TECHNICAL UNIVERSITY OF MOMBASA

School of Business

DEPARTMENT OF MANAGEMENT SCIENCE

UNIVERSITY EXAMINATIONS FOR DEGREE IN

BACHELOR OF BUSINESS ADMINISTRATION

BACHELOR OF BUSINESS INFORMATION TECHNOLOGY

BACHELOR OF BUSINESS AND OFFICE MANAGEMENT

BACHELOR OF COMMERCE

BMS 4101: MANAGEMENT MATHEMATICS I

END OF SEMESTER EXAMINATIONS

SERIES: DECEMBER 2015

TIME: 2 HOURS

INSTRUCTIONS:

Answer Question **ONE** and any other **TWO** questions.

Financial tables are not permitted in the examination room.

Show all your workings.

Do not write on the question paper.

QUESTION ONE

a) A survey was conducted on the readership of two daily newspapers; The Nation and The standard. The survey revealed that 630 people read the Nation newspaper, 870 people read the Standard newspaper and 220 people read both newspapers.

Required:

i) Present the above information in the form of a Venn diagram. [3 Marks]

ii) How many people read the Nation newspaper only? [2 Marks]

iii) How many people read the Standard newspaper only? [2 Marks]

iv) How many people were interviewed if 40 people read none of the newspapers?

[3 Marks]

b) An arithmetic sequence has 50 terms. The 7th term of the sequence is 29 and the 11th term is 54.

Required:

i) Determine the first term and the common ratio. [4 Marks]

ii) Determine the 20th term of the sequence. [2marks]

iii) Find the last term of the sequence. [2 Marks]

iv) Find the sum of the terms of the sequence. [2 Marks]

v) Find the sum of the last 10 terms of the sequence. [2 Marks]

c) A principal of Kshs. 6,000 is invested at a nominal rate of interest of 12% for 4 years. Determine the future value of interest is compounded:

i) Annually [2 Marks]

ii) Semi-annually [2 Marks]

iii) Quarterly [2 Marks]

iv) Monthly [2 Marks]

QUESTION TWO

a) A market survey of suppliers of a particular product resulted in the conclusion that the supply function is linear. Suppliers were asked what quantities they would be willing to supply at alternative market prices. The survey results were as follows:

Price (Ksh)	12,000	6,000	0
Supply (units)	1,200	900	600

Further survey of the demand pattern of the product indicated that the demand function was also linear. The survey results were as follows:

Price (Ksh)	3,000	1,800	600
Demand (units)	100	200	300

Required:

i)   Determine the demand function   [4 Marks]

ii)   Determine the supply function   [4 Marks]

iii)   Determine the market equilibrium price and quantity   [4 Marks]

b) A manufacturer can sell a certain product for Kshs. 80 per unit. Total cost consists of a fixed overhead of Kshs. 4,500 and production costs of Kshs. 50 per unit.

Required:

i)   Determine the total cost if 300 units are produced.   [2 Marks]

ii)   Determine the profit function.   [2 Marks]

iii)   Determine the profit if 300 units are produced and sold.   [2 Marks]

iv)   How many units must be produced and sold in order to earn a profit of Kshs.12,000.

[2 Marks]

QUESTION THREE

a) A company manufactures two different products. Each of the products must be processed through two different departments, A and B. The table below indicates the number of hours required to produce a unit of each product in each department. Also indicated is the number of production hours available each month in each of the departments.

Department	Product I	Product 2	Hours available per month
A	4	5	1400
B	3	7	1700

The company wants to determine the combination of the two products which can be produced each month such that there will be total utilization of all hours available in the departments.

Required:

i) Formulate the appropriate linear equations. [3 Marks]

ii) Determine the combination of the two products which satisfy the equations.

[3 Marks]

iii) How will each department's capacity be allocated among the two products?

[4 Marks]

b) Evaluate each of the following limits by constructing a table of values for f(x) and examining left and right hand limits. [4 Marks]

i. $\lim_{x \to 3} \frac{x^2-9}{x-3}$

ii. $\lim_{x \to 0} \frac{4}{x}$

c) A motorist drove 80 Kilometres. In order to save 16 minutes, he had to drive 10km/hr faster than usual. What was his usual driving speed ? [6 Marks]

QUESTION FOUR

a. How much will have to be invested now to produce Kshs. 40,000 after 5 years with a 10% compound interest rate? [4 Marks]

b. A company sets up a sinking fund and invests Kshs. 20,000 at the beginning of each year for 5 years at 9% compound interest. What will the fund be worth after 5 years? [6 Marks]

c. XYZ Company is considering operating in the East African Market at the initial cost of $ 100,000. The company expects to realize the following after tax cash flows.

Year	Cash flow
1	$ 10,000
2	$ 40,000
3	$ 40,000
4	$ 40,000
5	$ 10,000

Assume 5% discount rate and determine whether the project should be accepted or rejected by XYZ Company. Use the following discounting methods.

i) Net Present Value [8 Marks]

ii) Profitability index [2 Marks]

QUESTION FIVE

a) Solve the following equation.

$$Log(x-1) + Log(x+8)) = 2Log(x+2)$$ [4 Marks]

b) Solve the following quadratic equation using the method of completing the square.

$$5x^2 - x - 4 = 0$$ [5 Marks]

c) Solve the following quadratic equation using factorization method.

$$x^2 - 7x + 10 = 0$$ [3 Marks]

d) What is the present value of a perpetual annuity of Kshs. 700 per annum at 12% interest?

[3 Marks]

e) Sifuna gets employed and the employment contract provides for an annual increment of Kshs. 1600 per annum. If the salary in the first year is Ksh 32000, find:

i) The salary earned in the 6th year.   [2 Marks]

ii) The total earnings in the first 6 years.   [3 Marks]