TECHNICAL UNIVERSITY OF MOMBASA

Faculty of Business & Social Studies

DEPARTMENT OF BUSINESS STUDIES

DIPLOMA IN PROCUREMENT AND MATERIALS MANAGEMENT
DIPLOMA IN HUMAN RESOURCE MANAGEMENT
DIPLOMA IN BUSINESS ADMINISTRATION
DIPLOMA IN BUSINESS MANAGEMENT
DIPLOMA IN ACCOUNTANCY

BAC 2201: QUANTITATIVE TECHNIQUES

END OF SEMESTER EXAMINATIONS

SERIES: APRIL 2015

TIME: 2 HOURS

INSTRUCTIONS:

- This paper consists of **FIVE** questions.
- Answer question **ONE (Compulsory)** and any other **TWO** questions.
- Do not write on the question paper

This paper consists of Four printed pages.

QUESTION 1 (Compulsory)

a) Define the following terms:
   i) Operation research
   ii) Differentiation
   iii) Linear programming
   iv) Economic order quantity
   v) Geometric progression. **(10 marks)**

b) If a firm buys a lorry for Kshs. 3,250,000 and is expected to last for 20 years and have a scrap value of Kshs. 750,000 when depreciation is on straightline method.
   How much should be provided for in each year? **(5 marks)**

c) Given

$$A=\begin{bmatrix}3 & 1\\ 2 & 4\\ 7 & 4\end{bmatrix} \qquad B=\begin{bmatrix}8 & 0 & 5 & 4\\ 3 & 2 & 11 & 1\end{bmatrix}$$

   Calculate AB **(5 marks)**

d) A firm has two products X and Y with contribution of Ksh. 80 and Ksh. 100 per unit respectively. Production data per unit are:-

	Labour hours	**Material A**	**Material B**
X	3	4	6
Y	5	2	8
Total available	500	350	80

   Formulate the LP model in standardized manner. **(5 marks)**

e) Differentiate $y=\frac{1}{4}x^4-10x^2+9x^3$ **(2 marks)**

$\int_2^5 (1/3x-60x^4)\,dx$ **(3 marks)**

QUESTION 2

Given the following project in weeks:

Activity	Preceeding Activity	Most likely	Optimistic	Pessimistic
A	-	3	2	4
B	-	12	10	20
C	A	5	4	12
D	B	4	2	6
E	D, A	3	3	3
F	B	4	3	5
G	C, E,F	10	8	18
H	G	3	2	4
I	G	2	2	2
J	H	5	4	6
K	I,J	4	2	12

Using project evaluation and review technique (PERT)

a) For each task find the mean and standard deviation. **(5 marks)**

b) Draw a network and find the critical path using the mean. **(10 marks)**

c) Determine the mean and standard deviation of the critical path duration**.** **(5 marks)**

QUESTION 3

A company produces two products A and B. Product A contributes Ksh. 3l per unit and product B contributes Kshs. 4 per unit. The firm wants to establish the weekly production plan which maximizes contribution.

Production data are as follows:

	Machine Hrs per unit	Labour hours	Material Kgs.
A	4	4	1
B	2	6	1
Total available per week	100	180	40

Because of trade agreement sales of product A are limited to a weekly maximum of 20 units and atleast 10 units of product B must be sold per week.

Required:

i) Formulate a LP model. **(5 marks)**

ii) Solve using simplex method. **(15 marks)**

QUESTION 4

a) As a result of past experience ABC Ltd has established that the total cost and total revenue functions are as follows:

$$C = 100 + 10q + \tfrac{1}{2}q^2$$
$$R = 100q - q^2, \ (q < 100)$$

Where C = Total cost
R = Quantity produced/sold

Required:

i) Find the production level at which profit is maximized
ii) Maximum profit
iii) Quantity which would maximize revenue
iv) Maximum total revenue. **(10 marks)**

b) Stock costs are costs associated with running out of stock. Explain **FIVE** types of these costs. **(10 marks)**

QUESTION 5

a) Total petrol station has filling stations in Mombasa and Malindi where each station has cashiers, attendants and mechanics as shown below.

	Size of the filling station		
	Large	**Medium**	**Small**
Cashier	4	2	1
Attendants	12	6	3
Mechanics	6	4	2

The number of filling stations are

	Mombasa	**Malindi**
Large stations	3	7
Medium stations	5	8
Small stations	12	4

How many various types of staff are employed in Mombasa and Malindi. **(10 marks)**

b) Mutiso works in a firm where his annual salary increase is Ksh. 2,650. If his first salary was Ksh. 26,500.

i) What will be his salary after 10 years? **(5 marks)**
ii) How much will he have earned for working for 15 years? **(5 marks)**