



**KOLEJ YAYASAN PELAJARAN JOHOR
FINAL EXAMINATION**

COURSE NAME : ENGINEERING MATHEMATICS 2
COURSE CODE : MAT1022
EXAMINATION : OKTOBER 2017
DURATION : 2 HOURS

INSTRUCTION TO CANDIDATES

1. Answer **ALL** question in the Answer Booklet

2. Candidates are not allowed to bring any material to examination room except with the permission from the invigilator.

3. Please check to make sure that this examination pack consist of:
 - i. Question Paper
 - ii. Answer Booklet

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This examination paper consists of 8 printed pages including front page

Answer ALL Question in Answer Booklet.

Jawab SEMUA Soalan di Buku Jawapan.

QUESTION 1

- a) In an arithmetic series, the third term is 12 and the seventh term is 28. Find the first term and the common difference of the series.

Dalam suatu siri aritmetik, sebutan ketiga ialah 12 dan sebutan ketujuh ialah 28. Dapatkan sebutan pertama dan beza sepunya bagi siri tersebut.

(4 marks)

- b) Write the following as a series;

Tuliskan berikut sebagai suatu siri;

$$\sum_{r=1}^n r^2(r+2)$$

(2 marks)

- c) Find the sum of the following series;

Dapatkan hasil tambah bagi siri berikut;

$$1^2 \cdot 3 + 2^2 \cdot 4 + 3^2 \cdot 5 + \dots + n^2(2+n)$$

(4 marks)

QUESTION 2

- a) Find the term involving x^{10} in the expansion of;

Dapatkan sebutan yang melibatkan x^{10} dalam kembangan;

$$(6 + 2x^5)^3$$

(3 marks)

- b) Given the binomial function;

Diberi fungsi binomial;

$$(1 - 2x)^{\frac{1}{2}}$$

- i) Expand the binomial function above in an ascending power of x up to the term in x^3 .

Kembangkan fungsi binomial diatas dengan kuasa x menaik sehingga sebutan dalam x^3 .

(2 marks)

- ii) By letting $x = \frac{1}{100}$ in above series, evaluate $\sqrt{2}$ correct to five decimal places without using the calculator.

Dengan mengambil $x = \frac{1}{100}$ dalam siri diatas, nilaikan $\sqrt{2}$ betul kepada lima tempat perpuluhan tanpa menggunakan kalkulator.

(5 marks)

QUESTION 3

Given;

Diberi;

$$A = \begin{pmatrix} 1 & 2 & 8 \\ -3 & 6 & -1 \end{pmatrix}, \quad B = \begin{pmatrix} 1 & -2 \\ -2 & 4 \\ 5 & 3 \end{pmatrix}, \quad C = \begin{pmatrix} 1 & 2 & -1 \\ 2 & 0 & 2 \\ 3 & -2 & 1 \end{pmatrix}$$

- a) Find the matrix $A + B^T$.

Dapatkan matriks $A + B^T$.

(3 marks)

- b) Find the inverse of matrix C by using adjoint method.

Dapatkan songsangan bagi matriks C dengan menggunakan kaedah adjoin.

(5 marks)

QUESTION 4

- a) Solve the system of linear equations below by using the Cramer's Rule method;

Selesaikan sistem persamaan linear berikut dengan menggunakan kaedah

Petua Cramer's;

$$x + 4y + 3z = 17$$

$$3x + 3y + z = 16$$

$$2x + 2y + z = 11$$

(6 marks)

- b) Solve the system of linear equations below by using the Gauss elimination method;

Selesaikan sistem persamaan linear berikut dengan menggunakan

Kaedah penghapusan Gauss;

$$2x + y + z = 3$$

$$x + 2y - 4z = -6$$

$$2x + y - z = 1$$

(6 marks)

QUESTION 5

Given two vector $\underline{a} = 2i + 4j - k$ and $\underline{b} = -5i + j - 2k$.

Diberi dua vektor $\underline{a} = 2i + 4j - k$ dan $\underline{b} = -5i + j - 2k$.

- a) Find the vector $(4\underline{a} + 2\underline{b})$.

Dapatkan vektor $(4\underline{a} + 2\underline{b})$.

(2 marks)

- b) Find the angle between the vectors \underline{a} and \underline{b} .

Dapatkan sudut diantara vektor \underline{a} dan \underline{b} .

(4 marks)

- c) Find the area of parallelogram with sides \underline{a} and \underline{b} .

Dapatkan luas parallelogram yang bersisikan vektor \underline{a} dan vektor \underline{b} .

(4 marks)

QUESTION 6

a) Simplify;

Ringkaskan;

(i) $i^2 - 6(2 - 5i) + 7$

(2 marks)

(ii) $\frac{2+i}{3-i}$

(2 marks)

b) Find the polar representation of $z_1 = 1 - \sqrt{3}i$. Hence, find z^6 in polar form.*Dapatkan perwakilan kutub bagi $z_1 = 1 - \sqrt{3}i$. Seterusnya, dapatkan z^6 dalam bentuk kutub.*

(6 marks)

[60 MARKS]**END OF QUESTION PAPER**

LIST OF FORMULA
SENARAI RUMUS

Arithmetic Progression	Geometric Progression
$T_n = a + (n-1)d$	$T_n = ar^{n-1}$
$S_n = \frac{n}{2}(2a + (n-1)d)$	$S_n = \frac{a(1-r^n)}{1-r}, r < 1$ or $S_n = \frac{a(r^n - 1)}{r-1}, r > 1$
Theorems of Finite Series	
1. $\sum_{r=1}^n 1 = n$ 2. $\sum_{r=1}^n c = cn$ 3. $\sum_{r=1}^n r = \frac{n(n+1)}{2}$ 4. $\sum_{r=1}^n r^2 = \frac{n(n+1)(2n+1)}{6}$ 5. $\sum_{r=1}^n r^3 = \left(\frac{n(n+1)}{2}\right)^2$	
Binomial Theorem for any positive integer, n	
$(a+x)^n = a^n + {}^n C_1 a^{n-1} x + {}^n C_2 a^{n-2} x^2 + {}^n C_3 a^{n-3} x^3 + {}^n C_4 a^{n-4} x^4 + \dots + x^n = \sum_{r=0}^n {}^n C_r a^{n-r} x^r$	
Binomial Theorem when n is not a positive integer	
$(1+x)^n = 1 + nx + \frac{n(n-1)}{2!} x^2 + \frac{n(n-1)(n-2)}{3!} x^3 + \dots$	
Vector	
$a = a_1 i + a_2 j + a_3 k$ and $b = b_1 i + b_2 j + b_3 k$ and θ is a angle between a and b .	
(i) Magnitude: $ a = \sqrt{a_1^2 + a_2^2 + a_3^2}$	
(ii) Scalar Product: $a \cdot b = a b \cos \theta$; where $a \cdot b = a_1 b_1 + a_2 b_2 + a_3 b_3$	
Complex Numbers	
$ z = \sqrt{a^2 + b^2}$	
$\theta = \tan^{-1} \frac{b}{a}$	
$z = r(\cos \theta + i \sin \theta)$	
$z^n = r^n (\cos n\theta + i \sin n\theta)$	

