

CHUKA



UNIVERSITY

**UNIVERSITY EXAMINATION
RESIT/SUPPLEMENTARY / SPECIAL EXAMINATIONS
EXAMINATION FOR THE AWARD OF DEGREE OF BACHELOR OF SCIENCE**

MATH 211/221: CALCULUS II**STREAMS:****TIME: 2 HOURS****DAY/DATE: FRIDAY 13/08/2021****2.30 P.M - 4.30 P.M.****INSTRUCTIONS**

- Answer ALL the questions on the question paper.
- Do not write anything on the question paper.

QUESTION ONE (30 MARKS) – COMPULSORY.

(a) Evaluate the following:

$$(i) \int_0^1 x(5 - x^2)^5 dx. \quad (3 \text{ Marks})$$

$$(ii) \int x^2 \sin x dx. \quad (4 \text{ Marks})$$

$$(iii) \int e^{-x} dx \quad (3 \text{ Marks})$$

$$(iv) \int \frac{11x+12}{(2x+3)(x+2)(x-3)} dx. \quad (5 \text{ Marks})$$

(b) Find the area bounded by the curves $y = x^2$ and $y = 2x$. (4 Marks)

(c) A ball is dropped from a tower 450m above the ground. The distance covered by the ball is given by $s = 4.9t^2$. Calculate the velocity with which the ball is travelling when it hits the ground. (3 Marks)

(d) Use the trapezoidal rule with four strips to evaluate $\int_1^2 x^3 dx$. (4 Marks)

(e) Calculate the area of the surface generated by revolving the curve $y = x^3$ between $0 \leq x \leq \frac{1}{2}$ about the x-axis. (4 Marks)

QUESTION TWO (20 MARKS)

- (a) Determine $f(x)$ given that $\frac{dy}{dx} = 2x^2 - 3x - 4$ and $f(0) = 2$. (3 Marks)
- (b) Find the volume of the solid of revolution of the area under the curve $y = x^2 + 1$ from $x = 0$ to $x = 2$ about the x-axis. (5 Marks)
- (c) Determine the area bounded by the curves $y = x^3, y + x = 0$ and $2x - 3y = 20$. (8 Marks)
- (d) Evaluate $\int_0^1 \frac{\ln x}{x} dx$. (4 Marks)

QUESTION THREE (20 MARKS)

- (a) Evaluate $\int_0^\pi \int_0^{\sin x} y dy dx$. (5 Marks)
- (b) Approximate the integral of the function $\int_1^2 \frac{dx}{x}$ by the mid-point rule and obtain the actual error using 5 strips. (5 Marks)
- (c) Evaluate $\int \sin^2 4x \cos 4x$ (4 Marks)
- (d) Determine the length of the arc $y = \frac{1}{2}x^2$ joining the origin O (0,0) to the point $(1, \frac{1}{2})$. (6 Marks)

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