe how lipids are transported across the lumen of the small intestines into the central lacteal **(10 marks)**

2.

a. Explain the major differences between fat - soluble vitamins and water- soluble vitamins. Give two examples of the vitamins from each group **(10 marks)**

b. Discuss the significance of vitamin D and calcium in infants and children under the age of 2 years **(10 marks)**

c. Write short notes on

i. Pellagra **(5 marks)**

ii. Beri-beri **(5 marks)**

END OF EXAMINATION

THE UNIVERSITY OF ZAMBIA
SCHOOL OF AGRICULTURAL SCIENCES
DEPARTMENT OF FOOD SCIENCE & NUTRITION

BSc Human Nutrition

HUMAN NUTRITION
AGN 3222
2015-16

Date: 5th September 2016 **Time: 14:00 – 17:00**

Duration: THREE (3) HOURS **Venue: Omnia 1**

INSTRUCTIONS TO THE CANDIDATES:

1. **THIS PAPER CARRIES 150 MARKS AND HAS TWO SECTIONS, A & B**

2. **ANSWER ALL QUESTIONS IN SECTION A AND ONLY FOUR (4) QUESTIONS FROM SECTION B.**

3. **ALLOCATED MARKS FOR EACH SECTION ARE INDICATED IN THE BRACKETS**

Section A: (TOTAL 50 MARKS)

Answer ALL questions in this section

1. WHAT does dietary diversity measure? **(5 MARKS)**

2. List the FIVE (5) KEY nutrients needed during puberty? **(5 MARKS)**

3. What is the CAUSE of obesity in humans? **(5 MARKS)**

4. **a.** What is IUGR **(2 MARKS)**

   b. Describe what causes IUGR **(3 MARKS)**

5. What is the PRIMARY purpose of Food Based Dietary Guidelines (FBDGs) **(5 MARKS)**

6. List any **FIVE (5)** food sources of Vitamin D **(5 MARKS)**

7. **a.** The functions of Zinc can be classified into **THREE (3)** broad categories, what are these? **(3 MARKS)**

   b. Give one function of Zinc from any two of the categories you have stated in (7a) **(2 MARKS)**

8. List **FIVE (5)** subclinical forms of Vitamin A Deficiency **(5 MARKS)**

9. Outline **FIVE (5)** functions of water in life processes **(5 MARKS)**

10. List **THREE (3)** carotenoids that have vitamin A activity and **TWO (2)** carotenoids that have no vitamin A activity **(5 MARKS)**

Section B: (TOTAL 100 MARKS)

Answer ONLY four (4) questions in this section

1. **Individuals who consume predominantly cereal or tuber-based diets are at particularly high risk of micronutrient deficiencies due to low dietary diversity.**

   a. List the **THREE (3)** MAIN ways to measure dietary diversity **(3 MARKS)**

   b. What are the **FIVE (5)** KEY nutrients that may be missing in a cereal or tuber-based diet? **(5 MARKS)**

   c. For each of the five nutrients listed in your answer to (1b) explain how a person may diversify their diet to ensure they meet the recommended nutrient density. **(12 MARKS)**

2. **Obesity is a cross-cutting issue across all stages of the lifecycle.**
   a. What is the MOST COMMON measure of obesity in adults? **(1 MARK)**
   b. List **TWO (2)** considerations that must be made when using this measure? **(4 MARKS)**
   c. Obesity is associated with an increased risk of many health issues in both children and adults; NAME any **FIVE (5)** of these health issues and explain how they impact the individual **(20 MARKS)**

3. **Vitamins can be classified into two broad categories.**

   a. Illustrate with a chart the full classification of vitamins, giving examples under each category. **(20 MARKS)**

   b. List **THREE (3)** energy releasing vitamins and **TWO (2)** hematopoietic vitamins **(5 MARKS)**

4. **a.** Define Respiratory Quotient? **(2 MARKS)**

b. Using the given equation, calculate the RQ for Palmitic acid; **(3 MARKS)**

$$C_{16}H_{32}O_2 + 23\ O_2 \rightarrow 16\ CO_2 + 16\ H_2O$$

c. Explain why fats have a lower respiratory quotient than carbohydrates **(2 MARKS)**

d. Explain why BMR is lower in females than in males **(3 MARKS)**

e. (i) Austine is a strength athlete and is consuming 150 grams of protein /day. What is his weight if he is consuming 1.6 grams of protein/kg? **(3 MARKS)**

(ii) Given that his goal weight is 97.7 Kg. How much weight will he need to gain/lose to meet his goal? **(2 MARKS)**

f. Give details of **FIVE (5)** factors that affect nitrogen balance. **(10 MARKS)**

5. **a.** Explain the importance of food composition tables **(5 MARKS)**

b. What are the KEY components of a comprehensive food composition table? **(8 MARKS)**

c. Write short notes on the importance of having country-specific food composition databases **(10 MARKS).**

d. List **ONE (1)** limitation of using food composition data **(2 MARKS)**

THE UNIVERSITY OF ZAMBIA
SCHOOL OF AGRICULTURAL SCIENCES
DEPARTMENT OF FOOD SCIENCE & NUTRITION

BSc HUMAN NUTRITION

PRINCIPLES OF DIETETICS
AGN 3232
2016 END OF YEAR EXAMINATIONS

DATE: THURSDAY 15TH SEPTEMBER, 2016 TIME: 14:00-17:00H

DURATION: THREE (3) HOURS VENUE: OMNIA 3

INSTRUCTIONS TO THE CANDIDATES:

1. THIS PAPER CARRIES 100 MARKS AND HAS TWO (2) SECTIONS; SECTION A AND B

2. ANSWER **ALL** QUESTIONS IN SECTION A. CHOOSE **ANY THREE (3)** QUESTIONS FROM SECTION B

3. ALLOCATED MARKS FOR EACH SECTION ARE INDICATED IN THE BRACKETS

SECTION A – 25 marks

1. Celiac disease is triggered by ..... and is considered a food allergy because ..... **(2 marks)**

2. **T or F:** Taurine is an essential nutrient required in newborns that is found in high concentrations in the urine of vegetarian mothers. **(1 mark)**

3. Give two (2) advantages of hydrodensitometry as a method for determining body composition. **(2 marks)**

4. What are the four (4) steps of oxidative phopshorylation. **(4 marks)**

5. Give three (3) challenges that a dietitian might be faced with when counseling a patient. **(3 marks)**

6. List two (2) health risks that have been associated with fasting. For each of the health risks you have listed, give an example of a symptom that might be seen. **(3 marks)**

7. **T or F**: Rennin is an enzyme produced by the liver in the Rennin Angiotensin Aldosterone System (RAAS). **(1 mark)**

8. List three (3) types of whole protein feeds used in enteral feeding. **(3 marks)**

9. Define the term prebiotic and give an example of an alternative sweetener that can be used as a prebiotic. **(2 marks)**

10. Bioavailability of zinc in vegetarian diets is low due to the presence of ..... in most vegetarian foods.
    ..... and .....beans and other legumes can reduce levels of ....., while ..... can increase zinc absorption. **(4 marks)**

SECTION B (25 marks each)

Question 1

You are the nutritionist at Chitulika hospital and the doctor there asks you to carry out screening tests on a woman who is 69 years of age to determine whether she has any risk of malnutrition.

a) What type of screening will you do? **(1 mark)**
b) Upon completing the screening test, you find that this woman is malnourished and she tells you that she has poor appetite and stomach pains. Provide three (3) suggestions that you would give to her so that she can improve her nutritional status. **(3 marks)**
c) When laboratory tests are done, they show that the woman has atrophic gastritis.
    i. What are the two (2) types of infection that cause atrophic gastritis and result in anemia? **(2 marks)**
    ii. What type of anemia is associated with each of your answers in i. above? **(1 mark)**
d) B12 deficiency is a common symptom of one of the infections you have listed in c) above.
    i. Describe in detail how and why B12 deficiency occurs for this type of infection. Be sure to explain what happens to your food when ingested, all the way to the small intestines. **(8 marks)**
    ii. List three (3) symptoms that this patient is likely to have as a result of B12 deficiency. **(3 marks)**
e) If this woman was at risk of osteoporosis, explain in detail how a vegetarian diet would prevent osteoporosis? **(7 marks)**

Question 2

Mr. Shamu has a BMI of 33 with high blood pressure (HBP) and renal disease as co-morbidities.

a) To determine body composition, which two (2) methods have been shown to be unsuitable for an individual with a BMI like Mr. Shamu's? **(2 marks)**
b) Explain in detail how HBP may have caused renal disease. **(5 marks)**
    i. How does a damaged kidney in turn continue increasing blood pressure with respect to the RAAS? **(2 marks)**
c) Blood Urea Nitrogen (BUN) is one of the parameters that are tested when checking for renal disease
    i. Which Non-Communicable Disease (NCD) has been shown to influence the levels of BUN? **(1 mark)**
    ii. Explain how this NCD affects BUN **(7 marks)**
d) Provide in detail four (4) benefits of a high fiber diet **(8 marks)**

Question 3

Stephen Curry is a basketball player of the Golden State Warriors and weighs 86 kg. Since the NBAs are finally over, he is currently doing normal routine exercise just to keep fit.

a) Which principle is he applying? **(1 mark)**
b) What does the principle in a) state? **(2 marks)**
c) Name and describe the principle which would apply if Curry decided not to keep fit off-season. **(3 marks)**
d) How many grams of protein per day will Curry need during this off-season period? **(2 marks**
e) During the time that the Golden State Warriors were playing against the Cleveland Cavaliers in the NBA finals,
    i. How many grams of carbohydrates should Curry have been consuming each day? **(2 marks)**
    ii. During each final, how many grams of carbohydrates should Curry have consumed per hour? **(1 mark)**
    iii. For maximum glycogen repletion, how many grams of carbohydrates should Curry have consumed within the first hour after the game ended? **(2 marks)**
    iv. Draw and label a figure that would explicitly describe what each of Curry's meals should have consisted of each day during the time of heavy training/ competition using MyPlate. **(7 marks)**
f) ATP is regenerated using three (3) energy systems depending on the type of exercise one is engaged in. Give three (3) characteristics, with an equation showing how ATP is regenerated, of the energy system that is used for very high intensity exercises such as power events. **(5 marks)**

Question 4

Alcohol abuse has been shown to negatively impact the health of individuals, with some individuals being at higher risk than others.

a) Describe in detail the different factors that influence alcohol absorption and metabolism **(15 marks)**
b) Highlight the different stages of liver cirrhosis **(5 marks)**
c) Why should alcohol be avoided during breastfeeding? **(5 marks)**

