

CHUKA



UNIVERSITY

UNIVERSITY EXAMINATIONS

FIRST YEAR EXAMINATION FOR THE AWARD OF DEGREE OF BACHELOR OF COMMERCE, BACHELOR OF COOPERATIVE MANAGEMENT, BACHELOR OF ENTREPRENEURSHIP AND ENTERPRISE MANAGEMENT

BCOM 161: BUSINESS MATHEMATICS 1

STREAMS: BCOM Y1S1/BCOP Y1S1/BEEM Y1S1

TIME: 2 HOURS

DAY/DATE: WEDNESDAY 16/12/2020

11.30 A.M. – 1.30 P.M.

INSTRUCTIONS:

- **Answer question ONE and any other TWO questions.**

QUESTION ONE (30 MARKS)

- (a) Explain the following terms as used in business mathematics
- (i) Fixed cost (2 marks)
 - (ii) Marginal cost (2 marks)
 - (iii) Ordinary annuity (2 marks)
- (b) Use the quadratic formula to solve correct to 4 significant figures. (5 marks)
- (c) Given that the supply function of an item is while the demand function is defined by Determine quantity at which market equilibrium occurs. (6 marks)
- (d) From a class of 500 students appearing for CPA examination at a Centre, 200 passed in Financial Accounting (F), 210 passed in Economics (E); 270 passed in Cost Accounting (C), 100 passed both in FA and Cost Accounting, 130 passed both in Economics and Cost Accounting, while 70 passed both in FA and Economics. If 40 passed in all the three subjects, find the number of students who
- (i) Passed in Economics only. (3 marks)
 - (ii) Failed in all the three subjects. (2 marks)
- (e) An insurance agent proposes two investment options to a client:

First Option: The client will make a fixed deposit of Sh. 20,000 in a bank to earn a compound interest at 6% p.a. for a period of four years. The amount accumulated is then reinvested at 6% p.a. compounded monthly for the next 2 years.

Second Options: The client will deposit Ksh. 20,000 at the end of each year in a bank which pays 10% p.a. compound interest. The installments are allowed to accumulate.

Which option will yield highest future value at the end of the holding period (6th year)?
(8 marks)

QUESTION TWO (20 MARKS)

- (a) (i) Distinguish between permutation and combination. (2 marks)
- (ii) In how many ways can a committee of 3 ladies and 4 gentlemen be appointed from a meeting consisting of 8 ladies and 7 gentlemen? What will be the number of ways if Mrs. X refuses to serve in a committee having Mr. Y as a member? (4 marks)
- (b) Use binomial theorem to expand in ascending powers of Hence use your expansion to estimate (4 marks)
- (c) The results out of a survey on number of families who use electricity (E), gas (G) and kerosene (K) are summarized below. The sample size was 120 families.

Required:

- (i) Represent the results on a Venn diagram. (4 marks)
- (ii) How many families use one energy source only? (2 marks)
- (iii) How many families use gas but not electricity? (2 marks)
- (iv) How many families don't use any of the energy sources? (2 marks)

QUESTION THREE (20 MARKS)

- (a) Explain using examples the difference between singleton and disjoint sets. (4 marks)

- (b) Kopa credit is a non-deposit taking micro-finance providing low consumer loan services. A customer borrows a loan of Sh. 50,000 to be repaid in five equal annual instalments of Sh. 12,854.60. If the interest payment for the first year is Sh. 4,500
- (i) Determine the annual interest rate charged on the loan. (2 marks)
- (ii) Prepare the loan repayment schedule. (4 marks)
- (c) An Agronomist retailer will buy 10 bags of a certain fertilizer if the price is Sh. 750 per bag and 30 bags if the price is Sh. 250. The supplier of the fertilizer is willing to provide 35 bags if the price is Sh. 800 per bag but only 5 bags if the price is Sh. 200. Assuming the supply and demand functions for the fertilizer are linear:
- (i) Derive the liner equation for the demand and supply functions. (6 marks)
- (ii) At what point will the market equilibrium occur? (4 marks)

QUESTION FOUR (20 MARKS)

- (a) In an arithmetic sequence, the 8th term is twice the third term and the 20th terms is 110. Find
- (i) The common difference (3 marks)
- (ii) Determine the sum of the first 100 terms. (3 marks)
- (b) A company has fixed costs of Sh. 28,000 and variable cost per unit of Shillings, where x is the total number of units produced. Suppose further that the unit selling price of their product is given by $10 - 0.005x$ shillings per unit, calculate the profit on 1000 units are sold. (5 marks)
- (c) Mwea Skockist Ltd. sells all its products on credit. Data gathered over time indicate that the collection percentage for credit sales (debtors) issued in any month is an exponential function of the time since the sales were made. Specifically, the function approximating this relationship is:

Where P equals the percentage of debtors collected t months after the sales are made.

Required:

- (i) What percentage is expected to be collected 3 months after sale? (4 marks)
- (ii) After how many years will the expected collection be 76.83% ($P=0.7683$)? (4 marks)