UGANDA MARTYRS UNIVERSITY

UNIVERSITY EXAMINATIONS

May 2016

FACULTY OF BAM

END OF SEMESTER TWO FINAL ASESSMENT FOR BSC(ACCT) I

BSC.EC 123: QUANTITATIVE METHODS II

DATE: 2nd May 2016

TIME: 9:30 AM – 12:30 PM

DURATION: 3HRS

Instructions:

1. *Carefully read through ALL the questions before attempting*
2. ***ANSWER FOUR (4) Questions ONLY****. (Each question carries equal marks)*
3. *No **names** should be written anywhere on the examination book.*
4. *Ensure that your **ID number** is indicated on all pages of the examination answer booklet.*
5. *Ensure your work is **clear** and **readable**. Untidy work shall be penalized*
6. *Any type of examination Malpractice will lead to automatic disqualification*
7. *Do not write anything on the questions paper.*

QUESTION 1

(i) Define probability of an event **(01 Mark)**

(ii) Three men **P, Q** and **R** pack biscuits in a factory. From the batch allocated to them, **P** packs 55%, **Q** (30%) and **R** (15%). The probability that **P** breaks some biscuits in a packet is 0.7 and the respective probabilities for **Q** and **R** are 0.2 and 0.1 respectively. What is the probability that a packet with broken biscuits found by the checker was packed by **P**? **(05 Marks)**

(B) A business firm from Kayunga District saved money for investment. The management wanted to start two projects (I & II). Below are expected sales from the projects.

PROJECT A		PROJECT B	
SALES ($)	Probability	SALES ($)	Probability
5,000	0.3	11,000	0.1
7,000	0.4	6,000	0.6
9,000	0.3	3,500	0.3

The firm's profit is 75% of the sales.

(a) (i) Calculate the expected profit under each project. **(04 Marks)**

(ii)Which project would you recommend to the management for the better returns? **(02 Marks)**

(b) Calculate the standard deviation of the distribution of the profits for each project. **(04 Marks)**

(c) Which of the projects is most risky? **(02 Marks)**

(d) What is the coefficient of variation for each project? **(04 Marks)**

(e) As a risk-averse decision maker, which project would you advise this firm to undertake and why? **(03 Marks)**

QUESTION 2

(a) A manager was heard saying that quantitative methods are time wasting and largely useless. Critically comment on the above statement. **(10 Marks)**

(b) A certain Agricultural and Animal firm industry in Uganda has analysed its operating conditions, prices and costs and has developed the following functions.

Revenue in Ug.shs, $R = 50{,}000Q - 200Q^2$ and the Cost function in Ug.shs, $C = 50Q^2 + 2{,}000Q + 1{,}200{,}000$

Where Q is the units sold.

The company has its objectives set at maximising the profits.

Required

(i) What is the quantity to be sold? **(05 Marks)**

(ii) At what price will the quantity be sold? **(05 Marks)**

(iii) What will be the company's profit? **(05 Marks)**

QUESTION 3

(a) (i) what is the exponential function? **(01 Mark)**

(ii) Sketch the function $f(x) = 3^{-x}$ for values of x from -3 to 3 **(02 Marks)**

(b) Use logarithms and solve $e^{4x-5} = 15$ **(03 Marks)**

c) A Company found that its daily sales begin to fall after the end of advertising campaign, and the decline is such that the number of sales is $S = 2000(2^{-x/10})$, where x is the number of days after the end of the campaign.

(i) How many sales will be made 15 days after the end of the campaign? **(05 Marks)**

(ii) If they do not want sales to drop below $700 per day when should they start the campaign? **(05 Marks)**

(d) If the demand function for the good is given as $P = 1000e^{-0.1x}$, where p is the price per unit when x units are sold,

(i) What is the total revenue for the good? **(05 Marks)**

(ii) What would be the total revenue if 35 units are demanded and supplied? **(04 Marks)**

QUESTION 4

(a) Define the following terms as applied to linear programming

(i) Feasible solution

(ii) A constraint

(iii) Objective function

(iv) Slack values **(04 Marks @ 1 Mark)**

(b) Identify the assumptions of linear programming situations **(04 Marks)**

(c) KAYABWE MUBISI Company makes two types of wines Walagi and Tonto. The profit estimates are $ 35 per unit of Walagi and $ 20 per unit of Tonto.The labour (in minutes) requirements for the products in each of the three production departments are summarised below:

	Walagi	Tonto
Department A	90	180
Department B	120	60
Department C	15	15

The production supervisors in the departments have estimated that the following number of labour hours will be available during the next months. 450 hours in the department A, 350 hours in the department B, and 50 hours in the department C. Assuming that the company is interested in maximizing the profits answer the following:

(i) Write the objective function and the constraints for the problem **(05 Marks)**

(ii) Find the optimal solution. How much of each product should be produced and what is the expected profit? **(05 Marks)**

(iii) What are the scheduled production time and the slack time in each department? **(05 Marks)**

(iv) Write a brief MEMO to your departmental head outlining your recommendations.**(02 Marks)**

QUESTION 5

(a)Define the following terms as applied to differential calculus

(i) Calculus

(ii) Optimisation **(02 Marks @ 1 Mark)**

(b) Differentiate (i) $f(x) = (3x^3 - 4)^6$

(ii) $f(x) = 2x^3 + 5x^2 + x$ **(04 Marks @ 2 marks)**

c) Maximize profit (π) for a firm, given that $TR=4000Q - 33Q^2$, and $TC= 2Q^3 - 3Q^2 + 400Q + 5000$. Assuming $Q>0$ **(04 Marks)**

(d) Prime Ltd are dealers in second hand art crafts, the company has defined its total cost function as $TC=2000 + 300Q$ and the revenue function as $TR=500Q - 2Q^2$ where Q is the output. The company has identified one of its objectives as maximising the profits.

REQUIRED

(i) Determine the company's profit function **(05 Marks)**

(ii) Determine the number of units that the firm should produce to maximize the profits from their operations **(06 Marks)**

(iii) Determine the total maximum profits that can be earned by this firm. **(04 Marks)**

QUESTION 6

(a) Define the following terms,

(i) Linear optimization

(ii) Infeasibility

(iii) Unboundness **(03 Marks @ 1 Mark)**

(b) Outline the applications of linear programming. **(05 Marks)**

(c) Supporters of a certain soccer team wish to accompany their team for a soccer match. They are to travel by a taxi and a mini-bus. The capacity of a taxi is 18 people while that of the mini-bus is 27 people. The number of supporters to go will not exceed 108.Each trip the taxi and the mini-bus make, cost shs.240, 000 and 300,000 respectively. The money contribution for the transportation of the supporters is shs. 2,400,000. The number of trips made by taxi should not exceed those made by the mini-bus by more than two.

Required

(i) Generate the resource constraints **(06 Marks)**

(ii) List all the possible trips that will exhaust the available funds. **(06 Marks)**

(iii) What is the greatest number of supporters that can be transported with the available funding? **(05 Marks)**

END