SECTION B: SHORT QUESTIONS (20 MARKS)

Question 1:

Match the nutrient drug interaction with the appropriate category.

a.Warfarin is high in a malnourished patient

b. Furosemide causes hypokalaemia

c. Sorbitol in sugar-free cough mixture cause diarrhea

d. Liquorice causes a hypertensive crisis in a patient on diuretics

e. Phenytoin levels are low due to enteral feeding

f. Antibiotics cause diarrhoea and thereby hypokalaemia

g. A patient's sedative works poorly due to high caffeine intake

h. Dairy food reduces ciprofloxacin's effectiveness (example)

i. Isoniazid inhibits the activation of pyridoxine

j. Grapefruit increases blood nifedipine concentration

k. Over-prescription of laxatives cause diarrhoea and weight loss

Nowadd the letter of the interaction at the end of sentence in the space provided below; See shaded example in the first one done as an example

Effect of nutrients on drug absorption - *h (example)*

Drugs affect nutrient metabolism (1) _____

Modification of drug action by nutrients (1) _____

Effect of nutrients on drug distribution (1) _____

Drug excipients affect nutritional status (2) _____

Drugs affect nutrient absorption (1) _____

Effects of drugs on nutritional status (1) _____

Effect of nutrients on drug excretion (1) _____

Drugs affect nutrient excretion (2) _____

Question 2:

Match these drugs to the correct nutritional interaction

a. Actrapid

b.The ACE-inhibitor, Ramipril

c. Morphine

d. Warfarin

e. Monoamine-oxidase inhibitors

f. Calcium Channel blocker

g. Sucralfate

h. Metformin

i. Sequinavir

j. Aspirin

k. Rifampicin

Now add the letter of the drug into the corresponding Space provided

nausea and weight loss in early stages (1) _____

hyperglycaemia and metabolic changes (1) _____

hypertensive crisis when eating vintage cheddar and unfiltered beer (2) _____

reduced gastric motility and constipation (1) _____

forms clumps when given with enteral feed (1) _____

hypoglycaemia when taken without a meal (1) _____

hypotension in a patient eating grapefruit (1) _____

nausea and vomiting (1) _____

a sudden increase in green leafy vegetables causes an internal bleed (2) _____

hyperkalaemia (1) _____

Section B total (20 MARKS)

SECTION C; CASE STUDIES (60 MARKS)

ANSWER ALL QUESTIONS IN THIS SECTION.

Question 1

A 76-year old lady is admitted to the high dependency unit. She was in a road traffic accident. She is currently unconscious and on IV fluids. You are asked to start her on enteral feeding.

Primary Medical History	Current Medication list
Type 2 Diabetes Mellitus	Novomix30 25 at 7am
Hypertension	Novomix30 25 at 7pm
Hyperlipidemia	Ramipril 10mg OD
Gastroesophageal Reflux Disease(GORD)	Simavastatin 20mg OD
BMI 32Kg/m2	Sucralfate 1mg QDS
	Omeprazole 40mg OD
	Morphine 10mg QDS

a. Which one of her current medications is contra-indicated with enteral feeding? Provide a brief explanation*(2 MARKS)*

b. The patient is given insulin without food and has an unresponsive hypoglycaemic episode.What is the appropriate treatment for this?*(4 MARKS)*

c. Elderly patients are more likely to experience nutrient-drug interactions.Provide 4 reasons for this. (4 MARKS)

d. The patient has not opened her bowels in the last week. Which drug could be contributingto this? Provide two treatment options to improve her constipation.*(3 MARKS)*

e. What type of enteral feeding regime would work best, given the patient's conditionand insulin regime?*(3 MARKS)*

f. After a few days the patient's NG---tube becomes blocked. The nurses have tried to unblockit with warm water without success. Can you suggest two other options?*(4 MARKS)*

Question 2

You see a 27-year old female in clinic to help her lose weight and eat healthier. See has been on HAART for the last 12 months. More recently she started a SSRI anti-depressant. This is not been working very well and her doctor is considering a change to a Monoamine-oxidase inhibitors(MAOIs). She also tells you that she uses a garlic supplement to improve her immune function.

Primary Medical History
HIV
Hypertension
Hyperlipideamia
Insulin Resistance
BMI 31Kg/m2

Current Medication list
Citalopram 40mg OD
Lamivudine 150mg BD
Sequinavir 300mg BD
Efavirenz 600mg OD
Nifedipine 10mg OD
Simvastatin 10mg OD
Paracetamol 500mg prn
Vitamin C 250mg OD

Diet History

Breakfast	1 slice Bread Aged Cheddar Cheese 1 glass grapefruit juice
Lunch	1x marmite and cheese Sandwich 1 x Apple A handful of peanuts
Dinner	1 x chicken breast Green beans Green Salad with a soy dressing A home-brewed beer

a) Your client has had a recent increase in weight despite trying to eat better. Which drug could have contributed to this? *(4 MARKS)*

b) Name two nutrients in her diet that can affect her sequinavir levels and themechanism behind each. *(4 MARKS)*

c) Which other medications in her diet can be affected by the same foods?*(4 MARKS)*

d) If she changes to a MAOIs antidepressant, which foods in HER diet would sheneed to limit?*(4 MARKS)*

e) She suffers from a metabolic condition as a result of her medical treatment.What is it called?*(4 MARKS)*

Question 3a

Explain why are omega-3 fatty acids touted as the "wonder drug" *(10MARKS)*

Question 3b

Name a few supplements you would you recommend for an HIV positive clients and explain why you would recommend them*(10 MARKS)*

Total Marks for Section C – 60 MARKS

THE UNIVERSITY OF ZAMBIA
SCHOOL OF AGRICULTURAL SCIENCES
DEPARTMENT OF FOOD SCIENCE & NUTRITION

BSc HUMAN NUTRITION PROGRAMME

AGN 4410: DIET FORMULATION AND DIETETIC MANAGEMENT

2015-2016

DATE: 20th SEPTEMBER, 2016 **TIME: 14:00-16:00 Hrs**

DURATION: THREE (3) HOURS **VENUE: OMNIA 2**

1. **THIS PAPER CARRIES 100 MARKS AND HAS TWO (02) SECTIONS: "A" AND "B".**
2. **ANSWER ALL THE QUESTIONS IN SECTION "A".**
3. **THERE ARE FIVE (5) QUESTIONS IN SECTION "B",** ***ANSWER ONLY FOUR (4). QUESTION "1B" IS COMPULSORY.***
4. **ALLOCATED MARKS FOR EACH SECTION ARE INDICATED IN THE BRACKETS.**

SECTION A (20 MARKS)

ANSWER ALL QUESTIONS IN THIS SECTION

1. Jane consumes about 2000 kcal per day. When she adds up her total fat and saturated fat consumption she finds that she usually eats about 80 grams of fat including 20 grams of saturated fat. How is she doing in relation to current recommendations for fat intake? **(2 Marks)**
2. A dietitian is caring for a client who will receive enteral nutrition via gastrostomy. The client also has a condition that inhibits digestion and absorption of nutrients. What type of enteral nutrition formula should the dietitian select for this client? **(2 Mark)**
3. There is clear evidence that excessive alcohol intakes are associated with poor health outcomes. What are the guidelines for sensible drinking for males and females respectively? **(2 Marks)**
4. What does the "Reference Nutrient Index (RNI)" indicate? **(1 Mark)**
5. A dietitian is calculating the protein requirement for a client who is switching from peritoneal dialysis to hemodialysis. The client's Ideal Body Weight (IBW) is estimated to be 70 kg. How many grams of protein does this client need per day? **(2 Marks)**
6. Which dietary intake assessment tool would be in use if a patient was asked to recount everything she ate yesterday? **(1 Mark)**
7. The nutritional value of a food is the same as the estimates indicated in the "Food Composition Tables". **True or False? Justify your response. (2 Marks)**
8. Define the "Glycemic Index", and give an example of a food item that has moderate glycemic index ranking. **(2 Marks)**
9. A dietitian is interested in learning how well referred diabetic patients have controlled their blood glucose since the last visit. What lab values could the dietitian evaluate to determine how well the patients controlled their blood glucose over the past three months? **(2 Marks)**
10. What is respiratory quotient (RQ)? **(2 Marks)**
11. What does TPN stand for, and who is a candidate for TPN? **(2 Marks)**

SECTION B (80 MARKS)

THERE ARE FIVE (05) QUESTIONS IN THIS SECTION. ANSWER ONLY FOUR (4) QUESTIONS. ***QUESTION ONE (01) IS COMPULSORY.*** *EACH QUESTION IS WORTH 20 MARKS.*

1) a) When a diabetic patient learned that excessive administration of hypoglycemic drugs could be fatal, she decided to manage her condition by avoiding consumption of simple sugars and not taking the diabetic medication.

   i. In this instance, the staff dietitian would be concerned that the referenced patient would develop what clinical complication? **(2 Marks)**

   ii. Briefly outline the pathophysiological mechanism for the potential clinical complication being referred to above in question "i". **(3 Marks)**

   iii. Mention three symptoms that could be seen in a patient with the clinical complication in question. **(3 Marks)**

   iv. How can the referenced clinical complication be managed once in effect? **(2 Marks)**

   b) Identify and briefly explain five (05) metabolic consequences of the "Refeeding Syndrome". **(10 Marks)**

2) a) Envision that your are employed as a clinical nutritionist at an outpatient clinic and your major role is to counsel clients with diet-related chronic diseases with the goal of changing their dietary behaviors and improving their health status. To that effect, you have received a dietetic consult for a 70 year old osteoporotic female. Upon consultation, it is observed that the patient is a retired paramedic, and is interested in learning about the physiological mechanisms of bone resorption for ~~personal empowerment~~ informed decision making prospects. With the aid of a flowchart and a corresponding outline, illustrate the pathogenesis of osteoporosis. **(10 Marks)**

   b) Develop a "Fact Sheet" (leaflet) on five (05) "Dietary Factors Affecting Calcium Bioavailability" for the above referenced osteoporotic patient to take home with. Be sure to include the scientific reasoning for each identified dietary factor. **(10 Marks)**

Annex1: The Diabetic Exchange List

The Diabetic Exchange List

	Carbohydrate (grams)	Protein (grams)	Fat (grams)	Calories
I. Starch/Bread	15	3	trace	80
II. Meat				
Very Lean	.	7	0-1	35
Lean	.	7	3	55
Medium-Fat	.	7	5	75
High-Fat	.	7	8	100
III. Vegetable	5	2	.	25
IV. Fruit	15	.	.	60
V. Milk				
Skim	12	8	0-3	90
Low-fat	12	8	5	120
Whole	12	8	8	150
VI. Fat	.	.	5	45

3) a) Compare and contrast thrombosis and atherosclerosis pathophysiological mechanisms. **(10 Marks)**

b) Mr Bweupe has recently been screened for cancer, and is nervous about how his diet might be associated with cancer risk. Correspondingly, Mr Bweupe asks the staff nutritionist what in his diet might be associated with cancer. Briefly explain five (05) dietary factors that are associated with cancer risk. **(10 Marks)**

4) a) Use the provided "Diabetic Food Exchange List" in *"Annex 1"* to devise a meal plan for a patient who has been prescribed a 1200 kcal diet for weight management. **(10 Marks)**

b) Identify the Zambian FBDGs and its American counterpart. Further, compare and contrast the two dietary guidelines (the Zambian FBDGs versus the American equivalent).

