



MASENO UNIVERSITY
UNIVERSITY EXAMINATIONS 2016/2017

**FIRST YEAR SECOND SEMESTER EXAMINATIONS FOR THE
DEGREE OF BACHELOR OF BUSINESS ADMINISTRATION WITH
INFORMATION TECHNOLOGY**

CITY CAMPUS

ABA 107: MANAGEMENT MATHEMATICS I

Date: 15th June, 2017

Time: 5.30 - 8.30 pm

INSTRUCTIONS:

- Answer question ONE and any other THREE questions.
- Show all your workings clearly.
- Question ONE carries 25 marks while the rest carry 15 marks each.



QUESTION ONE (COMPULSORY) [25 MARKS]

- a) Define the following terms as used in management mathematics.
- i. Compounding.
 - ii. Annuities.
 - iii. Project appraisal.
 - iv. Universal set.
 - v. Internal rate of return [5 marks]
- b) Discuss THREE applications of set theory in business. [5 marks]
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- c) For a certain good, the collection percentage of credit issued in any month is an exponential function of the time since credit was issued. Specifically the function which approximates this relationship is

$$P = 0.95(1 - e^{-0.7t}), t \geq 0$$

Where P is the percentage of debtors (in shillings) collected t months after the credit is granted.

Required:

Calculate the percentage of debtors recovered after

- i. 3 months. [2 marks]
- ii. 7 months. [2 marks]

- d) In a recent survey people were asked if they took a vacation in the summer, winter, or spring in the past year. The results were 73 took a vacation in the summer, 51 took a vacation in the winter, 27 took a vacation in the spring, and 2 had taken no vacation. Also, 10 had taken vacations at all three times, 33 had taken both a summer and a winter vacation, 18 had taken only a winter vacation, and 5 had taken both a summer and spring but not a winter vacation.
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Required:

- i. How many people had been surveyed? [3 marks]
- ii. How many people had taken vacations at exactly two times of the year? [3 marks]
- iii. How many people had taken vacations during at most one time of the year? [3 marks]

- iv. What percentage had taken vacations during both summer and winter but not spring? [2 marks]

QUESTION TWO [15 MARKS]

- a) Suppose a certain commodity has linear demand and supply functions going through the following points
- (i) When $P = \text{Sh } 7500$, $q = 1000$ units
 $P = \text{Sh } 4625$, $q = 750$ units
 - (ii) When $P = \text{Sh } 2525$, $q = 100$ units
 $P = \text{Sh } 1525$, $q = 200$ units

Required;

- i. Obtain the linear functions that go through the points given in (i) and (ii) above and clearly explain which one is the supply and demand function. Assume this is a normal commodity. [10 marks]
- ii. Explain what is meant by market equilibrium and obtain the same for the above. Indicate your results on a graphical sketch. [5 marks]

QUESTION THREE

- a) The Green-Belt Company determines that the cost of manufacturing men's belts is Ksh 2 each plus Ksh 300 per day in fixed costs. The company sells the belts for Ksh 3 each. What is the break-even point? [7 marks]
- b) Suppose a student wishes to determine how much she will have at the end of 3 years if she deposits Ksh. 10000 at the end of each year in an account paying 4% interest rate. How much will she have after three years if the interest is computed:
- i. Annually [2 marks]
 - ii. Semiannually [2 marks]
 - iii. Quarterly [2 marks]
 - iv. Monthly [2 marks]

QUESTION FOUR [15 MARKS]

- a) Ochieng' bought two shirts and 4 trousers at a total cost of Ksh 400 while Anyango bought 3 shirts and one trouser of the same type at a total cost of Ksh 300. Find the price of each shirt and each trouser. How much will Kimani spend on five trousers and 6 shirts? [6 marks]
- b) Jubilee Holdings has identified a project which will generate cash flow of Ksh 400,000 at the end of each year for the next three years. Given that the required rate of return on the capital is 12%, find how much capital the company needs to set aside for this project. [5 marks]
- c) Explain two applications of functions in business management. [4 marks]

QUESTION FIVE [15 MARKS]

- a) A father has decided to set up an education fund for his newborn son. He deposits Ksh 5000 at the end of every year into an account which earns an interest rate of 10% compounded annually. What will be the accumulated amount in the account after 10 years? [6 marks]
- b) Two products which are substitutes, X and Y are sold by Kilifi Traders. They have recently become interested in their profit function and a consultant has found out that fixed costs amount to Ksh 100. If the function of profit is given by the following form:

$$\pi = ax + by - cx^2y^2 - f$$

Where a , b and c are the coefficients and f is a fixed cost.

Required:

- i. Establish the profit function given the following information
 $(\pi, x, y) = (249, 1, 1), (966, 4, 7)$ [5 marks]
- ii. Hence determine the profit when $x = y = 5$ units. [2 marks]
- c) Differentiate between an annuity due and an annuity immediate. [2 marks]