TECHNICAL UNIVERSITY OF MOMBASA

Faculty of Engineering & Technology in Conjunction with Kenya Institute of Highways and Building & Technology (KIHBT)

DEPARTMENT OF ELECTRICAL & ELECTRONIC ENGINEERING

HIGHER DIPLOMA IN TECHNOLOGY

EEA 3101: ENGINEERING MATHEMATICS I

END OF SEMESTER EXAMINATION
SERIES: MAY 2015
TIME ALLOWED: 2 HOURS

Instructions to Candidates:

You should have the following for this examination

- *Answer Booklet*

This paper consists of **FIVE** questions. Answer question **ONE (Compulsory)** and any other **TWO** questions
Maximum marks for each part of a question are as shown
This paper consists of **TWO** printed pages

Question One (Compulsory)

a) Differentiate: $\frac{3}{4}e^{2y+1}$ **(3 marks)**

b) Determine $\frac{d}{dx}\left(3x^2y^3\right)$ using the product rule **(6 marks)**

c) Supplies are dropped from a helicopter and the distance fallen in a time t seconds is given by $x = \frac{1}{2}gt^2$, where g = 9.8m/s^2. Determine the velocity and the acceleration of the supplies after it has fallen for 2 seconds **(7 marks)**

d) Determine the integral of $\int \frac{2x^3 - 3x}{4x}dx$ **(6 marks)**

e) Evaluate $\int_0^1 2e^{6x-1}dx$ correct to 4 s.f **(8 marks)**

Question Two

a) Evaluate $\int_0^{\pi/4} 2\cos^2 4tat$ **(8 marks)**

b) Sketch the curve $y^2 = 9x$ between the limits x = 0 and x = 4. Determine the position of the centroid of this area. **(12 marks)**

Question Three

a) Evaluate $\int_0^{\pi/0} 3\sin^2 3dxdx$ correct to 3 s.f **(8 marks)**

b) Determine $\int \sqrt{(16 - at)}dt$ **(12 marks)**

Question Four

a) Determine the differential coefficient of $ta^{n-1}\left(\frac{x}{1-x^2}\right)$ **(8 marks)**

$$\sec h^{-1}\frac{3x}{4}$$

b) Differentiate with respect to x **(6 marks)**

$$\frac{d}{dx}\left(x\cosh^{-1}\left(\cosh x\right)\right)$$

c) Determine **(6 marks)**

Question Five

$$\int_{-2}^{1}\frac{3x^2+16x+15}{\left(x+3\right)^3}dx$$

a) Evaluate correct to 4 s.f. **(8 marks)**

$$\int\frac{5x^2-2x-19}{x(+3)(x-1)2}dx$$

b) Find **(12 marks)**