TECHNICAL UNIVERSITY OF MOMBASA

FACULTY OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF BUILDING & CIVIL ENGINEERING

UNIVERSITY EXAMINATION FOR:

CERTIFICATE IN BUILDING AND CIVIL ENGINEERING

AMA 1250 : ENGINEERING MATHEMATICS III

END OF SEMESTER EXAMINATION

SERIES:AUGUST2019

TIME:2 HOURS

DATE:2019

Instructions to Candidates

You should have the following for this examination:

Answer Booklet, examination pass and student ID

This paper consists of five questions.

Attempt any THREE questions

Do not write on the question paper.

QUESTION ONE

a) Find the area bounded by the curve $y = 3x^2 + 6x + 8$, the x-axis and the ordinates $x = 1$ and $x = 3$. **(4mks)**

b) Find the volume generated when the plane figure bounded by $y = 5\cos 2x$, the x-axis and ordinates at $x = 0$ and $x = \frac{\pi}{4}$, rotates about the x-axis through a complete revolution. **(10mks)**

c) Determine the following integrals:

(i) $\int 4e^{5x-2}.dx$

(ii) $\int 3 \text{ Sin } (2x+1).dx$

(iii) $\int (1 - 4x)^2.\ dx$ **(6mks)**

QUESTION TWO

a) The parametric equations of a curve are $3t^2$, $y = 3t-t^2$. Find the volume generated when the plane figure bounded by the curve, the x-axis and the ordinates corresponding to $t = 0$ and $t = 2$, rotates about the x-axis. **(10mks)**

b) Find (i) $\int \frac{1}{(16-x^2)}\ dx$ for $x = 0$ and $x = 2$

(ii) $\int (4x^3+5x^2-2x+7.dx$

(iii) $\int (4e^{2x+4}+\frac{3}{4x-1}).dx$ **(10mks)**

QUESTION THREE

a). A hemispherical bowl has a radius of 9cm.It contains soup to a depth of 5cm. Find:

(i) Volume of the soup

(ii) Surface area in contact with the soup. **(10mks)**

b). Find the length of the curve $y^2 = x^3$ between x = 0 and x = 3.
(5mks)

c). Find the area under the curve $y = e^x$ between x = -2 and x = 3
(5mks)

QUESTION FOUR

a). Evaluate $\int x^2 e^{3x}.dx$ **(8mks)**

b). Determine $\int \frac{4x^2+26x+5}{2x^2+9x+4}$ dx by partial fractions. **(12mks)**

QUESTION FIVE

a). Find the position of the centroid of the figure bounded by $y = e^{2x}$, the x-axis, the y-axis and the ordinate at x = 2.

(20mks)