TECHNICAL UNIVERSITY OF MOMBASA

SCHOOL OF BUSINESS

DEPARTMENT OF MANAGEMENT SCIENCE

UNIVERSITY EXAMINATION FOR:

DIPLOMA IN PROCUREMENT AND MATERIALS MANAGEMENT
DIPLOMA IN LOGISTICS AND TRANSPORT MANAGEMENT
DIPLOMA IN HUMAN RESOURCES MANAGEMENT
DIPLOMA IN BUSINESS ADMINISTRATION
DIPLOMA IN SALES&MARKETING MANAGEMENT
DIPLOMA IN BUSINESS MANAGEMENT
DIPLOMA IN ACCOUNTANCY
DIPLOMA IN FRONT OFFICE

BAC 2201: QUANTITATIVE TECHNIQUES

END OF SEMESTER EXAMINATION

SERIES:AUGUST2019

TIME:2

DATE:Pick DateAug

Question ONE

a) An employee who received fixed annual increments had a final salary of ksh 9000 p.a

after 10yrs..If his total salary was 65000 over 10yrs, what was his initial salary? (10marks)

(b) How long will it take for a sum of money double itself amounts to at 8%p.a compound interest (5marks)

ci)Find the derivative of the following function

$y=(5x^3+4)(x^4+2x)$ (8marks)

cii)Find the integral of the following function

$\int(20x-20-4x^2)dx$ (2marks)

d) A company produces two products x and y with respective contribution/unit of ksh.40   and ksh30. There are 3 resource constraints i.e.
- Processing hours
- Skilled labour hours
- Material a, which is used in the production of x and y

The table below identifies the resource requirements in the production of x and y.

Resources	X	Y	Total available
Processing hours/unit	3	4	2 000
Skilled labour hrs/unit	2	5	3 000
Material A per kg	4	3	5000

Required

 Formulate a linear programme in standardized format   (5marks)

Question TWO

(a) Solve the simulteneous equations below using the inverse method:

2x + 3y+4z = 16
3x + 4y-3z = 14
 x +2y- 3z= 4   (12marks)

b) Abc Ltd has 3 production depots, A with a capacity of 2000 units; B with a capacity of 2500 units and C whose capacity is 2300 units. The units are marketed through 3 destinations X Y and Z with demand of 2800, 1800 and 2200 units respectively. The production costs in the factory are the same so that the transportation cost between the factories will determine which factory supplies to which market area. These costs are given in the table below

Destinations

		X	Y	Z	Capacity
	A	[3]	[6]	[2]	2000
Sources	B	[5]	[9]	[5]	2500
	C	[4]	[5]	[2]	2300
	Requires	2800	1800	2200	6800

Required

Find the initial feasible solution using north west corner rule (8marks)

Question THREE

a)Modern coastbus has two main branches that manage offices throughout Kenya. Mombasa branch controls coastal offices while Nairobi manages the upcountry offices. Each office has conductors ,mechanics and drivers as show below

Type of office

	large	medium	small
conductors	8	6	4
mechanics	7	4	3
drivers	12	8	5

The number of offices are-;

	Nairobi	Mombasa
large	13	7
medium	15	8
small	12	4

Required;

Find the number of various kinds of staff employed in Nairobi and Mombasa using matrix method. (10marks)

b) Repairmen Ali, Bozo and Charles would be allocated jobs of repairing a phone, radio, & television with the following costs.

	Radio	Phone	Television
Ali	11	14	15
Bozo	18	10	13
Charles	12	19	17

Assign each repairman a job which minimizes the cost of repair   (10marks)

Question FOUR

a) EvaG ltd as a result of past experience estimates that the weekly production costs and revenues   are as follows-; $C=100+100q+2q^2$ and $R=800q-5q^2$ where C is the total costs R is the total revenue and q is the quantity produced/sold

   Required find;

(i) The quantity that maximizes total revenue (2marks)

(ii)   The maximum total revenue (2marks)

(iii) The quantity that maximizes profit (4marks)

(iv) The maximum profit (2marks)

b) A firm wishes to undertake a project whose activities and project durations are given as follows;

Activity	Predecessor	Duration [Months]
A	-	3
B	A	4
C	A	7
D	B	5
E	A	8
F	E,D	4
G	F	3
H	C	6
J	E	9
K	G,H,J	5

Required

i. Draw a network diagram for the project(7marks)

ii. Determine the project duration and the critical activities (3marks)

Question FIVE

a) What are the requirements of a linear programming problem?   (5marks)

b) XYZ Ltd produces two products Alpha and Beta using the same raw material, labour and machinery. Alpha and Beta contributes ksh. 6000 and 5000 per unit respectively. Details of the products are given below:

Resources/Unit	Alpha	beta	Maximum/week
Machine hours	3	5	4500 hours
Labour hours	2	3	4200 hours
Material input [Q]	1	2	1000 kg

The maximum weekly demand of product Beta is 400 units using graphical method

Required
1) Formulate the above as a LP problem (5marks)
2) Determine the optimal level of output of each product per week using graphical method. (10marks)