

SULIT



KEMENTERIAN PENDIDIKAN TINGGI
JABATAN PENDIDIKAN POLITEKNIK DAN KOLEJ KOMUNITI

BAHAGIAN PEPERIKSAAN DAN PENILAIAN
JABATAN PENDIDIKAN POLITEKNIK DAN KOLEJ KOMUNITI
KEMENTERIAN PENDIDIKAN TINGGI

JABATAN ASASI TEKNOLOGI KEJURUTERAAN

PEPERIKSAAN AKHIR
SEMESTER I : 2024/2025

FB10064: MATHEMATICS 1

TARIKH : 16 DISEMBER 2024
MASA : 8:30 PAGI – 10.30 PAGI (2 JAM)

Kertas soalan ini mengandungi **SEMBILAN (9)** halaman bercetak.

Subjektif (4 soalan)

Dokumen sokongan yang disertakan : Formula

JANGAN BUKA KERTAS SOALAN INI SEHINGGA DIARAHKAN

(CLO yang tertera hanya sebagai rujukan)

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INSTRUCTION:

This section consists of **FOUR (4)** subjective questions. Answer **ALL** questions.

ARAHAN:

*Bahagian ini mengandungi **EMPAT (4)** soalan subjektif. Jawab **SEMUA** soalan.*

QUESTION 1**SOALAN 1**

CLO1

- a) Express the following expression in the simplest form.

Nyatakan ungkapan berikut dalam bentuk yang paling mudah.

i) $3(4m - 3n) - \frac{1}{2}(2m + 6n)$

[3 marks]
[3 markah]

ii) $\frac{2x + 4y}{9x - 18y} \times \frac{3x - 6y}{4x + 8y}$

[5 marks]
[5 markah]

CLO2

- b) Calculate the partial fraction for the following equation.

Kira pecahan separa untuk persamaan berikut.

$$\frac{5x - 7}{(x - 2)^2(x + 1)}$$

[8 marks]
[8 markah]

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CLO1

- c) Based on the Diagram 1, express $\sin \theta$.
 Berdasarkan Rajah 1, nyatakan $\sin \theta$.

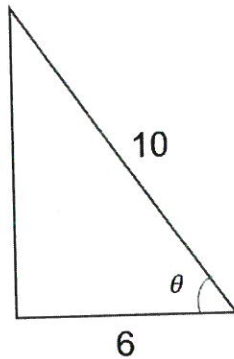


Diagram 1/Rajah 1

[3 marks]

[3 markah]

CLO2

- d) Calculate the angle between $0^\circ \leq \theta \leq 360^\circ$ for $4\cos^2 \theta + 6\sin \theta - 6 = 0$.
 Kira sudut antara $0^\circ \leq \theta \leq 360^\circ$ untuk $4\cos^2 \theta + 6\sin \theta - 6 = 0$.

[6 marks]

[6 markah]

QUESTION 2

SOALAN 2

CLO2 a) Given $A = \begin{pmatrix} 2 & 4 & 1 \\ 5 & 3 & 6 \\ 7 & 8 & 9 \end{pmatrix}$ and $B = \begin{pmatrix} 1 & 0 & 3 \\ 2 & 6 & 1 \\ 4 & 5 & 2 \end{pmatrix}$. Calculate $(A-B)^T$.

Diberi $A = \begin{pmatrix} 2 & 4 & 1 \\ 5 & 3 & 6 \\ 7 & 8 & 9 \end{pmatrix}$ dan $B = \begin{pmatrix} 1 & 0 & 3 \\ 2 & 6 & 1 \\ 4 & 5 & 2 \end{pmatrix}$. Kira $(A-B)^T$.

