THE MOMBASA POLYTECHNIC UNIVERSITY COLLEGE

(A Constituent College of Jkuat)

Faculty of Engineering and Technology

DEPARTMENT OF MECHANICAL & AUTOMOTIVE ENGINEERING

DIPLOMA IN TECHNOLOGY
ELECTRICAL POWER ENGINEERING (DEPE2)
ELECTRONIC & AUTOMOTIVE ENGINEERING (DEAE2)

EEE 2204: ENGINEERING MATHEMATICS IV

SPECIAL/SUPPLEMENTARY EXAMINATION

SERIES: FEBRUARY/MARCH 2012

TIME: 2HOURS

INSTRUCTION TO CANDIDATES

You should have the following for this examination

- *Answer booklet*
- *A Non-programmable scientific calculator*
- *Mathematical table*

This paper consists of **FIVE** questions.
Attempt any **THREE** questions
Maximum marks for each part of a question are as shown.
This paper consists of **THREE** printed pages

QUESTION ONE (20 MARKS)

$$f(x)=\frac{4x^3-8x+6x}{2x}$$

a) If find the coordinates of the point which the gradient is:

(i) Zero

(ii) Four (3 marks)

b) Differentiate the following:

$$y=\frac{3\cos x}{5x^3}$$

(i) (3 marks)

$$y=\sinh^{-1}x$$

(ii) (3 marks)

$y=xe^{-2x}$ $\quad x\frac{d^2y}{dx^2}+2x\frac{dy}{dx}+2y=0$

c) Given that show that (5 marks)

$$y=\frac{x^3}{3}-\frac{x^2}{2}-2x+5$$

d) Find the turning points of and distinguish between them (6 marks)

QUESTION TWO (20 MARKS)

a) Integrate the following

$$\int\cos 5x\sin 3x\,dx$$

(i) (3 marks)

$$\int\frac{x}{2+3x^2}dx$$

(ii) (3 marks)

$$\int\frac{11-3x}{x^2+2x-3}\,dx$$

(iii) (3 marks)

$y=x^2+2x+1$

b) Find the area under the curve between x =1 and x = 2 (4 marks)

$y=3\sin 5t+2\cos 3t$ $\quad \pi$

c) Find the mean value of between t = 0 and t = (7 marks)

QUESTION THREE (20 MARKS)

a) Determine in Polar form

$$8\angle 25^o\times 4\angle 60^o$$

(i) (2 marks)

$$\frac{16\angle 75^o}{2\angle 15^o}$$

(ii)

(iii) If $z = x + jy$ find the equation of the locus $\left|\frac{z+1}{z-1}\right| = 2$ (6 marks)

b) Find the 5(five) firth roots of $12\angle 300^o$ and indicate the principal root (5 marks)

c) A 240V 50Hz voltage is applied across a series connected circuit having a resistance of 12Ω and inductance of 0.10H and a capacitance of $120\mu F$. Determine the current flowing in the circuit

QUESTION FOUR (20 MARK

a) (i) Evaluate $\sinh 1.27s$ (2 marks)

(ii) Using the series expansion for *chx* evaluate *ch1* correct to 4 dp (3 marks)

b) Solve $2.6chx + 5.1shx = 8.73$ correct to 4 decimal places (6 marks)

c) A chain bag hangs in the form given by $y = 40ch\,{}^{x}\!/_{40}$ determine correct to 4 s.f

(i) The value of y when x = 25

(ii) The value of x when y = 54.30 (6 marks)

QUESTION FIVE (20 MARKS)

a) (i) Find the differential coefficient of $f(x) = 3x^3$ from the first principal (4 marks)

(ii) If $y = 7\sqrt{x}\ In\,4x$ find (4 marks)

b) (i) If $4e^x - 3e^{-x} = P\,shx + Q\ chx$ determine P and Q (3 marks)

c) Integrate the following functions

(i) $\int {}^{3}\!/_{2}\left(x^2 + 2\right)^6 2x\ dx$ (3 marks)

(ii) $\int_1^3 \frac{e^t}{3 + e^t} dt$ (3 marks)