5) a) What dietetic advise would you give to an "End Stage Renal Failure (ESRF)" patient on peritoneal dialysis with regards to the following dietary factors. Indicate rationale for the rendered dietetic advice? **(10 Marks)**

i. Protein
ii. Phosphate
iii. Fluid
iv. Potassium
v. Fiber

b) A visiting clinical nutritionist is caring for a client who has HIV/AIDS. At the nutritionist's most recent visit, it was observed that the client was experiencing unintentional weight loss. The nutritionist knows that there are several issues that could cause unintentional weight loss in a person with HIV/AIDS. Briefly describe potential determinants of wasting in HIV/AIDS patients and related intervention measures. (10 marks)

THE UNIVERSITY OF ZAMBIA
SCHOOL OF AGRICULTURAL SCIENCES
DEPARTMENT OF FOOD SCIENCE & NUTRITION

BSC HUMAN NUTRITION

AGN 4520 PUBLIC HEALTH NUTRITION

DATE: 15TH SEPTEMBER 2016 TIME: 09 - 12HOURS

DURATION: THREE (3) HOURS VENUE: OMNIA 1

INSTRUCTIONS TO THE CANDIDATE:

1. THIS PAPER CARRIES 150 MARKS
2. ANSWER QUESTION 1 AND ANY OTHER 4
3. ALLOCATED MARKS FOR EACH QUESTION ARE INDICATED IN BRACKETS

PART A:SHORT ANSWER QUESTIONS
ANSWER ALL QUESTIONS IN THIS SECTION [TOTAL 50 MARKS]

1. Briefly explain the Nudge theory in public health nutrition (**5 MARKS**)

2. Define the following terms (**12 MARKS**)
   a. Product reformulation
   b. Functional Foods
   c. Ecological approach
   d. Stake-holder analysis
   e. Biological targeting
   f. Food security (FAO, 2006)

3. List the FOUR (4) types of case situations (**4MARKS**)

4.
   a. In public health nutrition approaches, signing up for a health walk that awards a free drink after the walk would serve as a..... (**1 MARK**)
   b. Giving discounts on fresh fruit and vegetables counts as a....(**1 MARK**)

5. What is meant by the term 'stakeholder' in programme management? (**1 MARK**)

6. What **THREE (3)** complications if left untreated ultimately lead to death in Severe Acute Malnutrition? (**3 MARKS**)

7. Mention **FOUR (4)** tests that should be done on a severely malnourished child upon admission (**4MARKS**)

8. There are **THREE (3)** circumstances in which supplementation is considered a choice intervention? Outline these three circumstances **(3MARKS)**

9. Mention **FIVE (5)** groups of people that need dietary supplementation **(5 MARKS)**

10. Indicate true or false to the statements listed below **(1 MARK EACH)**

- **a.** The International Code of Marketing of Breastmilk Substitutes (BMS) bans the use of infant formula
- **b.** Display of promotional materials in health facilities represents the code of marketing of BMS violations
- **c.** Public health is the study of factors that determine the frequency, distribution and strength of disease in a population
- **d.** A guideline is a reference that provides nutrition advice for the general health of populations
- **e.** Epidemiology is the science of promoting health, preventing disease and prolonging life through organized efforts by communities, government, Non-governmental organizations (NGOs)
- **f.** Food fortification and nutrient supplementation provides examples of directnutrient-based interventions
- **g.** A policy is a statement of intent to act in order to maintain or alter a condition in society by an authoritative body
- **h.** The school health and nutrition policy (MoE,2006) ranks among National Nutrition Policies specific to Zambia
- **i.** Harold Laswell (1936) defined politics as "who gets what, when and how" including distribution of resources
- **j.** Policy serves to set national priorities and guide resource allocation

k. Health for All" by the Year 2000 vision was declared in Alma-Ata in 1987

Part B: APPLICATION QUESTIONS

ANSWER ANY FOUR (4) QUESTIONS FROM THIS SECTION[TOTAL 100 MARKS]

Question 1

a. Distinguish between a case and case study (5 MARKS)
b. Describe the role of a student in a case analysis (5 MARKS)
c. Explain the FOUR (4) different types of case studies (10 MARKS)
d. Outline the steps for problem analysis in case studies (5 MARKS)

Question 2

a. Why isthe provision of evidence in planning nutrition interventions necessary? **(5 MARKS)**
b. Write brief notes on the under listed study types **(10 MARKS)**
    i. Case-Control Studies
    ii. Cohort Studies
    iii. Randomized studies
    iv. Cohort studies
c. Provide brief notes for each of the under listed "Hills criteria of causation" **(10 MARKS)**
    i. Strength
    ii. Plausibility
    iii. Specificity
    iv. Consistency
    v. Coherence

Question 3

a. Why is community participation a necessary ingredient in development (**2MARKS**)
b. What are the benefits of community participation? (**5MARKS**)
c. Discuss the provisions of asset mapping in community assessment (**8MARKS**)
d. Explain the "triple A approach" in nutrition situation analysis in development (**5MARKS**)
e. Provide brief and clear explanationsof the components for basic change strategies model (**5MARKS**)

Question 4

a. Outline the recommended infant and young child feeding practices in Zambia (**5 MARKS**)
b. Provide justification for each of the practices identified in 5a above, (**10 MARKS**)
c. Show case the relevance of each of the ten steps to successful breastfeeding (**10 MARKS**)

Question 5

a. Write short notes on the Socio-Behavioral Approach in Public Health? (**5 MARKS**)
b. Explain how the Socio-Behavioral Approach can be used to tackle micronutrient deficiencies in pregnant women in Bweengwa ward? (**10 MARKS**)
c. Critique the Socio-Behavioral approach (**10MARKS**)

Question 6

In Stakeholder analysis, a stakeholder mapping tool groups players according to their level of influence and interest.

a. Using the Stakeholder mapping matrix, identify and describe the four key groups? (**10 MARKS**)
b. Give **THREE (3)** reasons why it is important to identify stakeholders earlier on in the project (**3 MARKS**)
c. List **THREE (3)** principles of stakeholder management (**3 MARKS**)
d. Potential stakeholders normally fall under **THREE (3)**levels. Outline the (3) levels giving an example in each case (**9 MARKS**)

THE UNIVERSITY OF ZAMBIA
SCHOOL OF AGRICULTURAL SCIENCES
DEPARTMENT OF FOOD SCIENCE & NUTRITION

BSC HUMAN NUTRITION

NUTRITION CARE IN SPECIALISED SETTINGS
AGN 5442
2016 END-OF-YEAR EXAMINATIONS

DATE: 14TH SEPTEMBER, 2016 TIME: 09:00H

DURATION: THREE (3) HOURS VENUE: OMNIA 2

INSTRUCTIONS TO THE CANDIDATES:

1. THIS PAPER CARRIES 100 MARKS AND HAS 2 PARTS; PART A AND B

2. ANSWER ALL THE QUESTIONS IN PART A & B

3. PART A WILL RUN FOR A TOTAL OF 60 MINUTES, YOU WILL THEN HAVE TO SUBMIT PART A **BEFORE** YOU WILL BE GIVEN YOUR "OPEN-BOOK MATERIALS" FOR PART B

4. ON ENTRANCE TO THE EXAM ROOM, YOU WILL BE ASKED TO PROVIDE THE EXAMINER WITH YOUR "OPEN-BOOK MATERIALS"

5. ALLOCATED MARKS FOR EACH PART ARE INDICATED IN THE BRACKETS

PART A (35 marks)

Question 1 (2 marks)

What is the role of the Dietitian in Mental Health?

Question 2 (6 marks)

a. What are the differences between Anorexia Nervosa and Bulimia Nervosa?

b. What are THREE nutritional interventions for Anorexia Nervosa

c. What are FIVE important topics for education in Eating Disorders?

Question 3 (4 marks)

Define the following:

a. Neonate
b. Pre-term baby
c. VLBW
d. Macrosomia

Question 4 (4 marks)

What are TWO common complications/discomforts of pregnancy? Give TWO nutritional recommendations to overcome each of them.

Question 5 (3 marks)

a. State TWO benefits each, for baby and mum, of breastfeeding.
b. How does the maternal diet influence the composition of breast milk?

Question 6 (1 mark)

Which option below is false? The current available researches shows that overweight and obese women are at increased risk for:

A. Intrauterine foetal demise
B. Low birth weight
C. Pregnancy-induced hypertension
D. Caesarean section

Question 7 (4 marks)

Complete the following table in relation to nutrition deficiency during pregnancy

Nutrition Deficiency	**Implications to fetus and/or mother**	**Two food sources (no fortified foods)**
	Neural tube defects	
Vitamin D		

Question 8 (3 Marks)

Develop SIX key messages for anaemic pregnant women, which must be included during your health talk at an antenatal clinic.

Question 9 (5 Marks)

Pregnancy induced Hypertension (PIH) or Pre-eclampsia can lead to the more serious condition of Eclampsia. Discuss briefly its (Eclampsia) pathophysiology, symptoms and nutritional treatment.

Question 10 (3 Marks)

What is the aim of vitamin A supplementation for the mother and the infant in postnatal care in Zambia?

PART B (65 marks)

Question 1 (35 marks)

Mercy is a 22-year-old hairdresser, who lives with her partner in a small flat above her salon. She is currently at 25 weeks of Gestation and has been referred to you for dietary management of GDM. During her late teens (16-19 yrs.) she suffered from "binge eating", which was later classified as Bulimia Nervosa. She received pre-conceptual advice, partly informed by a strong family history of diabetes; her mother has type 2 diabetes and her older sister has type 1 diabetes. She is 1.77m tall, is normotensive (105/60 mmHg) and the most recent fasting glucose test came back at 14mmol/L. She also complains of constipation.

