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). Solve $\int 1/\sqrt{x}\, dx$ using the trapezoidal rule with FOUR intervals for x = 0 and x = 3 **(10mks)**

b). 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)**

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

QUESTION TWO

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 THREE

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 FOUR

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)

QUESTION FIVE

a) 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)**

b) 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)