POLiTEKNiK
MALAYSIA
SULTAN SALAHUDDIN ABDUL AZIZ SHAH

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

JABATAN MATEMATIK, SAINS DAN KOMPUTER

PENILAIAN ALTERNATIF

SESI DIS 2020

DBM3013 : ENGINEERING MATHEMATICS 3

NAMA PENYELARAS KURSUS : RABIATUL ADAWIYAH BINTI ROSLI

KAEDAH PENILAIAN   : PEPERIKSAAN ONLINE

JENIS PENILAIAN   : SOALAN ESEI BERSTRUKTUR
       (2 SOALAN)

TARIKH PENILAIAN   : 30 JUN 2021

TEMPOH PENILAIAN   : 1 JAM

SECTION A : 25 MARKS
BAHAGIAN A : 25 MARKAH

INSTRUCTION:
This section consists of **TWO (2)** subjective questions. Answer ALL
ARAHAN :
*Bahagian ini mengandungi **DUA (2)** soalan subjektif. Jawab SEMUA.*

QUESTION 1

a)   The scores of students in Quiz are 3, 13, 11, 15, 5, 4, 2, 3, 2. Calculate:

CLO1   *Markah pelajar dalam Quiz adalah 3, 13, 11, 15, 5, 4, 2, 3, 2. Kira:*
C3
i.   Mean
         Min
                                                                        [3 marks]
                                                                        [3 *markah*]
ii.   Median
         Median
                                                                        [3 marks]
                                                                        [3 *markah*]

iii.   Mode
         Mod
                                                                        [3 marks]
                                                                        [3 *markah*]

b)   The data below shows the body weight of 40 football player in a club. The

CLO1   measurement is to the nearest kilogram (kg).
C3
Data di bawah menunjukkan berat badan 40 pemain bola sepak di sebuah kelab.

Pengukuran adalah ke kilogram terdekat (kg).

55	70	57	73	55	59	64	72
60	48	58	54	69	51	63	78
75	64	65	57	71	78	76	62
49	66	62	76	61	63	63	76
52	76	71	61	53	56	67	71

(i)   Construct a frequency distribution table for the data.
       Bina jadual taburan frekuensi untuk data

                                                                        [11 marks]
                                                                        [11 *markah*]

(ii)   Calculate mean.
       Kirakan Min

[5 marks]
[5 *markah*]

QUESTION 2

CLO1   (a)   Use Doolittle's method to solve the following system.
C3   *Menggunakan kaedah Crout, selesaikan sistem berikut:*

$$x_1 + 2x_2 + 3x_3 = 10$$

$$-x_1 + x_2 + x_3 = 0$$

$$x_2 - x_3 = 1$$

[14 marks]
[*14 markah*]

(b)   By using the Newton-Raphson iteration method, calculate the real root of
      $x \sin x - 4 \cos x = 0$ to 5 decimal places. Given $x_0 = 1$.

      Menggunakan kaedah Newton-Raphson, kirakan nilai punca sebenar bagi
      $x \sin x - 4 \cos x = 0$ *kepada 5 titik perpuluhan. Diberi $x_0 = 1$*

[11 marks]
[*11 markah*]

SOALAN TAMAT

FORMULA DBM3013 (ENGINEERING MATHEMATICS 3)

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	$x_0 = \dfrac{1}{y_2 - y_1} \begin{vmatrix} x_1 & y_1 \\ x_2 & y_2 \end{vmatrix}$ $\qquad x_{n+1} = x_n - \dfrac{f(x)}{f'(x)}$

SOLUTION FOR 1st ORDER DIFFERENTIAL EQUATION	
Homogeneous Equation $$y = vx \quad \text{and} \quad \frac{dy}{dx} = v + x\frac{dv}{dx}$$	Linear Factors (Integrating Factors) $$y \bullet IF = \int Q \bullet IF \, dx$$ Where $IF = e^{\int P dx}$
	Logarithmic $$a \quad = e^{\ln a}$$ $$a^x \quad = e^{x \ln a}$$ $$\int a^x \, dx \quad = \frac{a^x}{\ln a} + c$$

