TECHNICAL UNIVERSITY OF MOMBASA

FACULTY OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF MEDICAL ENGINEERING

UNIVERSITY EXAMINATION FOR:

DIPLOMA IN MEDICAL ENGINEERING

AMA2150: ENGINEERING MATHEMATICS I

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) A shed 4.0 m long and 2.0 m wide has a concrete path of constant width laid all way round. Taking the area of the path as $9.50m^2$, calculate the width to the nearest centimeters

(10 marks)

(b) (i) Make b the subject of the formula $a = \frac{x-y}{\sqrt{bd+be}}$

(ii) Simplify $\frac{(x^2 y^{\frac{1}{2}})(\sqrt{x}\ \sqrt[3]{y^2}}{(x^5 y^3)^{\frac{1}{2}}}$ **(10 marks)**

(c) Expand in ascending the powers of x as far as the term in x^3 using binomial theorem

(10 marks)

Question TWO

(a) The height S meters of a mass thrown vertically upwards at a time t seconds is given by $s = 40t - 13t^2$. Determine the time taken by the mass on ascent and descent after being thrown to a height of 25 m

(10 arks)

(b) A vertical aerial stand on horizontal ground where a surveyor positioned due east of the aerial measures the elevation of the top as 48^o. He then moves due south 30 m and measures the elevation as 44^o. Determine the height of the aerial

(10 marks)

Question THREE

(a) Solve the following equations using completing the square method

i) $2x^2 - 10x - 7 = 0$

ii) $2x^2 + 10x + 8 = 0$ **(10 marks)**

(b) A new Piaggo tuktuk was tested for speed and the following speeds were recorded for the first six seconds 2.5,5.5,8.75,12.5,17.5,24*m/s*. Determine the distance travelled in the six seconds using

i) Mid-ordinate
ii) Trapezoidal
iii) Simpson rule

(10 marks)

Question FOUR

(a) Solve

i) $2\sin^2\theta = \sin\theta$ for $0^o \leq \theta \leq 360^o$

ii) $\tan\theta = 2\sin\theta$ for $0^o \leq \theta \leq 360^o$

. **(10 marks)**

(b) Solve the area of a triangle ABC given that $B = 128^o$, $AB = 7.2cm$ and $BC = 4.5cm$

(10 marks)

Question FIVE

(a) Prove the following identities.

(i) $\frac{(cosec\theta + cot\theta)tan\theta}{(tan\theta + sec\theta)} = \frac{cos\theta + 1}{sin\theta + 1}$

(ii)$1 + cos\theta = 2sin^2\theta$

(10 marks)

(b) The resonant frequency of a circuit containing Inductance and Capacitance is given by $f_r = \frac{1}{2\pi\sqrt{LC}}$. Given that the values of L and C are 2.6 and 0.8 percent large and small respectively, approximate the percentage errors in the frequency **(10 marks)**