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TECHNICAL UNIVERSITY OF MOMBASA

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SCHOOL OF BUSINESS

UNIVERSITY EXAMINATIONS 2018/2019

EXAMINATION FOR THE DEGREE OF BACHELOR OF  
BUSINESS ADMINISTRATION AND BACHELOR OF COMMERCE

BMS 4101: MANAGEMENT MATHEMATICS I

END OF SEMESTER EXAMINATIONS B

**TIME: 2HOURS**

**DATE: Aug2019**

**Instructions to Candidates**

This paper consists of **FIVE** questions. Attempt question ONE (Compulsory) and any other TWO questions

You should have the following for this examination:

*Answer Booklet, examination pass and student ID*

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**QUESTION ONE**

a) Calculate the present value of a perpetual annuity of Shs. 92,000 at 12%

[3 Marks]

(b) If  $U = 1,2,3,4,5,6,7,8,9,10,11,12,13,14,15$

$A = 2,5,6,9,11,14$

$B = 5,8,9,11,13,15$

$C = 2,6,11,13,14$

What is?

i)  $A \cap B$

ii)  $A \cup B$

iii)  $B \cap C$

iv)  $A^c$

v)  $C^c$

[5 Marks]

c) Find the 18<sup>th</sup> term of the series

8, 14, 20, 26

[3 Marks]

d) Solve the quadratic equation by formula

$$6q^2 + 20q - 12 = 0$$

[4 Marks]

(e) Calculate the sum of the first 10 terms of the geometric progression

1, 4, 16, 64, 256.....

[4 Marks]

f) Calculate the present value of a perpetual annuity of Shs. 108,000 at 12%

[4 Marks]

(g) How much money should be invested now in order to acquire Shs. 8800,000 after five years?  
The investment rate is 12%

[3 Marks]

**(g)Discuss the application of Business Mathematics in business**

**(4Marks)**

## QUESTION TWO

a) Solve the equation

$$x^2 + 6x - 9 = 0$$

[3 Marks]

b)A company sets up a sinking fund and invests Shs. 180,000 each year for 5 years at 9% compound interest. What will the fund be worth after 5 years?

[5 Marks]

c)Calculate the rate of interest when Shs. 84,000 investment now provides a partial annual of Shs. 2,400p.a

[3 Marks]

d) A farmer bores a well 500M deep. Estimate the cost of boring if the cost is Shs. 90 for drilling the first meter with an increase in cost of Shs. 5 per meter for each succeeding metre.

(5marks)

e) Determine the straight line which has a slope  $b = -5$  and goes through  $(x,y) = (12,30)$

[4 Marks]

### QUESTION THREE

3(a) Calculate how much money should be invested now in order to acquire Shs. 640,000 after five years if the investment rate is 12%

[5 Marks]

Q. 3 a) The starting salary of a certain employee at a high school is Shs. 164,000 per annum. The annual increment is Shs. 4,000 per annum.

i) Calculate the salary at the end of the 8<sup>th</sup> year.

[3 Marks]

ii) Calculate total earnings over this period

[4 Marks]

b) A firm expects its revenue to grow by 13% per month. If the January revenue is Shs. 260,000. Calculate the expected total annual revenue.

[5 Marks]

c) Solve the following simultaneous equations

$$4x + 2y = 22$$

$$x + y = 9$$

[3Marks]

### QUESTION FOUR

4.(a) The value of XYZ Ltd's investment can be described by the function

$$C(t) = 1,500,000e^{0.04(t)}$$

where  $C(t)$  is value in shillings and  $t$  is the time in years.

Required:

i) Compute the total gain in value of the property between the 2<sup>nd</sup> and the 5<sup>th</sup> year  
[5 Marks]

b) In an arithmetic sequence, the first term is 3 and the common difference is 6.

i) Find the 10<sup>th</sup> term of the sequence  
[3 Marks]

ii) Find the sum of the first 16 terms of the sequence  
[4 Marks]

c) What is the straight line which has a slope  $b = -4$  and goes through  $(x,y) = 16,38$   
[3 Marks]

d) Solve the equation

$$x^2 + 6x - 9 = 0$$

[3 Marks]

### QUESTION FIVE

5. a) A principal of Shs. 124,000 is invested at 12% for 4 years. Calculate the future value if interest is compounded:

i) Annuity [3 Marks]

ii) Semi-annually [3 Marks]

iii) Quarterly [3 Marks]

b) Calculate the amount of money to invest now in order to acquire Shs. 128,000 after six years. The investment rate is 12%.

[4 Marks]

c) Explain the meaning of the following

i) Polynomial functions

ii) Multivariate functions

iii) Exponential functions [3 Marks]

d) The profit function for a firm is

$$P = -10q^2 + 36,000q - 150,000$$

What is the profit expected to equal to if 3000 units are sold. [4 Marks]