JARAMOGI OGINGA ODINGA UNIVERSITY OF SCIENCE AND TECHNOLOGY

SCHOOL OF INFORAMATICS AND INNOVATIVE SYSTEMS

MAY AUGUST 2013 SEMESTER UNIVERSITY EXAMINATION

BACHELOR OF SCIENCE IN COMPUTER FORENSICS

COURSE CODE: SMA 3114

COURSE TITLE: ANALYTICAL METHODS FOR COMPUTING

INSTRUCTIONS

1. This paper contains FIVE questions. Question One is 30 Marks and the rest are 20 Marks each.
2. Answer question one which is COMPULSORY and ANY OTHER TWO
3. Be precise and clear in your answers.

Question one 30 marks

a) i) What is a function?   2marks

ii) Find the inverse of the function $h(x) = 2x^2-7$ 4marks

iii) Find the maximum and minimum values of the function; $8x^5-15x^4+10x^2$

4marks

b)   The price of a used car can be represented by the formula;

$P= 16000e^{-t/10}$

Where p= the price in $ and t is the age in years from when it is new.

Calculate;

i)   the new price   2marks

ii)   the value at 5 years old   4marks

iii) The eventual value of the car.   4marks

c) Given that the function $g(x)= 2x^2+3$, find;

i)   The value of g(2)   2marks

ii)   The value such that g(a)=35   4marks

iii) The range of the function.   4marks

Question two 20marks

a) The population of a certain city is increasing according to the formula;

$P= 20+10e^{t/50}$

Where p= the population in thousands and t is the time in years from the year 2000.

i)   State the population in the year 2000   5marks

ii)   Use the model to predict the population in the year 2020   5marks

iii) Sketch the graph of p against t for the years 2000 to 2010.   5marks

b) If $\log_2 x+ \log_4 x+\log_{16} x= 21/4$, find x.   5marks

Question three 20marks

 a) Show that in any base b≥2, the sum of any three single-digit numbers is at most two digits long.

10marks

b) Show that any binary integer is at most four times as long as the corresponding decimal integer. For very large numbers, what is the ratio of these two lengths, approximately?   10marks

Question four 20marks

a) In Nairobi, there are 20 colleges and 50 schools. Each school has 1 gateman, 5 clerks and 1 cashier. Each college in addition has 1 accountant and 1 head cook. The monthly salary of each of them is as follows; Gateman Kes 15,000; clerk kes 25,000; cashier kes 30,000; accountant kes 35,000 head cook kes 40,000.

Using matrix notation, find;

   i.   Total number of posts of each kind in schools and colleges taken together.   (5marks)

   ii.   The total monthly salary bill of all the schools and colleges taken together.   (5marks)

b) Show that the three points with position vectors given by;   10marks
           a-2b+3c

           -2a+3b+2c

           -8a+ 13b are collinear

Question Five 20marks

   a) Determine the critical value for the following functions and find out the critical value constitutes amaximum   6marks

$$y = x^3 - 12x^2 + 36x + 8$$

bYour company manufacturers large scale units. It has been shown that the marginal (or variable) cost, which is the gradient of the total cost curve, is (92 – 2x) Shs. thousands, where x is the number of units of output per annum. The fixed costs are Shs. 800,000 per annum. It has also been shown that the marginal revenue which is the gradient of the total revenue is (112 – 2x) Shs. thousands.

Required

i.   Establish by integration the equation of the total cost curve   3marks

ii.   Establish by integration the equation of the total revenue curve   3marks

iii. Establish the break even situation for your company   2marks

iv. Determine the number of units of output that would

     a)   Maximize the total revenue and   3marks

     b)   Maximize the total costs, together with the maximum total revenue and total costs   3marks