

SULIT



**BAHAGIAN PEPERIKSAAN DAN PENILAIAN
JABATAN PENDIDIKAN POLITEKNIK
KEMENTERIAN PENDIDIKAN TINGGI**

JABATAN MATEMATIK SAINS DAN KOMPUTER

PEPERIKSAAN AKHIR

SESI DISEMBER 2015

DBM3013: ENGINEERING MATHEMATICS 3

TARIKH : 05 APRIL 2016

MASA : 8.30 AM - 10.30 AM (2 JAM)

Kertas ini mengandungi **ENAM BELAS (16)** halaman bercetak.

Bahagian A: Struktur (4 soalan)

Bahagian B: Struktur (2 soalan)

Dokumen sokongan yang disertakan : Kertas Graf, Formula

JANGAN BUKA KERTAS SOALAN INI SEHINGGA DIARAHKAN

(CLO yang tertera hanya sebagai rujukan)

SULIT

SECTION A
BAHAGIAN A

INSTRUCTION:

This section consists of **FOUR (4)** structured questions. Answer **THREE (3)** structured questions only.

ARAHAN :

Bahagian ini mengandungi EMPAT(4) soalan stuktur. Jawab TIGA(3) soalan sahaja.

QUESTION 1

SOALAN 1

CLO2
C1

- a) A container contains 10 red plates, 15 blue plates, 8 yellow plates and 7 white plates. What is the probability of picking a blue plate.
- Sebuah bekas mengandungi 10 pinggan merah, 15 pinggan biru, 8 pinggan kuning and 7 pinggan putih. Apakah kebarangkalian untuk mengambil pinggan biru.*
- [2 marks]
[2 markah]

CLO2
C2

- b) The probabilities of Danial and Damia to be chosen as members of a committee are $\frac{3}{5}$ and $\frac{7}{9}$ respectively. Find the probability that
- Kebarangkalian Danial dan Damia dipilih sebagai ahli jawatankuasa ialah $\frac{3}{5}$ dan $\frac{7}{9}$. Dapatkan kebarangkalian*
- i. Neither of them is chosen as a member of the committee
Tiada seorang daripada mereka dipilih sebagai ahli jawatankuasa
- [2 marks]
[2 markah]
- ii. Only one of them is chosen as a member of the committee
Hanya salah seorang daripada mereka dipilih sebagai ahli jawatankuasa
- [3 marks]
[3 markah]

QUESTION 2

SOALAN 2

CLO2
C1

- a) Diagram 1 shows monthly salary allocation of Mr. Ahmad.

Carta Bar 1 menunjukkan bagaimana En Ahmad membahagikan pendapatan bulanannya.

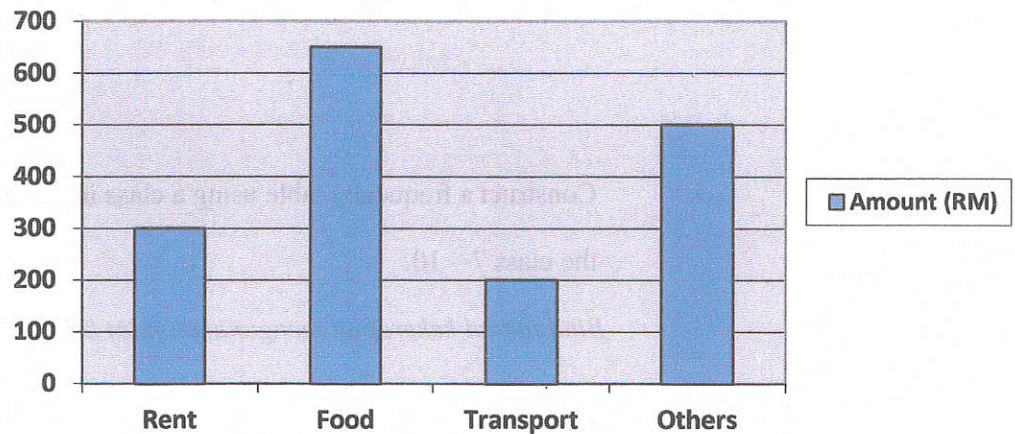


Diagram 1/ Rajah 1: Bar chart 1/ Carta Bar 1

- i. Which item is the cheapest?

