MAASAI MARA UNIVERSITY

REGULAR UNIVERSITY EXAMINATIONS

2020/2021

SCHOOL OF BUSINESS AND ECONOMICS

BACHELOR'S OF SCIENCE IN ECONOMICS, BACHELOR'S OF SCIENCE IN FINANCE AND ECONOMICS AND BACHELOR'S OF SCIENCE ECONOMICS AND STATISTICS

SECOND YEAR SECOND SEMESTER

COURSE CODE: ECO 2206

COURSE TITLE: CALCULUS II

DATE: **TIME:**

INSTRUCTIONS:
Attempt Question one and any other Three Questions

Show your workings as marks will be awarded for correct working.

QUESTION ONE

a.   Marginal utility is defined as $MU_x = P_x$

Show that $\dfrac{MU_x}{P_x} = \dfrac{MU_y}{P_y} = \dfrac{MU_n}{P_n} = \lambda$

(5 marks)

b.   If the marginal revenue function of a firm in the production of output is MR = 40 - 10q2 where q is the level of output and total revenue is 120 at 3 units of output, find the total revenue function. (3 marks)

c.   Calculate consumer's surplus if the demand function $p = 50 - 2x$ and $x = 20$

(3 marks)

d.   The demand function for a commodity is $p = e^{-x}$. Find the consumer's surplus.

(5 marks)

e.   Find $(2x - 5)^7 \, dx$.

(3 marks)

f.   Determine $\int \cos^4 x \, dx$.

(4 marks)

g.   Use a reduction formula to determine $\int x^2 \cos x \, dx$.

(2 marks)

QUESTION TWO

   a. Derive   capital   to   labour   ratio   at   time   t
      and hence discuss Solow's model of economic growth mathematically   (10 marks)
   b. Discuss Taylor's theorem using mathematical formula

(5 marks)

QUESTION THREE

a)   The demand and supply functions under perfect competition
     are $p_d = 1600 - x^2$ and $p_s = 2x^2 + 400$ respectively. Find the producer's
     surplus   [6 marks]

b)   Find $\int x\sqrt{2x + 1} \, dx$ [4 marks]

c)   Find the consumer's surplus and producer's surplus for the demand
     function $p_d = 25 - 3x$ and supply function $p_s = 5 + 2x$.

[5 marks]

QUESTION FOUR

a.   If MR and MC denotes the marginal revenue and marginal cost functions,
     then the profit functions is   (4 marks)

b.   Prove that for the demand function p(x), the elasticity of demand with respect to price is
     unity then revenue is constant   (5 marks)

c. Evaluate the following;

   i) $\int_1^4 3x \, dx$ [3 marks]

   ii) $\int_1^4 \{\theta + 2 / \sqrt{\theta}\} d\theta$ [3 marks]

QUESTION FIVE

a)   Area bounded by $y = e^x$ between the limits 0 to 1 is   [2 marks]

b)   The A company has determined that the marginal cost function for a product of a particular commodity is given by $MC = 125 + 10x - x^2/9$. where C KES is the cost of 9 producing x units of the commodity. If the fixed cost is KES250 what is the cost of producing 15 units.   [5 marks]

c)   The rate of change of sales of a company after an advertisement campaign is represented as, $f(t) = 3000e^{-0.3t}$ where t represents the number of months after the advertisement. Find out the total cumulative sales after 4 months and the sales during the fifth month. Also find out the total sales due to the advertisement campaign $e^{-1.2} = 0.3012$, $e^{-1.5} = 0.2231$.   [8 marks]