

SULIT



BAHAGIAN PEPERIKSAAN DAN PENILAIAN  
JABATAN PENDIDIKAN POLITEKNIK  
KEMENTERIAN PENDIDIKAN TINGGI

JABATAN MATEMATIK, SAINS DAN KOMPUTER

PEPERIKSAAN AKHIR

**SESI JUN 2015**

**DBM2013: ENGINEERING MATHEMATICS 2**

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**TARIKH : 28 OKTOBER 2015**  
**MASA : 2.30 PM - 4.30 PM (2 JAM)**

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Kertas ini mengandungi **SEMBILAN (9)** halaman bercetak.

Bahagian A: Struktur (1 soalan, jawab SEMUA)

Bahagian B: Struktur (4 soalan, jawab 3 soalan)

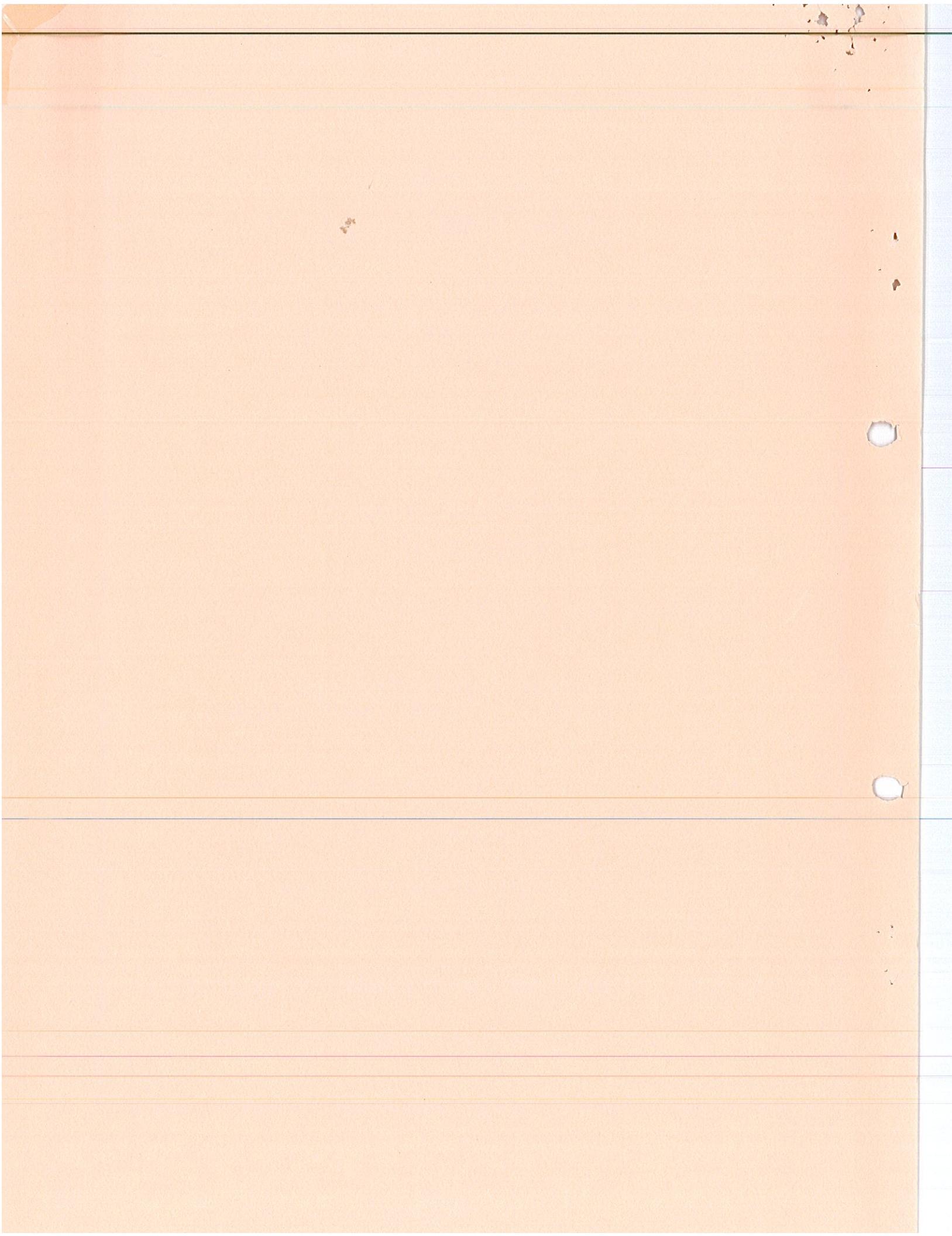
Dokumen sokongan yang disertakan : Formula

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**JANGAN BUKA KERTAS SOALANINI SEHINGGA DIARAHKAN**

(CLO yang tertera hanya sebagai rujukan)

SULIT



SESI JUN 2015

**SECTION A : 25 MARKS**  
**BAHAGIAN A : 25 MARKAH**

**INSTRUCTION:**This section consists of **ONE (1)** subjective question. Answer **ALL** the questions.**ARAHAN:**Bahagian ini mengandungi **SATU (1)** soalan subjektif. Jawab **SEMUA** soalan.**QUESTION 1****SOALAN 1**

- CLO1      (a) Simplify the following expressions.

