



**JARAMOGI OGINGA ODINGA UNIVERSITY OF SCIENCE AND TECHNOLOGY**  
**SCHOOL OF BUSINESS AND ECONOMICS**  
**UNIVERSITY EXAMINATION FOR THE DEGREE OF BACHELOR OF BUSINESS**  
**ADMINISTRATION WITH IT**  
**2<sup>ND</sup> YEAR 1<sup>ST</sup> SEMESTER 2013/2014 ACADEMIC YEAR**  
**BUSIA L. C.**

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**COURSE CODE: ABA 205**

**COURSE TITLE: MANAGEMENT MATHEMATICS II**

**EXAM VENUE:**

**STREAM: (BBA)**

**DATE: 10/12/14**

**EXAM SESSION: 9.00 – 11.00 AM**

**TIME: 2 HOURS**

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**Instructions:**

- 1. Answer ALL questions in section A and ANY other 2 questions in section B**
- 2. Candidates are advised not to write on the question paper.**
- 3. Candidates must hand in their answer booklets to the invigilator while in the examination room**

**Answer question one compulsory and any other 2**

Q1. A) Machine 1 and II produce items x, y and z at the hourly rate given in Matrix H. Matrix D gives the number of hours each machine runs during the week.

$$\begin{matrix} X \\ Y \\ Z \end{matrix} \begin{pmatrix} 3 & 2 \\ 5 & 4 \\ 1 & 2 \end{pmatrix} = H \qquad D = \begin{pmatrix} & M & T & W & T & F \\ 8 & 8 & 8 & 7 & 7 \\ 6 & 10 & 12 & 11 & 9 \end{pmatrix}$$

Required

- i) The number of y items produced on Monday (3mks)
  - ii) The number of z items produced on Thursday (3mks)
- b) Differentiate the following terms by using relevant examples
- i) Dependent and independent variable (2mks)
  - ii) Transpose and inverse of a matrix (2mks)
  - iii) Local minimum and local maximum (2mks)
  - iv) Domain and Range (2mks)
  - v) Slack variable and a constraint (2mks)
- c) i) Find the derivative of  $y = 3x + 5$  using the first principle (Delta method) (4mks)
- ii) Explain markov chain process (3mks)
- d) Explain 3 characteristics of input output analysis (3mks)
- e) Explain the application of exponential functions in growth and decay process (4mks)

Q2.

a) Solve for  $x_1$ ,  $x_2$  and  $x_3$  given

$$2x_1 + 3x_2 - x_3 = 7$$

$$x_1 + x_2 + 2x_3 = 8$$

$$5x_1 - 2x_2 + x_3 = 15 \qquad (12\text{mks})$$

b) Explain any 4 assumptions of Markov chain analysis (4mks)

c) Integrate the function  $(6x^4 + 2x^2 + 5)$  with respect to x (4mks)

**Q3.** A marketing manager in a company dealing in newspapers carried out a market study which showed that of those customers who buy nation in a day, 85% will buy nation the next day, 5% will change to standard and 10% to the people. Of those who buy standard one day, 20% change to nation the next day and 60% will stay with standard and 20% will change to the people. Of those who buy the people, 15% change to standard and 5% change to nation. The market share enjoyed by the newspapers currently stands at 50% for nation, 35% for standard and 15% for the people.

Required

- a) Calculate the next day's market shares for the newspapers (10mks)
- b) By use of relevant examples explain any 3 properties of determinants (6mks)
- c) If  $y = (2x + 3)(x^3)$  calculate  $dy/dx$  (4mks)

**Q4.** The following related sales in (000)s of shillings on a given time period

Period	sales
1	50
2	200
3	450
4	500
5	1250

- i) Use the information to generate a logarithmic functions of  $x$  (period) in terms of sales ( $y$ ) in the form  $y = ax^b$  (10mks)
- ii) Use the function in (i) to find the value of  $y$  when  $x = 6$  (3mks)

b) The revenue function for an organization is given as  $R = 12x - 0.08x^2$  and the cost function as  $100 + 5x$  where  $x$  is the quantity produced and sold. Calculate the quantity produced to maximise the profit. Confirm that the profit is maximum (7mks)

**Q5.** A factory manufactures 2 articles  $x$  and  $y$ . To manufacture article  $x$  a certain machine has to be worked for  $1\frac{1}{2}$  hours and in addition a craftsman has to work for 2 hours. To

manufacture y the machine has to work for  $2\frac{1}{2}$  hours in a week in addition a craftsman has to work for  $1\frac{1}{2}$  hours a week. The factory avails 80 machine hours and 70 craftsman hours. The profit on each article of x is £5 and of y is £4. All the articles produced are sold.

Require:

- a) Formulate the problem as an LP model (10mks)
- b) Consider an economy of 2 sectors x and y

Producer	User		Final demand	Total Output
	X	Y		
X	400	250	140	900
Y	220	260	110	700

**Required:**

The output factor of the economy if the demand changes to 180 for x and 80 for y (10mks)