MACHAKOS UNIVERSITY

University Examinations for 2018/2019 Academic Year

SCHOOL OF BUSINESS AND ECONOMICS

DEPARTMENT OF BUSINESS ADMINISTRATION

FIRST YEAR SPECIAL/SUPPLEMENTARY EXAMINATION FOR

BACHELOR OF COMMERCE

BMS 100 BUSINESS MATHEMATICS

DATE: 23/7/2019 **TIME: 2:00 – 4:00 PM**

INSTRUCTIONS

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Answer Question ONE And Any Other Two Questions

QUESTION ONE 30 MARKS

1. a) Name four areas where business mathematics is applicable (4 marks)

b) Using the quotient rule,differentiate (3 marks)

$$\frac{X^{3/4}}{2+X^3}$$

c) Find the equation of a curve passing through(4,1) if its slope is derivative

$\frac{dy}{dx} = \frac{x^2-4}{x^2}$ 3marks

d) Find $\frac{dy}{dx}, \frac{d^2y}{dx^2}$,for $2x^2$-3x,x+x^2 (3marks)

e) Mark the following statements as either True or FALSE (5marks)

i) The empty set is a subset to every set
ii) A set with two elements has more than two subsets
iii) Second order conditions are sufficient to identify the nature of a turning point
iv) y= $10x^2 + 15e - 0.03$ is an exponential function
v) A multi-variate function has more than one dependent variable

d) A bus travels from Nairobi to makindu at a speed ofx km/h a distance of 320km.If the speed is reduced by 20km/h the bus will take 48minutes.Represent the information as a quadratic equation and solve using the formula method (4 marks)

e) Kamau borrowed a 3 year loan of shs.100,000 at an interest rate of 9percent p.a.The repayment is to be made in 3 equal installments at the end of each year.

Required

Prepare a loan harmonization schedule (8marks)

f) What are the disadvantages of non discounted techniques of project appraisal (3marks)

QUESTION TWO 20 MARKS

A firm finds that the marginal the marginal revenue is given by the expression 20-2q while marginal cost is given by the expression 4q-10.its fixed cost is shs.30.q represents quantities of output produced and sold.

required

a) i) Total revenue (2marks)
ii) Total cost (2marks)
iii) Profit function (2marks)

b) Profit maximizing

i) Output (2marks)

ii) Price (3marks)

iii) The maximum profit (2marks)

c) The average total cost at profit maximizing output (3marks)

d) Break even point (3marks)

QUESTION THREE 20MARKS

a) A Firm intends to borrow ksh.1,000,000 to be invested in either project 1 or project 2.the annual interest payable 1s 15 percent.the following are the expected cash flows for the two projects

Period	Project 1(ksh)	Project 2(ksh)
1	500,000	600,000
2	300,000	500,000
3	400,000	400,000
4	550,000	450,000
5	600,000	300,000

Required

Profitability Index

Net present value

Advise the management on the best project to invest in.Give reasons

b) What are advantages of using internal rate of returnIRR as a project appraisal technique

c) A shopkeeper has articles for sale.After selling a number a number of articles at shs.5 each,he sells the remainder at shs.4 each and his total receipts are 11 pounds.if total receipts come to 11 poundsand shs 10.calculate the number sold at each of the prices and the number of articles sold together in total how many were sold 5marks

d) factorize pq-8r-2p+4rq

QUESTION FOUR 20MARKS

a) Chapati Mix ltd conducted a market survey to investigate customers loyalty to the companies three brands of flour namely Ngano ,Chapo and Super flour.The survey covered a total of 140 households.The following results were obtained from the survey

53 of the households were loyal to the Ngano brand

52 of the households were loyal to the Chapo brand

54 of the households were loyal to the super flour brand

15 of the households were loyal to both the nNgano and Chapo brands

10 of the households were loyal to both the Ngano and super flour brands

12 of the households were loyal to both the Chapo and super flour brands

13 of the households were not loyal to any of the three brands

Required

a) present the above information in a venn diagram (5marks)

b) the number of households that were loyal to all the three brands (5marks)

c) The number of household that were loyal to exactly two brands (5marks)

d) The number of households that were loyal to the Ngano brand (5marks)

e) The number of households that were loyal to at most one brand (5marks)

b) How is set theory useful in business (5marks)

QUESTION FIVE 20MARKS

a) jaribu ltd manufactures 2 types of milling machines,ace,and champion which costs shs .10 and shs.15 respectively per unit.There is a budget constraint of shs.850.if it has been established that the profit function is

$$\pi r^2 = 60x + 150y - x^2 - 3y^2$$

Required

Determine the optimal number of machines if x and y are the respective number of ace and champion to be produced (10 marks)

b) A firm conducted a survey on the demand of one of its products and established that the demand function to be p= $500q + 12{,}500$ where q is the number o units demanded at price p.The estimated fixed cost to produce one unit of the product was ksh.6000 while the variable cost was shs.5 per unit

Calculate

i) Quantity that would be produced to maximize profits (5marks)
ii) The selling price per unit tha would maximize profits (5marks)