SECTION A

BAHAGIAN A

STRUCTURED : 2 Questions (25 marks each)

STRUKTUR : 2 soalan (25 markah setiap soalan)

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

*Arahan : Bahagian ini mengandungi **DUA (2)** soalan struktur. Jawab **SATU (1)** soalan sahaja.*

QUESTION 1
SOALAN 1

CLO1
C2

a)   Students in an adult school surveyed about the type of transport they use to travel to school. The results are as follows:

Pelajar dari sebuah sekolah pelajar dewasa telah disoal selidik mengenai jenis kenderaan yang mereka naiki untuk datang ke sekolah. Keputusan adalah seperti berikut :

Table 1/Jadual 1

Transport Type	walking	van	bus	car	bicycle
Number of Student	9	10	6	12	3

Construct a pie chart with this given information.   (9 marks)

Binakan sebuah carta pai dari maklumat yang diberi.   *(9 markah)*

QUESTION 2

SOALAN 2

Thirty cars were tested for fuel efficiency in miles per gallon (mpg). The frequency distribution obtained is shown in Table 2.

Tiga puluh kereta telah diuji untuk kecekapan bahan api, dalam batu segelen (mpg).
Taburan kekerapan telah diperolehi seperti di Jadual 2.

Table 2/*Jadual 2*

Class/*Kelas*			Frequency/*Frekuensi*
8	-	12	2
13	-	17	6
18	-	22	17
23	-	27	3
28	-	32	2

Based on Table 2:

Berdasarkan Jadual 2:

CLO1
C2

(a) Construct a histogram and frequency polygon.   (9 marks)

   Bina histogram dan poligon frekuensi.   *(9 markah)*

CLO1
C2

(b) Based on the histogram in (a), determine the mode for fuel efficiency.
                                                                                    (2 marks)

   Berdasarkan histogram di (a), tentukan mod bagi kecekapan bahan api.
                                                                                    (2 markah)

CLO1
C2

(c) Construct a "more than" percentage ogive.   (8 marks)

   Bina ogif peratusan "lebih besar daripada"   *(8 markah)*

CLO1
C2

b)   The age of twenty secondary school students visiting the zoo on a weekend was recorded.

Umur bagi dua puluh orang pelajar sekolah menengah melawat zoo pada hari minggu telah direkodkan.

12, 16, 10, 19, 17, 10, 10, 11, 11, 11, 11, 12, 12, 11, 12, 13, 12, 14, 15, 18

i)   Find the lowest and highest values.   (1 mark)

   Cari nilai terendah dan tertinggi.   *(1 markah)*

ii)   Construct a frequency table including a cumulative frequency column.
                                                                            (5 marks)

   Bina Jadual Kekerapan beserta lajur frekuensi longgokan.
                                                                            (5 markah)

iii)   Calculate the mean age of school students visiting the zoo.
                                                                            (2 marks)

   Kirakan umur min pelajar yang melawat zoo.
                                                                            (2 markah)

iv)   Construct an ogive and find the median and the interquartile range of age of students.   (8 marks)

   Binakan ogif dan carikan median serta julat antara kuartil bagi umur pelajar.

                                                                            (8 markah)

SECTION B

BAHAGIAN B

STRUCTURED : 4 Questions (25 marks each)

Struktur : 4 Soalan (25 markah setiap soalan)

INSTRUCTION: This section consists of **FOUR (4)** structured questions. Answer

THREE (3) questions only.

*Arahan : Bahagian ini mengandungi **EMPAT (4)** soalan struktur. Jawab **TIGA (3)** soalan sahaja*

QUESTION 3
SOALAN 3

CLO2
C3

a) Given a function $f(x) = \frac{\ln x}{x}$.
    Diberi fungsi $f(x) = \frac{\ln x}{x}$.

i.   Complete Table 3 and give answers correct to 4 decimal places.

      Lengkapkan Jadual 3 dan beri jawapan tepat kepada 4 tempat perpuluhan.

Table 3 / Jadual 3

x		1.5	2.0		3.0	3.5	4.0
f(x)	0		0.3466	0.3665		0.3579	

(5 marks)
(*5 markah*)

CLO1
C2

(d) Based on the ogive in (c), determine :

     Berdasarkan ogif di (c), tentukan:

i. the 37th percentile.   (2 marks)

    Persentil ke-37   (*2 markah*)

ii. the interquartile range   (4 marks)

     Julat antara kuartil   (*4 markah*)

QUESTION 4
SOALAN 4

CLO2
C2

a) Given an arithmetic progression, -8, -3, 2... Calculate the sum of the first 10 terms of the progression.   (4 marks)

Diberi janjang aritmetik, -8, -3, 2... Kirakan hasil tambah bagi 10 sebutan pertama janjang tersebut.   *(4 markah)*

CLO2
C2

b) The 9th term of an arithmetic progression is 19 and the 8th term is four times the 4th term.