Her Antenatal Card reveals the following Weight History:

Usual preconception weight (self-reported)	84.2kg
Weight at 6 weeks (GP)	87.2kg
Weight at 14 weeks (booking clinic and scan)	91.4kg
Weight at 20 weeks (self-reported)	95.6kg
Weight at 25 weeks (GP)	98kg

Her dietary history reveals an intake of about 3000 kcal/d. She eats two meals each day (omitting lunch) and her largest meal being in the evening (1200Kcal +). She says she eats healthy and complains of being lonely at night as her partner is often away for work. Mercy knows she was carrying excess weight at the outset of pregnancy and is keen not to put on too much as she has heard that this may produce a big baby and doesn't want her friends to "judge her" for it. She walks some days of the week when she has "over-eaten" and claims to do other forms of exercise along with this.

a) Using the whole Nutrition Care Process, outline your plans for providing Mercy with appropriate Medical Nutrition Therapy (30 marks)
b) What are some of the maternal and fetal complications that can arise from GDM? (5 marks)

Question 2 (30 marks)

An 18-month boy, Matongo, has come in for routine growth monitoring and assessment. The nurse on duty observed the following: bilateral pitting oedema (+++), weight (7.3kg), length (74.5cm) and MUAC 109mm. The child is then referred to the Pediatrician on duty who ordered the following tests:

Glucose (-), blood smear (malaria) (+), Hb and Hct (H/H) (normal), urine culture test (urine cx) (+), stool test (normal), chest X-ray (CXR) (normal), TB (-)

Medical Hx: birth weight of 2600g, temperature (39°C), frequent episodes of diarrhea in past month and is still crawling.

Medications: Amoxicillin and anti malaria drugs

Matongo is referred to you, as Nutritionist in charge for nutritional management. Your assessment confirms the anthropometry indicators obtained from the clinic. In addition you also find the following in assessment:

Dietary Hx: mother has stopped breastfeeding
BF: ½ cup porridge + ½ cup milk,
L: 60g of Nshima with home fermented cows milk (150ml)
D: ½ cup porridge + with peanut butter (1 tsp)

Nutrition focused exam: passed appetite test, sunken eyes, grey sparse *hair, pale tongue and not active.*

Social Hx: parents do not go to work, they rely on farming but country currently experiencing drought.

a) Using the whole Nutrition Care Process, outline your plans for providing Matongo with appropriate Medical Nutrition Therapy (30 marks)

THE UNIVERSITY OF ZAMBIA
SCHOOL OF AGRICULTURAL SCIENCES
DEPARTMENT OF FOOD SCIENCE & NUTRITION

BSC HUMAN NUTRITION

DIETARY & FOODSERVICE MANAGEMENT
AGN 5432
2016 END-OF-YEAR EXAMINATIONS

DATE: FRIDAY 6TH SEPTEMBER, 2016 TIME: 14:00H

DURATION: THREE (3) HOURS VENUE: OMNIA 2

INSTRUCTIONS TO THE CANDIDATES:

1. THIS PAPER CARRIES 100 MARKS AND HAS 2 PARTS; PART A AND B

2. ANSWER ALL THE QUESTIONS IN PART A & B

3. PART A WILL RUN FOR A TOTAL OF 60 MINUTES, YOU WILL THEN HAVE TO SUBMIT PART A **BEFORE** YOU WILL BE GIVEN YOUR "OPEN-BOOK MATERIALS" FOR PART B

4. ON ENTRANCE TO THE EXAM ROOM, YOU WILL BE ASKED TO PROVIDE THE EXAMINER WITH YOUR "OPEN-BOOK MATERIALS"

5. ALLOCATED MARKS FOR EACH PART ARE INDICATED IN THE BRACKETS

PART A (35 marks)

Question 1(3 marks)

What is the purpose of having a scope of Practice and Code of ethics for the nutrition profession?

Question 2(3 marks)

What are THREE limitations of using National Dietary Guidelines and NRVs for the hospital population?

Question 3(6 marks)

What are the steps involved in planning a cyclic menu? Use examples in your explanation.

Question 4(5 marks)

You have been given the following recipe to modify and asked to make it "healthier". The company would like to market it as a **Low-GI, High-Fibre** snack, suitable for both Diabetic and CVD patients. They would like you to suggest the serving size too.

Choc-Chip Muffins.

500g Plain Flour
3 teaspoons Baking Powder
120g sugar
150g choc-chips
2 medium eggs
250ml Full-cream milk
40g melted butter

Question 5(4 marks)

Describe the difference between a Leader and a Manager and explain why Leadership is critical to success in nutrition and dietetics.

Question 6(6 marks)

List FOUR unethical purchasing practices and explain why ethics in purchasing is important?

Question 7 (4 marks)

Dietitians cost money and we must demonstrate 'value for money'. What kinds of financial arguments can you think of to justify the expense?

Question 8(4 marks)

Schiller, 1994, argues that information is a key tool to help nutrition services. Why is this?

PART B (65 marks)

Question 1(35 marks)

You are working as a Dietitian in an acute care setting. The Dietetics Director has appointed you to lead the introduction of IDNT in the department. You are the only Dietitian on staff with experience using IDNT.

a. How does the IDNT relate to TQM? (5)
b. Describe the strategies and steps you would use to introduce the IDNT within the department over a 6 month period and how you would measure success or otherwise of this project (10)
c. How would you overcome resistance and barriers to change? Ensure you identify possible barriers and use case specific examples in your answer. (10)
d. As part of the introduction of the IDNT, you have been asked to write a short piece for the monthly newsletter to help colleagues motivate their employees and to advocate for the nutrition profession. Write a 250-word piece addressing this, for submission. (10)

Question 2 (30 marks)

Any business, whether public or private, relies on reputation and image to ensure that it will continue.Burton & Freeman (2005) suggest that we need to be more proactive at marketing the profession so that we can compete with other allied health successfully, as well as that marketing can be a useful tool for improving the effectiveness of professionals.

a. Discuss the above statement in relation to private practice and the acute care setting (10)
b. Why is marketing considered a 'tool' of management? (5)
c. What is the relationship between the environment of a food or nutrition service and marketing? (5)
d. Provide specific examples of positive marketing for either a food OR nutrition service that you know about, with reasons why it was positive (5)
e. Provide specific examples of negative marketing for either a food OR nutrition service that you know about, with reasons why it was negative (5)

THE UNIVERSITY OF ZAMBIA
SCHOOL OF AGRICULTURAL SCIENCES
DEPARTMENT OF FOOD SCIENCE & NUTRITION

BSC HUMAN NUTRITION

DIETARY INTERVIEWING & COUNSELLING + NUTRITION CARE IN INFECTIOUS DISEASE, ONCOLOGY & TRAUMA
AGN 5462
2016 END-OF-YEAR EXAMINATIONS

DATE: FRIDAY 16TH SEPTEMBER, 2016 TIME: 14:00H

DURATION: THREE (3) HOURS VENUE: OMNIA 1

INSTRUCTIONS TO THE CANDIDATES:

1. THIS PAPER CARRIES 100 MARKS AND HAS 2 PARTS; PART A AND B

2. ANSWER ALL THE QUESTIONS IN PART A & B

3. PART A WILL RUN FOR A TOTAL OF 60 MINUTES, YOU WILL THEN HAVE TO SUBMIT PART A **BEFORE** YOU WILL BE GIVEN YOUR "OPEN-BOOK MATERIALS" FOR PART B

4. ON ENTRANCE TO THE EXAM ROOM, YOU WILL BE ASKED TO PROVIDE THE EXAMINER WITH YOUR "OPEN-BOOK MATERIALS"

5. ALLOCATED MARKS FOR EACH PART ARE INDICATED IN THE BRACKETS

PART A (35 marks)

Question 1 (5 marks)

a. Explain the etiology and pathophysiology (4 stages) of HIV/AIDS
b. Discuss FIVE nutritional complications of ART and/or HIV itself

Question 2 (6 marks)

a. What is Metabolic Stress?
b. Describe the Ebb and Flow phases.
c. Describe at least FIVE changes to macronutrient metabolism during Metabolic Stress. Ensure you compare this to STARVATION metabolism

Question 3 (1 mark)

Which of the following is not a Cytokine involved in Metabolic Stress

A. Interleukin-1
B. Interleukin-6
C. Tumor Necrosis Factor
D. Cortisol

Question 4 (6 marks)

What are SIX specific nutritional interventions for a Burns patient who has >20% TBSA burned. Ensure you explain the pathophysiology/reasons for each mentioned intervention.

Question 5 (3 marks)

a. Briefly explain the relationship between malnutrition and a surgery
b. What would be your basic goals for Pre and Post-operative care for a Surgery patient.

Question 6 (3 marks)

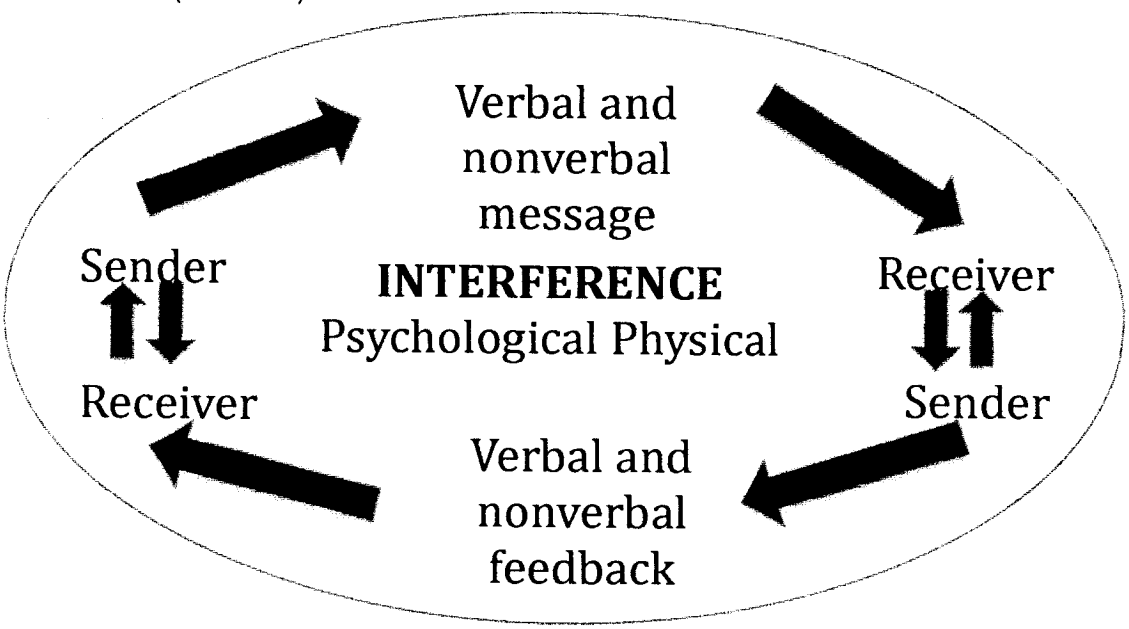
Differentiate between each of the following types of *questions* and give an example of each:

a. Open and closed

b. Primary and secondary

c. Neutral and leading

Question 7 (3 marks)



Identify the model above and give a description of each component using an example

Question 8 (2 marks)

What are the TEN common cognitive distortions?

