Pwani University College

A Constituent College of Kenyatta University

UNIVERSITY EXAMINATIONS 2010/2011 ACADEMIC YEAR

1ST YEAR 1ST SEMESTER EXAMINATION FOR THE DEGREE OF

STREAM: BACHELOR OF COMMERCE

BMS 100: MANAGEMENT MATHEMATICS

END SEMETER: I TIME: 3 HOURS

DAY/TIME:TUESDAY:8.00 TO 11.00 P.M. DATE: 23/11/2010

INSTRUCTIONS

- *Answer question **ONE** and any other **THREE** questions*
- *Present your work logically, showing your working clearly.*

QUESTION ONE – (COMPULSORY) – 40 MARKS

a) Explain the following terms

i) Limit of a function
ii) Derivative of a function
iii) Implicit function
iv) Independent variable (4 marks)

b) i) Find the values of x for which $x^2 + x > 2$ (5 marks)

ii) Solve the equation

$$\frac{2x + 1}{3} - \frac{2(2x + 3)}{4} = 2 + \frac{x - 3}{6}$$ (3 marks)

c) i) Find the rate of change of y with respect to x given that:
$y = 3\sqrt{x} \ln 2x$ (4 marks)

ii) If $2y^2 - 5x^4 - 2 - 7y^3 = 0$

Determine $\frac{dy}{dx}$ at x = 1, y = 2 (6 marks)

d) Sam bought shares worth € 10,000 in his employer's profit – sharing scheme when the share price rose by €10, he kept 1,000 shares and sold the rest for €11,000. How can you describe their purchase? (8 marks)

e) i) Find the point of maximum value of the Revenue function
£R = 400 Q – Q^2 (7 marks)

ii) Find the following limit

$$\lim_{x \to 1} \frac{x^2 + x - 2}{x^2 - x}$$ (3 marks)

QUESTION TWO - (20 MARKS)

a) Find the integrals of the following:

i) $\int_0^4 e^{-2x}\,dx$ (3 marks)

ii) $\int_1^3 \left(3x - 3\sqrt{x} + \frac{20}{x^3}\right) dx$ (4 marks)

iii) If $z = 5x^4 + 2x^3y^2 - 3y$ find

$\frac{\partial z}{\partial x}$ and $\frac{\partial z}{\partial y}$ (4 marks)

b) A Company manufactures three products x, y and z, each of which must go through three processes A, B and C for the following times:

Product	Time Spent in Process		
	A	B	C
X	3	3	1
Y	3	2	3
Z	2	0	1

The maximum capacity of processes A, B and C are 130, 85 and 60 respectively. Calculate the number of units to be produced of product x, y and z to ensure utilization of maximum capacity.

(10 marks)

QUESTION THREE (20 MARKS)

a) Sketch the graph of e^{0-5x} for values of x between -3 and +3 find the value of y when x = -1 and 1.5 from your curve. (10 marks)

b) UK gross domestic product (GDP) measured in year 2000 prices, rose from £988.338 million in 2002. What was the average annual growth rate? (6 marks)

c) If $y = \ln (x^3 + 2x)$
find $\frac{dy}{dx}$. When x = ½ (4 marks)

QUESTION FOUR (20 MARKS)

a) If $y = x^2 + 2x + 9$

i) Determine whether this function has a maximum or minimum value using the second derivative test. (5 marks)

ii) Sketch the graph. (5 marks)

b) A firm has analysed their operating conditions, prices and costs and have developed the following functions.
Revenue £(R) = $400Q - 4Q^2$
and cost £(C) = $Q^2 + 10Q + 30$
where Q is the number of units sold the firm wishes to maximize profits and wishes to know

i) what quantity should be sold? (5 marks)

ii) At what price? (2 marks)

iii) What will be the amount of profit? (3 marks)

QUESTION FIVE – 20 MARKS)

a) A company has a large number of typists. A survey shows that 30 can use a word processor, 25 are audio-typists and 28 are shorthand writers. Of the typists who are shorthand writers, 3 are audio-typists and can use a word processor, 5 are audio typists and can not use a word processor ,

9 can use a word processor but are not audio- typists, 6 of the audio-typists can use a word processor but are not shorthand writers.

i) Represent this information on a Venn diagram. (4 marks)

ii) How many typists were involved in the survey? (5 marks)

iii) How many typists have only one skill? (2 marks)

b) A firm selling a business directory has developed a profit function as follows:-

$P = 9D – 0.0005D^2 + 0.06DA – 80A^2 – 5000$ where

D = no. of directories sold and

A = no. of advertising pages

How many directories containing how many advertising pages should be sold to maximize profits. (9 marks)