



THE MOMBASA POLYTECHNIC UNIVERSITY COLLEGE

(A Constituent College of Jkuat)

Faculty of Engineering and Technology

DEPARTMENT OF BUILDING AND CIVIL ENGINEERING

**HIGHER DIPLOMA IN CONSTRUCTION
(BUILDING ECONOMICS OPTION)**

EBE 3102: MATHEMATICS II

SPECIAL/SUPPLEMENTARY EXAMINATION

SERIES: FEBRUARY/MARCH 2012

TIME: 2 HOURS

Instructions to Candidates:

You should have the following for this examination

- *Answer booklet*
- *Electronic Calculator*

This paper consists of **FIVE** questions

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

Maximum marks for each part of a question are as shown

This paper consists of **TWO** printed pages
SECTION A (COMPULSORY)

Question 1

$$\int \frac{10x}{(x^2 - 1)(x + 1)}$$

a) Evaluate (8 marks)

$$x = 1 - \cos \vartheta \quad y = 0 - \sin \vartheta \quad \vartheta = \frac{\pi}{6}$$

b) Find the radius of curvature for the function at the point where (12 marks)

SECTION B (Answer any TWO questions from this section)

Question 2

$$x^2 + 4xy + y^3 = 5$$

a) Determine the radius of curvature at (-2, 6) for the curve; (10 marks)

$$\frac{4x^2 + 1}{x^2 + 1} \quad \int \frac{4x^2 + 1}{x^2 + 1} dx$$

b) Determine the partial fractions for and hence evaluate (10 marks)

Question 3

$$\int \frac{4}{(x^2 + 1)(x + 1)} dx$$

a) Evaluate (8 marks)

$$\frac{6}{x^2 - 7x + 12} \quad \int \frac{6}{x^2 - 7x + 12}$$

b) Find the partial fraction for and hence evaluate (12 marks)

Question 4

$$\int \cos^2 \vartheta \sin^2 \vartheta d\vartheta$$

a) Evaluate (8 marks)

$$x = \cos t \quad y = t \sin t \quad t = \frac{\pi}{4}$$

b) A function is defined as: find the radius of curvature at (12 marks)

Question 5

a) Evaluate:

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

(ii)
$$\int \frac{4x}{x^2 - 13x + 36}$$

(15 marks)

b) Find radius of curvature for the point (1, -11) for the function $\frac{y+1}{x-2} = x+4$

(5 marks)