Question 9 (4 mark)

a. What are FIVE strategies that can help to prevent relapse?
b. List THREE High-risk situations, with regards to relapse.

Question 10 (2 marks)

Define cultural competence. What can nutrition professional do to develop it?

PART B (65 marks)

Question 1 (35 marks)

Mrs. Mainza is a 57-year-old lady diagnosed with gastric cancer who underwent a partial gastrectomy 2 weeks ago. The surgeon has referred her to you. An appointment was made for her to see you in the outpatient clinic. She currently weighs 59kg. Her weight 6 months ago was 66kg. In the few months prior to surgery Mrs. Mainza lost weight due to nausea and early satiety. She is 164cm tall. While in hospital she received postoperative enteral feeds via a PEJ and her weight was stable at 60kg.
She was discharged from hospital several days ago and is now on a soft diet. Mrs. Mainza is experiencing some nausea that is affecting her appetite and ability to eat. She has been having lollies and drinking juice to help with her energy levels but soon feels dizzy and experiences sweating and diarrhoea after consuming these. Mrs. Mainza complains of fatigue and reports that she is spending at least half the day sitting on the lounge or in bed. A physical examination reveals there is some protrusion of the clavicle, scapula and shoulders. There is some hollowing under the eyes and mild depression around the calf and quadriceps. There is no edema or ascites.

Current intake
Breakfast
- 1 bowl Cornflakes + 2 % fat milk
- 1 glass (200ml) 100% fruit juice
Lunch
- 1 bowl custard with ~ 1 banana
- 1 glass (200ml) 100% fruit juice
Dinner
- 1 small fillet poached/steamed fish in white sauce or 2 scrambled eggs, ~ ½ cup mashed vegies + 1 glass soft drink
Extras - handful of jelly lollies and 5-6 boiled lollies per day, sips on ORS throughout the day.

Psychosocial: Mrs. Mainza is married with 2 adult children and 1 grandchild. She does the shopping and most of the cooking. She works part time in a jewellery store.

a) Perform a nutritional assessment for Mrs. Mainza. Ensure you complete a PG-SGA for Mrs.Mainza (15)
b) What are your nutritional diagnoses? (6)
c) Plan appropriate nutritional interventions for Mrs. Mainza (10)
d) How will you monitor and evaluate the effectiveness of the Intervention? (4)

Question 2 (30 marks)

You have been asked to contribute your nutritional skills and expertise towards an initiative called "Health Week", being run by an accounting firm for their employees. Their aim is to motivate their employees to want to change their current health-related behaviours.

Using your knowledge and skills gained throughout this course, explain (in detail) how you intend to run your session so that it is as EFFECTIVE as it can possibly be. Consider the following aspects

i. Communication (verbal and non-verbal)
ii. Counseling (for behavior change)
iii. Motivating employees (motivational interviewing)
iv. Planning, Implementing and Evaluating Learning
v. Group facilitation and dynamics
vi. Creating and delivering an effective presentation

THE UNIVERSITY OF ZAMBIA
SCHOOL OF AGRICULTURAL SCIENCES
DEPARTMENT OF FOOD SCIENCE & NUTRITION

BSc Human Nutrition

AGN 5552
Nutrition in Emergencies
Final Examination

Date: /09/2016

Duration: Three (3) hours

Instructions to candidates

Answer all questions

Question 1 (total 20 marks)

i. Define what is meant by disaster management (4 marks)

ii. What are some of the food and labour problems associated with the Food-For-Work (FFW) programmes? (6 marks)

iii. Using examples, describe what is meant by **loud** and **silent** emergencies (10 marks)

Question 2 (total 20 marks)

i. Name some of the objectives of the emergency school feeding programme (4 marks)

ii. What is the main role of the cluster approach and how is this achieved? (6 marks)

iii. In humanitarian financing, explain the differences between FLASH appeal, CERF, and Consolidated appeal (6 marks)

iv. What are the four technical areas that the Sphere project operates in? (4 marks)

Question 3(total 20 marks)

i. What information is contained in a commodity distribution report? (4 marks)

ii. Describe the types of therapeutic feeding (6 marks)

iii. What are the advantages of cash transfers and when are they not appropriate to use? (6 marks)

iv. When planning a nutrition survey, name the four types of outcome indicators that can be used (4 marks)

Question 4 (total 15 marks)

i. Name each cluster in the humanitarian system and the organisation responsible for leading it (10 marks)

ii. What screening tools can be used when conducting a rapid appraisal? (5 marks)

UNIVERSITY OF ZAMBIA
END OF YEAR EXAMINATIONS-SEPTEMBER 2016
AGS 2110
FUNDAMENTALS OF SOIL SCIENCE

TIME: 3.0 HOURS **MARKS: 100**
INSTRUCTIONS: ANSWER ALL QUESTIONS

1. Define the following terms: (10 marks)

a. Streak of a mineral
b. Humus
c. Micronutrient
d. Matric potential
e. Physical weathering
f. Photoautotroph
g. Soil moisture characteristic curve
h. Immobilization of nitrogen

2. Indicate whether the following statements are true or false: (10 marks)

a. A soil with a colour code 5YR 4/2 is redder and darker than one with a colour code 7.5YR5/2.
b. Saline sodic soils are commonly associated with areas that receive high rainfall.
c. A mineral that is able to scratch quartz is harder than orthoclase.
d. A soil with 2 % organic carbon and a C: N ratio of 25 :1, contains more nitrogen than a soil containing 400 mg N/kg soil.
e. A soil with variable charge will have a higher CEC at pH 5 than at pH 7.5.
f. Heterotrophs are involved in the decomposition of soils organic matter.
g. A 50 kg bag of fertilizer containing 24 % P_2O_5 contains more P than 200 metric tonnes of soil containing 15 mg P/kg soil.
h. More energy is required to extract water from soil pores with a diameter of 0.05 mm than to extract pure water from an aqueous solution of 0.01M NaCl at 25°C.
i. Granular soil structure is usually found in the A horizon.
j. Illuviation is an example of soil forming processes termed as losses.

3. Answer the following questions briefly but concisely. (20 marks)

a. A soil profile is reported to have 5 horizons, namely, A, B, C, E and O. (i) Using a diagram show the arrangement of these horizons from the surface to the deepest layer in the profile. (5 marks)

b. Part of the description of a soil layer is given below:

A 0 to 8 cm. Brown (10YR5/3) sandy loam, very dark grayish brown (10 YR3/2) moist, weak medium sub angular blocky structure; soft, nonsticky, nonplastic;

List all the physical properties contained in the above description. For each property –indicate the words that refer to that property. (5 marks)

c. List and define the components of the total water potential (ψ_t) of unsaturated soils and describe how each of the components affects the availability of water for plant uptake. (5 marks)

d. Rocks are broadly classified into three groups based on their mode of formation. Name and define these three classes and describe how transformation can occur among these 3 rock types. (5 marks)

4. Answer the following questions: (20 marks)

a. List the 13 elements obtained by plants from the soil; indicate their classification by the fertilizer industry, and their bioavailable forms. (5 marks)

b. Describe how the Effective Cation Exchange Capacity (ECEC) is determined in the laboratory. (5 marks)

c. $Al_2Si_2O_5(OH)_4$ and $KAl_2(Si_3Al)O_{10}(OH)_2$, are common layer silicate minerals.

(i) Name the minerals and indicate whether they are primary or secondary minerals (2 marks)

(ii) Draw a schematic diagram of the structure of one these minerals and describe its properties with reference to its source of negative charge, the magnitude of its CEC, its specific surface area and its ability to expand and contract. (5 marks)

(iii) Write a balanced chemical weathering reaction of $KAl_2(AlSi_3)O_{10}(OH)_2$ to form $Al_2Si_2O_5(OH)_4$ by hydrolysis. (3 marks)

5. A soil horizon has the following physical properties.

Depth (cm)	ρ_b $g.cm^{-3}$	ρ_s $g.cm^{-3}$	Sand %	Silt %	Clay %
0 - 20	1.45	2.65	73	10	17

Answer the following questions: (20 marks)

a. If the fine earth fraction of this soil has a gravimetric moisture content of 7.5 %, what moist mass of the fine earth fraction is required to supply 100 grams of clay? (3 marks)

b. If the relationship between the matric potential and the volumetric moisture content of the above soil is given by the equation:

$$pF = 10x[0.35 - \theta v] + 2.0$$

where: $pF = log_{10}$ (suction of soil in cm); θv= volumetric moisture content of soil (cm^3H_2O/cm^3 soil)

Given that the permanent wilting point corresponds to a suction of 15000 cm and field capacity corresponds to 100 cm, express the water holding capacity of this soil horizon in mm? (7 marks)

c. To what depth will this soil layer be wetted by 10 mm of rainfall, if the initial moisture content is 0.07 gH_2O/g soil, and assuming all the water enters the soil? (5 marks)

d. A small rural community wants to build a water filtration unit to filter water from a nearly stream that usually has a lot of suspended particles. It is decided that the unit would be a cylindrical reservoir to hold a 50 cm layer of sand with K_{sat} of 2 x 10^{-3} cm/s at the base, which would be continuously submerged under a 1 meter free column of water. The unit is intended to produce 200, 000 liters of filtered water every 8 hours. What should the internal diameter of this filtration unit be? (5 marks)