C2      *Permudahkan ungkapan berikut.*

(i)       $x^{\frac{3}{2}} \div x^4 \times x^{-1}$

[3 marks]  
[3 markah]

(ii)       $\log_2 64$

[3 marks]  
[3 markah]

- CLO1      (b) Solve the following expressions.

C3      *Selesaikan ungkapan berikut.*

(i)       $27^{4x} = \frac{1}{243}$

[4 marks]  
[4 markah]

(ii)       $2^{6x} - 8^{10-2x} = 0$

[5 marks]  
[5 markah]

(iii)       $3 \log 2 + \log(4x-1) = \log(7-8x)$

[5 marks]  
[5 markah]

CLO1  
C4

(c) Calculate the value of x.

*Kirakan nilai x.*

$$2 \log 2x + \log 3x = \log 96$$

[5 marks]

[5 markah]

**SECTION B : 75 MARKS**  
**BAHAGIAN B : 75 MARKAH**

### **INSTRUCTION:**

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

ARAHAN:

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

## QUESTION 2

## QUESTION SOALAN 2

CLO2  
C3

- (a) Differentiate all the following functions.

*Bezakan setiap fungsi berikut.*

$$(i) \quad y = \frac{2x^6 + 4x^5 + 3x}{x}$$

[3 marks]  
[3 markah]

$$(ii) \quad y = (4 - 3x^3)^4$$

[4 marks]  
[4 markah]

$$(iii) \quad y = (x+2)^2(2x-3)^4$$

[5 marks]  
[5 markah]

$$(iv) \quad y = 3 \sin^2(2x^2 - 1)$$

[5 marks]  
[5 markah]

CLO2  
C4

- (b) Solve the stationary points for  $y = 3x^3 + x^2$  and determine the maximum and minimum points.

Selesaikan koordinat titik pегun bagi lengkung  $y = 3x^3 - 2x$  dan tentukan titik maksimum dan titik minimum.

[8 marks]  
[8 markah]

**QUESTION 3**  
**SOALAN 3**

CLO2  
C3

- (a) (i) Find the rate of change of the square area whose side is 8 cm long if the side length is increasing at 2 cm/min.

*Cari kadar perubahan luas segi empat sama dimana sisinya adalah 8 cm, jika sisinya bertambah 2 cm/min.*

[8 marks]  
[8 markah]

- (ii) The parametric equations of a curve are  $x = \frac{t^2 - 2}{1+t}$  and  $y = \frac{1}{1+t}$ . Find  $\frac{dy}{dx}$  in terms of  $t$ .

*Persamaan parameter sebuah lengkung adalah  $x = \frac{t^2 - 2}{1+t}$  dan  $y = \frac{1}{1+t}$ . Cari  $\frac{dy}{dx}$  dalam sebutan  $t$ .*

[9 marks]  
[9 markah]

CLO2  
C4

- (b) Find  $\frac{\partial z}{\partial x}$ ,  $\frac{\partial z}{\partial y}$ ,  $\frac{\partial^2 z}{\partial x \partial y}$  and  $\frac{\partial^2 z}{\partial y \partial x}$  for the function below.

*Cari  $\frac{\partial z}{\partial x}$ ,  $\frac{\partial z}{\partial y}$ ,  $\frac{\partial^2 z}{\partial x \partial y}$  and  $\frac{\partial^2 z}{\partial y \partial x}$  bagi fungsi di bawah.*

$$z = (8x + 3y)(7x + 5y)$$

[8 marks]  
[8 markah]

**QUESTION 4****SOALAN 4**CLO2  
C2

- (a) Solve the following integrals.

*Selesaikan pengamiran berikut.*

(i)  $\int (2x^2 + 3)dx$

[2 marks]  
[2 markah]

(ii)  $\int (4t+7)^4 dt$  [Use substitution method]

[Guna kaedah gantian]

[4 marks]  
[4 markah]CLO2  
C3

- (b) Evaluate the definite integrals below.

*Tentukan nilai kamiran tentu berikut.*

(i)  $\int_{-1}^2 (4x - x^2)dx$

[4 marks]  
[4 markah]

(ii)  $\int_{-2}^{-1} \left( \frac{x^4 + 5x}{x^3} \right) dx$

[6 marks]  
[6 markah]

(iii)  $\int_1^2 (2x^2 + x)dx + \int_{-2}^3 (2x^2 + x)dx$

[9 marks]  
[9 markah]

**QUESTION 5**  
**SOALAN 5**

CLO2  
C3

- (a) Integrate each of the following.

