TECHNICAL UNIVERSITY OF MOMBASA

Faculty of Business & Social Studies

DEPARTMENT OF BUSINESS STUDIES

DIPLOMA IN PROCUREMENT AND MATERIALS MANAGEMENT
DIPLOMA IN LOGISTICS AND TRANSPORT MANAGEMENT
DIPLOMA IN HUMAN RESOURCE MANAGEMENT
DIPLOMA IN BUSINESS ADMINISTRATION
DIPLOMA IN BUSINESS MANAGEMENT

BAC 2201: QUANTITATIVE TECHNIQUES

SPECIAL/SUPPLEMENTARY EXAMINATIONS

SERIES: FEBRUARY 2015

TIME: 2 HOURS

INSTRUCTIONS:

- This paper consists of **FIVE** questions.
- Answer question **ONE (Compulsory)** and any other **TWO** questions.

This paper consists of Four printed pages.

QUESTION 1 (Compulsory)

a) Explain **FOUR** essential features of quantitative techniques approach. **(4 marks)**

b) If $A = \begin{bmatrix} 3 & 11 & 6 \\ 9 & -3 & 8 \\ 5 & 0 & 9 \end{bmatrix}$ $Y = \begin{bmatrix} 2 & 2 & 0 \\ 0 & -4 & 5 \\ 5 & -8 & 7 \end{bmatrix}$

Find x – y

(3 marks)

c) A company has set up a sinking fund and invests Ksh. 100,000 each year for 5 years at 9% compound interest. What will the fund be worth after 5 years. **(5 marks)**

d) Explain any **FOUR** reasons for holding stock. **(4 marks)**

e) Draw a network and calculate the critical path and duration:

Activity	**Preceding activity**	**Duration (in weeks)**
A	-	1
B	-	2
C	A	3
D	-	5
E	B	1
F	C	4

(8 marks)

f) A manufacturer procedures two products A and B. A has a contribution of Ksh. 30 per unit and B contributes Ksh. 40 per unit. The manufacturer wishes to establish weekly production plan which maximizes contribution.

Production data is as follows per unit:

	Machine hours	**Labour hrs**	**Material hrs**
A	4	4	1
B	2	6	1

Sales of A are limited to a weekly maximum of 20 units and atleast 10 units of B must be sold per week:

Required:
Formulate the linear program model. **(6 marks)**

QUESTION 2

a) Otieno has secured a loan of Ksh. 3.6 million to buy a house. The loan capital excluding interest is to be repaid in equal monthly instalments over a period of 15 years. An interest rate of 2% is charged on monthly outstanding balance of the loan capital and interest is paid at the end of each month.

Required:

i) Prepare a loan repayment for the first 6 months showing the monthly interest charged and the total loan repayment. **(10 marks)**

ii) Calculate the total interest paid over 15 year period. **(5 marks)**

b) Solve using matrix method:

$3x + y = 7$

$5x + 2y = 12$

(5 marks)

QUESTION 3

Mombasa Motors Ltd produces two types of vehicles, minibus and lorries. Each goes through the production department namely wiring, pressing and assembling. Each minibus requires 2 hrs of Pressing, 6 hrs of wiring and 4 hrs of assembling. The lorries require 4 hrs of pressing, 2 hrs of wiring and 4 hrs of assembling. Each week the resources required are 160 hrs of pressing 240 hrs of wiring and 200 hrs of assembling. The profit from each product is Ksh. 600 and Ksh.. 800 per unit for minibus and lorries respectively.

Required:

a) Formulate this problem as a linear program. **(5 marks)**

b) Solve the LP model using simplex method. **(15 marks)**

QUESTION 4

a) Mapato producers analysed their operating costs and prices and came up with the following functions:

$TR = 400q - 4q^2$

$TC = q^2 + 10q + 30$

Where q is the quantity sold and produced

TC is the total costs incurred
TR is the total revenue realized.

Required:

i) Quantity that should be sold to maximize profit.

ii) The selling price of the commodity.

iii) The maximum profit realized. **(10 marks)**

b) Rehema has a shop that sales 5 tons of rice every year. The demand for rice is evenly spread throughout the year and the rice is purchased at Ksh. 50 per Kg. It costs Ksh. 100 to place an order and the ordering costs are estimated at Ksh. 4 per unit.

Determine

i) The Economic Order Quantity

ii) The total inventory cost. **(10 marks)**

QUESTION 5

Use PERT to draw a network diagram of the following project.

Activity	**Preceding**	**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

Required:

a) For each activity find the mean duration and standard deviation σ

b) Draw a network diagram.

c) Determine the mean and standard deviation of the critical path.

(20 marks)