MACHAKOS UNIVERSITY COLLEGE

(A Constituent College of Kenyatta University)
University Examinations for 2015/2016

SCHOOL OF BUSINESS AND ECONOMICS

DEPARTMENT OF ECONOMICS

FIRST SEMESTER EXAMINATION FOR DEGREE IN

BACHELOR OF ECONOMICS AND FINANCE

BACHELOR OF ECONOMICS

EAE 408: ECONOMICS OF INDUSTRY

DATE: 12/8/2016 **TIME: 2:00 – 4:00 PM**

INSTRUCTIONS:

Answer Question One and Any Other Two Questions

QUESTION ONE (COMPULSORY)

a) A manufacturer produces two products, chairs and tables. The contribution per unit is $3 and $4 for chairs and tables respectively. The manufacturer wishes to establish the weekly production plan which maximizes contribution.Both products are processed on three machines M_1, M_2 and M_3. The time required by each product and total time available per week on each machine is as follows:

Machine	chairs	tables	Available hours
M1	3	3	36
M2	5	2	50
M3	2	6	60

i) Use the simplex method to determine how the manufacturer should schedule his production in order to maximize contribution. (10 marks)

ii) Using the primal solution solve the dual problem (5 marks)

b) What are the Kuhn-tucker necessary conditions for a minimum and a maximum? (6 marks)

c) Determine if a cobb-douglas production function given as $Q = AK^{\beta}L^{\alpha}$ is concave or convex given that $\beta+\alpha\leq 1$ (5 marks)

d) Integrate the following function: (4 marks)

$$\int e^{t-1}.2t + 5t^2 .dt$$

QUESTION TWO

a) Solve the following Max REVENUE =R = $X_1(10 - X_1) + X_2(20 - X_2)$

subject to $5X_1 + 3X_2 \leq 40$

$X_1 \leq 5$

$X_2 \leq 10$

$X_1 \geq 0$; $X_2 \geq 0$: (8 marks)

b) Test for linear dependence of the following set (7 marks)

$$f(x, y, z, u, v) = x^2 + y^2 + z^2 + uv - 14$$
$$f(x, y, z, u, v) = y^2 + z^2 + u^2 v - 10$$
$$f(x, y, z, u, v) = z^2 + uv^2 - 9$$

c) Determine if function Z is convex or concave (5 marks)

$$Z = 200 - 2x^2 - y^2 - 3w - xy - e^{2x+2y+2w}$$

QUESTION THREE

a) Integrate the following function by parts (4 marks)

$$\int (x+3)(x+1)^{1/2}\,dx$$

b) Define the term differential equations (3 marks)

c) Find the general and particular solution given that (6 marks)

$D_t=10-2P_tS_t= -5+4P_{t-1}$

$P(0) = 10$

d) Use Gauss Jordan elimination method to solve the following simultaneous equations

$4X+2Y+4Z=17$

$X+Y+Z=6$ (7 marks)

$3X+7Y+8Z=41$

QUESTION FOUR

a) Integrate by substitution (4 marks)

$$\int_1^2 \frac{2x}{x^2+3}.\,dx$$

b) Solve for Y in the following differential equations (8 marks)

$$\frac{dy}{dt}=\frac{t}{y}$$

$$\frac{dy}{dt}+2ty=t$$

c) Explain the steps involved in expressing a linear programming problem in a standard manner. (8 marks)

QUESTION FIVE

a) Differentiate between a homogenous and non-homogenous differential equation? (4 marks)

b) The supply and demand function of cabbage is given as:

$$Qst = -4 + 2\,P_{t-1} Qdt = 80 - 2\,P_t$$

Required:

i) Determine the equilibrium price (4 marks)

ii) Is it stable? (4 marks)

c) If we have a function Z given as $Z = f(X, Y)$outline all conditions for concavity and convexity of the function (8 marks)