*Kamirkan setiap yang berikut.*

(i)  $\int x \cos x dx$

[6 marks]  
[6 markah]

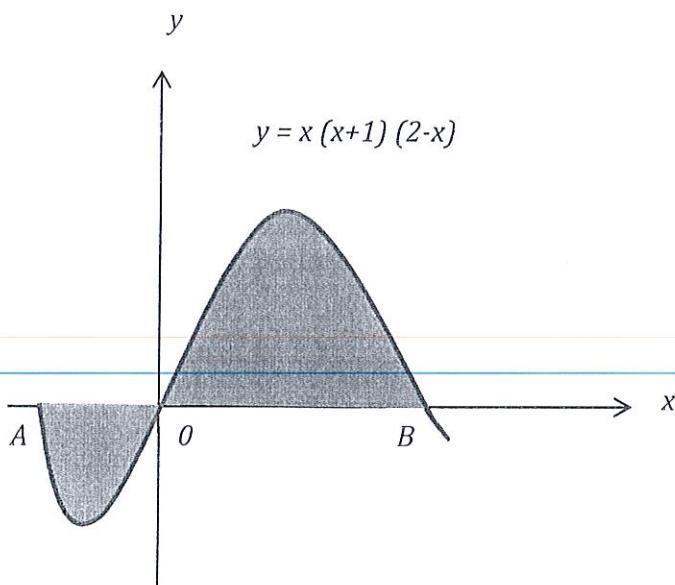
(ii)  $\int \frac{2x}{(x+1)(x-3)} dx$

[11 marks]  
[11 markah]

CLO2  
C4

- (b) Find the area of the curve below between  $x = A$  to  $x = B$ .

*Carikan luas lengkung antara  $x = A$  hingga  $x = B$  dalam gambar rajah berikut.*



[8 marks]  
[8 markah]

**SOALAN TAMAT**

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.	$\frac{d}{dx} [\tan^n u] = n \tan^{n-1} u \times \sec^2 u \times \frac{du}{dx}$
21.	$\frac{d}{dx} (\sin^{-1} u) = \frac{1}{\sqrt{1-u^2}} \frac{du}{dx}$
22.	$\frac{d}{dx} (\cos^{-1} u) = \frac{-1}{\sqrt{1-u^2}} \frac{du}{dx}$
23.	$\frac{d}{dx} (\tan^{-1} u) = \frac{1}{1+u^2} \frac{du}{dx}$
24.	$\frac{d}{dx} (\cot^{-1} u) = \frac{-1}{1+u^2} \frac{du}{dx}$
25.	$\frac{d}{dx} (\sec^{-1} u) = \frac{1}{ u \sqrt{u^2-1}} \frac{du}{dx}$
26.	$\frac{d}{dx} (\cosec^{-1} u) = \frac{-1}{ u \sqrt{u^2-1}} \frac{du}{dx}$
27.	$\frac{dy}{dx} = \frac{dy}{dt} \times \frac{dt}{dx}$ [Parametric Equation]

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



15.	$\int \frac{1}{\sqrt{a^2 - u^2}} du = \sin^{-1} \frac{u}{a} + c$
16.	$\int \frac{-1}{\sqrt{a^2 - u^2}} du = \cos^{-1} \frac{u}{a} + c$
17.	$\int \frac{1}{a^2 + u^2} du = \frac{1}{a} \tan^{-1} \frac{u}{a} + c$
18.	$\int \frac{-1}{a^2 + u^2} du = \frac{1}{a} \cot^{-1} \frac{u}{a} + c$
19.	$\int \frac{1}{u\sqrt{u^2 - a^2}} du = \frac{1}{a} \sec^{-1} \frac{u}{a} + c$
20.	$\int \frac{-1}{u\sqrt{u^2 - a^2}} du = \frac{1}{a} \cosec^{-1} \frac{u}{a} + c$

## Identity Trigonometry

1.	$\cos^2 \theta + \sin^2 \theta = 1$	2.	$1 + \tan^2 \theta = \sec^2 \theta$
3.	$1 + \cot^2 \theta = \cosec^2 \theta$	4.	$\sin 2\theta = 2 \sin \theta \cos \theta$
5.	$\cos 2\theta = 2 \cos^2 \theta - 1$ $= 1 - 2 \sin^2 \theta$ $= \cos^2 \theta - \sin^2 \theta$	6.	$\tan 2\theta = \frac{2 \tan \theta}{1 - \tan^2 \theta}$
7.	$\tan \theta = \frac{\sin \theta}{\cos \theta}$	8.	$\cot \theta = \frac{\cos \theta}{\sin \theta} = \frac{1}{\tan \theta}$
9.	$\sec \theta = \frac{1}{\cos \theta}$	10.	$\cosec \theta = \frac{1}{\sin \theta}$

## AREA UNDER CURVE

1.	$A_x = \int_a^b y \, dx$	2.	$A_y = \int_a^b x \, dy$
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## VOLUME UNDER CURVE

1.	$V_x = \pi \int_a^b y^2 \, dx$	2.	$V_y = \pi \int_a^b x^2 \, dy$
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## INTEGRATION BY PARTS

$$\int u \, dv = uv - \int v \, du$$