Item manakah yang paling murah?

[1 mark]

[1 mark]

- ii. Find the total monthly salary of Mr. Ahmad.

Cari pendapatan sebulan bagi En Ahmad.

[3 marks]

[3 markah]

CLO2
C2

- c) The probabilities that both students Ali and Mutu can solve a problem are $\frac{4}{5}$ and $\frac{2}{3}$ respectively. What is the probability that at least one student can solve the problem?

Keberangalian bahawa Ali dan Mutu boleh menyelesaikan masalah adalah $\frac{4}{5}$

dan $\frac{2}{3}$ masing-masing. Apakah keberangalian sekurang-kurangnya seorang

pelajar boleh menyelesaikan masalah?

[5 marks]

[5 markah]

- ii. List down three inequalities other than $x \geq 0$ and $y \geq 0$ that fulfilled the condition above :

Senaraikan tiga ketaksamaan yang memenuhi syarat di atas selain daripada $x \geq 0$ dan $y \geq 0$:

[3 marks]

[3 markah]

CLO2
C3

- c) Yahya is a seller and he has a capital of RM 225 to buy x kg of prawns and y kg of fish. The total mass of the commodities is not less than 15 kg. The mass of prawns is at most three times that of fish. The price of 1 kg of prawns is RM9 and the price of 1 kg of fish is RM5.

Yahya adalah seorang penjual dan dia mempunyai modal sebanyak RM 225 untuk membeli x kg udang dan y kg ikan. Jumlah jisim komoditi tidak kurang daripada 15 kg. Jisim udang adalah paling banyak tiga kali ganda daripada ikan. Harga 1 kg udang ialah RM9 dan harga 1 kg ikan adalah RM5.

- i. Write three inequalities, other than $x \geq 0$ and $y \geq 0$ that satisfy all the above conditions.

Senaraikan tiga ketaksamaan yang memenuhi syarat di atas selain daripada $x \geq 0$ dan $y \geq 0$:

[3 marks]

[3 markah]

- ii. State the objective function if he sell prawns at RM15 per kilogram and fish at RM9 per kilogram so that he can gain maximum profit.

Nyatakan fungsi objektif jika beliau menjual udang pada RM15 sekilogram dan ikan pada RM9 sekilogram supaya beliau mendapat perolehi keuntungan yang maksimum.

[2 marks]

[2 markah]

QUESTION 4

SOALAN 4

CLO2
C1

- a) Given Linear Programming problem with, Maximum, $12x + 5y + 5z$
Diberi permasalahan Pengaturcaraan Linear dengan nilai, Maksimum
 $12x + 5y + 5z,$

With constraint,

Dengan kekangan

$$2x + 2y + z \leq 8$$

$$x + 4y - 3z \leq 12$$

Where $x, y, z \geq 0$

Di mana $x, y, z \geq 0$

- i. Write the objective function of the Linear Programming problem
Tuliskan semula objektif permasalahan Pengaturcaraan Linear.

[1 mark]

[1 markah]

- ii. Write the corresponding system of constraint equations.
Tuliskan persamaan kekangan yang sepadan

[2 marks]

[2 markah]

CLO2
C2

- b) Convert the following standard form into first initial tableau.

Tukarkan Bentuk Am berikut kepada bentuk Jadual Permulaan.

$$4x - 3y + z + s = 3$$

$$x + y + z + t = 10$$

$$2x + y - z + u = 10$$

$$-2x + 3y - 4z + p = 0$$

[4 marks]

[4 markah]

SECTION B : 25 MARKS

BAHAGIAN B : 25 MARKAH

INSTRUCTION:

This section consists of **TWO (2)** structured questions. Answer only **ONE (1)** questions.

ARAHAN:

Bahagian ini mengandungi **DUA (2)** soalan berstruktur. Jawab **SATU (1)** soalan.

QUESTION 5

SOALAN 5

CLO1
C1

- a) State **THREE(3)** method to find simultaneous linear equations.

