PP1

TECHNICAL UNIVERSITY OF MOMBASA

FACULTY OF HEALTH AND APPLIED SCIENCES

DEPARTMENT OF MATHS & PHYSICS

UNIVERSITY EXAMINATION FOR:

CERTIFICATE IN ELECTRICAL & ELECTRONIC ENGINEERING

AMA1250 ENGINEERING MATHEMATICS 3

END OF SEMESTER EXAMINATION

SERIES: APRIL / MAY 2016 SERIES

TIME: 2HRS

DATE: APRIL / MAY 2016

Instructions to Candidates

You should have the following for this examination

-Answer Booklet, examination pass and student ID Mathematical table, calculator, no mobile phone

This paper consists of **FIVE** questions. Attempt question ONE (Compulsory) and any other TWO questions.

Do not write on the question paper.

QUESTION ONE

a) (i) if $f(x) = 4x^3 - 2x^2 - 3x + 1$ Find

$$\frac{f(1+b) - f(1)}{b}$$

(3Mks)

ii) If $fx = 3x^2 + 2x - 9$ find $\frac{f(3 + a) - f(3)}{9}$ (3Mks)

b) (i) Find x from the equation

$9\cos x + 23\sinh x + 54 = 0$ (4Mks)

ii) If $\sin hx = 2$, what is thx (3Mks)

c) Integrate

i) $I = \int \frac{7xdx}{\sqrt{8x^2 + 4}}$ by putting $Z = \sqrt{8x^2 + 4}$ (4Mks)

ii) $I = \int x(3-2x)^4 dx$ (3Mks)

d) Determine the following

(i) $\int 3y^{1.3} dy$ (2Mks)

(ii) $\int_2^3 (p - 1)^2 \, dp$ (3Mks)

(iii) Sketch the curve and find the area between the curve $y=x^2-x+2$, the ordinates x=-1 and x=2 and the x-axis (5mks)

QUESTION TWO

a) (i) Given that $f(x)=x^2$, express as simple as possible

$f(5 + h)$ and $\frac{f(5+h)-f5)}{h}$ $h\neq0$ (3Mks)

(ii) Given that $f(x) = x^3$ find

$\frac{f(a+h) - f(a-h)}{2h}$ $(h\neq o)$ (3Mks)

b) Given that $f: x \rightarrow (10+x)$, $G: x \rightarrow x^3$ and $H: x \rightarrow x/2$ write down the functions

a) FG (2Mks)

b) GF (2Mks)

c) FGH (3mks)

c) Sketch the graph of $y = \frac{1 + 2}{x-3} + 2 (x\neq3)$ (3Mks)

d) The domain of the function g(d) = 5x+1 is $\{o, 1, 3, 4, 5\}$ find its range (4Mks)

QUESTION THREE

a) Use Simpsons rule to find an approximation for the area under the curve Y=1/x between x=1 and x=2 (use five ordinates) (12Mks)

b) (i) Find the area bounded by the curve $y=3x^2+14x+15$, the x-axis and ordinates at x = -1 and x=2 (3Mks)

(ii) Given that volume of solid of revolution is given $\int_a^b \prod y^2 dx$ The parametric equations of curve are $x=3t^2$, $y=3t - t^2$. 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 (hint:-remember to change the variable of the integral) (5Mks).

QUESTION FOUR

a) (i) Find all first and second partial derivations of Z = sinxy (5Mks)

(ii) If $z = Ln(e^x + e^y)$, show that

$\frac{dz}{dx} + \frac{dz}{dy} = 1$ (partial d) (6Mks)

b) (i) Use the trapezium rule to estimate the area under the curve y=1/x from x = 1 to x = 2 using six ordinates (6Mks)

(ii) Compare the results of b(i) above with the true area obtained by integration (3Mks)

QUESTION FIVE

a) Integrate each of the following as per method indicated

(i) $\int x^2 \ln x dx$ by parts (3Mks)

(ii) $I = \int \frac{x+1}{X^2 - 3x+2}$ by partial functions (5Mks)

(iii)I = $\int \cos^3 x \, dx$ by trigonometrick formation (3Mks)

b) Evaluate the following

(i) I = $\int_1^2 \int_0^{\Pi} 3 + Sin\theta) \, d\theta dr$ (4Mks)

(ii) I = $\int_1^2 \int_0^3 p^2 + q^2 - r^2)dpdqdr$ (5MKs)