

Mount Kenya University



UNIVERSITY EXAMINATION 2014/2015

SCHOOL OF PURE AND APPLIED SCIENCES.
DEPARTMENT OF MATHEMATICS, STATISTICS AND ACTUARIAL SCIENCE

BEDS/BEDA/BSNE/BENH
SCHOOL BASED

UNIT CODE: BMA1204

UNIT TITLE: CALCULUS II

DATE: JUNE 2015

SUPP / SPECIAL EXAM

TIME: 2 HOURS

INSTRUCTIONS: Answer questions one and any other two questions.

1. a) i) Find $\int_0^2 \frac{1}{1+x^2} dx$ (4 Marks)

ii) Express $\frac{4x-7}{x^2-3x+2}$ in partial fractions hence solve $\int \left(\frac{4x-7}{x^2-3x+2} \right)^{dx}$. (6 Marks)

b) Use Simpson's formula with $n=4$ to estimate $\int_0^1 \frac{1}{1+x^3} dx$ (7 Marks)

c) Show that $\int \sin^2 R d\theta = \frac{\theta}{2} - \frac{\sin \theta \cos \theta}{2}$ (5 Marks)

d) Find the surface area generated by revolving $y = x^2$ from 0 to 1 above the y-axis. (4 Marks)

2. a) Find $\int \frac{1}{1+\sin x} dx$ (5 Marks)

b) Find $\int \frac{1-\sqrt{x}}{1+\sqrt{x}} dx$ (6 Marks)

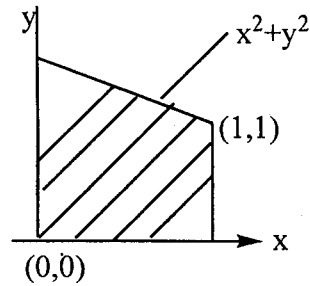
c) Find the area bounded by the curve $y^2 = \frac{x^4}{4-x^2}$ and its asymptotes. (9 Marks)

3. a) A body travels with velocity, $v(t)=\sin t$, Calculate the displacement of the body $[0, 2\pi]$ (3 Marks)

b) Find $\int \frac{(4x-7)}{x^2-3x+2} dx$ (6 Marks)

c) Find $\int \frac{x^3}{\sqrt{16-x^2}} dx$ (8 Marks)

d) Find the area of the shaded region bounded



(3 Marks)

4. a) Evaluate $\int e^x \sin x dx$ (6 Marks)

b) Find $\int_{-\infty}^{\infty} \frac{1}{1+x^2} dx$ (6 Marks)

c) Find the area bounded by the curve $y = \cot^2 2x \operatorname{cosec}^2 2x$, the x-axis and the $x = \pi/6$ $x = \pi/3$ (4 Marks)

d) Obtain the volume of the solid formed when the area enclosed by the curve $y = x^3 + 1$ the x-axis and the line $x=1$ is rotated through one revolution about x-axis. (4 Marks)

5. a) Find the length of the arc described by $y = x^3/6 + 1/2x$ for $x=2$ to $x=5$.

(6 Marks)

b) i) Find the integral $\int \frac{4}{(x-2)(x+2)} dx$

(4 Marks)

ii) Calculate the surface area formed by rotating the curve $y = \sqrt{x}$ about x-axis between $x=1$ and $x=6$

(5 Marks)

c) Find the volume of the solid of revolution formed by rotating the area enclosed by the curve $y = x + x^2$, the x-axis and the coordinate $x=2$, $x=3$ through one revolution about the x-axis.

(5 Marks)