



# THE MOMBASA POLYTECHNIC UNIVERSITY COLLEGE

(A Constituent College of JKUAT)  
*Faculty of Engineering and Technology*

DEPARTMENT OF BUILDING AND CIVIL ENGINEERING

**DIPLOMA IN ARCHITECTURE**  
**DIPLOMA IN BUILDING & CIVIL ENGINEERING**

AMA 2206: CALCULUS II

**SPECIAL/SUPPLEMENTARY EXAMINATION**

SERIES: MAY/JUNE 2012

**TIME: 2 HOURS**

## **Instructions to Candidates:**

You should have the following for this examination

- *Answer Booklet*
- *Scientific calculator*

This paper consists of **FIVE** questions

Answer question **ONE** and any other **TWO** questions

Maximum marks for each part of a question are clearly shown

This paper consists of **THREE** printed pages

**Question 1 (Compulsory – 20 marks)**

a) Evaluate the following:

$$\int \frac{2x}{(x+1)^2} dx$$

i)

$$\int \frac{dx}{4x+9}$$

ii)

$$\int x^2 \sin x dx$$

iii)

(10 marks)

b) Find the area bounded by the parabola  $y = -x^2 - 3x + 6$  and the line  $y = 3 - x$  (10 marks)

**Question 2 (20 marks)**

$$\int_{\frac{1}{2}}^{\frac{3}{4}} \frac{(x+1)}{x^2(x-2)} dx$$

a) Evaluate: (10 marks)

b) Find the volume for the solid generated when the area bounded by the functions  $y = x^3$  and  $y = 2x - x^2$  is revolved once about the x-axis (10 marks)

**Question 3 (20 marks)**

$$\int x^2(4x^3 + 5) dx$$

a) Evaluate: (6 marks)

b) A plane surface is bounded by the function  $y = x - 2x^2$  and the x-axis.  
i) The area for the surface  
ii) The volume for the solid generated when the surface in (i) is rotated about the x-axis through 1 revolution. (10 marks)

**Question 4 (20 marks)**

$$\frac{3x}{(x^2 - 6x + 9)(x - 1)}$$

a) Determine the partial fractions for; and hence evaluate;

$$\int \frac{3x}{(x^2 - 6x + 9)} dx$$

Evaluate (12 marks)

- b) Determine the second moment of inertia for the surface shown in figure 1

Figure 1

**Question 5 (20 marks)**

- a) Evaluate:

$$\int_1^2 x \ln x dx$$

(8 marks)

- b) A plane surface is bounded by the functions  $y^2 = 4x$  and  $y = x$ . Find the position of centroid for the surface about the x-axis (12 marks)