



JARAMOGI OGINGA ODINGA UNIVERSITY OF SCIENCE AND TECHNOLOGY
SCHOOL OF BUSINESS & ECONOMICS
UNIVERSITY EXAMINATION FOR THE DEGREE OF BACHELORS OF BUSINESS
ADMINISTRATION WITH IT
1ST YEAR 1ST SEMESTER 2018/2019 ACADEMIC YEAR
KISII CAMPUS-PART TIME

COURSE CODE: ABA 402

COURSE TITLE: QUANTITATIVE METHODS IN BUSINESS II

EXAM VENUE: STREAM: (BBA)

DATE: EXAM SESSION:

TIME: 2 HOURS

Instructions:

- 1. Answer QUESTION ONE and any other TWO 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 (COMPULSORY 30 MARKS)

(a) Differentiate between the following terms

- i. Product and slack variables (2marks)
- ii. Balanced and unbalanced assignment problems (2marks)

(b) A firm of wholesale of office equipment suppliers, with three warehouses, received orders for a total of 100 computers from 4 retail shops. In total, in the 3 warehouses there are 110 computers and the management wish to minimise transport costs by despatching the computers required from appropriate warehouses. Details of availabilities, requirements and transportation costs are given in the table below;

			Required				Total
			Shop A	Shop B	Shop C	Shop D	
	Computers		25	25	42	8	100
Available	Warehouse I	40	\$3	16	9	2	Transport cost per computer
	Warehouse II	20	\$1	9	3	8	
	Warehouse III	50	\$4	5	2	5	
	Total	110					

It is required to make the most economic deliveries. Make up the initial tableau and make the initial feasible deliveries. (5marks)

- (a) (i). Outline the characteristics of a queuing model (3marks)
- (ii). A health center has a single doctor taking care of patients arriving from a rural community. It is established that patients' mean arrival rate (λ) is one patient every 4 minutes and the mean service time (m) is $2\frac{1}{2}$ minutes.

Required

- i. Calculate the average number of patients in the queuing system (2marks)
- ii. the average queue length (2marks)
- iii. the time taken by a patient in the system (2marks)
- iv. the average time a patient waits before being served. (2marks)

(c) Outline the main applications of assignment problems in business (5 marks)

(d) Consider the multiple regression model $y_i = 4.987 + 2.542X_{i1} - 0.912X_{i2}$

Required:

- i. How many variables are in the model (1mark)
- ii. Interpret the relationship between y_i , x_{i1} and x_{i2} (2marks)
- iii. Use the model to predict y_i when $x_1 = 80$ and $x_2 = 12.5$ (2marks)

QUESTION TWO (20 MARKS)

(a) Unique Furniture manufactures chairs and Desks. If X_1 = no. of Chairs and X_2 = no. of Desks manufactured by the company, you are required to:

Maximize Profit, $P = 45X_1 + 80X_2$,

Subject to: $5 X_1 + 20 X_2 \leq 400$;Timber
 $10 X_1 + 15 X_2 \leq 450$;.....Labour hours
 $X_1, X_2 \geq 0$.

Required:

(i)Formulate relevant simplex problem (2 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. (2 marks)

(b) Trucks at a single platform weigh-bridge arrive according to Poisson probability distribution. The time required to weigh the truck follows an exponential probability distribution. The mean arrival rate is 12 trucks per day, and the mean service rate is 18 trucks per day.

Required:

- i. the probability that no trucks are in the system (2marks)
- ii. the average number of trucks waiting for service (2marks)
- iii. the average time a truck waits for weighing service to begin (2marks)
- iv. the probability that an arriving truck will have to wait for service (2marks)

QUESTION THREE (20 MARKS)

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 transportation model (5marks)

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 (11 marks)
- d. determine the transportation cost (3marks)

QUESTION FOUR (20 MARKS)

- a. (i). Explain the advantages of simulation (4marks)
- (ii). what is Monte Carlo Simulation (2marks)
- (iii). Outline the procedure for Monte Carlo Simulation (4marks)
- b. A company has four machines that are used for four jobs. Each job can be assigned to one and only one machine. The cost of each job on each machine is given in the following Table

	MACHINES			
	1	2	3	4
A	20	38	19	13
B	15	30	31	28
C	40	21	20	17
D	21	28	26	12

Required

- i. the optimal assignment of jobs (8marks)
- ii. the cost that will be involved. (2marks)

QUESTION FIVE (20MARKS)

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

(2marks)

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

(3marks)

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

(7marks)