



EMBU UNIVERSITY COLLEGE

(A Constituent College of the University of Nairobi)

2015/2016 ACADEMIC YEAR

SECOND SEMESTER EXAMINATION

SECOND YEAR EXAMINATION FOR THE DEGREE OF BACHELOR OF
ECONOMICS

SMA 201: CALCULUS II

DATE: APRIL 12, 2016

TIME: 08:30-10:30

INSTRUCTIONS: Answer Question ONE and ANY Other TWO Questions.

QUESTION ONE

- a) Solve for x : $\ln(2 - \sin^2 x) = 0$, $0 \leq x \leq 360^\circ$ (4 Marks)
- b) Determine whether the series $3 + 2 + \frac{4}{3} + \frac{8}{9} + \dots$ is convergent or divergent. If it is convergent, determine its sum. (4 Marks)
- c) Using the definition of a definite integral as the limit of a Riemann sum, prove that $\int_3^4 (x^2 + 2) dx = 14\frac{1}{3}$ (6 Marks)
- d) Evaluate the following integrals:
- (i) $\int (x^2 - 5\sqrt{x} + \frac{3}{x^2}) dx$ (2 Marks)
- (ii) $\int_0^1 x^2(1 + 2x^3)^5 dx$ (4 Marks)
- e) Using integration by parts, evaluate $\int x^3 \ln x dx$ (3 Marks)
- f) Determine the area of the region between the curve $y = 27 - 3x^2$ and the x -axis. (4 Marks)
- g) Evaluate the improper integral $\int_0^\infty e^{-3x} dx$ (3 Marks)

QUESTION TWO

- a) Evaluate the following integrals:
- (i) $\int \frac{dx}{\sqrt{2x+1}}$ (3 Marks)

(ii) $\int_0^1 x^2 e^x dx$ (4 Marks)

(iii) $\int \frac{2x+3}{x^2-9} dx$ (4 Marks)

b) If the marginal revenue for a commodity is $9 - 6x^2 + 2x$ determine the total revenue and demand function (4 Marks)

c) The marginal cost function of manufacturing x units of a commodity is $6 + 10x - 6x^2$. Determine the total cost and average cost, given that the total cost of producing 1 unit is Shs. 15. (5 Marks)

QUESTION THREE

a) Evaluate the integral $\int \frac{(1-5x)dx}{\sqrt[5]{10x^2-4x+7}}$ (4 Marks)

b) If the demand and supply functions under pure competition are given by $p_d(x) = 16 - x^2$ and $p_s(x) = 2x^2 + 4$, respectively, determine the consumer's surplus and producer's surplus at the market equilibrium price. (16 Marks)

QUESTION FOUR

a) Use the partial fraction decomposition technique to evaluate $\int_1^2 \frac{4x^2-7x-12}{x(x+2)(x-3)} dx$ (11 Marks)

b) Find the area of the region bounded by the curves $y = x^2 - 5$ and $y = 3 - x^2$ (9 Marks)

QUESTION FIVE

a) Evaluate the following integrals:

(i) $\int \left(\sqrt[3]{x} - \frac{1}{x} + \sin \theta \right) dx$ (4 Marks)

(ii) $\int \frac{x^2 dx}{(4-x^3)^{3/2}}$ (4 Marks)

b) Evaluate the improper integral $\int_2^5 \frac{dx}{\sqrt{x-2}}$ (4 Marks)

c) Determine the area of the region enclosed between the curves $y = x^2$ and $y = x^2 + 2x + 3$ from $x = 1$ to $x = 2.5$ (8 Marks)

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