# TECHNICAL UNIVERSITY OF MOMBASA
## *School of Business*

DEPARTMENT OF BUSINESS ADMINISTRATION

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**

SPECIAL/SUPPLEMENTARY EXAMINATIONS

**SERIES:** JUNE/JULY 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) Solve the following:

$$A=\begin{bmatrix}2 & 3 & -1\\ 4 & 0 & 3\\ 3 & 3 & 4\end{bmatrix}\quad B=\begin{bmatrix}2 & 1 & 1\\ -1 & 0 & 2\\ 0 & -3 & 3\end{bmatrix}\quad C=\begin{bmatrix}1 & 2\\ -3 & 3\\ 4 & -1\end{bmatrix}$$

i) A – B **(2 marks)**

ii) B C **(3 marks)**

b) Aisha who received a fixed annual increments had a final salary of Ksh. 90,000 p.a after 10 years. If her total salary was Ksh. 650,000 over the 10 years, what was her initial salary. **(5 marks)**

c) Explain any **FIVE** stages in quantitative techniques study. **(10 marks)**

d) Explain the following terms as used in network analysis.

i) Network analysis

ii) Activity

iii) Event

iv) Dummy activity

v) Critical path. **(10 marks)**

**QUESTION 2**

a) Given the following project:

| **Activity** | **Preceeding activity** | **Duration in week** |
|---|---|---|
| A | - | 9 |
| B | - | 3 |
| C | A | 8 |
| D | A | 2 |
| E | A | 3 |
| F | C | 2 |
| G | C | 6 |
| H | C | 1 |
| J | B, D | 4 |
| K | F, J | 1 |
| L | E, H, G, K | 2 |
| M | E,H | 3 |
| N | L, M | 4 |

i) Draw a network diagram
ii) Find the critical path. **(10 marks)**

b) i) Find the derivative of

$y = (8x + 4)\ (2x^3 + 6)$ **(5 marks)**

ii) $\int_0^5 (3X + 10)\, dx$ **(5 marks)**

**QUESTION 3**

a) A firm has two products X and Y with contribution of Ksh. 8 and Ksh. 10 per unit respectively. Production data per unit are:

| | **Labour hours** | **Material A** | **Material B** |
|---|---|---|---|
| **X** | 3 | 4 | 7 |
| **Y** | 5 | 2 | 8 |
| **Total available** | 500 | 350 | 800 |

i) Formulate the LP Model in standard form. **(5 marks)**
ii) Solve using graphical method. **(5 marks)**

b) How much will have to be invested now to produce Ksh. 200,000 after 10 years with a 10% compound interest rate? **(5 marks)**

c) If a car is bought for Ksh. 325,000 and is expected to last for 10 years and have a scrap value of Ksh. 75,000 how much depreciation should be provided for if the firm uses straight line method?
**(5 marks)**

**QUESTION 4**

a) i) Solve using matrix method

$3x + 4y = 10$

$2x + 7y = 11$

ii) $x = \begin{bmatrix} 1 & 2 & 0 \\ 0 & -4 & 5 \\ 5 & -8 & 7 \end{bmatrix}$ *find* $X^{-1}$

**(10 marks)**

b) The following data relate to a particular stock item:

| | |
|---|---|
| Normal usage | 110 per day |
| Minimum usage | 50 per day |
| Maximum usage | 140 per day |
| Lead time | 25 – 30 per day |
| EOQ | 5,000 |

Calculate

i) Re-order level
ii) Maximum level
iii) Minimum level

**(10 marks)**

**QUESTION 5**

Draw a network diagram of the following project

| **Activity** | **Preceeding activity** | **Duration in months** |
|---|---|---|
| A | - | 9 |
| B | - | 3 |
| C | A | 8 |
| D | A | 2 |
| E | A | 3 |
| F | C | 2 |
| G | C | 6 |
| H | C | 1 |
| I | B, D | 4 |
| J | F, J | 1 |
| K | E, H, G, K | 2 |
| L | E,H | 3 |
| M | L, M | 4 |

**Required:**

a) Draw network diagram.

b) Find critical path

c) Find the total float, freefloat, independent float for each non critical activity

**(20 marks)**