TECHNICAL UNIVERSITY OF MOMBASA

FACULTY OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF MEDICAL ENGINEERING

UNIVERSITY EXAMINATION FOR:

DIPLOMA IN MEDICAL ENGINEERING

AMA2351: ENGINEERING MATHEMATICS VI

END OF SEMESTER EXAMINATION

SERIES:DECEMBER2016

TIME:2HOURS

DATE:9Dec2016

Instructions to Candidates

You should have the following for this examination

-Answer Booklet, examination pass and student ID

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

Do not write on the question paper.

Question ONE

(a) Express $\sin(x + h)$ as a series of powers of h hence evaluate sin 44^{o} correct to 5 decimal places **(10 marks)**

(b) Evaluate the positive root of the quadratic equation $2x^2 - 6x - 3 = 0$ correct to 3 significant figures taking $x_1 = 3$ as the first approximation using Newton- Raphson iterative **(10 marks)**

(c) Evaluate the following

i) $\int_1^3 \int_0^{\ln y} dydx.$

ii) $\int_0^2 \int_1^3 \int_1^2 xy^2 dzdydx$ **(10 marks)**

Question TWO

(a) Determine the Maclaurin series for the function $f(x) = \frac{5+x}{(5-x)^3}$ as far as term in degree three hence evaluate $\int_0^1 (x-7)f(x)dx$ **(10 marks)**

(b) Given that $x = 1.1$ is an approximation to one of the root of the equation $x^5 - x - 0.2 = 0$, use Newton-Raphson iterative method to determine the root correct to five decimal places.
(10 marks)

Question THREE

(a) Use Newton-Raphson formula to calculate $\sqrt[4]{9}$ correct to six decimal places
(10marks)

(b) i) Given the function $y_n = f(x_n)$, derive an expression for linear interpolation and linear extrapolation

ii) Derive the Newton-Raphson on iterative formula for determining the root $y = f(x) = 0$ hence evaluate $\sqrt[3]{65}$ correct to four significant figures
(10 marks)

Question FOUR

(a) Use Taylor approximation to express $\tan(\frac{\pi}{6} + h)$ as a polynomial in h as far as h^3 hence estimate $\tan 34°$ correct to five decimal places
.
(10 marks)

(b) Evaluate

i) $\int_0^1 \int_3^2 \int_{1-y}^{y+2} 2xyz \, dxdydz$

ii) $2\int_0^{\frac{\pi}{3}} \int_a^{2acos\theta} r \, drd\theta$

(10 marks)

Question FIVE

(a) Use Newton-Gregory forward difference formula to obtain a polynomial of minimum degree which exactly fit the data given below

x	-1	-0.7	-0.4	-0.1	0.2	0.5
f(x)	12	12.357	12.336	12.099	11.808	11.625

(10 marks)

(b) Expand $log_e \frac{1+x}{1-x}$ in powers series and hence evaluate $log_e 3$ correct to five decimal places.

(10 marks)