



INTI
International College Penang

FINAL
Examination Paper

(COVER PAGE)

Session : August 2018

Programme : Diploma in Electrical & Electronic Engineering (DEEI)

Course : MAT1134: Engineering Mathematics 1

Date of Examination : 14 December 2018 (Friday)

Time : 8:00am – 10:00am 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.

Materials permitted :
Non-Programmable Calculator

Materials provided :
Formula Booklet 1

Examiner(s) : Chong Mee Teng

Moderator : Dr. Ch'ng Pei Eng

This paper consists of 5 printed pages, including the cover page.

INTI INTERNATIONAL COLLEGE PENANG

DIPLOMA IN ELECTRICAL & ELECTRONIC ENGINEERING PROGRAMME (DEEI)
 MAT 1134: ENGINEERING MATHEMATICS 1
 FINAL EXAMINATION: AUGUST 2018 SESSION

Instructions: 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) Solve the followings:

(i) $\log_5 81 \div \log_5 27$ (3 marks)

(ii) $2^x 2^3 = 3^x 5^x$ (4 marks)

(b) Given $\log_3 2 = p$ and $\log_3 5 = q$, evaluate $\log_3 1\frac{3}{5}$ in terms of p and q . (3 marks)

(c) By completing the square, solve the quadratic equation $x^2 + 3x + 1 = 0$. (5 marks)

(d) If the roots of the equation $m^2 x^2 - (m + 2)x + 1 = 0$ are equal, find the possible values of m . (4 marks)

(e) Given that the polynomial $P(x) = tx^4 + 3x^3 + 2x^2 + x - 8$ can be divided by $(x + 1)$. Find the value of t . (3 marks)

(f) Show that $(x - 3)$ is a factor of $f(x) = x^3 + 3x^2 - 13x - 15$. (3 marks)

Question 2

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

(i) $5 \cos 2x + 8 \sin x = 3$, (7 marks)

(ii) $\tan^2 x - \tan x = 2$. (6 marks)

- (b) Prove the identity: $\frac{\cos x}{1 - \sin x} - \frac{1}{\cos x} = \tan x$ (5 marks)
- (c) Given that $\tan A = -\frac{3}{4}$ and $\tan B = 2$ and that both A and B are between 90° and 270° , find the value of $\sin A$ and $\cos B$ without using a calculator. (4 marks)
- (d) Convert $(3\sqrt{2}, -2)$ from rectangular to polar coordinates. (3 marks)

Question 3

- (a) State the amplitude, period and phase shift of $y = \sin(x - \frac{\pi}{6})$. Hence, sketch the curve for one oscillation. (5 marks)
- (b) The sixth term of an arithmetic progression is twice the third term, and the first term is 3. The sequence has ten terms.
- (i) Find the common difference. (5 marks)
- (ii) Find the sum of all the terms in the progression. (2 marks)
- (c) Expand $(3x + 2y^2)^5$. (5 marks)
- (d) Find the fifth term of $(\frac{1}{2} + x)^{10}$. (4 marks)
- (e) Solve the triangle ABC , given $a = 525$ cm, $c = 421$ cm and $A = 130^\circ$. (4 marks)

Question 4

- (a) Find $\frac{dy}{dx}$ for each of the following:
- (i) $y = x^2 \sin 2x$ (3 marks)
- (ii) $y = (e^x - \frac{1}{e^x})^2$ (3 marks)
- (iii) $y = \ln \frac{x-1}{x+1}$ (3 marks)

- (b) Find the equation of the tangent to the curve $2x^2 - xy + 3y^2 = 18$ at the point of $(3, 1)$.
(5 marks)
- (c) Find the stationary points of the function $y = x^2 - 8x$ and determine the nature of the stationary points. Hence, sketch the graph of the function.
(6 marks)
- (d) The length of a side of a square is increasing at a rate of 0.2 cm/s. At what rate is the area increasing when the length of the side is 10 cm?
(5 marks)

Question 5

- (a) Find the following integrals:

(i) $\int \left(x + \frac{2}{x}\right)^2 dx$ (4 marks)

(ii) $\int \frac{3 + e^x}{e^x} dx$ (4 marks)

(iii) $\int \frac{1}{3x+2} dx$ (2 marks)

- (b) Use the trapezoidal rule to evaluate $\int_1^5 \sqrt{1+x^2} dx$ using 8 equal intervals. Show your working in the form of a table and give your final answer to 2 decimal places.
(6 marks)
- (c) Find the area of the shaded region enclosed by the curve $y = x^2 - 4x + 3$ and the x axis as shown in **Figure Q5(c)**.
(4 marks)

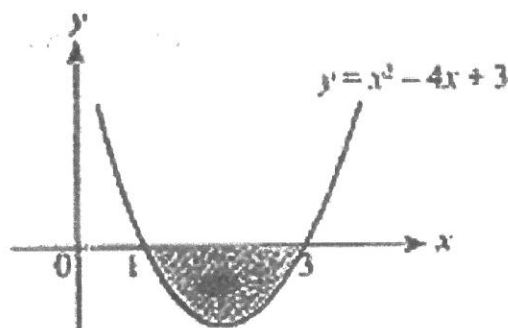


Figure Q5(c)

- (d) Find the volume of the solid generated when the shaded region is revolved through 360° about the y-axis as shown in **Figure Q5(d)**. (5 marks)

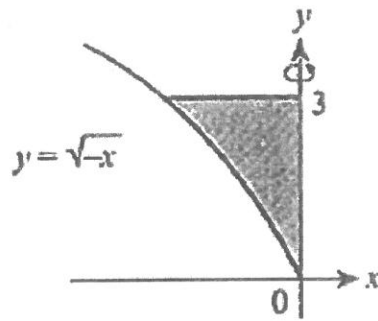


Figure Q5(d)

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