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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: **NOVEMBER 2024**	SESSION: **1**
DURATION: **3 HOURS**	MARKS: **100**

FIRST OPPORTUNITY: 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 (28 marks)

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

1.1 $\int (w+4)\sin(5w)dw$ using integration by parts. (6)

1.2 $\int \frac{3x+7}{x^2-x-6}dx$ using integration by partial fractions. (8)

1.3 $\int \frac{\sqrt{2}}{\sqrt{98-2x^2}}dx$ using trigonometric substitution. (7)

1.4 $\int \frac{4dx}{\sin^2 x}$ using the t-formula. (7)

Question 2 (19 marks)

2.1 Use the midpoint rule to estimate $\int_0^1 (x^3+x^2)dx$ with $n=6$. (10)

2.2 What value of n will be required to estimate $\int_0^1 (x^3+x^2)dx$ correct to within 0.001 using the midpoint rule. (9)

Question 3 (20 marks)

3.1 Evaluate the improper integral $\int_0^3 \frac{2}{\sqrt{3-x}}dx$ if it is convergent. (10)

3.2 Calculate the root mean square value of $f(x)=\frac{2}{x+3}$ for $0\le x\le 2$. (10)

Question 4 (19 marks)

4.1 Determine the volume of the solid generated when a plane figure bounded by $y=5\cos 2x$, the x-axis, and the ordinates $x=0$ and $x=\frac{\pi}{4}$, rotates about the x-axis through a complete revolution. (7)

4.2 A curve is defined by the parametric equations $x=\theta-\sin\theta$ and $y=1-\cos\theta$. Determine the area of the surface generated by the curve between $\theta=0$ and $\theta=2\pi$, when rotated completely about the x-axis. (12)

Question 5 (14 marks)

5.1 Determine the Taylor's series for $f(x) = e^{-x}$ about $x = 2$ from the definition. That is, without assuming that $e^{\theta} = \sum_{n=0}^{\infty} \frac{\theta^n}{n!}$. (9)

5.2 Express $(-4, 3)$ in polar coordinate form. (5)

End of paper **Total marks 100%**