KABARAK UNIVERSITY

UNIVERSITY EXAMINATIONS

2009/2010 ACADEMIC YEAR
FOR THE DEGREE OF BACHELOR OF BUSINESS MANAGEMENT AND INFORMATION TECHNOLOGY

AND BACHELOR OF ENVIROMENTAL SCIENCE & TELECOMMUNICATION

COURSE CODE: BMIT 122/ENVS 112/TLCM 127

COURSE TITLE: BUSINESS MATHEMATICS

STREAM: Y1S2

DAY: FRIDAY

TIME: 2.00 – 5.00 P.M.

DATE: 06/08/2010

INSTRUCTIONS:

1. Answer question **ONE** and any other **THREE** questions
2. Begin each question on a separate page
3. Show your workings clearly

PLEASE TURN OVER

QUESTION ONE (40 MARKS)

a) Solve the following equation $2\sin^2 x + 3\cos x - 3 = 0$ (4 marks)

b) Let $A = \begin{bmatrix} 2 & 5 \\ 1 & 3 \end{bmatrix}$ and $B = \begin{bmatrix} 3 & -5 \\ -1 & 2 \end{bmatrix}$ Find AB and BA (6 marks)

c) Prove the distribution law $pv(q\wedge r) \equiv (pvq) \wedge (pvr)$ (6 marks)

d) An auditorium has 20 rows of seats. There are 20 seats in the first row, 21 seats in the second row, and 22 seats in the third row and so on. How many seats are there in all 20 rows? (4 marks)

e) A manager wants an estimate of sales of salesmen in his company. A random sample 100 out of 500 salesmen is selected and average sales are found to be Shs. 75,000. If the sample standard deviation is Shs. 15000 , find the population mean at 99% level of confidence (6 marks)

f) Find $\lim\limits_{x \to -3} \dfrac{x^2 + x - 6}{x + 3}$ (4 marks)

g) Solve the following function using first principles

$$f(x) = x^2 + 1$$ (4 marks)

h) A random sample of 25 with a mean of 80 and a standard deviation of 30 is taken fro a population of 1000.

(i) Find an interval estimate for the population mean at (i) 95% (ii) 99% confidence intervals (4 marks)

(ii) What does results in part a tell us (2 marks)

QUESTION TWO (20 MARKS)

a) Find dy/dx if $x^2y + 2y^3 = 3x + 2y$ (8 marks)

b) Consider these relations on the set of intergers
$R_1 = (a, b) | a \leq b$
$R_2 = (a, b) | a > b$
$R_3 = (a, b) | a = b$ or $a = -b$
$R_4 = (a, b) | a = b$
$R_5 = (a, b) | a = b+1$
$R_6 = (a, b) | a+b \leq 3$
Which of these relations contain each of the pairs $(1,1)$, $(1,2)$, $(2,1)$, $(1,-1)$ and $(2,2)$
(5 marks)

c) Intergrate the following function $\int_3^5 x^3 + 4x^2 + 5x + 2 \ dx$ (5 marks)

QUESTION THREE (20 MARKS)

a) A Businessman borrows Kshs 1000 and repays the loan by yearly instalments of Ksh 100, the first instalment paid one year after the loan. After how many years will he be out of the debt, interest being reckoned throughout at 4 percent per annum (4 marks)

b) Let A = (0,1,2…,15)
   i)   Find the representation of (2,4,5,7,11,14) as a bit string (2 marks)
   ii)   Write down the set represented by the bit string 1010011011101001 (2 marks)

c) Two planes leave an airport L at 12.00 noon. The first plane flies due West at a speed of 600km/h and the second flies on a bearing N30°E at a speed of 1000km/h. Calculate how far a part the planes will be at 1.00PM and the bearing of the second plane from the first at that time (4 marks)

d) In a competition two players A and B play 9 games of chess. Player A wins 5 games, player B wins 3 games while one goes a draw. In the second and final round they decide to play three more games. Find the probability that;
       i) A wins all the three games (2 marks)

       ii) A and B win one each and the other is drawn (4 marks)

       iii) B wins at least one game (2 marks)

QUESTION FOUR (20 MARKS)

The managers of an import agency are investigating the length of time that customers take to pay their invoices, the normal terms for which are 30 days net. They have checked the payment record of 100 customers chosen at random and have compiled the following table:

Payment in	Number of customers
5 to 9 days	4
10 to 14 days	10
15 to 19 days	17
20 to 24 days	20
25 to 29 days	22
30 to 34 days	16
35 to 39 days	8
40 to 44 days	3

a) Calculate the arithmetic mean. (4 marks)
b) Calculate the standard deviation. (4 marks)
c) Calculate the Median. (4 marks)
d) Calculate the Mode. (4 marks)
e) Calculate the Variance (2 marks)
f) Calculate the Coefficient of Variation (2 marks)

QUESTION FIVE (20 MARKS)

a) Differentiate the following functions

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

ii. $y = \dfrac{x^3}{(3x + 7)}$ (4 marks)

b) Kigen chemicals limited are aware that its power cost over the last six month. These costs have shown the following relationship standard measure of output.

Month	Output (standard units)	Total power costs (£ 000)
1	12	6.2
2	18	8.0
3	19	8.6
4	20	10.4
5	24	10.2
6	30	12.4

Using the method of least squares, determine an appropriate linear relationship between total power costs and output   (12 marks)