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

DATE: TIME: 2 HOURS

INSTRUCTIONS

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

COMPULSORY QUESTION (30 MARKS)

QUESTION ONE

a) Given the series 9 + 15+ 21+……..

Determine the ;

i) 20^{th} term of the series (3 marks)

ii) Sum of the first 20 terms of the series (5 marks)

b) Njoki, Atieno and mwema are green grocers based in Nairobi. Recently, the three grocers travelled to Molo town to purchase potatoes, tomatoes and mangoes for sale. Njoki purchased 2 bags of potatoes, 6 boxes of tomatoes and bags of mangoes at a total of sh 20,020. Atieno

purchased 10 bags of potatoes, 4 bags of tomatoes, and I bag of mangoes at a total cost of sh 21,800. Mwema purchased 1 bag of potatoes, 7 boxes of tomatoes and 6 bags of mangoes at a total cost of sh 21,900. The transportation cost of the groceries from molo town to Nairobi was sh 100 per bag of potatoes, sh 150 per box of tomatoes and sh 120 per bag of mangoes. The green grocers sold the groceries at sh 1,800 per bag of potatoes, sh 1,600 per box of tomatoes and sh 2,500 per bag of mangoes

Required;

i) The unit cost price of each type of grocery (8 marks)
ii) The total profit earned by the three grocers. Assume that no additional cost was incurred by the green grocers. (4 marks)

c) Solve the equation $2x^2-10=11x-22$ (4 Marks)

d) Determine the $\frac{dy}{dx}$ given that;

(i) $y=(x^2+4x+4)/ (x-2)$ (3 marks)

(ii) $y=(x-5)^2/5x$ (3 marks)

(Total 30 marks)

ANSWER ANY TWO QUESTIONS

QUESTION TWO

a)A company wishes to invest sh 30,000,000 in order to buy a plant in five years from now. Currently, the investment rates are at a nominal of 10% p.a. Determine the amount after five years if the investment rate is compounded semi-annually. (6 marks)

b) 250 members of a certain society have voted to elect a new chairman. Each member may vote for either one or two candidates. The candidate to be elected is the one who polls most votes. Three candidates X,Y, and z,stood for election and when the votes were counted it was found that;

59 voted for ‘y’ and, 37 for z only, 12 voted for X and Y, 14 voted for X and Z.147 voted for either X and Y or both ‘X and Y but not for z. 102 voted for ‘Y’ or ‘z’ or both but not for X

Required;

Determine

I) The number of possible voters who did not vote (4 marks)
II) How many voters voted for 'X' only (5 marks)
III) Who won the election (5 marks)

(Total 20 marks)

QUESTION THREE

a) The revenue and cost functions of midland company Ltd are quadratic in nature. The following data was obtained from the company's records.

Quantity (q)	4	8	12
Revenue (R)	1,536	2,944	4,224
Total cost (2)	7616	7,264	6,944

Required;

Determine total revenue, total cost and profit functions (10 marks)

b) It is estimated that an investment in a new process will cause the following cash flow (in sh000)

End year	0	1	2	3	4	5	6
Cash flow	-	-	15,000	20,000	20,000	20,000	20,000
Cash outflow	60,000	10,000					

The business wishes to earn at least 15% per annum on projects of this type. Calculate the net present value of the project and comment on the course of action to be taken (10 marks)

(Total 20 marks)

QUESTION FOUR

a) The profit, in sh'000', from a daily production activity is given by *P*,which is a function of the level of production ,x,(in thousands).

If dp/dx=11-2x and that there are two levels of production when where profit is zero, one of them being 3000 units

Required;

i) P as a function of x (2 marks)

ii) the other point when profit is also zero (3 marks)

iii) the daily production activity that gives maximum profit (3 marks)

iv) the value of maximum daily profit (2 marks)

b) Calculate the net present value of sh 125,000 which is payable at the end of each of the five years and subject to a discount rate of 8% (5marks)

c)Subject to the conditions;

$2x + 3y \leq 120$ and $2x + y \leq 60$

With X, Y being non-negative integers ,determine the;

(i) Values of 'X' and 'Y' that maximizes the functions 2x +2y (4 marks)

(ii) Maximum value (1 mark)

(Total 20 marks)

QUESTION FIVE

(a) From a research carried out recently, the following data was observed to be in line with a growth curve of the form

$Y=pq^x$ where 'p' and 'q' are constants

Year	sales sh 'millions'
2008	100
2009	150
2010	225
2011	337.5
2012	506.25

Determine the

i) Values of constants 'p' and 'q' (14 marks)
ii) Sales the year 2014 (2 marks)

(b)Evaluate the sum to infinity of the following series

0.1, 0.01, 0.001……. (4 marks)

(Total 20 marks)