



**PAMIBIA UNIVERSITY
OF SCIENCE AND TECHNOLOGY**

**FACULTY OF HEALTH, NATURAL RESOURCES AND APPLIED SCIENCES
DEPARTMENT OF MATHEMATICS AND STATISTICS**

QUALIFICATION: Bachelor of Science; Bachelor of Science in Applied Mathematics and Statistics			
QUALIFICATION CODE:	07BOSC; 07BSAM	LEVEL:	6
COURSE CODE:	CLS601S	COURSE CODE:	CALCULUS 2
SESSION:	NOVEMBER 2022	PAPER:	THEORY
DURATION:	3 HOURS	MARKS:	100

FIRST OPPORTUNITY EXAMINATION QUESTION PAPER	
EXAMINER:	DR. DSI IYAMBO
MODERATOR:	DR. N CHERE

INSTRUCTIONS
<ol style="list-style-type: none">1. Attempt all the questions in the booklet provided.2. Show clearly all the steps used in the calculations.3. All written work must be done in black or blue ink, and sketches must be done in pencil.

PERMISSIBLE MATERIALS

1. Non-programmable calculator without a cover.

THIS QUESTION PAPER CONSISTS OF 3 PAGES (Including this front page)

Question 1.

Find a function f satisfying the following conditions.

$$f''(x) = 6e^{2x}, \quad f(0) = -3 \quad \text{and} \quad f'(0) = 2.$$

[8]

Question 2.

Evaluate each of the following integrals

a) $\int \frac{\sqrt{\sqrt{x} + 5}}{\sqrt{x}} dx$ [6]

b) $\int \left(2^x + 5 \sec 2x \tan 2x - \frac{\arctan x}{1 + x^2} \right) dx$ [6]

c) $\int_0^{\frac{\pi}{2}} \frac{4 \cos x}{1 + \sin^2 x} dx$ [8]

d) $\int 3x \ln 2x dx$ [6]

e) $\int_0^3 \frac{1}{\sqrt{3-x}} dx$ [9]

Question 3.

Find the area of the region bounded by the graphs of the equations $y = x^4 - 2x^2$ and $y = 2x^2$.

[10]

Question 4.

In each of the following cases, calculate the volume of the solid generated when the area of the region bounded by the given curves is revolved around the stated axis.

a) $y = \sin x$, x -axis, $x = 0$, $x = \pi$ around the y -axis. [6]

b) $y = x^2$, x -axis, $x = 1$, $x = 3$ around the x -axis. [5]

Question 5.

a) Approximate the following integral using the *Trapezoid Rule* with $n = 4$.

$$\int_0^{2\pi} \sin 2x dx.$$

[9]

b) Calculate the arc length of the graph of the function $f(x) = \ln(\sec x)$ on the interval $[0, \frac{\pi}{4}]$.

[10]

Question 6.

Determine whether the following series is absolutely convergent, conditionally convergent or divergent.

$$\sum_{n=1}^{\infty} (-1)^{n+1} \frac{2^n n^2}{(2n)!}$$

[8]

Question 7.

Find the radius and interval of convergence of the following power series.

$$\sum_{n=1}^{\infty} (-1)^n \frac{(x-2)^n}{(2^n)(n)}$$

[9]

END OF EXAMINATION QUESTION PAPER
