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UNIVERSITY EXAMINATIONS 2024/2025

FIRST YEAR, FIRST SEMESTER EXAMINATION FOR DEGREE OF BACHELOR OF SCIENCE IN ECONOMICS

BEC 3101: INTROUDCTION TO MATHEMATICS FOR ECONOMISTS

DATE: JANUARY 2025 **TIME: 2 HOURS**

INSTRUCTIONS: ***Answer Question ONE and any other TWO Questions.***

QUESTION ONE – (30 MARKS)

a) Distinguish between the following concepts as used in Mathematics for Economists.

i) Discrete Vs Continuous variables

ii) Constant Vs Variable

iii) Implicit Vs Explicit function

iv) Linear Vs Quadratic function (14 Marks)

b) Solve the equation.

$4x^2 - x - 3 = 0$

i) By factorization (3 Marks)

ii) By formula (3 Marks)

c) Explain five fundamental areas in economics where Mathematics is applied. (10 Marks)

QUESTION TWO - (20 MARKS)

a) Expand the following: (10 Marks)

i) $(x + y)^3$

ii) $(c - d)^4$

iii) $(a + b)^5$

iv) $(x + y)^6$

b) The coordinates of two points on some straight lines are given by

i) $(0,5)\ and\ (5,1)$

ii) $(2,1) and\ (5,4)$

iii) $(3,7) and\ (10,7)$

iv) $(3,5) and\ (3,15)$

Determine the tangents and the slops of the lines. (10 Marks)

QUESTION THREE - (20 MARKS)

a) Evaluate the following: (10 Marks)

i) $\log_3 81$

ii) $\log_x x$

iii) $18^{\frac{1}{2}} \times 4^{\frac{1}{2}}$

iv) $15^{\frac{1}{3}} \times 2^{-1}$

v) $\log_x 1000$

b) An engineering firm makes metal components. Each component requires 1.01 tonnes of steel, 0.5 hours of labour plus 0.5 hours of machine time. Let the number of components produced be denoted by x. derive the algebraic expression for:

i) The amount of steel required. (2 Marks)

ii) The amount of labour required (2 Marks)

iii) The amount of machine time required (2 Marks)

c) Demonstrate with examples the four laws of exponents. (4 Marks)

QUESTION FOUR - (20 MARKS)

a) Simplify the following:

i) $(6-5x)(10-2x+3y)$ (2 Marks)

ii) $(x+3)^2-2x$ (2 Marks)

iii) $\frac{x^2+5x+6}{x+3}$ (3 Marks)

iv) $\frac{x^2+12x+27}{x+3}$ (3 Marks)

b) A firm sells 6,000 tonnes of its output in its first year of operation. Sales then decrease each year by 10% of the previous year's sales figure. Write an expression for the firm's total sales over n years and evaluate for $n = 4$ and $n = 6$ respectively. (10 Marks)

QUESTION FIVE - (20MARKS)

a) Differentiate between the following:

i) Natural numbers and whole numbers. (3 Marks)

ii) Dependent variable and Independent variables. (3 Marks)

iii) Elasticity of demand and elasticity of supply. (3 Marks)

b) Factorize the following expressions

i) $3x^2+24+16$ (2 Marks)

ii) $x^2-6xy+9y^2$ (2 Marks)

iii) $8x^2-10x+33$ (2 Marks)

c) Giving relevant examples discuss instances where use of negative numbers is applicable in economics and instances where it is not applicable. (5 Marks)