6. Selected properties of soil from the Central Province are presented in the table below.

Depth cm	pH $CaCl_2$	Bd $g.cm^{-3}$	BS %	K^+ meq/100g	Clay %	ECEC meq/100g	CEC pH 7.0 meq/100g	Org C %	Tot N %	Avail P mg/kg
0-20	4.40	1.40	45	0.12	18	2.8	5.4	0.8	0.046	6.8

Answer the following questions. (20 marks)

a. If the base saturation given in the table above is based on the ECEC, what is the exchangeable acidity of this soil? (2 marks)

b. Using the CEC of the soil at pH 7 and the organic carbon content of the soil, calculate the percentage contribution of the organic matter to the CEC of the soil measured at pH 7. (3 marks)

c. If the respiration rate of this soil in 8.2 mg CO_2-C/kg soil per day. What will be the organic matter content and C: N ratio of this soil after 4 months, if no nitrogen is lost from the soil during the period, and the respiration rate is constant? (4 marks)

d. Would this soil be able to supply adequate amounts of N, P and K for a crop of wheat with nutrient requirements of 140 kg N/ha, 35 kg P/ha and 108 kg K/ha, if 3 % of total N is mineralized in one season and is available to the crop, while all exchangeable K and available P is available to the crop? Show calculations to support your answer. (5 marks)

e. How many 50 kg bags of Compound D, and Urea would the farmer require to meet the requirements of wheat for a 1hectare plot, if the fertilizers available to the farmer are Compound D (10:20:10), and Urea (46:0:0). It is assumed that (i) all P not supplied by the soil would be supplied by Compound D, and (ii) any shortfall of N after applying compound D would be supplied by Urea, Show the necessary calculations to support your answer. (6 marks)

Useful data: R = 8.3145J.$mol^{-1}.k^{-1}$, Atomic masses: Ca=40g, P=31g, S=32g, H=1, N=14g, O=16g, K= 39g, Na=23g, Mg=24g, C=12g.

SOIL SCIENCE IS FUN

UNIVERSITY OF ZAMBIA

UNIVERSITY FINALEXAMINATIONS – SEPTEMBER, 2016

AGS 3312: SOIL PHYSICS

Time: Three (3) Hours

Instructions: Answer **ALL** Questions — Total Marks: **100**

Non-programmable calculators are allowed

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1. Soil structure and texture are very important factors in soil management. The aggregates observed in the field can be described in four major distinctive ways.
   a. Differentiate between the columnar/prismatic and platy structure. [8 Marks]
   b. Explain, briefly, how a farmer can improve a compacted plough layer. [6 Marks]
   c. What are static properties of soils? Give two (2) examples. [4 Marks]
   d. List two methods of determining soil texture. [2 Marks]

2. Soil moisture can be determined using direct and indirect methods.
   a. List four (4) of these indirect methods. [4 Marks]
   b. What is the principle on which these methods are based? [1 Marks]
   c. Describe the Neutron Scattering Method. [10 Marks]
   d. What are the disadvantages and advantages of the Neutron Scattering method? [10 Marks]

3. A sandy loam soil has an initial volumetric water content of 0.10 $cm^3\ cm^{-3}$ and its volumetric water content at field capacity is 0.30 $cm^3\ cm^{-3}$.
   a. How deep will a 100 mm rain wet the soil? [10 Marks]
   b. How much water is needed to wet the soil to 125 cm? [10 Marks]

4. A given soil's water is in equilibrium with the water table at 40cm. Taking the reference at the water table, determine;
   a. The potentials (gravitational (z), matric/pressure (h/p), total hydraulic head (H)) across the soil profile. [12 Marks]
   b. In which direction is the water flowing between the surface and 30cm in the profile? [1 Marks]
   c. What is the driving force for water to flow? [2 Marks]

5. A soil column contains two (2) soil textured and attached to a constant temperature source so that the top is maintained at 50°C and the bottom at 20°C to achieve a steady-state heat flow. The specific heat (Cv) and thermal conductivity (λ) of the soil layers are provided below. calculate the following:

Soil Layer	Thickness (m)	Cv ($MJ\ m^{-3}\ °C^{-1}$)	λ ($MJ\ m^{-1}\ s^{-1}\ °C^{-1}$)
Sand	0.00 - 0.50	2.5	0.50
Loam	0.50 – 0.75	1.2	0.25

   a. The diffusivity ($m^2\ s^{-1}$) of each layer *(4 marks)*
   b. The damping depth (m) of each layer *(4 marks)*
   c. The effective thermal conductivity of the soil column *(4 marks)*
   d. The steady state heat flux (q_h) through the two layers *(4 marks)*
   e. The temperature at the sand-loam interface *(4 marks)*

UNIVERSITY OF ZAMBIA
SCHOOL OF AGRICULTURAL SCIENCES
FINAL EXAMINATION AUGUST 2016
AGS 4210
SOIL MINERALOGY AND CHEMISTRY

DURATION: 3 hours
INSTRUCTIONS: Answer all questions

MARKS: 100

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1. Answer the following questions briefly and concisely. (10 marks)
   a. List and define three chemical weathering reactions. (5 marks)
   b. What is the difference between plane and crossed polarized light? (2.5 marks)
   c. In the crystal structure of dolomite [$CaMg(CO_3)_2$] list the constituent ions in order of increasing size, starting with the smallest ion to the largest ion. (2.5 marks)

2. Calcite and Gypsum are common minerals in soils of semi-arid to arid environments. Answer the following questions: (20 marks)

   a. Given that the crystallographic properties of calcite are: a = 0.499 nm, b = 0.499nm, d=0.499nm and c =1.706 nm; $\alpha=90^{\circ}$, $\beta=90^{\circ}$ and $\gamma=120^{\circ}$; $n\omega=1.66$ and $n\varepsilon=1.49$ and those of gypsum are : a=0.567 nm, b=1.515nm , c=0.628 nm, $\alpha=90^{\circ}$, $\beta=113^{\circ}51'$, $\gamma=90^{\circ}$,. Answer the following:
      i. To which crystal systems do calcite and gypsum belong? Give reasons to support your answer. (4 marks)
      ii. What is the birefringence of calcite? (2 marks)
      iii. What is the axial ratio of gypsum? (2 marks)
      iv. Given that the two most prominent X-ray diffraction peaks for calcite are 0.304 nm and 0.229 nm while those for gypsum are 0.278 nm and 0.428 nm. At what 2θ values would you expect to find the two prominent peaks of calcite and gypsum on a diffractogram obtained from an X-ray diffractometer using $Co_{k\alpha}$ radiation with $\lambda= 0.1790$ nm. (4 marks)
      v. If the dissolution of gypsum in pure water at 25° C and 1 bar pressure has a $k_{sp} = 10^{-4.58}$, would a soil whose saturated extract is at equilibrium with gypsum qualify to be classified as saline (EC > 4m/cm)? Show the necessary calculations to support your answer. (4 marks)
      vi. When calcite is heated at 970°C, it gives off CO_2 gas and is converted to lime CaO. If a 120 mg sample of agricultural lime containing calcite when analyzed by TGA records a weight loss of 45 mg at 970° C, what is the percentage of calcite is present in the sample. (4 marks).

3. The silt fraction of soil sample from a farm in Lusaka was analyzed by X-ray diffraction analysis to determine the mineralogical composition. The analysis was conducted using a Diffractometer using Cu kα radiation with $\lambda = 1.542$ Å. The silt fraction was saturated with KCl and analyzed at room temperature. Attached is the diffractogram of the samples analyzed. Answer the following questions: (20 marks)

a. Calculate the d-spacings of minerals for peaks labelled 1,2,3,4 and 5. (5 marks)

b. Using your knowledge of the (001) d-spacings of layer silicate minerals and given that the most intense peaks for quartz is 3.34Å, while that of goethite is 4.18 Å, and that of gibbsite is 4.85 Å, indicate the names and chemical formulas of the minerals responsible for the 5 labelled peaks on the diffractogram. Give reasons to support your answer. (5 marks)

c. Write a balance reaction of the weathering by carbonation of one of the layer silicate minerals present in the sample to the other layer silicate mineral in the sample. (4 marks)

d. Draw a schematic diagram of one of the layer silicate minerals in this soil and (i) indicate the chemical compositions of all the planes then (ii) describe the sources of negative charge on the mineral,(iii) the magnitude of its CEC, (iv) its ability to expand and contract and (v) its specific surface area. (6 marks)

4. The chemical behavior of an acid soil is intimately linked to the solution chemistry of aluminium. Answer the following: (15 marks)

a. Using relevant reaction equations show how Al contributes to soil acidity (4 marks)

b. The Al^{3+} is predominant at pH <4.7 in soil. Given that $Al(OH)_3$ (log K_{sp} =-36.30) controls the concentration of Al^{3+} in solution, show that raising the pH of the soil to 5.5 through liming reduces the Al^{3+} concentration to levels considered safe for plant growth of about 2μM. (6 marks)

c. Describe the primary reactions and effects of agricultural lime in an acid soil [5 marks]

5. Isomorphous substitution in clay mineral structures results in very large values of unit charges.

a. Describe charge neutralization mechanisms that reduce the net charges to smaller values that are frequently measured as CEC in soils. [9 marks]

