QUALIFICATION : BACHELOR of SCIENCE IN APPLIED MATHEMATICS AND STATISTICS and BACHELOR OF SCIENCE	
QUALIFICATION CODE: **07BSAM / 07BOSC**	LEVEL: **6**
COURSE: **CALCULUS 2**	COURSE CODE: **CLS601S**
DATE: **JANUARY2025**	SESSION: **1**
DURATION: **3 HOURS**	MARKS: **100**

SECOND OPPORTUNITY / SUPPLEMENTARY: EXAMINATION QUESTION PAPER

EXAMINER:	Mr Benson.E Obabueki
MODERATOR:	Dr. David Iiyambo

INSTRUCTIONS

1. Answer all questions on the separate answer sheet.
2. Please write neatly and legibly.
3. Do not use the left side margin of the exam paper. This must be allowed for the examiner.
4. No books, notes and other additional aids are allowed.
5. Mark all answers clearly with their respective question numbers.
6. All written work must be done in blue or black ink and sketches in pencil.
7. Show clearly all the steps used in the calculations.

PERMISSIBLE MATERIALS:

1. Non-Programmable Calculator without a cover.

ATTACHEMENTS

None

This paper consists of 2 pages excluding this front page

Question 1 (29 marks)

Determine the following indefinite integrals using only the indicated method for each:

1.1 $\int (3t+5)\cos(\frac{t}{4})dt$ using integration by parts. (6)

1.2 $\int \frac{x^2+7}{3x^3+4x^2-4x}dx$ using integration by partial fractions. (10)

1.3 $\int \frac{x+2}{\sqrt[3]{x-3}}dx$ using u-substitution. (Hint: Let $u=\sqrt[3]{x-3}$). (6)

1.4 $\int \frac{3dx}{\cos^2 x}$ using the t-formula. (7)

Question 2 (18 marks)

2.1 Use the trapezoidal rule to estimate $\int_0^1 x^3 dx$ with $n=6$. (10)

2.2 What value of n will be required to estimate $\int_0^1 x^3 dx$ correct to within 0.001 using the trapezoidal rule? (8)

Question 3 (10 marks)

3.1 Evaluate the improper integral $\int_1^\infty \frac{1}{x^2}dx$. (4)

3.2 Calculate the mean value of $f(x)=\frac{2x}{3x^2+5}$ for $0 \le x \le 2$. (6)

Question 4 (19 marks)

4.1 Determine the position of the centroid of the plane figure bounded by $y=e^{2x}$, the x-axis, the y-axis and the ordinate $x=2$. (9)

4.2 Determine the length of the first quarter of the circle $y^2+x^2=1$. (10)

Question 5 (24 marks)

5.1 Determine up to the fourth-degree term of the Maclaurin's series for $f(x) = x^2 e^x$ from the definition. That is, without assuming that $e^\theta = \sum_{n=0}^{\infty} \dfrac{\theta^n}{n!}$. (11)

5.2 Express $(4, 60^0)$ in cartesian coordinate form. (5)

5.3 Determine the equations of the tangent and the normal to the curve $x^2 + y^2 - 4xy + 2x = 3$ at $(0, 2)$. (8)

End of paper   **Total marks: 100**