

**SULIT**



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

**JABATAN MATEMATIK, SAINS DAN KOMPUTER**

**PENILAIAN ALTERNATIF BERIKUTAN  
PELAKSANAAN PERINTAH KAWALAN BERSYARAT**

**SESI JUN 2020**

**KOD KURSUS : DBM3013 (ENGINEERING MATHEMATICS 3)**

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**NAMA PENYELARAS KURSUS: RABIATUL ADAWIYAH ROSLI**

**KAEDAH PENILAIAN : PEPERIKSAAN ONLINE**

**JENIS PENILAIAN : ESEI BERSTRUKTUR (2 SOALAN)**

**TARIKH PENILAIAN : 22 DISEMBER 2020**

**TEMPOH PENILAIAN : 1 JAM**

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**LARANGAN TERHADAP PLAGIARISM (AKTA 174)**

**PELAJAR TIDAK BOLEH MEMPLAGIAT APA-APA IDEA, PENULISAN, DATA  
ATAU CIPTAAN ORANG LAIN. PLAGIAT ADALAH SALAH SATU  
PENYELEWENGAN AKADEMIK. SEKIRANYA PELAJAR DIBUKTIKAN  
MELAKUKAN PLAGIARISM, PENILAIAN BAGI KURSUS BERKENAAN AKAN  
DIMANSUHKAN DAN DIBERI GRED F DENGAN NILAI MATA 0.**

**(RUJUK BUKU ARAHAN-ARAHAN PEPERIKSAAN DAN KAEDAH PENILAIAN (Diploma) EDISI 6, JUN 2019,  
KLAUSA 17.3)**

**INSTRUCTION:**

This section consists of **TWO (2)** subjective questions. Answer **ALL** questions. Write your answers in the Alternative Exam answer sheet.

**ARAHAN :**

*Bahagian ini mengandungi DUA (2) soalan subjektif. Jawab SEMUA soalan. Tulis jawapan anda di dalam kertas jawapan Penilaian Alternatif.*

**QUESTION 1**CLO1  
C3

- (a) Solve the following equations by using Crout Method:  
*Selesaikan persamaan berikut dengan menggunakan Kaedah Crout:*

$$12p - 2q + r = 16$$

$$15p + 12q - r = 1$$

$$13p + 4q + r = 11$$

[14 marks]

[14 markah]

- (b) Use the Newton-Raphson method to calculate the real root of  $8.0000x^4 + 0.4500x^3 - 4.5440x - 0.1136 = 0$  to 4 decimal places. Given  $x_0 = 0.8$

*Menggunakan kaedah Newton-Raphson, kirakan nilai punca sebenar bagi  $8.000x^4 + 0.4500x^3 - 4.5440x - 0.1136 = 0$  kepada 4 titik perpuluhan. Diberi  $x_0 = 0.8$ .*

[11 marks]

[11 markah]

## QUESTION 2

CLO1

C3

- (a) Solve the first order differential equations for:  
*Selesaikan persamaan pembezaan peringkat pertama bagi:*

(i)  $\frac{dy}{dx} = e^{x-y}$

[5 marks]

[5 markah]

(ii)  $\frac{dy}{dx} = \frac{xy}{x^2+y^2}$

[10 marks]

[10 markah]

- (b) Solve the following second order differential equations for:  
*Selesaikan persamaan pembezaan peringkat kedua bagi:*

(i)  $\frac{d^2y}{dx^2} + 2\frac{dy}{dx} + 4y = 0$

[5 marks]

[5 markah]

(ii)  $y'' + 4y = 0$

[5 marks]

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

SOLUTION FOR 1 <sup>st</sup> ORDER DIFFERENTIAL EQUATION	
Homogeneous Equation $y = vx$ and $\frac{dy}{dx} = v + x \frac{dv}{dx}$	Linear Factors (Integrating Factors) $y \cdot IF = \int Q \cdot IF dx$ Where $IF = e^{\int P dx}$
	Logarithmic $a = e^{\ln a}$ $a^x = e^{x \ln a}$ $\int a^x dx = \frac{a^x}{\ln a} + c$
GENERAL SOLUTION FOR 2 <sup>nd</sup> ORDER DIFFERENTIAL EQUATION	
Equation of the form $a \frac{d^2 y}{dx^2} + b \frac{dy}{dx} + cy = 0$	
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. $\frac{d}{dx}(k) = 0, k \text{ is constant}$	2. $\frac{d}{dx}(x^n) = nx^{n-1}$ [Power Rule]
3. $\frac{d}{dx}(ax^n) = anx^{n-1}$	4. $\frac{d}{dx}(f(x) \pm g(x)) = f'(x) \pm g'(x)$
5. $\frac{d}{dx}(uv) = u \frac{dv}{dx} + v \frac{du}{dx}$ [Product Rule]	6. $\frac{d}{dx}\left(\frac{u}{v}\right) = \frac{v \frac{du}{dx} - u \frac{dv}{dx}}{v^2}$ [Quotient Rule]
7. $\frac{dy}{dx} = \frac{du}{dx} \times \frac{dy}{du}$ [Chain Rule]	8. $\frac{d}{dx}(e^x) = e^x$
9. $\frac{d}{dx}(e^{ax+b}) = e^{ax+b} \times \frac{d}{dx}(ax+b)$	10. $\frac{d}{dx}(\ln x) = \frac{1}{x}$
11. $\frac{d}{dx}[\ln(ax+b)] = \frac{1}{ax+b} \times \frac{d}{dx}(ax+b)$	12. $\frac{d}{dx}(\sin x) = \cos x$
13. $\frac{d}{dx}(\cos x) = -\sin x$	14. $\frac{d}{dx}(\tan x) = \sec^2 x$
15. $\frac{d}{dx}[\sin(ax+b)] = \cos(ax+b) \times \frac{d}{dx}(ax+b)$	16. $\frac{d}{dx}[\cos(ax+b)] = -\sin(ax+b) \times \frac{d}{dx}(ax+b)$
17. $\frac{d}{dx}[\tan(ax+b)] = \sec^2(ax+b) \times \frac{d}{dx}(ax+b)$	18. $\frac{d}{dx}[\sin^n u] = n \sin^{n-1} u \times \cos u \times \frac{du}{dx}$
19. $\frac{d}{dx}[\cos^n u] = n \cos^{n-1} u \times -\sin u \times \frac{du}{dx}$	20. $\frac{d}{dx}[\tan^n u] = n \tan^{n-1} u \times \sec^2 u \times \frac{du}{dx}$

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