JARAMOGI OGINGA ODINGA UNIVERSITY OF SCIENCE AND TECHNOLOGY

UNIVERSITY EXAMINATION FOR THE BARCHELOR OF BUSINESS ADMINISTRATION WITH IT SECOND YEAR SECOND SEMESTER

SCHOOL OF BUSINESS AND ECONOMICS

MAIN CAMPUS

ABA 205: MANAGEMENT MATHEMATICS II

DURATION: 2HOURS

INSTRUCTIONS

1. **Answer QUESTION ONE and any other TWO questions.**
2. **Show clearly and neatly all the workings.**
3. **Do not write anything on the question paper.**

QUESTION ONE (30 MARKS) - COMPULSORY

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a) There are thre firms P,Q and R sharing a market as 40%, 40%, and 20 % respectively on January1, 2012. Over a year , the followibng developments take place: P retains 80% of customers , losses 16% to Q and 4% to R. Q retains 84% of customers, losses 12% to P and 4% to R. R retains 76% of its custmers , losses 18% to P and 6% to Q
Assume that the market does not change,

i) Market share to be held by each firm on january 1, 2014 **(6marks)**

ii) What would be the lonrun shares of the firms. **(6marks)**

iii) Outline three posible reasons responsible for the market share of firm Q as revealed by the equilibriam state**.** **(3marks)**

b) Given that B = $\begin{bmatrix} 6 & -5 & 8 \\ 7 & 1 & 10 \\ -3 & 2 & 0 \end{bmatrix}$ find,

i. B^T-B **(3marks)**

ii. The determinant of the matrix B **(3marks)**

c) (i) Work out: $\int(4x^3 + 3x^2 - 6x - 12)dx$ for $1 \leq x \leq 5$ **(5marks)**

(ii). Find the derivative of the function $Y = (3+2x^2)(4x^3 - 1)$ using the product rule **(4marks)**

QUESTION TWO

(i).The total cost (TC) function of a company XYZ is given as $TC=10000+50Q+4Q^2$, where Q=Units produced. Determine the units XYZ company should manufacture to minimize its average cost **(6marks)**

a. Solve the following matrix equation using inverse method **(8marks)**

$$\begin{bmatrix} 6 & -15 \\ 3 & 18 \end{bmatrix} \begin{pmatrix} x \\ y \end{pmatrix} = \begin{bmatrix} 12 \\ 51 \end{bmatrix}$$

b. Explain **four** assumptions underlying input-out analysis in business. **(6marks)**

QUESTION THREE (20 MARKS)

a) Outline **four** assumptions necessary to subject a problem to a linear model **(4marks)**

b) Suppose a company produces two types of testers, Normal and Standard. Each requires in its manufacture the use of three machines; A, B, and C. A Normal tester requires the use of the machine A for 2 hours, machine B for 1 hour, and machine C for 1 hour. A standard tester requires 1 hour on A, 2 hours on B, and 1 hour on C.The maximum numbers of hours available per month for the use of machines A, B, and C are 180, 160, and 100, respectively. The profit on a Normal tester is \$4 and on standard tester is \$6. The company objective is to maximize profit.

Required:

i. Formulate a linear Programme problem to maximize monthly profit. **(6 marks)**

ii. Use graphical method to determine optimal solutions, hence maximum profit. **(4 marks)**

iii. Solve the dual problem. **(6marks)**

QUESTION FOUR (20MARKS)

(a) Total cost function of a firm is stated as: $C= x^3/3 -3x^2+9x+16$
Demand function as: 21-x

Required:

i) Revenue function of the firm **(2marks)**
ii) Marginal revenue function **(2marks)**
iii) Profit function **(4marks)**
iv) Maximum profit **(6marks)**

c) Explain any three assumptions necessary to subject a problem to linear programming (6marks)

QUESTION FIVE (20MARKS)

a. Briefly explain the following terms as used in Input-output analysis

i) Intermediate demand **(2marks)**
ii) Total output **(2marks)**
iii) Technical matrix **(2marks)**

iv) The table below shows two sector economy Agriculture and Industry

Input	**Inter Industry Sector**		**Final Demand**	**Total Output**
	Agriculture	**Energy**		
Agriculture	1000	1200	200	2400
Energy	1600	2400	800	4800
Consumers (Primary input)	600	400	0	1000
Total input	3200	4000	1000	8200

Required:

i) Technical coefficient matrix **(2marks)**

ii) Suppose the final demand for agriculture increased by 60% and that of Energy reduced by 5%, determine the total output that will satisfy intermediate demand and final demand, hence account for the Agriculture output. **(12 marks)**