

CHUKA



UNIVERSITY

UNIVERSITY EXAMINATIONS

RESIT EXAM

EXAMINATIONS FOR THE AWARD OF BACHELOR OF AGRIBUSINESS  
MANAGEMENT

BPLM 102/BCOM 170/BCOM 161: BUSINESS MATHEMATICS I

STREAMS: BPSM/AGBM Y1S1

TIME: 2 HOURS

DAY/DATE: WEDNESDAY 12/9/2018

8.30 A.M. – 10.30 A.M.

Instructions: Answer Question ONE and any other TWO questions

QUESTION ONE (30 MARKS)

(a) Explain the following terms as used in set theory

- (i) Finite set (1 mark)
- (ii) Universal set (1 mark)

(b) Given that  $A = \{e, f, g, h, k, m\}$ ,  $B = \{e, h, i, n\}$  and  $C = \{g, h, i, l\}$

Determine the composition of the following set relations

- i)  $A - B$  (2 marks)
- ii)  $A - (B \cap C)$  (2 marks)
- iii)  $n[A \cup B \cup C]$  (2 marks)

(c) Find the sum of the first 20 terms of the series  $\frac{1}{4},$

$$\frac{7}{12}, \frac{11}{12}, \dots$$

(4 marks)

(d) (i) Explain the difference between marginal cost and marginal profit (4 marks)

(ii) Given that the supply function of an item is  $P=64+32Q+4Q^2$  while the demand function is defined by  $P=-12Q^2+1744+24Q$ . Determine value of Q where the supply and demand functions intersect. (4 marks)

(e) A US micro-finance bank operating in Kenya provides low cost consumer loan services. A client wishes to borrow a loan to be repaid in equal five annual instalments of \$ 1285.46. A section of the loan repayment schedule is provided in the table below.

Year	Beginning Balance	Annual Installment amount	Interest Payment	Principal Payment	Ending balance
1	??	1285.46	450	??	4164.54
2	??	1285.46	??	??	??
3	??	1285.46	??	??	??
4	??	1285.46	??	??	??
5	??	1285.46	??	??	??

**Required:** Complete the table (4 marks)

- (f) (i) A deposit of Sh.20,000 earns a compound interest at 6% p.a for a period of four years. What is the value of the deposit at the end of the holding period? (2 marks)
- (ii) Suppose the interest rate in (i) above is compounded monthly. By how much would the interest earned over the same period differ? (2 marks)

**QUESTION TWO (20 MARKS)**

- (a) Explain the meaning of the following pair of terms as used in financial mathematics
- (i) An annuity and a perpetuity (4 marks)
  - (ii) Compounding and discounting (4 marks)
- (b) Find the number of permutations of letters in the word ‘DISINTEGRATION’ if all letters are taken at once (2 marks)
- (c) Solve for P: Given that  $\log_{10} 4 + 2 \log_{10} P = 2$  (3 marks)
- (d) Suppose a company has fixed costs of sh. 28,000 and variable cost per unit of  $\frac{2}{5}x + 222$  shillings, where x is the total number of units produced. Suppose further that the selling price of its product is  $1250 - \frac{3}{5}x$  shillings per unit, find the possible levels of production at which there will be neither profit nor loss (6 marks)

**QUESTION THREE (20 MARKS)**

- (a) Distinguish between a permutation and a combination (2 marks)
- (b) A SACCO credit committee of 11 members is to be constituted from 9 directors, 7 credit officers and the chairman of board. In how many ways can the committee be formed such that:
- (i) Any of the eligible members can be included (2 marks)
  - (ii) The chairman of the board must be included (2 marks)
  - (iii) The chairman and 5 directors must be included (2 marks)
- (c) Use binomial expansion to expand  $(2x - 3)^5$ . Hence use your expansion to estimate the value of  $(1.008)^5$  (6 marks)
- (d) Suppose you are offered two identical jobs; one paying a starting salary of sh.20000 with yearly raises of sh.1000 and another one paying a starting salary of 10,000 with 10% pay rises every year. The pay rise is effected at the end of each year. What is the difference in the salaries between the jobs at the end of 10th year? (6 marks)

**QUESTION FOUR (20 MARKS)**

- (a) Which investment would earn more money, a sh.50000 investment for 6 years at 7% p.a compounded quarterly or a sh.50,000 investment for 6 years at 7% p.a compounded continuously? (5 marks)
- (b) A machine is valued at Ksh. 100,000 on 1st January 2009. If depreciation at the end of each year is 20% of its value at the beginning of the year, find its value at the end of 8 years (apply sequences and series). (3 marks)
- (c) Consider the following data on students in Eco-tourism management department. It was found that 130 studied French, 90 studied German, 84 studied Russian, 40 studied French and Russian, 30 studied German and Russian, 50 studied French and German while 16 studied all the three languages. 119 students were not studying any of the language. Let F, G and R denote sets of students studying French, German and Russian respectively.
- (i) Represent the data using a Venn diagram (2 marks)
- Find the number of students:
- (ii) Who were actually involved in the survey (2 marks)
  - (iii) Studying exactly one language (2 marks)
  - (iv) Studying exactly two languages (2 marks)

(d) A company manufactures T-shirts and sells them for Sh.54.90 each. The total cost function is linear and costs amount to Sh.50,000 for 2000 T-shirts and Sh.32,120 for 800 T-shirts. Let  $x$  be the number of T-shirts sold

- (i) Write down the equation for total revenue (1 marks)
  - (ii) Write the equation for total cost (3 marks)
  - (iii) Find the break even quantity (2 marks)
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