Sebutan ke-9 bagi janjang aritmetik ialah 19 dan sebutan ke-8 adalah empat kali sebutan ke-4

 i) Find the first term and the common difference of the progression.

            (5 marks)

  Cari sebutan pertama dan beza sepunya janjang tersebut.

            (5 markah)

 ii) Find the sum of the first 10 terms of the progression.

            (3 marks)

  Cari hasil tambah bagi 10 sebutan pertama janjang tersebut.

            (3 markah)

CLO2
C2

c) Given a geometric progression, $6, 3, \frac{3}{2}$ ... Find the 8th term of the progression.   (3 marks)

Diberi janjang geometri, $6, 3, \frac{3}{2}$ ... cari sebutan ke-8 janjang tersebut.

            (3 markah)

---

ii. From the Table 3, calculate the area under the curve f(x), from x = 1 to x = 4 by using the Trapezium's Rule. Give your answer correct to 3 decimal places.

            (6 marks)

Daripada Jadual 3, di atas, kirakan luas di bawah lengkung f(x), dari x = 1 kepada x = 4 dengan menggunakan Petua Trapezium. Berikan jawapan tepat kepada 3 tempat perpuluhan.

            (6 markah)

CLO2
C3

b) By using the Simpson's Rule, evaluate $\int_1^7 \frac{dx}{1-sinx}$ with n=6. Give your answer correct to two decimal places. (14 marks)

Dengan menggunakan Petua Simpson, nilaikan $\int_1^7 \frac{dx}{1-sinx}$ dengan n =6. Berikan jawapan tepat kepada 2 tempat perpuluhan. *(14 markah)*

QUESTION 5
SOALAN 5

CLO3
C2

(a) Solve for a and b if $\begin{bmatrix} 4 & a \\ -3 & 0 \end{bmatrix}\begin{bmatrix} b & 6 \\ -1 & 5 \end{bmatrix} + \begin{bmatrix} 7 & 1 \\ 3 & 6 \end{bmatrix} = \begin{bmatrix} 21 & 35 \\ -9 & -12 \end{bmatrix}.$ (6 marks)

Selesaikan untuk a dan b jika $\begin{bmatrix} 4 & a \\ -3 & 0 \end{bmatrix}\begin{bmatrix} b & 6 \\ -1 & 5 \end{bmatrix} + \begin{bmatrix} 7 & 1 \\ 3 & 6 \end{bmatrix} = \begin{bmatrix} 21 & 35 \\ -9 & -12 \end{bmatrix}.$

(6 markah)

CLO3
C2

(b) Given $A = \begin{bmatrix} 5 & 2 & 3 \\ 3 & 6 & 1 \\ -4 & 8 & 7 \end{bmatrix}$ and minor $A = \begin{bmatrix} 34 & 25 & 48 \\ -10 & 47 & 48 \\ -16 & -4 & 24 \end{bmatrix}$. Find

Diberi $A = \begin{bmatrix} 5 & 2 & 3 \\ 3 & 6 & 1 \\ -4 & 8 & 7 \end{bmatrix}$ dan minor $A = \begin{bmatrix} 34 & 25 & 48 \\ -10 & 47 & 48 \\ -16 & -4 & 24 \end{bmatrix}$. Cari

(i) determinant of matrix A (2 marks)

penentu bagi matrik A *(2 markah)*

(ii) cofactor of matrix A (5 marks)

kofaktor bagi matrik A *(5 markah)*

CLO3
C2

(c) Solve the following simultaneous equations by using the Cramer's Rule. (12 marks)

Selesaikan persamaan serentak berikut dengan menggunakan Petua Cramer.

(12 markah)

$$x + 3y + 2z = 9$$
$$4x + 3y = 1$$
$$2x + y + 2z = 1$$

CLO2
C2

d) The 3rd and the 4th term of a geometric progression are 108 and -324 respectively.

Sebutan ke-3 dan sebutan ke-4 bagi janjang geometri adalah 108 dan -324 masing-masing.

i) Find the common ratio and the first term of the progression.

(5 marks)

Cari nisbah sepunya dan sebutan pertama janjang tersebut.

