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FINAL
Examination Paper

(COVER PAGE)

Session	:	JANUARY 2015
Programmes	:	**DIPLOMA IN ELECTRICAL AND ELECTRONIC ENGINEERING (DEEI)**
Course	:	**MAT 1121 : ENGINEERING MATHEMATICS 1**
Date of Examination	:	16 March 2015 (Monday)
Time	:	8:00 am – 10:00 am Reading Time: Nil
Duration	:	2 Hours
Special Instructions	:	

This paper consists of **FIVE (5)** questions. Answer any **FOUR (4)** questions in the answer booklet provided. All questions carry equal marks.

Students are not allowed to remove this question paper from the examination venue.

Materials permitted : Non Programmable Scientific Calculator

Materials provided: Graph paper, formula booklet 1

Examiner(s) : **Ms. Fang Yen Yen**

Moderator : **Dr. Ch'ng Pei Eng**

This paper consists of 5 printed pages.

INTI INTERNATIONAL COLLEGE PENANG
DIPLOMA IN ELECTRICAL AND ELECTRONIC ENGINEERING PROGRAMME
MAT 1121: ENGINEERING MATHEMATICS 1
FINAL EXAMINATION: JANUARY 2015 SESSION

This paper consists of **FIVE (5)** questions. Answer any **FOUR (4)** questions in the answer booklet provided. All questions carry equal marks.

Question 1

(a) Given $e^{k-3}, e^{k+1}, e^{5k-3}$ are the first 3 terms of a geometric sequence.

(i) Find the value of k.

(4 marks)

(ii) Find the first term and common ratio.

(2 marks)

(b) Solve for x.

(i) $2x = 1 - \sqrt{2-x}$

(4 marks)

(ii) $x = xe^{5x+2}$

(4 marks)

(c) Solve the simultaneous equations:

$3^{x+1} = 27(3^{y-1})$

$\log_2(6x+3y) = 2 + \log_2 6$

(6 marks)

(d) Find the tangent line to $f(x) = \tan x + 2$ at $x = \pi$.

(5 marks)

Question 2

(a) Given $y=\left(x^2-\frac{1}{2x}\right)^8$.

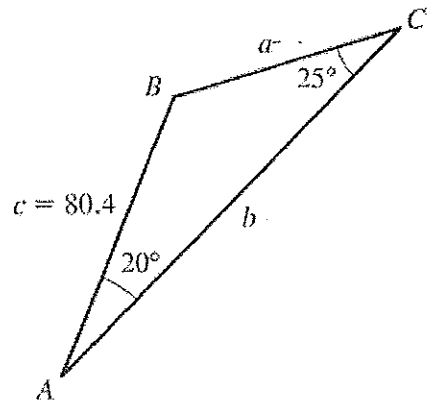
(i) Find the first four terms in the expansion of y, in descending powers of x.

(6 marks)

(ii) Find the coefficient of x^{16} in the expansion of $(x^3+3)\left(x^2-\frac{1}{2x}\right)^8$.

(5 marks)

(b) Solve the triangle in the Figure below by finding the values of a and b.



(5 marks)

(c) Show that $y=x^2-x+13$ has complex roots. Hence, sketch the graph of y.

(4 marks)

(d) Use Trapezoidal rule with 5 subdivisions to approximate $\int_1^2 \frac{1}{x}$.

(5 marks)

Question 3

(a) Prove the identity:

$$\sin 3A = 3\sin A - 4\sin^3 A$$

(5 marks)

(b) Sketch the graph of $y = 2\sin(3x)$. State the amplitude and period of y.

(5 marks)

(c) Find the term independent of x in the expansion of $\left(2x + \frac{1}{4x}\right)^{10}$.

(5 marks)

(d) Find x for each of the following cases for $0^0 \leq x \leq 360^0$

(i) $1 + \sin x = 2\cos^2 x$

(5 marks)

(ii) $\tan 3x + 1 = \sec 3x$

(5 marks)

Question 4

(a) Differentiate:

(i) $h(x)=\dfrac{4\sqrt{x}}{x^2-2}$.

(4 marks)

(ii) $y=5\sin(x)\cos(x)+4\csc(x)$

(4 marks)

(b) Simply the expression: $\tan\theta+\dfrac{\cos\theta}{1+\sin\theta}$.

(6 marks)

(c) Given $y=x\cos x$, prove that $\dfrac{1}{y}\dfrac{dy}{dx}=\dfrac{1}{x}-\tan x$.

(6 marks)

(d) Find the volume of the solid generated by revolving the region bounded by $y=\sqrt{x}$, $y=3$ and the y-axis about the y-axis.

(5 marks)

Question 5

(a) Evaluate the following integrals:

(i) $\int \frac{x}{\sqrt{1-4x^2}}\,dx$.

(4 marks)

(ii) $\int [\sin(1-x)][2-\cos(1-x)]^4\,dx$.

(4 marks)

(iii) $\int_{-2}^{0} 2t^2\sqrt{1-4t^3}\,dt$

(4 marks)

(b) Find $\frac{dy}{dx}$ for $x^3y^5+3x=8y^3+1$ by using the implicit method.

(4 marks)

(c) Find the area enclosed between the curve $y=3+2x-x^2$ and above the x-axis.

(4 marks)

(d) Use Newton's Method to determine x_2 for the equation $f(x)=x^3-7x^2+8x-3$ if the initial value, $x_0=5$. Give your answer correct to five decimal places.

(5 marks)

—THE END—