



**MURANG'A UNIVERSITY COLLEGE (MRUC)**  
(A *Constituent* College of Jomo Kenyatta university of Agriculture & Technology)

SCHOOL OF BUSINESS AND ECONOMICS

UNIVERSITY EXAMINATION 2013

FIRST YEAR FIRST SEMESTER EXAMINATION

FOR THE DEGREE OF BACHELOR OF HUMAN RESOURCE

HBC 2110: MANAGEMENT MATHEMATICS

(SPECIAL/SUPPLEMENTARY)

DATE:

TIME: 2 HOURS

**INSTRUCTIONS**

Answer Question *ONE* and any *OTHER TWO* Questions.

**QUESTION ONE; COMPULSORY QUESTION (30 MARKS)**

a) A construction company purchased equipment at a cost of Sh 675,000. The equipment is expected to have a useful life of 10 yrs and a resale of sh 187,988. The company's policy is to charge depreciation using the reducing balance method.

**Required;**

The annual depreciation rate of the equipment (6 marks)

b)i) Determine the net present values for the projects will the following cash flows.

**Project A:**

Year	0	1	2	3	4
Cash Flows	-4,000	+800	+600	+700	+500

**Project B**

Year	0	1	2	3	4	
Cash flows	-4000	+650	+650	+650	+650	(8marks)

ii) Which project is more acceptable?

Support your answer (2 marks)

c) Solve the following quadratic equations

i)  $4-12x + 3x^2 = 0$  (3marks)

d) Show the regions represented by the following inequalities of two products X and Y

$$2x + y \leq 50$$

$$X + 3y \leq 90$$

Where 'X' and Y' are the amounts of products X and Y (6 marks)

If a product X sells for sh 400 and Y for sh 300, determine the number of each products X and Y that produce maximum revenue (3 marks)

Determine the maximum revenue (2 marks)

**(TOTAL;30 Marks)**

### ANSWER ANY TWO QUESTIONS

#### QUESTION TWO

(a) An Estate agent receives commission on the sale of property as follows:-

- 5% on the first sh 100,000 of the sale price.
- 3% on the remainder of the sale price

Required;

The sale price of the property where the estate agent receives a total commission of sh 391,000

(7 Marks)

b) Convert the following none- linear equations into linear form and for each illustrate with a graphical sketch;

i)  $Y= ax^2 + c$  (3 marks)

ii)  $y=a + \frac{b}{x}$  (3 marks)

c) Evaluate the sum to infinity of the following series

3/4, 3/16, 3/64, 3/256, ...

( 7 marks)

**(TOTAL 20 MARKS)**

### **QUESTION THREE**

(a) Differentiate between “set union” and set intersection as used in set theory. (2 marks)

b) Faulu college has a total number of 52 students undertaking three courses namely; management mathematics, introduction to accounting and introduction to management. During the recently conducted examinations, 13 students excelled in management mathematics and Introduction to management, 16 students excelled in management mathematics and introduction to accounting and 12 students excelled in introduction to management and introduction to accounting. The number of students that excelled in introduction to accounting was 24 while 2 students excelled in none of the three courses. The number of the students who excelled in management mathematics only was twice the number of students who excelled in introduction to management only. The number of students who excelled in introduction to management only was six times the number of students who excelled in introduction to accounting only.

Required;

i) Present the information in Venn diagram (6 marks)

ii) The number of students who excelled in all the three courses (4 marks)

iii) The number of students who excelled in two courses only (4 marks)

**(TOTAL; 20 MARKS)**

### **QUESTION FOUR**

(a)(i) That  $y=ax^b$ , where ‘y’ denotes predicted variable, ‘a’ and ‘b’ are constants while ‘x’ denotes the time periods; transform the equation into a logarithmic form (3 marks)

ii) The following data was extracted from the books of accounts of company XYT limited.

Year	sales (in millions of sh)
2008	50
2009	200
2010	450
2011	800
2012	1,250

From the previous experience, the data conforms to a logarithmic function of the form  $y=ax^b$

**Required;**

(I) Determine constants 'a' and 'b' (10 marks)

(II) Predict the sales for the year 2014 (3 marks)

(b) Determine the roots of the following quartic equation

$$X^3 + 2X^2 - X - 2 = 0 \quad (4 \text{ Marks})$$

**(TOTAL; 20 MARKS)**

### QUESTION FIVE

(a) A company manufactures three products X, Y and Z, each of which must go through three processes A, B and C, for the following three times;

<i>Product</i>	<i>Time spent in the process</i>		
	A	B	C
X	3	3	1
Y	3	2	3
Z	2	0	1

The maximum capacities of processes A, B, and C are 130, 85 and 60 respectively.

#### **Required**

The number of units to be produced of X, Y and Z (10 Marks)

(b) The second term of an arithmetic progression is 7 and the ninth term is 28 .

Determine the;

(i) Common difference (5 Marks)

(ii) First term of the sequence (5 Marks)

**(TOTAL; 20 MARKS)**