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: APRIL2016

TIME: 2HOURS

DATE: 9May2016

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) Given that x_r is the approximation of the root to the equation $x^4 + 5x - 20 = 0$, determine

i. the better approximation

ii. roots of the equation taking $x_o = 1.8$ (10 marks)

b) Determine the first four Taylor series terms for the following

i. $(x-1)e^x$

ii. $x^2 + x - 2$ (10 marks)

c) Determine the Maclaurin series for $sin^2 x$ hence evaluate $\int_0^{\frac{\pi}{6}} f(x)dx$ (10 marks)

Question TWO

a) Using Newton's method determine the positive roots of the quadratic equation

$5x^2 + 11x - 17 = 0$ correct to three significant figures (10 marks)

b) Determine a polynomial in x which takes on the values $-3,3,11,27,57,107$ when $x = 0,1,2,3,4,5$ respectively. (10 marks)

Question THREE

Determine the Maclaurin series for the following

a. $sin^2 x$
b. $\frac{x}{\sqrt{1-x^2}}$
c. xe^{-x}
d. $\frac{x}{1+x^2}$ (20 marks)

Question FOUR

a) Expand $log_e \frac{1+x}{1-x}$ in power series hence evaluate $log_e 3$ correct to five decimal places (10 marks)

b) Use Newton-Raphson iterative method to solve $x = 2 \sin x$ taking $xo = 1.5$ (10 marks)

Question FIVE

a) Given the data below use Newton-Gregory interpolation to evaluate

i) $f(0.36)$
ii) $f(0.44)$

x	0.2	0.3	0.4	0.5	0.6
y	0.234	0.2788	0.3222	0.3617	0.3979

(10 marks)

b) Determine Maclaurin expansion for $e^x ln(1 + x)$ (10 marks)