(5 markah)

ii) Find the 10th term of the progression. (2 marks)

Cari sebutan ke-10 janjang tersebut. *(2 markah)*

iii) Find the sum of the first 6 terms of the progression. (3 marks)

Cari hasil tambah bagi 6 sebutan pertama janjang tersebut.

(3 markah)

FORMULA OF ENGINEERING MATHEMATICS 3 (BA301)

1. Mean

$$\bar{x} = \frac{\sum x}{N} = \frac{\sum fx}{\sum f}$$

$$\text{Median} = L + \left[\frac{\frac{N}{2} - F}{f_m}\right]c$$

2. Mod e $= L + \left[\dfrac{d_1}{d_1 + d_2}\right]c$

3. Quartile , $Q_k = L + \left[\dfrac{\frac{k}{4}N - F}{f_{QK}}\right]c$

4. Decil , $D_k = L + \left[\dfrac{\frac{k}{10}N - F}{f_{DK}}\right]c$

5. Percentile, $P_K = L + \left[\dfrac{\frac{k}{100}N - F}{f_{PK}}\right]c$

6. Mean Deviation

   i. $E = \dfrac{\sum |x - \bar{x}|}{n}$

   ii. $E = \dfrac{\sum |x - \bar{x}|f}{n}$

7. Variance.

   i. $s^2 = \dfrac{\sum(x - \bar{x})^2}{n}$

   ii. $s^2 = \dfrac{\sum_{i=l}^{n} x_i^2 - n\bar{x}^2}{n}$

   iii. $s^2 = \dfrac{\sum(x - \bar{x})^2 f}{n}$

   iv. $s^2 = \dfrac{\sum fx^2}{\sum f} - \left[\dfrac{\sum fx}{\sum f}\right]^2$

8. Standard Deviation

$$s = \sqrt{\text{var}\, iance}$$

Arithmetic Progression

9. $T_n = a + (n-1)d$

10. $S_n = \dfrac{n}{2}[2a + (n-1)d]$

11. $T_n = \dfrac{T_{n-1} + T_{n+1}}{2}$

Geometric Progression

12. $T_n = ar^{n-1}$

13. $S_n = \dfrac{a(1 - r^n)}{1 - r} @ \dfrac{a(r^n - 1)}{r - 1}$

14. $T_n = \sqrt{T_{n-1} \times T_{n+1}}$

Matrix

15. Inverse of Matrix

   i. $A^{-1} = \dfrac{Adjoin(A)}{|A|} = \dfrac{C_a^t}{|A|}$

   ii. Cofactor , $C = (-1)^{i\cdot j} M_{ij}$

Area of Irregular Shape

16. Trapezoidal Rule

   i. $\displaystyle\int_a^b f(x)dx = \dfrac{h}{2}(y_0 + 2y_1 + 2y_2 + \ldots\ldots + 2y_{n-1} + y_n)$

   ii. $\displaystyle\int_a^b f(x)dx = h\left(\dfrac{1}{2}f(a) + f(x_1) + \ldots\ldots + f(x_{n-1}) + \dfrac{1}{2}f(b)\right)$

17. Simpson's Rule

   i. $\displaystyle\int_a^b y\,dx = \dfrac{h}{3}(f_0 + 4f_1 + 2f_2 + 4f_3 + \ldots.. + 4f_{n-1} + f_n)$

   ii. $\displaystyle\int_a^b f(x)dx = \dfrac{h}{3}(f(a) + 4\Sigma f(odd\ number) + 2\Sigma f(even\ number) + f(b))$

QUESTION 6
SOALAN 6

CLO3
C3

(a) Given the following simultaneous equations, find the value of x, y and z using the Gaussian Elimination Method.

Diberi persamaan serentak berikut, cari nilai x, y dan z dengan menggunakan Kaedah Penghapusan Gauss.

$$3x + 5y - z = 7$$
$$2x + 2y + 4z = 8$$
$$6x - y + 3z = 8$$

(12 marks)

(12 markah)

CLO3
C3

(b) Solve the equation , $x^3 + 3x^2 - 2 = 0$ by using the Newton-Raphson Method. Give the answer correct to 3 decimal places with an initial guess of $x_0 = 1$.

(13 marks)

Selesaikan persamaan $x^3 + 3x^2 - 2 = 0$ menggunakan kaedah Newton-Raphson. Berikan jawapan tepat kepada 3 tempat perpuluhan dengan tekaan awal $x_0 = 1$.

(13 markah)

SOALAN TAMAT

END OF PAPER