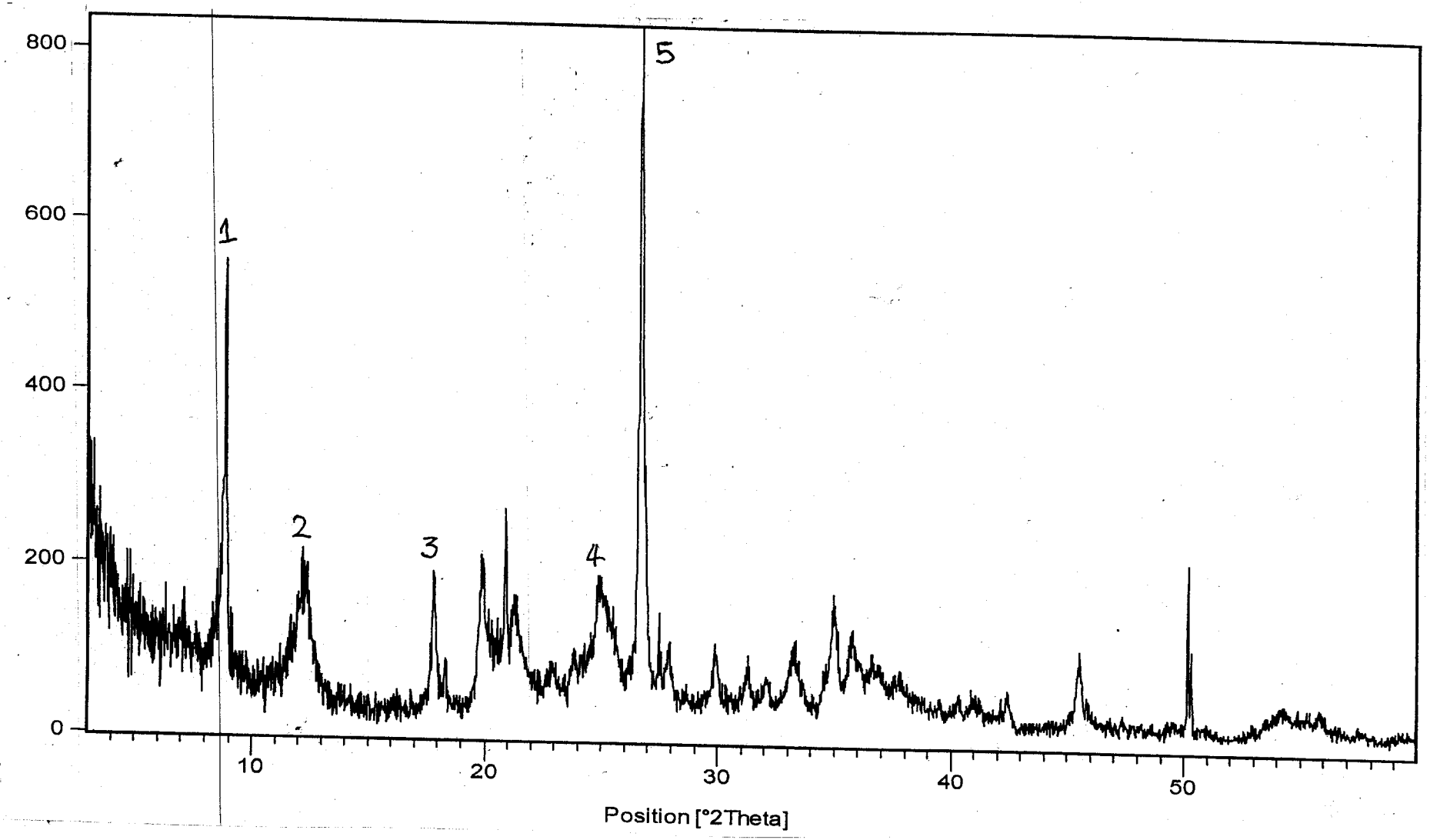
b. Describe the effect of ion size and ion charge on the zeta potential (ξ) and its implications on soil structure. [6 marks]

6. a). Account for salt accumulation in soil by listing and describing all the major sources and outflows as captured by the salt balance equation for the management of salt in the soil. [10 marks]

b) The agronomic effectiveness of organic residues such as manure depends on their rates of mineralization which governs the release of nutrients to the soil for plant uptake. Given that 5 ton of manure containing 1.5 % N was applied to soil, how much N would be mineralized in 50 days if the mineralization rate was estimated at 0.125 per week? [10 marks]

END OF EXAMINATION

Diffractogram of silt fraction for question 3.



UNIVERSITY OF ZAMBIA

END OF ACADEMIC YEAR EXAMINATIONS - SEPTEMBER, 2016

AGS 4232: SOIL FERTILITY AND AMENDMENTS

TIME: Three (3) Hours

INSTRUCTIONS: Answer all Questions **MARKS**: 100

1. A farmer from Mpongwe observed a decline in crop productivity at his farm. After taking soil samples to the laboratory for analyses, the following results were obtained. [25 marks]

Table 1: Soil Physical and Chemical Properties

Depth (cm)	CEC pH 7	Ca^{2+}	Mg^{2+}	Na^{+}	K^{+}	H^{+}	Al^{3+}	Org C	Total N	ρ_b	pH
			(-------meq/100g soil--------)					(--g/100g---soil)		g/cm^3	0.01M $CaCl_2$
0-25	5.5	0.2	0.3	0.1	0.2	0.2	0.8	0.90	0.063	1.7	4.2

Using the information given in Table 1 above, answer the following questions:

a. List three (3) soil constraints to crop production. [3 marks]

b. What strategies can be put in place to alleviate each of the constraints listed in (a) above [6 marks]

c. Will this soil be able to mineralize nitrogen? Show calculations to support your answer. [4 marks]

d. What is the percentage contribution of organic matter to the negative charge on soil colloids at pH 7 in this soil? [6 marks]

e. As a consultant, you may advise the farmer to use Integrated Soil Fertility Management (ISFM) technologies to improve crop productivity. Describe the management practices involved in ISFM? [6 marks]

2. To determine potassium (K) in soil, 10 g of soil from Monze is equilibrated in 50 ml of 1M ammonium acetate for 30 minutes, followed by filtration using Whatman filter paper. The concentration of potassium in the filtrate was measured using the Atomic Absorption Spectrophotometer and was found to be 5 mg/l. [25 marks]

   a. Would this soil meet the nutrient requirements for a maize crop that needs 85 kg of K per hectare? Show your calculations. (Assume a 20 cm plough layer with bulk density of 1.3 g/cm^3) [10 marks]
   b. What is the excess or deficit K_2O equivalent for this soil? [5 marks]
   c. Another soil from Magoye has a phosphorus (P) deficit of 22 kg/per hectare to meet the nutrient requirement for cotton. How many 50 kg bags of compound D (NPK; 10:20:10) per hectare are required to meet the crop requirement for P? [5 marks]
   d. What five (5) factors should a farmer consider to ensure the efficient use of fertilizers? [5 marks]

3. The principle of liming a soil is to apply a material which will react with the soil, to remove hydrogen ions and replace them with calcium or magnesium. [25 marks]
   a. List six (6) causes of soil acidity [6 marks]
   b. A liming material has a neutralizing value of 85 %. After a sieve analysis, the following results were obtained:

      Retained on 8 mesh (2449 um) sieve = 10 %
      Retained on 60 mesh (250 um) sieve= 20 %
      Passed through 60 mesh (250 um) sieve = 70 %

      Calculate the Effective Neutralizing Value (ENV) of the lime. [5 marks]

   c. Given that the total acidity of soil is 2.8 meq/100 g soil, how many 50 kg bags of lime that has an ENV calculated in (b) above are required to neutralize the total acidity of the top 20 cm of one hectare of this soil (assume a bulk density of 1.5 g/cm^3) [10 marks]
   d. List four (4) commonly used liming materials. [4 marks]

4. The decomposition of organic matter results in the production of a heterogeneous mixture of complex organic compounds. [25 marks]
   a. Discuss four (4) functions of organic matter in soil [10 marks]
   b. Discuss the properties and characteristics of the humic acids in relation to soil fertility and nutrition of plants? [10 marks]
   c. List five (5) factors which affect decomposition of organic matter [5 marks]

END OF EXAMINATION

UNIVERSITY OF ZAMBIA

SCHOOL OF AGRICULTURAL SCIENCES

DEPARTMENT OF SOIL SCIENCE

2015/2016 END OF YEAR FINAL EXAMINATION

AGS 5522: IRRIGATION MANAGEMENT

INSTRUCTIONS:

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ANSWER ALL QUESTIONS

ANSWER QUESTION SIX (06) IN A SEPARATE ANSWER BOOK

TIME: (03) THREE HOURS

MARKS: QUESTIONS CARRY EQUAL MARKS

DATE: 14TH SEPTEMBER 2016

Q1. When an irrigation system is designed, it is recommended that a drainage system be also designed as part of the irrigation project. There are three methods of calculating the amount of ground water to be removed by the drainage system, for each of the three name the method. Describe exactly how the calculation is done giving an example. In each of the methods description indicate what factors influence the accuracy or success of the method.

Q2. When land is being graded, (06) six steps are followed to guide and minimize possible errors. Describe each of these six steps explaining what is done in each step. There is also a need to minimize the cost of grading by planning efficiently routes of hauling soil during cut and fill. The method used to achieve this is a fool proof method consisting also of six steps. Name and describe these (06) six steps.

Q3. To manage an irrigation system, the operator or manager develops a schedule to use in emergencies i.e. when the original schedule cannot be met. In the time table or schedule there is the displacement policy under which are global displacement and local displacement policies. Describe the three global displacement policies of MINIMAX, MINIMUM VARIACE AND MAXIMUM DAILY DISCHARGE. Describe also the (02) two local displacement policies of the Reduction of water amounts i.e the (γ) gamma policy and the Relative reduction policy.

Q4. When an irrigation system or project has been designed. It is subjected to an economic analysis in which feasibility is done, ranking may be done and project size which is most suitable are done. Explain these processes in terms of why they are done. In the analysis, costs and benefits are used. Explain what costs are and what benefits are.

Q5. When identifying crops to be irrigated a number of factors are evaluated to ensure that the project will most likely be successful by being profitable. The factors considered include yield, agronomic requirements, water requirements and methods of irrigation. Discuss the above with respect to wheat and maize. Explain why one of these two is extensively irrigated while the other is not, using the factors identified.

Q6. A farmer practicing irrigated agriculture in Chongwe district draws his irrigation water from Ngwerere stream which drains much of Lusaka city. Water in the stream comes from different areas of the city which are a likely source of pollution and increased Biology Oxygen Demand.

a. Define Biological Oxygen demand (BOD). Why is it important to know the BOD of water?

b. What is water pollution and how does it affect agricultural production?

c. People buying vegetables from this farmer later complained of feeling ill after consumption of these vegetables. If the farmer came and consulted you over this matter, what would you advise and recommend to the farmer?

