JARAMOGI OGINGA ODINGA UNIVERSITY OF SCIENCE AND TECHNOLOGY

SCHOOL OF BUSINESS & ECONOMICS

UNIVERSITY EXAMINATION FOR THE DEGREE OF BACHELOR OF BUSINESS ADMINISTRATION WITH IT

4TH YEAR 1ST SEMESTER 2015/2016 ACADEMIC YEAR

MAIN CAMPUS RESIT

COURSE CODE: ABA 402

COURSE TITLE: QUANTITATIVE METHODS IN BUSINESS II

EXAM VENUE: LAB 1 **STREAM: (BBA)**

DATE:06/05/16 **EXAM SESSION: 11.30 – 1.30PM**

TIME: 2 HOURS

Instructions:

1. **Answer Question ONE (COMPULSORY) and ANY other 2 questions**
2. **Candidates are advised not to write on the question paper.**
3. **Candidates must hand in their answer booklets to the invigilator while in the examination room.**

QUESTION ONE

(a) Interpret the final tableau of a simplex solution shown below:

Solution variable	X1	X2	X3	S1	S2	S3	Solution quantity
S2	0	0	0	1.25	1	-1.5	630
X1	1	0	0	0.75	0	3.0	250
X2	0	1	0	0	0	1	60
X3	0	0	1	-1.5	0	1.5	120
P	0	0	0	-6	0	-25	-42,200

Given, X1= units of product X1 and S1= Slack variable for Labour hours
X2= units of product X2 S2= Slack variable for Material in Kgs
X3= units of product X3 S3= Slack variable for Machine hours (**7marks)**

(b) A company has four salesmen who have to visit four clients. The profit records from previous visits are shown in the table below;

		Clients				
		A	B	C	D	
	1	$6	12	20	12	
Salesmen	2	22	18	15	20	Contributions to be gained (profits)
	3	12	16	18	15	
	4	16	8	12	20	

Required: maximize profits by the best assignments. **(6 marks)**

(c)(i)Define the term simulation and hence explain the concept *Monte carlo* simulation **(2marks)**

(ii)Highlight any two advantages of simulation approach. **(2 marks)**

(d) Analysis done by the department of management science shows that a students's core (Y) depents on the number of hours studied (X_1) , the students's IQ (X_2) and the number assignments done (X3). The general form is $Y= a + b_1 X_1 + b_2X_2+ b_3X_3$

Calculations have produced the following values

$Y= \$86 + 0.37X_1 + 0.08X_2 + 0.55X_3$

$r^2_{x1} = 0.78$, $r^2_{x2} = 0.16$, $r^2_{x3} = 0.20$ and $R^2 = 0.88$

Required: Interpret these values. **(5 marks)**

(b)The following data relates to the sales revenue for five trading periods for Nakumatt Supermarket.

Period	1	2	3	4	5
Sales($ million)	50	200	450	800	1,250

It is established that the relationship between sales and trading period is non- linear(ie logarithmic function).

Required:

(i)By taking x as the periods and y as the sales, linearise the expenetial relationship and hence determine the non-linear regresion equation in the form $\mathbf{y} = a\mathbf{x}^b$ **(7 marks)**

(ii)Estimate the sales during the 6th trading period. **(1 mark)**

QUESTION TWO

(a) Although the method of solving transportation problems differs in appearance from simplex method, it has some basic similarities. Highlight these similarities **(4 marks)**

(b) Unique Furniture manufactures chairs and Desks. A chair consumes 5 feet of timber and 10 labour hours while a desk consumes 20 feet of timber and 15 labour hours. A total of 400 labour hours and 450 feet of timber are available. The profit per chair and desk is Ksh. 45 and Ksh. 80 respectively. By letting Y_1= no. of Chairs and Y_2= no. of Desks manufactured by the company, you are required to:

(i)Formulate relevant simplex problem **(4 marks)**

(ii)Solve the simplex formulation up to two tableau **(8 marks)**

(iii)Assume there was 25 extra feet of timber, do a sensitivity analysis to determine the effect on the solution. **(4marks)**

QUESTION THREE

(a)Highlight the six steps/ guidelines for constructing a simulation model. **(6 marks)**

(b) Safaricom employs service engineers based at various locations through- out Western Kenya to service and repair their Communication equipment installed in various locations. Four requests for service have been received and the company finds that four engineers are available. The distances each of the engineers is from the various locations is given in the table below

		Locations				
		L1	L2	L3	L4	
Service	Albert	25	18	23	14	
Engineers	Bob	38	15	53	23	Distances in Km from engineers to
	Charles	15	17	41	30	Locations
	Dan	26	28	36	29	

Required: Assign engineers to locations to minimize the distance to be traveled, hence compute the minimum distance to be traveled by the engineers. **(14 marks)**

QUESTION FOUR

The cost of transportation per unit from three sources and four destinations are given in the table below.

SOURCE	DESTINATIONS				SUPPLY
	1	2	3	4	
1	4	2	7	3	250
2	3	7	5	8	450
3	9	4	3	1	500
DEMAND	200	400	300	300	1200

Required:

a. develop a linear programming model for the above transportation model **(5 marks)**

b. with reasons, state whether the transportation model is balanced or unbalanced **(2 marks)**

c. solve the transportation problem using the Least Cost Method to determine the initial basic feasible solutions **(10 marks)**

d. determine the transportation cost **(3 marks)**

QUESTION FIVE

(a) (i)What is queuing theory? **(1 mark)**

(ii) In designing a good queuing system, it is necessary to have good information about the model. List the characteristics features that would provide sufficient information **(3 marks)**

(b) The Managing Director is concerned about the persistent fluctuations in efficiency depicted by machine hours and production costs. In respect of production costs, it is desired to estimate an equation of the form $y = a + bx$, where y is the units produced at an activity level x, a is the fixed expense and b is the rate of variable cost.

The following data relates to the year ending 30 June 2015:

Month	**Machine hours**	**Maintenance cost (Shs000)**
January	26	500
February	26	500
March	31	530
April	35	550
May	43	580
June	48	680
July	34	640
August	30	620
September	34	620
October	39	590
November	42	500
December	32	530

(a)Using Regression analysis determine;

(i) variable cost per unit **(4marks)**
(ii) fixed cost **(4marks)**
(iii) a cost function that uses units produced to predict production costs **(1mark)**

(b) In January and February 2016, the company plans to allocate 51 and 55 machine hours. Calculate the forecasted production costs. **(2 marks)**

(c) Calculate the correlation coefficient and comment on the nature and strength of the relationship between machine hours and production costs **(5 marks)**