

SULIT



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

JABATAN MATEMATIK, SAINS & KOMPUTER

PENILAIAN ALTERNATIF

SESI DIS 2020

DBM30043 : ELECTRICAL ENGINEERING MATHEMATICS

NAMA PENYELARAS KURSUS : SITI NURUL HUDA BT ROMLI

KAEDAH PENILAIAN : PEPERIKSAAN ONLINE

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

TARIKH PENILAIAN : 30 JUN 2021

TEMPOH PENILAIAN : (1 JAM)

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 Assessment answer sheet.

ARAHAN :

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

QUESTION 1**SOALAN 1**

CLO1
C3 a) Construct the Ordinary Differential Equation for $y = 2Ax + \frac{7B}{x}$ [7 marks]

Bentukkan Persamaan Pembezaan Biasa bagi $y = 2Ax + \frac{7B}{x}$ [7 markah]

CLO1
C3 b) Solve the following differential equations :
Selesaikan persamaan pembezaan berikut:

i) $\frac{dy}{dx} = \frac{3y^2 - xy^2}{x^2 y + 5x^2}$ [5 marks]

[5 markah]

ii) $\frac{d^2y}{dx^2} + 4\frac{dy}{dx} + 10y = 0$ [5 marks]

[5 markah]

iii) $\frac{d^2y}{dx^2} + 6\frac{dy}{dx} + 9y = 0$ given that $x = 0, y = 2, \frac{dy}{dx} = 5$

[8 marks]

[8 markah]

QUESTION 2

SOALAN 2

CLO1
C3

a) Change the following functions into Laplace Transform:

Tukarkan fungsi-fungsi yang berikut kepada Jelmaan Laplace:

i) $f(t) = 3k$ by using the definition $F(s) = \int_0^{\infty} e^{-st} f(t) dt$

$f(t) = 3k$ dengan menggunakan takrif $F(s) = \int_0^{\infty} e^{-st} f(t) dt$

[4 marks]

[4 markah]

ii) $f(t) = e^{-5t} (\cosh t + \sinh t)$ by using First Shift Theorem.

 $f(t) = e^{-5t} (\cosh t + \sinh t)$ dengan menggunakan Teorem Anjakan Pertama.

[5 marks]

[5 markah]

CLO1
C3

b) Solve the following Inverse Laplace Transform by using a suitable method:

Selesaikan Jelmaan Laplace Songsang berikut dengan menggunakan kaedah yang sesuai:

i) $F(s) = \frac{6}{s-\frac{1}{3}}$

[2 marks]

[2 markah]

ii) $F(s) = \frac{s+7}{s^2+6s+11}$

[6 marks]

[6 markah]

iii) $F(s) = \frac{3s^2+s+1}{(s^2+1)(s+1)}$

[8 marks]

[8 markah]

SOALAN TAMAT

FORMULA DBM30043 - ELECTRICAL ENGINEERING MATHEMATICS

SOLUTION FOR 1st ORDER DIFFERENTIAL EQUATION	
<p align="center">Homogeneous Equation</p> $y = vx \quad \text{and} \quad \frac{dy}{dx} = v + x \frac{dv}{dx}$	<p>Linear Factors (Integrating Factors)</p> $y \bullet IF = \int Q \bullet IF dx$ <p>Where $IF = e^{\int P dx}$</p> <hr/> <p>Logarithmic</p> $a^x = e^{x \ln a}$ $a^x = e^{x \ln a}$ $\int a^x dx = \frac{a^x}{\ln a} + c$
GENERAL SOLUTION FOR 2nd ORDER DIFFERENTIAL EQUATION	
Equation of the form	$a \frac{d^2 y}{dx^2} + b \frac{dy}{dx} + cy = 0$
Quadratics Formula	$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$
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	$y = e^{\alpha x} (A \cos \beta x + B \sin \beta x)$

LAPLACE TRANSFORM

No.	$f(t)$	$F(s)$	No.	$f(t)$	$F(s)$
1.	a	$\frac{a}{s}$	13.	$e^{-at} \sin \omega t$	$\frac{\omega}{(s+a)^2 + \omega^2}$
2.	at	$\frac{a}{s^2}$	14.	$e^{-at} \cos \omega t$	$\frac{s+a}{(s+a)^2 + \omega^2}$
3.	t^n	$\frac{n!}{s^{n+1}}$	15.	$\sinh \omega t$	$\frac{\omega}{s^2 - \omega^2}$
4.	e^{at}	$\frac{1}{s-a}$	16.	$\cosh \omega t$	$\frac{s}{s^2 - \omega^2}$
5.	e^{-at}	$\frac{1}{s+a}$	17.	$e^{at} \sinh \omega t$	$\frac{\omega}{(s-a)^2 - \omega^2}$
6.	te^{-at}	$\frac{1}{(s+a)^2}$	18.	$e^{-at} \sinh \omega t$	$\frac{\omega}{(s+a)^2 - \omega^2}$
7.	$t^n \cdot e^{at}, n=1,2,3$	$\frac{n!}{(s-a)^{n+1}}$	19.	$e^{-at} \cosh \omega t$	$\frac{s+a}{(s+a)^2 - \omega^2}$
8.	$t^n \cdot f(t)$	$(-1)^n \frac{d^n}{ds^n} [F(s)]$	20.	$f_1(t) + f_2(t)$	$F_1(s) + F_2(s)$
9.	$\sin \omega t$	$\frac{\omega}{s^2 + \omega^2}$	21.	$\int_0^t f(u) du$	$\frac{F(s)}{s}$
10.	$\cos \omega t$	$\frac{s}{s^2 + \omega^2}$	22.	$f(t-a)u(t-a)$	$e^{-as} F(s)$
11.	$t \sin \omega t$	$\frac{2\omega s}{(s^2 + \omega^2)^2}$	23.	First derivative $\frac{dy}{dt}, y'(t)$	$sY(s) - y(0)$
12.	$t \cos \omega t$	$\frac{s^2 - \omega^2}{(s^2 + \omega^2)^2}$	24.	Second derivative $\frac{d^2y}{dt^2}, y''(t)$	$s^2Y(s) - sy(0) - y'(0)$

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. $\int \sec^2(ax+b) dx = \frac{1}{\frac{d}{dx}(ax+b)} \times \tan(ax+b) + c$	