END

The University of Zambia

UNIVERSITY END OF YEAR EXAMINATION- SEPTEMBER 2016

School of Agricultural Sciences

AGS 5612

INTEGRATED LAND HUSBANDRY

Duration: 3 hours **Marks: 100**

INSTRUCTION: ANSWER ALL QUESTIONS AND WRITE LEGIBLY

1. Explain the following terms and highlightening their significance in alleviation of land degradation. (20 marks)
   a. Acidification
   b. De-vegetation
   c. Soil crust
   d. Waterlogging
   e. Salinization
   f. Exchangeable Sodium Percentage
   g. Hydrological regime
   h. Standard plot
   i. Seal

2. An area in Ngabwe Disstrict of Central Province has been ravaged by serious land degradation challenges which have lead to decline in land productivity of both crops and livestock. You have been contracted by Government to make an on the spot assessment of the situation and come up with suggestions of how to restore and sustain productivity of the land. Give a detailed methodology and justification of how you would go about doing the assignment. (20 marks)

3. Explain why farmers degrade the land on which their sustenance depends. (5 marks)

4. Discuss the three (3) untapped resources in alleviation of land degradation. (10 marks)

5. Explain why natural vegetation grows vigorously compared to crops which require fertilizer and water management. (10 marks)

Table 1. Land qualities of the Land Mapping Units

Land unit	Moisture availability	Nutrient availability	Nutrient retention	Oxygen availability	Land workability	Erosion hazard	Flood hazard
A	3	2	3	1	3	2	1
B	2	3	2	1	2	1	1
C	3	3	2	1	3	2	1
D	3	2	3	1	2	2	1
E	2	2	2	2	2	2	3

Table 2. Minimum Requirements of Land Utilization Types for their Optimum Productivity

Land unit	Moisture availability	Nutrient availability	Nutrient retention	Oxygen availability	Land workability	Erosion hazard	Flood hazard
Maize	3	2	3	1	3	2	1
Soyabean	2	3	2	1	2	1	1
Sunflower	3	3	2	1	3	2	1
Wheat	3	2	3	1	2	2	1
Beef production	2	2	2	2	2	2	3

a. Determine the land capability classification score for each soil map unit **(8 marks)**

b. Calculate the total land capability classification score for the farm **(2marks)**

9. The United States Bureau of Reclamation (USBR) is a qualitative system for land evaluation for irrigated agriculture

a. What are the main principles of the USBR land classification system? **(6 marks)**

b. What is the meaning of the following mapping symbol under the USBR land classification system? (Assume that the land use is permanent rice production) **(4 marks)**

3Rstd
PrP32CY

END OF EXAM

7. The table below shows soil analysis from the laboratory from two different locations in Zambia.

Locations	pH	Ca^{2+}	Mg^{2+}	k+	Na^{+}	Al^{3+}	H^{+}	P
				cmol/kg				mg/kg
A	4.2	0.03	0.06	0.03	0	0.9	0.01	4
B	5.6	0.9	0.1	0.1	0.02	0.02	0.01	5

Answer the following questions, assuming a soil depth of 20 cm and bulk density of 1500kg/m^3. (Molecular weight; Ca=40, K=39, H=1, O=16, N=14, P=31, S=32).

a. Calculate the cation exchange capacity (CEC) of the soils from the two locations? **(1marks)**

b. Which parts of the country could these places be located, justifying your answer? **(1mark)**

c. Based on the CEC, in which location could the land be more expensive? **(2 marks)**

d. Assuming lime available, calculate the lime requirement in terms of number of bags of united quarries lime for location A, given that it has an effective neutralizing value of 97%? **(3 marks)**

e. Given that beans requires 50 kg K/ha and 40kg P/ha to attain optimum yields.

1. State whether these soils from two sites can supply these nutrients? **(4 marks)**
2. How much should be added given the sources of K and P are potassium sulphate (K_2SO_4) and triple superphosphate ($Ca(H_2PO4)_2$) **(4 marks)**

8. You have been asked to conduct a land evaluation project on a 576 acres farm using the Land Evaluation and Site Assessment (LESA) method. The farm has 8 soil map units of different sizes and land capability classes (LCC) as shown in the table below. Additional relevant information on LESA model is given in tables 3 and 4.

Soil map unit	Land capability class	Size in acres
S	IVsw	46
T	IIe	113
U	V	76
V	IVe	68
W	VI	59
X	VII	81
Y	IIIe	31
Z	IIsw	102

UNIVERSITY OF ZAMBIA
SCHOOL OF AGRICULTURAL SCIENCES

UNIVERSITY EXAMINATIONS: SEPTEMBER 2016

AGS 5622: LAND EVALUATION AND IMPROVEMENT

Instructions: Answer all Questions. Time: Three (3) Hours Total Marks: 100

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1. A farmer owning a 600 ha farm has hired you to conduct a land evaluation study to determine suitability of his farm to maize, wheat, soyabean, cotton and beef production. Present a detailed methodology you would follow and the expected results you would provide the client **(20 marks)**

2.a. Using the data in Tables 1 and 2, here attached, determine the land suitability classes of the land mapping units indicated **(5 marks)**

b. Make recommendations on the appropriate Land Utilization Type in each Land Unit

c. Make recommendations on how to tackle the limitations identified in order to improve land suitability of the recommended Land Utilization Types under (b) above **(5marks)**

3. Explain how gross margin analysis is used in land suitability classification **(5 marks)**

4. Suggest a methodology for assessing and rating the land quality 'Nutrient availability' to Land Utilization Types in the field **(15 marks)**

5. Explain the three types of land degradation in Zambia, highlighting the most severe type. **(7 marks)**

6. Explain the disadvantages and advantages of saline and sodic soils in integrated farming system. **(8 marks)**

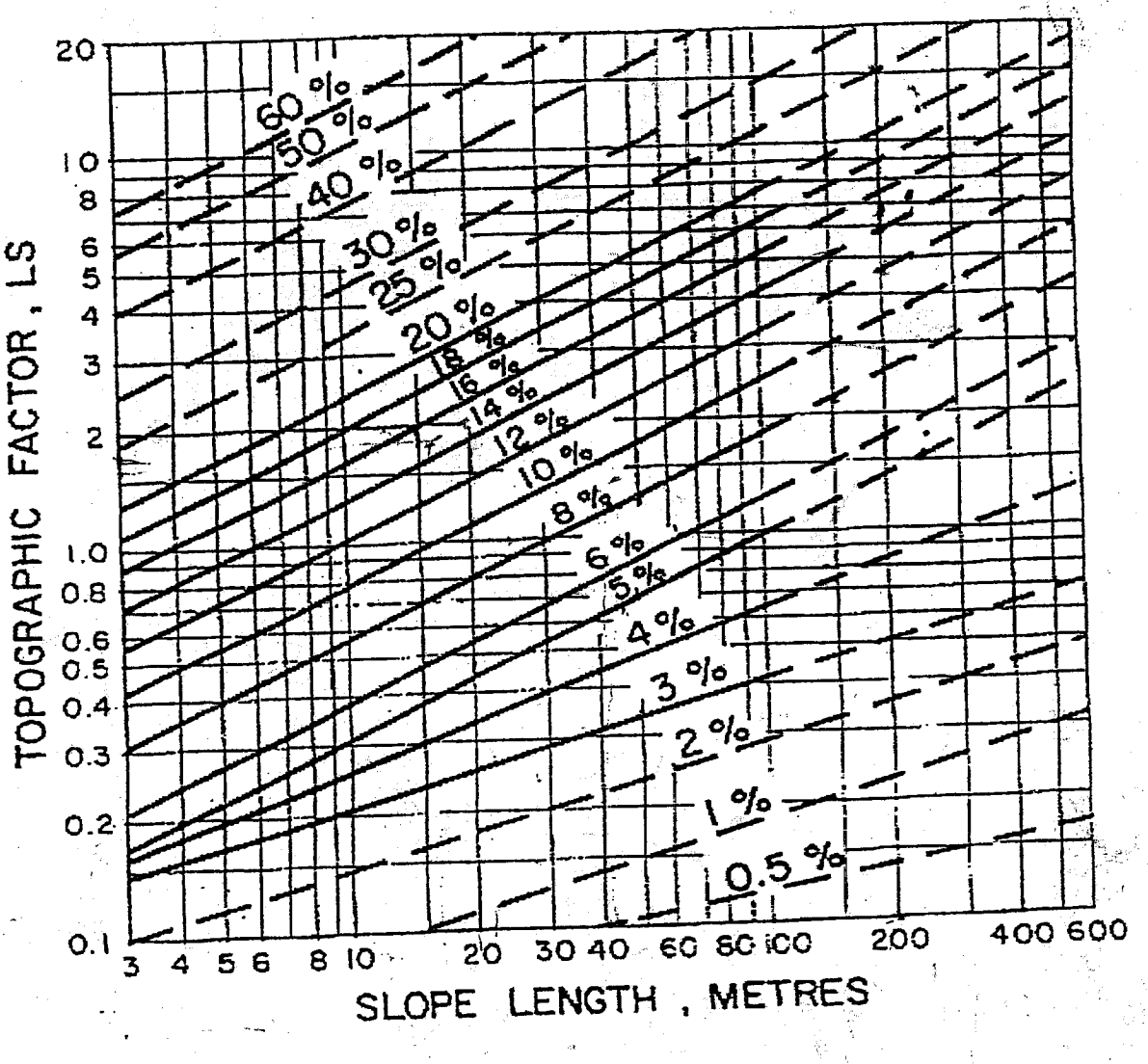

Figure 5.15 Relation between topographic factor LS and slope length

6. After soil analysis the liquid limit and plastic limit were found to be 0.85 and 0.55.

   a. Calculate the plasticity index. (2 marks)
   b. Explain the use of the plasticity index for agricultural and construction purposes. (5 marks)
   c. What is the optimal time of cultivating the field in preparation for the immediate season. (2 marks)
   d. Apart from atterberg limits, what other three indicators show soil structure degradation (3 marks)
   e. What measures can you recommend to ameliorate soil structure degradation. (3 marks)

7. A field of dimension 400m with a slope of 15% has an erodibility of 0.3 and the rainfall erosivity is 200:

   a. Estimate the soil loss in ton/yr, using the Universal Soil Loss Equation, given that there are no crop management and erosion control processes being practiced. (3 marks)
   b. A farmer was contemplating on strip cropping maize with groundnuts, given that the crop management factors are 0.5 and 0.3, respectively and that for strip cropping the erosion control factor is 0.3, which combination would reduce soil erosion significantly. (5 marks)
   c. With the aid of a drawing, design 50 m terraces and calculate the soil loss given that the new slope is 9% and that $1m^3$=1.5ton. (10 marks)
   d. Explain why terracing is considered the last option in controlling soil erosion. (2 marks)

END OF EXAMINATION

Table 3. Numeric conversion of Land Capability Classification (LCC) unit

Land Capability Classification	LCC Point Rating
I	100
IIe	90
IIsw	80
IIIe	70
IIIsw	60
IVe	50
IVsw	40
V	30
VI	20
VII	10
VIII	0

Table 4. LESA Model Scoring sheets

Total LESA Score	Scoring Decision
0-39	Not considered significant
40-59	Considered significant only if LE AND SA sub-scores are each greater than or equal to 20 points
60-79	Considered significant unless either LE or SA sub-score is less than 20 points
80-100	Considered significant