[4 marks]

[4 markah]

CLO2 b) Solve the following simultaneous equation by using Cramer's Rule.
Selesaikan persamaan serentak berikut menggunakan Kaedah Cramer.

$$\begin{pmatrix} 1 & 2 & 3 \\ 2 & 3 & 1 \\ 3 & 1 & 2 \end{pmatrix} \begin{pmatrix} x \\ y \\ z \end{pmatrix} = \begin{pmatrix} 9 \\ 8 \\ 7 \end{pmatrix}$$

[10 marks]

[10 markah]

SULIT

- CLO1 c) Express $|3i - 4j + 12k|$.
Nyatakan $|3i - 4j + 12k|$.
- [2 marks]
[2 markah]
- CLO2 d) Given that $\underline{a} = 5\underline{i} + 6\underline{j} - \underline{k}$ and $\underline{b} = \underline{i} + 2\underline{j} + \underline{k}$. Solve $3\underline{a} - 2\underline{b}$ in terms of $\underline{i}$, $\underline{j}$ and $\underline{k}$.
Diberi bahawa $\underline{a} = 5\underline{i} + 6\underline{j} - \underline{k}$ dan $\underline{b} = \underline{i} + 2\underline{j} + \underline{k}$. Selesaikan $3\underline{a} - 2\underline{b}$ di dalam sebutan $\underline{i}$, $\underline{j}$ dan $\underline{k}$.
- [3 marks]
[3 markah]
- CLO2 e) Given that $\underline{a} = 7\underline{i} + 3\underline{j} + p\underline{k}$ and $\underline{b} = 3\underline{i} - 2\underline{j} + 5\underline{k}$ are perpendicular. Compute the value of p .
Diberi bahawa $\underline{a} = 7\underline{i} + 3\underline{j} + p\underline{k}$ dan $\underline{b} = 3\underline{i} - 2\underline{j} + 5\underline{k}$ adalah berserenjang.
Kirakan nilai bagi p .
- [6 marks]
[6 markah]

QUESTION 3

SOALAN 3

CLO1

- a) The data in Table 1 shows the marks obtained by 50 students in Mathematics. Convert the data given to a frequency distribution table by using 10 class interval.

Data di dalam Jadual 1 menunjukkan markah yang diperolehi oleh 50 pelajar dalam subjek Matematik. Tukarkan data yang diberikan kepada jadual taburan kekerapan dengan menggunakan 10 selang kelas.

Table 1/Jadual 1

64	65	50	65	55	79	68	48	60	60
58	40	51	64	40	51	89	74	40	69
74	56	55	34	58	57	79	61	45	57
64	57	55	52	99	53	42	63	88	75
57	51	35	90	36	32	47	40	83	45

[4 marks]

[4 markah]

- b) The Table 2 shows the years of working experience for 100 employees of Gemify Company.

Jadual 2 menunjukkan tahun pengalaman bekerja untuk 100 pekerja syarikat Gemify.

Table 2/ Jadual 2

Years of experience <i>Tahun pengalaman</i>	Number of employees <i>Bilangan pekerja</i>
1-5	9
6-10	16
11-15	27
16-20	24
21-25	12
26-30	10
31-35	2

Based on the Table 2, use a suitable formula to calculate:

Berdasarkan Jadual 2 di atas, guna formula yang sesuai untuk mengira:

- i. Mean and mode

[6 marks]

[6 markah]

CLO1

- c) Assume that the sample space of an experiments is an integer number that start from 11 until 23. A number is picked randomly from the sample.

Andaikan ruang sampel eksperimen ialah nombor integer yang bermula dari nombor 11 hingga 23. Satu nombor dipilih secara rawak dari sampel tersebut.

- i. Express the probability of getting an even number.

Nyatakan keberangskalian untuk mendapat nombor genap.

[4 marks]

[4 markah]

- ii. Express the probability of getting number that is divisible by 3.

Nyatakan keberangskalian untuk mendapat nombor yang boleh dibahagi dengan 3.

[3 marks]

[3 markah]

CLO2

d) Lukman and Sean are nominated to represent the school in badminton match.

