



TECHNICAL UNIVERSITY OF MOMBASA
Faculty of Business and Social Studies

DEPARTMENT OF BUSINESS STUDIES

UNIVERSITY EXAMINATIONS FOR DEGREE IN
BACHELOR OF BUSINESS ADMINISTRATION
BACHELOR OF COMMERCE

BMS 4101: MANAGEMENT MATHEMATICS I

SPECIAL/SUPPLEMENTARY EXAMINATIONS

SERIES: FEBRUARY 2015

TIME: 2 HOURS

INSTRUCTIONS:

- Answer Question **ONE (Compulsory)** and any other **TWO** questions.
- Do not write on the question paper

This paper consists of Four printed pages

QUESTION 1 (Compulsory)

- a) Mr Wamae who was a personal driver to a senior government official was retired in August 1999. On 1st January 2000, he received his golden handshake of sh. 240,000 which he deposited in a savings account on the same day. The savings account was paying interest at 6% per annum compounded monthly. After one year, he withdrew sh. 110,000 and spent sh. 50,000. The balance was deposited on 1st January 2001 in a fixed deposit account at an interest rate of 10% per annum compounded quarterly. The savings account continued paying interest under the initial conditions. Mr. Wamae withdrew all the money in both accounts after a further period of 2 years from 1st January 2001.

Required:

- i) The accumulated amount in the savings account after the first one year. **(4 marks)**
- ii) The total accumulated amount that Mr. Wamae received after 3 years. **(6 marks)**

- b) A survey of 600 Jua Kali workers showed that 210 regularly listened to the seven o'clock news on radio and that 370 regularly listened to late night news on radio while 120 regularly listened to both newscasts.

Required:

- i) Present the above information in the form of a Venn diagram. (3 marks)
ii) How many workers listened to the seven o'clock news but not the late night news? (2 marks)
iii) How many workers did not listen to either of the news broadcasts. (3 marks)
- c) The cost of two skirts and three blouses is sh. 600. If the cost of three skirts and two blouses of the same quality is Ksh. 650, find the cost of each item. (4 marks)
- d) A geometric sequence has 20 terms. The first term and the common ratio are 5 and 2 respectively.

Required:

- i) Find the 7th term. (2 marks)
ii) Find the sum of the terms of the geometric sequence. (2 marks)
- e) Use the quadratic formula to solve the equation $2x^2 - 3x + 1 = 0$. (4 marks)

QUESTION 2

- a) A company manufactures chairs for a ten-week period each year. Production starts with 600 chairs in week I and increases by 50 for each subsequent week. Use sequences and series to calculate:
- i) The number of chairs manufactured in week 7.
ii) The total number of chairs manufactured during the ten weeks. (6 marks)
- b) A TV manufacturer plans to increase his output by 5% each month. If he is now producing 300 TVs per month, calculate using sequences and series:
- i) His output in the 15th month
ii) His total output in 15 months, starting with the present month.
iii) The month in which his output reaches 500.

(9 marks)

- c) Given the series $1 + \frac{3}{4} + \frac{9}{16} + \frac{27}{64} + \dots$

- i) Show that it is convergent
ii) Find the limit of its sum

(5 marks)

QUESTION 3

- a) A company produces and markets a product that is sold for Ksh. 8 per unit. The variable cost of the product is Ksh. 2 for each unit produced while fixed costs are Ksh. 240,000 per month.

Required:

- i) Write down the equation for the total cost function.
- ii) Determine the total cost when 150 units are produced.
- iii) Write an expression for total revenue.
- iv) Determine the total revenue when 150 units are produced and sold.
- v) Determine the break-even quantity.
- vi) Determine the profit when 50,000 units are sold.

(14 marks)

- b) Given the supply function, $P = 500 + 2Q$ where P is the price of a bottle of soda in shillings, Q is the number of bottles supplied.

Required

- i) Find the price at which 20 bottles of soda are supplied.
- ii) Find the quantity supplied when price is Ksh. 600.
- iii) Express the supply function in the form $Q = f(p)$

(6 marks)

QUESTION 4

- a) Alex wants to accumulate Ksh. 100,000 to be used for his daughters college education. He would like to have the amount available on 31st December, 2019. Assume that the funds will accumulate in an account paying 8% interest compounded annually.

Required

Answer each of the following independent questions.

- i) If Alex were to deposit a single amount, how much would he have to invest on December 31st, 2014? **(4 marks)**
 - ii) If Alex were to make five equal deposits on each December 31st, beginning on December 31st, 2015, what is the required deposit? **(5 marks)**
 - iii) If Alex were to make five equal deposits on each December 31st, beginning on December 31st, 2014, what is the required deposit. **(5 marks)**
- b) A project involves an initial investment of Ksh. 800,000. The expected cashflow at the end of each of the next four years is given as:

Year (end)	1	2	3	4	5
Cash inflow	100,000	150,000	300,000	250,000	150,000

Required

- i) Determine the present value of the cash inflows when interest rate is 20% per annum.
- ii) Determine the net present value of the project. **(6 marks)**

QUESTION 5

- a) Use Pascal's triangle to expand the following expression:
 $(x + y)^4$ **(4 marks)**

- b) A man divided his estate as follows:
40% to his wife, two daughters Jane and June shared $\frac{3}{5}$ of the remainder in the ratio 1:2 respectively. The rest was donated to charity and this amounted to sh. 60,000.

Required:

- i) The total value of the estate
 - ii) The share for each of the dependents. **(7 marks)**
- c) i) Find two successive natural numbers whose sum of squares is 13
 - ii) The sum of twice a number and 5 is equal to the difference between the number and 3. Find the number. **(5 marks)**
- d) Briefly but clearly, distinguish between exponential and quadratic function. Cite relevant examples. **(4 marks)**