Nyatakan TIGA (3) kaedah untuk mencari persamaan serentak linear

[3 marks]

[3markah]

CLO1
C2

- b) The simultaneous linear equations as follows:

Diberi persamaan serentak seperti berikut:

$$x - 2y + z = 0$$

$$2x + y - 3z = 5$$

$$4x - 7y + z = 1$$

- i. Find the value a'_{21} , a'_{22} , a'_{23} and b'_2 using the Gaussian Elimination Method.

Dapatkan nilai a'_{21} , a'_{22} , a'_{23} dan b'_2 menggunakan kaedah Penghapusan Gauss.

[4 marks]

[4 markah]

QUESTION 6

SOALAN 6

CLO1
C1

- a) Find the differential equation for the function below

Cari persamaan pembezaan untuk fungsi di bawah

$$y = 2Ax + x^2$$

[3 marks]

[3 markah]

CLO1
C2

- b) Solve the first order differential equation below

Selesaikan persamaan pembezaan peringkat pertama di bawah

$$\frac{dy}{dx} = \frac{3x}{y+2}$$

[4 marks]

[4 markah]

CLO1
C3

- c) Determine the general solution for the following

Tentukan penyelesaian am yang berikut

$$\text{i. } \frac{d^2y}{dx^2} + 5\frac{dy}{dx} + 6y = 0$$

[5 marks]

[5 markah]

$$\text{ii. } \frac{d^2y}{dx^2} + 4\frac{dy}{dx} + 4y = 0$$

[5 marks]

[5 markah]

$$\text{iii. } \frac{d^2y}{dx^2} + 2\frac{dy}{dx} + 7y = 0$$

[8 marks]

[8 markah]

SOALAN TAMAT

| Numerical Method | |
|-----------------------|--|
| Crout Method | $A = \begin{pmatrix} l_{11} & 0 & 0 \\ l_{21} & l_{22} & 0 \\ l_{31} & l_{32} & l_{33} \end{pmatrix} \begin{pmatrix} 1 & u_{12} & u_{13} \\ 0 & 1 & u_{23} \\ 0 & 0 & 1 \end{pmatrix}$ |
| Doolittle Method | $A = \begin{pmatrix} 1 & 0 & 0 \\ l_{21} & 1 & 0 \\ l_{31} & l_{32} & 1 \end{pmatrix} \begin{pmatrix} u_{11} & u_{12} & u_{13} \\ 0 & u_{22} & u_{23} \\ 0 & 0 & u_{33} \end{pmatrix}$ |
| Newton Raphson Method | $x_0 = \frac{1}{y_2 - y_1} \begin{vmatrix} x_1 & y_1 \\ x_2 & y_2 \end{vmatrix} \quad x_{n+1} = x_n - \frac{f(x)}{f'(x)}$ |

| Probability | |
|-------------------------------------|---|
| $E(x) = \sum_{s \in S} P(s)X(s)$ | $P(A \cup B) = P(A) + P(B) - P(A \cap B)$ |
| $P(B A) = \frac{P(B \cap A)}{P(A)}$ | $P(A \cap B) = P(A) \cdot P(B)$ |
| | $P(A \cap B) = P(A) \cdot P(B A)$ |

| SOLUTION FOR 1 st ORDER DIFFERENTIAL EQUATION | |
|--|--|
| <p>Homogeneous Equation $y = vx$ and $\frac{dy}{dx} = v + x \frac{dv}{dx}$</p> | <p>Linear Factors (Integrating Factors) $y \cdot IF = \int Q \cdot IF dx$ Where $IF = e^{\int P dx}$</p> |
| | <p>Logarithmic $a = e^{\ln a}$ $a^x = e^{x \ln a}$ $\int a^x dx = \frac{a^x}{\ln a} + c$</p> |
| GENERAL SOLUTION FOR 2 nd ORDER DIFFERENTIAL EQUATION | |
| <p>Equation of the form $a \frac{d^2 y}{dx^2} + b \frac{dy}{dx} + cy = 0$</p> | |
| 1. Real & different roots: | $y = Ae^{m_1 x} + Be^{m_2 x}$ |
| 2. Real & equal roots: | $y = e^{m x} (A + Bx)$ |
| 3. Complex roots: | $y = e^{\alpha x} (A \cos \beta x + B \sin \beta x)$ |