The probability of Lukman being selected as a school badminton player is $\frac{4}{7}$

while the probability of Sean being selected is $\frac{8}{13}$. Show the probability that:

Lukman dan Sean tercalon untuk mewakili sekolah dalam pertandingan badminton. Kebarangkalian Lukman dipilih sebagai pemain badminton sekolah ialah $\frac{4}{7}$ manakala kebarangkalian Sean dipilih ialah $\frac{8}{13}$. Tunjukkan kebarangkalian bahawa:

- i. both of them are selected as school badminton players.
kedua-duanya dipilih sebagai pemain badminton sekolah.

[3 marks]

[3 markah]

- ii. at least one of them is selected as a school badminton player.
sekurang-kurangnya seorang daripada mereka dipilih sebagai pemain badminton sekolah.

[5 marks]

[5 markah]

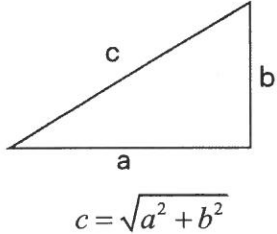
QUESTION 4
SOALAN 4

- CLO1 a) Given $K = 6 + 8i$, $L = -4 + 2i$ and $M = -2 - 9i$. Express the following:
Diberi $K = 6 + 8i$, $L = -4 + 2i$ dan $M = -2 - 9i$. Nyatakan yang berikut:
- i. $K - 3L$ [3 mark]
 [3 markah]
- ii. $\frac{L}{M}$ [5 mark]
 [5 markah]
- CLO2 b) Given $S = 3 - 4i$ and $T = 5 + 2i$. Compute the modulus and arguments for $S - T$. Then, sketch Argand Diagram for $S - T$.
Diberi $S = 3 - 4i$ dan $T = 5 + 2i$. Kira modulus dan hujah bagi $S - T$. Kemudian, lakarkan Rajah Argand bagi $S - T$.
- [7 marks]
 [7 markah]
- CLO2 c) Solve the following and write the answer in polar form:
Selesaikan yang berikut dan tulis jawapan dalam bentuk polar:
- i. $\frac{7e^{1.0472i}}{4 + 3i}$ [5 marks]
 [5 markah]
- ii. $5(\cos 70^\circ + i \sin 70^\circ) \times 25e^{1.3265i}$ [5 marks]
 [5 markah]

SOALAN TAMAT

FORMULA FB10064 – MATHEMATICS 1

BASIC ALGEBRA	
QUADRATICS EQUATION	
1. Quadratic Formula	2. Completing the square
$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$	$\left(x + \frac{b}{2}\right)^2 - \left(\frac{b}{2}\right)^2 + c = 0$

TRIGONOMETRY	
PYTHAGORAS' THEOREM	TRIGONOMETRIC IDENTITIES
 $c = \sqrt{a^2 + b^2}$	$\tan \theta = \frac{\sin \theta}{\cos \theta}$ $\cos^2 \theta + \sin^2 \theta = 1$ $1 + \tan^2 \theta = \sec^2 \theta$ $1 + \cot^2 \theta = \operatorname{cosec}^2 \theta$
COMPOUND-ANGLE	
5. $\sin(A + B) = \sin A \cos B + \cos A \sin B$	
6. $\sin(A - B) = \sin A \cos B - \cos A \sin B$	
7. $\cos(A + B) = \cos A \cos B - \sin A \sin B$	
8. $\cos(A - B) = \cos A \cos B + \sin A \sin B$	
9. $\tan(A + B) = \frac{\tan A + \tan B}{1 - \tan A \tan B}$	
10. $\tan(A - B) = \frac{\tan A - \tan B}{1 + \tan A \tan B}$	
DOUBLE-ANGLE	
11. $\sin 2A = 2 \sin A \cos A$	
12. $\cos 2A = \cos^2 A - \sin^2 A$ $= 1 - 2 \sin^2 A$ $= 2 \cos^2 A - 1$	
13. $\tan 2A = \frac{2 \tan A}{1 - \tan^2 A}$	
FORMULA OF TRIANGLE	
14. Sine Rules $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$	
15. Cosine Rules $a^2 = b^2 + c^2 - 2bc \cos A$	
16. Area of Triangle $= \frac{1}{2} ab \sin C$	

