Kasarani Campus
Off Thika Road
Tel. 2042692 / 3
P.
O. Box 49274, 00100
NAIROBI
Westlands Campus
Pamstech House
Woodvale Grove
Tel. 4442212
Fax: 4444175

KIRIRI WOMENS' UNIVERSITY OF SCIENCE AND TECHNOLOGY
UNIVERSITY EXAMINATION, 2023/2024 ACADEMIC YEAR
FIRST YEAR, SECOND SEMESTER EXAMINATION
FOR THE DEGREE OF BACHELOR OF SCIENCE IN
COMPUTER SCIENCE

KMA 201- CALCULUS II

Date: 10th August, 2023
Time: 8.30am – 10.30am

INSTRUCTIONS TO CANDIDATES
ANSWER QUESTION ONE (COMPULSORY) AND ANY OTHER TWO QUESTIONS
QUESTION ONE (30 MARKS)

a)   i)   State the Mean Value Theorem. (2 Marks)

     ii)   Verify the *Mean Value Theorem* for $f(x)=x^3-3x^2-10x+20$
on the interval $[-1,5]$. (4 Marks)

b)   Find the value of C in the function $f(x)=x^3$-12x prescribed in the Rolle's theorem on the
interval $0\leq x\leq 2\sqrt{3}$. (3 Marks)

c)   Calculate the second Taylor Polynomial of $f(x)=\sqrt{x}$ at $x=1$ and use this polynomial to
estimate $\sqrt{1.02}$. (6 Marks)

d)   Evaluate the following integrals;

     i) $\int x^2 e^{x^3} dx$ (3 Marks)

     ii) $\int \cos 3x \cos 4x \, dx$ (4 Marks)

     iii) $\int \frac{x^3}{\sqrt{1-x^2}} \, dx$ (4 Marks)

e)   Using cylindrical shells, find the volume of the solid generated when the region endorsed
between $y=\sqrt{x}, x=1, x=4$ is revolved about the $y-axis$. (4 Marks)

QUESTION TWO (20 MARKS)

a)   Find the area of the region bounded by the curve $y=xe^{-x}$ and the $x-axis$ ¿ $x=0$ to $x=4$.
(6 Marks)

b)   Evaluate $\int \frac{2x^3-4x^2-x-3}{x^2-2x-3} \, dx$ using partial fractions method. (7
Marks)

c)   Find the length of the cardioid $r=1-\cos\varphi$ (7 Marks)

QUESTION THREE (20 MARKS)

a)   Find the Taylor Polynomials $f_{1,\pi}(x)$, $f_{3,\pi}(x)$ and $f_{5,\pi}(x)$ for
$f(x)=\sin x$. (7 Marks)

b)   Evaluate the integrals;

i) $\int \dfrac{\cos \sqrt{x}}{\sqrt{x}}\, dx$ (3 Marks)

ii) $\int 3x\sqrt{1-2x^2}\, dx$ (5 Marks)

iii) $\int \dfrac{dx}{\left(9-x^2\right)^{\frac{3}{2}}}$ (5 Marks)

QUESTION FOUR (20 MARKS)

a) Evaluate the integral;

   i) $\int e^x \cos x\, dx$ (6 Marks)

   ii) $\int \sin^5 x\, dx$ (3 Marks)

   iii) $\int \sin^4 x \cos^4 x\, dx$ (6 Marks)

b)   Use Partial fractions to evaluate;

$$\int \dfrac{-2x+4}{(x¿¿2+1)¿¿¿}¿\, dx$$ (5 Marks)

QUESTION FIVE (20 MARKS)

a) Use substitution method to evaluate;

   i) $\int \dfrac{x}{\sqrt{1-x^2}}\, dx$ (5 Marks)

   ii) $\int x^2 \sin\left(x¿¿3\right)dx\,¿$ (4 Marks)

   iii) $\int \sqrt{x}\,\sin^2(¿ - 1¿dx.$ (5 Marks)

b)   Determine the third Taylor polynomial of the function;

$$f(x)=\cos(\pi -5x)\ at\ x=0$$ (6 Marks)