The Co-operative University of Kenya

END OF SEMESTER EXAMINATION – DECEMBER 2016

EXAMINATION FOR THE BACHELOR COMMERCE /BACHELOR OF SCIENCE IN FINANCE
(YR I SEM I)

UNIT CODE: HBC 2103/ CMFI 2101

UNIT TITLE: MATHEMATICS FOR BUSINESS/ MANAGEMENT MATHEMATICS I

DATE: 6TH DECEMBER, 2016 **TIME: 9:00 AM – 11:00 AM**

INSTRUCTIONS:

- Answer question **ONE (compulsory)** and any other **TWO** questions

QUESTION ONE

a) The Amanco Company produces a product for which is the variable cost per unit is KSh. 6 and the fixed cost is KSh. 80,000. Each unit has a selling price of KSh. 10. Determine the number of units that must be sold for the company to earn a profit of KSh. 60,000. (4 Marks)

b) How long will it take for money to double at the effective rate of r? (3 Marks)

c) The cost of making 15 units of a product labeled P and 10 units of a product labeled Q is Shs. 600. The cost of making 5 units of P and 8 units of Q is Sh. 340. Calculate the cost of making one unit of product P and Q respectively. (4 Marks)

d) The Andersons Company produces a product for which the variable cost per unit is Sh. 6 and the fixed cost of Sh. 80,000. Each unit has a selling price of 10 shillings. Determine the number of units that must be sold for the company to earn a profit of 60,000 shillings. (5 Marks)

e) In a class of 52 students, 13 excel in Science and Mathematics, 16 excel Science and Arts, 12 excel in Mathematics and Arts, 24 excel in Arts and 2 excel in none. Twice as many students excel in Science only as do in Mathematics only. The number of students who excel Mathematics only is six times the number of students who excel in Arts only. Determine the number of students who excelled in:

   i). All the three subjects (5 Marks)
   ii). At least two subjects. (3 Marks)

f) $\log x = 3\log 2 + \frac{1}{2}\log 25 - \log 20$ (3 Marks)

g) $\ln x + \ln(x+1) = \ln 6$ (3 Marks)

(Total: 30 Marks)

QUESTION TWO

a) Evaluate the following using a calculate

   i) $\log_7 23 + \log_4 33$ (3 Marks)

ii) $\log_{2.7} 11 - \log_{1.1} 7$ (3 Marks)

b) A management performance factor is expressed as $P(x) = 8e^{\frac{-x}{10}}$ where x is the age of the manager.
What is the value of this factor for a manager whose age is:
i) 55 years. (2 Marks)
ii) 30 years. (2 Marks)

c) A tenant was living in a house where he used to pay a fixed constant annual increase. He paid 10,000 shillings on the 12^{th} year. The total amount he had paid to his landlord for the last 12 years was 90,000 shillings. Determine the initial rent on first year and the fixed rate of increase. (4 Marks)

d) Cities A and B presently have a populations of 80,000 people and 65,000 people respectively. City A grows at the rate of 4.5% per year and B grows at the rate of 6% per year. Determine the difference in populations of the cities at the end of five years. (3 Marks)

e) A small company has made a long-term investment of 300,000 shillings. The interest rate is 12% per year and interest is compounded quarterly. If all interest is invested at the same rate of interest, what will the value of the investment be after 10 years? (3 Marks)

(Total: 20 Marks)

QUESTION THREE

a) The research department in a company that manufactures clock watches established the following price- demand and cost functions

$P(x) = 200 - 10x, \qquad C(x) = x^2 - 20x + 1000$

Where x is in thousands of units and P(x) and C(x) are in thousands of shillings. Using the method of completing the square or otherwise:
i) Find the output that will produce maximum revenue hence the maximum value of revenue (6 Marks)
ii) Find the output that will produce the maximum profit hence the maximum value of profit. (5 Marks)
iii) Determine the break-even point. (3 Marks)

b) Solve for x in the following problems
i) $1 = 8^{(2x+7)}$ (3 Marks)
ii) $8^x = 2^{11.11}$ (3 Marks)

(Total: 20 Marks)

QUESTION FOUR

a) A survey of 100 students produced the following statistics; 32 study Mathematics
20 study Physics
45 study Biology
15 study Mathematics and Biology 7 study Mathematics Physics
10 study Physics and Biology
30 do not Study any of the three subjects
i) Present the above information in a Venn diagram (4 Marks)
ii) Find the number of students studying all the three subjects (4 Marks)
iii) Find the number of students taking exactly one of the three subjects (4 Marks)
iv) What percentage of students take Mathematics only. (3 Marks)

b) If $A = \{P, Q, R, S, T\}$ and $B = \{Q, S, T, V, W, Y\}$. Find
i) $(A \cap B)^C$ (2 Marks)
ii) $A^C \cup B^C$ (2 Marks)

iii) Comment on your answers in i and ii above (1 Mark)

(Total: 20 Marks)

QUESTION FIVE

a) Find the sum of the first ten terms of the geometric sequence:

1, 1.05, 1.05^2 ..... (3 Marks)

b) The sum of the first six terms of an AP is 51 and the sum of the first 11 terms is 187 find

i) The first term and the common difference (3 Marks)

ii) The 20^{th} term (2 Marks)

iii) The sum of the first 15 terms. (3 Marks)

c) Evaluate the following

i) $\sum_{i=2}^{10} X_i$ for $X_i = 10,9,8,7,6,5,4,3,2,1$ (4 Marks)

ii) $\prod_{i=1}^{5}(1+X_i)$

for $X_i = 11\%,12\%,13\%,14\%,15\%,16\%,17\%,18\%,19\%,20\%$

(5 Marks)

(Total: 20 Marks)