COMPLEX NUMBERS

1. Modulus of $z = \sqrt{a^2 + b^2}$	2. Polar Form; $z = r \angle \theta$
3. Argument of $z = \tan^{-1} \left(\frac{b}{a} \right)$	4. Exponential Form; $z = re^{i\theta}$
5. Cartesian Form; $z = a + bi$	6. Trigonometric Form; $z = r(\cos \theta + i \sin \theta)$

MATRICES

1. Cofactor; $C = (-1)^{i+j} M_{ij}$	2. Adjoin; $Adj(A) = C^T$
3. Inverse of Matrix; $A^{-1} = \frac{1}{ A } Adj(A)$	4. Cramer's Rule; $x = \frac{ A_1 }{ A }, \quad y = \frac{ A_2 }{ A }, \quad z = \frac{ A_3 }{ A }$

VECTOR AND SCALAR

1. Unit Vector; $\hat{u} = \frac{\vec{u}}{ u }$	2. $\cos \theta = \frac{\vec{A} \cdot \vec{B}}{ A B }$
3. Scalar Product; $\vec{A} \cdot \vec{B} = a_1 a_2 + b_1 b_2 + c_1 c_2$	4. Vector Product; $\vec{A} \times \vec{B} = \begin{vmatrix} i & j & k \\ a_1 & b_1 & c_1 \\ a_2 & b_2 & c_2 \end{vmatrix}$
5. Area of parallelogram ABC; $= \vec{AB} \times \vec{BC} $	

DATA DESCRIPTION

1. Number of class Sturges Rule, $k = 1 + 3.33 \log n$ Rule of Thumb, $2^k > n$	2. Mean $\bar{x} = \frac{\sum x}{n}, \quad \bar{x} = \frac{\sum (fx)}{\sum f},$
3. Median $= L_m + \left(\frac{\frac{N}{2} - F}{f_m} \right) C$	4. Mode $= L_{Mo} + \left(\frac{d_1}{d_1 + d_2} \right) C$

5. Quartile $Q_k = L_{Qk} + \left(\frac{\frac{kN}{4} - F}{f_{Qk}} \right) C; \quad k=1,2,3$	6. Decile $D_k = L_{Dk} + \left(\frac{\frac{kN}{10} - F}{f_{Dk}} \right) C;$ $k=1,2,3,\dots,9$
7. Percentile $P_k = L_{Pk} + \left(\frac{\frac{kN}{100} - F}{f_{Pk}} \right) C;$ $k=1,2,3,\dots,99$	8. Mean Deviation $E = \frac{\sum x - \bar{x} }{n}, \quad E = \frac{\sum x - \bar{x} f}{\sum f},$
9. Variance $s^2 = \frac{\sum (x - \bar{x})^2}{n}, \quad s^2 = \frac{\sum [(x - \bar{x})^2 f]}{\sum f}, \quad s^2 = \frac{\sum_{i=1}^n x_i^2 - n\bar{x}^2}{\sum f}, \quad s^2 = \frac{\sum fx^2}{\sum f} - \left[\frac{\sum fx}{\sum f} \right]^2$	
10. Standard Deviation, $s = \sqrt{\text{variance}}$	

PROBABILITY	
1. $E = pn$	2. $P(A \cup B) = P(A) + P(B) - P(A \cap B)$
3. $P(A \cap B) = P(A) \cdot P(B)$	4. $P(A \cup B) = P(A) + P(B)$
5. $P(A \cap B) = P(A) \cdot P(B A)$	6. $P(B A) = \frac{P(B \cap A)}{P(A)}$