GENERAL SOLUTION FOR 2nd ORDER DIFFERENTIAL EQUATION

Equation of the form $a\dfrac{d^2 y}{dx^2} + b\dfrac{dy}{dx} + cy = 0$	
1. Real & different roots:	$y = Ae^{m_1 x} + Be^{m_2 x}$
2. Real & equal roots:	$y = e^{mx}(A + Bx)$
3. Complex roots:	$y = e^{\alpha x}(A\cos\beta x + B\sin\beta x)$

DIFFERENTIATION			
1.	$\dfrac{d}{dx}(k) = 0, k \text{ is constant}$	2.	$\dfrac{d}{dx}(x^n) = nx^{n-1}$ [Power Rule]
3.	$\dfrac{d}{dx}(ax^n) = anx^{n-1}$	4.	$\dfrac{d}{dx}\big(f(x) \pm g(x)\big) = f'(x) \pm g'(x)$
5.	$\dfrac{d}{dx}(uv) = u\dfrac{dv}{dx} + v\dfrac{du}{dx}$ [Product Rule]	6.	$\dfrac{d}{dx}\left(\dfrac{u}{v}\right) = \dfrac{v\dfrac{du}{dx} - u\dfrac{dv}{dx}}{v^2}$ [Quotient Rule]
7.	$\dfrac{dy}{dx} = \dfrac{du}{dx} \times \dfrac{dy}{du}$ [Chain Rule]	8.	$\dfrac{d}{dx}(e^x) = e^x$
9.	$\dfrac{d}{dx}\big(e^{ax+b}\big) = e^{ax+b} \times \dfrac{d}{dx}(ax+b)$	10.	$\dfrac{d}{dx}(\ln x) = \dfrac{1}{x}$
11.	$\dfrac{d}{dx}[\ln(ax+b)] = \dfrac{1}{ax+b} \times \dfrac{d}{dx}(ax+b)$	12.	$\dfrac{d}{dx}(\sin x) = \cos x$
13.	$\dfrac{d}{dx}(\cos x) = -\sin x$	14.	$\dfrac{d}{dx}(\tan x) = \sec^2 x$
15.	$\dfrac{d}{dx}[\sin(ax+b)] = \cos(ax+b) \times \dfrac{d}{dx}(ax+b)$	16.	$\dfrac{d}{dx}[\cos(ax+b)] = -\sin(ax+b) \times \dfrac{d}{dx}(ax+b)$
17.	$\dfrac{d}{dx}[\tan(ax+b)] = \sec^2(ax+b) \times \dfrac{d}{dx}(ax+b)$	18.	$\dfrac{d}{dx}[\sin^n u] = n\sin^{n-1}u \times \cos u \times \dfrac{du}{dx}$
19.	$\dfrac{d}{dx}[\cos^n u] = n\cos^{n-1}u \times -\sin u \times \dfrac{du}{dx}$	20.	$\dfrac{d}{dx}[\tan^n u] = n\tan^{n-1}u \times \sec^2 u \times \dfrac{du}{dx}$

INTEGRATION		
1. $\int ax^n dx = \dfrac{ax^{n+1}}{n+1} + c \ ; \{n \neq -1\}$	2. $\int (ax+b)^n dx = \dfrac{(ax+b)^{n+1}}{(a)(n+1)} + c \ ; \{n \neq -1\}$	
3. $\int k \ dx = kx + c, k \text{ is constant}$	4. $\int_a^b f(x)dx = F(b) - F(a)$	
5. $\int \dfrac{1}{x} \ dx = \ln x + c$	6. $\int \dfrac{1}{ax+b} \ dx = \dfrac{1}{a} \times \ln(ax+b) + c$	
7. $\int e^x \ dx = e^x + c$	8. $\int e^{ax+b} \ dx = \dfrac{1}{a} \times e^{ax+b} + c$	
9. $\int \sin x \ dx = -\cos x + c$	10. $\int \cos x \ dx = \sin x + c$	
11. $\int \sec^2 x \ dx = \tan x + c$		
12. $\int \sin(ax+b) \ dx = -\dfrac{1}{\frac{d}{dx}(ax+b)} \times \cos(ax+b) + c$		
13. $\int \cos(ax+b) \ dx = \dfrac{1}{\frac{d}{dx}(ax+b)} \times \sin(ax+b) + c$		
14. $\int \sec^2(ax+b) \ dx = \dfrac{1}{\frac{d}{dx}(ax+b)} \times \tan(ax+b) + c$		