

**MERU UNIVERSITY OF SCIENCE AND TECHNOLOGY**

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**University Examinations 2015/2016**

FIRST YEAR, FIRST SEMESTER EXAMNATION FOR THE DEGREE OF BACHELOR OF BUSINESS INFORMATION TECHNOLOGY, SECOND YEAR , FIRST SEMESTER EXAMINATION FOR THE DEGREE OF BACHELOR OF BUSINESS INFORMATION TECHNOLOGY, FIRST YEAR , FIRST SEMESTER EXAMINATION FOR THE DEGREE OF BACHELOR OF COMMERCE AND FIRST YEAR, FIRST SEMESTER FOR THE DEGREE OF BACHELOR OF SCIENCE IN ECONOMICS

**SMB 3110: MATHEMATICS FOR BUSINESS**

**DATE: November, 2015 TIME: HOURS**

**INSTRUCTIONS:** *Answer questions* ***one Compulsory*** *and any other* ***two*** *questions*

**QUESTION ONE - (30 MARKS)**

1. If , S = , T = an universal set U =,

Find;

1. (1 Mark)
2. (2 Marks)
3. From a survey of 100 college students, a marketing research company found that 75 students owned stereos, 45 owned cars and 35 owned cars and stereos. Find the number of students who owned either a car or a stereo. (3 Marks)
4. Perform the indicated operation and simplify (4 Marks)
5. A record manufacturer has determined its weekly cost equation is c = 300 + 1.5x, where x is the number of records produced and sold each week. If records are sold for sh. 4.50 each how many records must be produced and sold each week for the manufacturer to break even. (4 Marks)
6. Solve and graph the inequality (4 Marks)
7. Determine the amount you would invest now at 10% compounded quarterly to have $8,000 to buy a car in 5 years time. (2 Marks)
8. (i) Given the function Find (1 Mark)

(ii) Using past records it is estimated that a company will sell N(x) units of a product after spending $ x thousand on advertising given by N (x) = 60x - where S . Find , , , (3 Marks)

1. Find the following indefinite integral dx (3 Marks)
2. The weekly marginal profit for an output of x units is given by = 150 – for 0 What is the total change in profit for a production to change from 10 units per week to forty units. (3 Marks)

**QUESTION TWO (20 MARKS**)

1. Find the  (3 Marks)
2. Given the function find
3. (1 Mark)
4. (1 Mark)
5. (1 Mark)
6. A company manufactures and sells x-transistor radios per week. If the weekly cost and revenue equation are;

R(x) = 10x - 0

Find the approximate changes in revenue and profit if production is increased from 2000 to 2010 unit per week. (5 Marks)

1. Solve + = 6 (4 Marks)
2. If $ 100 is invested at 6% interest compounded continuously. What amount will be in the account after 2 years. (3 Marks)
3. This year the sales of a growing company will be $ 256,000. For the next 8 years , the yearly sales, S are expected to be for 0 where t is an integer denoting the number of years. Determine the expected sales in 5 years time. (2 Marks)

**QUESTION THREE (20 MARKS)**

1. Solve (7 Marks)

 2x + 3y – 5z = -8

 5x – 4y + 3z = 7

1. (i) A small company manufactures portable home computers. The plant has fixed costs (leases insurances and so on) of $ 48,000 per month and variable costs (labour material and so on of $ 1,400 per unit produced. The computers are sold $ 1,800 each , thus the cost and the revenue equations are ;

C = 48,000 + 1400x

R = 1,800 x

Where x is the total number of computers produced and sold each month. C and R are monthly costs and revenue respectively in dollars. How many units must be manufactured and sold each month for the company to break even? (3 Marks)

(ii) Graph both equation in the same coordinate system and show the break even point.

(3 Marks)

1. (i) Given M = find (3 Marks)

(ii) Labour and material costs for manufacturing two guitar models are given in the table below.

 Labour Material

Guitar model Cost Cost

A $30 $20

B $40 $30

 If a total of $3000 a week is allowed for labor and material, how many of each model should be produced the second week to use exactly each of the allocations indicated in the following table.

 Weekly allocation

 1 2 3

 Labour $1800 $1750 $1720

 Material $1200 $1250 $1280

**QUESTION FOUR (20 MARKS)**

1. Use substitution to integrate;

 (4 Marks)

1. A new piece of industrial equipment will depreciate in value rapidly at first then less rapidly as time goes suppose the rate in dollars per year at which the value of a new milling machine changes is given approximately by;

(t) = 500 (t – 12) 0 where V (t) is the value of the machine after t years. Find the total loss in value of the machine in the second five years. (5 Marks)

1. Solve the quadratic equation;

 (3 Marks)

1. The manufacturer of a stereo system finds that the number of units x ordered per day (demand) is given by where P is the price per unit. The total cost C per day to manufacture x units is given by

how many units must be produced and sold each day to break even. (5 Marks)

1. Find the sum of the first 30 terms in the arithmetic progression 3,8,13,18 …(3 Marks)

**QUESTION FIVE (20 MARKS)**

1. A marketing survey of 1000 car commuters found that 600 listen to the news, 500 listen to music and 300 listen to both, let

N = set of commuters in the sample who listen to news only.

M = Set of commuters in the sample who listen to music only

Find

1. NUM (ii) N (2 Marks)
2. Combine into a single fraction and reduce the lowest term. (2 Marks)
3. The weekly demand and cost equations for the production and sale of a particular item are

 c = 9000 + 150x

How many items x, should be produced and sold each week to earn a profit of at least

$ 7,200 (5 Marks)

1. (i) Graph the function for 0 (3 Marks)

(ii) Determine the maximum point. (1 Mark)

1. Find the of (2 Marks)
2. A company manufactures and sells x televisions per month . If the cost and revenue equations are;

R(x) = 200x - 0

Find the approximate changes in revenue and profit if production is increased from 1500 to 1501 (5 Marks)