



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: APRIL 2016

TIME: 2 HOURS

DATE: 9 May 2016

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 question 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
- the better approximation
 - roots of the equation taking $x_0 = 1.8$ (10 marks)
- b) Determine the first four Taylor series terms for the following
- $(x - 1)e^{-x}$
 - $x^2 + x - 2$ (10 marks)
- c) Determine the Maclaurin series for $\sin^2 x$ hence evaluate $\int_0^{\pi} f(x) dx$ (10 marks)

Question TWO

- a) Using Newton's method determine the positive roots of the quadratic equation
- $$5x^2 + 11x - 17 = 0 \text{ correct to three significant figures} \quad (10 \text{ marks})$$
- 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 $x_0 = 1.5$ (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)