

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

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

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

Bahagian A: Struktur (1 soalan, jawab SEMUA)

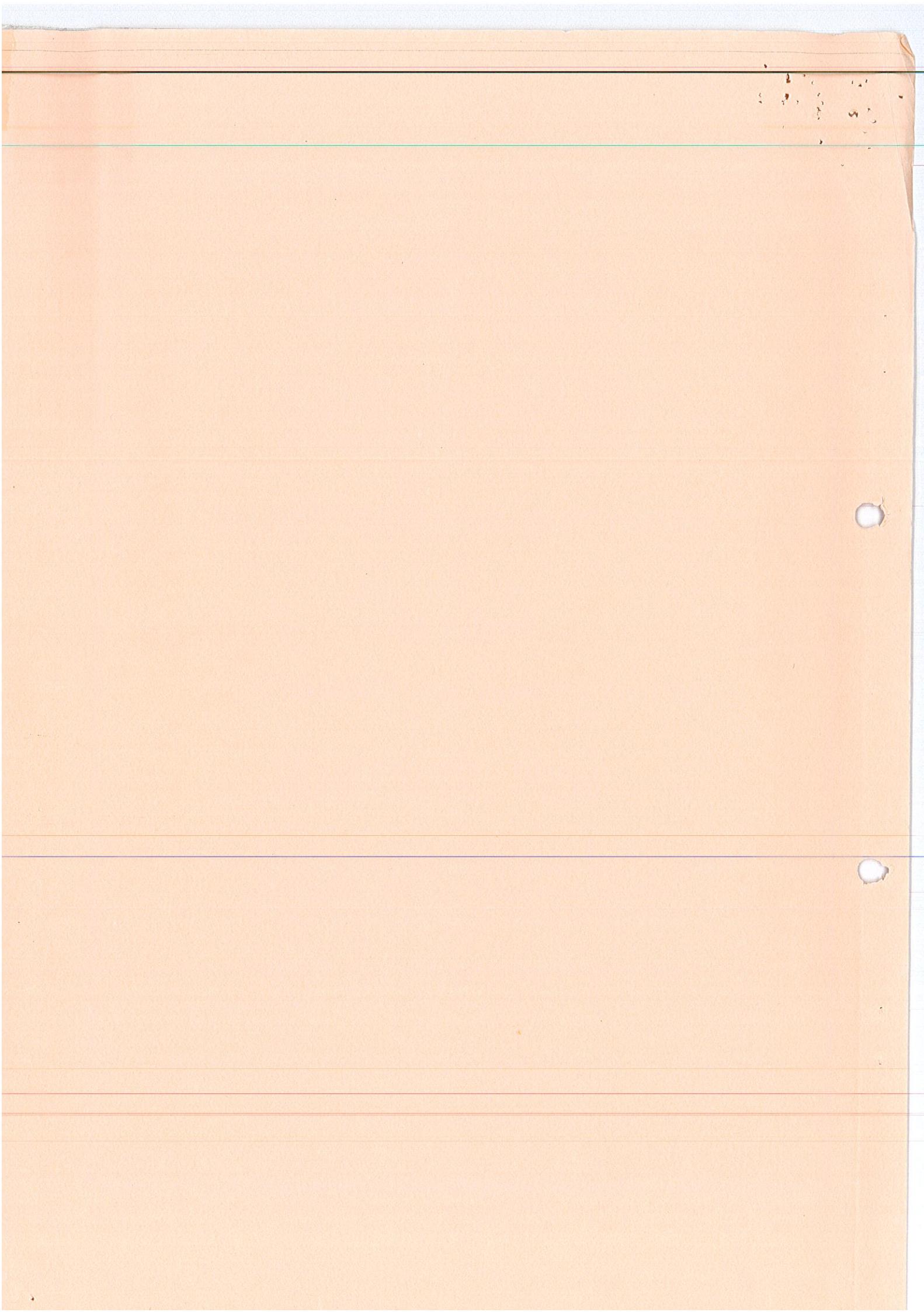
Bahagian B: Struktur (4 soalan, jawab 3 soalan)

Dokumen sokongan yang disertakan : Formula

JANGAN BUKA KERTAS SOALAN INI SEHINGGA DIARAHKAN

(CLO yang tertera hanya sebagai rujukan)

SULIT



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
C2

(a) Simplify the following expressions.

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
C3

(b) Solve the following expressions.

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.

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

f

[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**SOALAN 2**

CLO2
C3

- (a) Differentiate all the following functions.

Bezakan setiap fungsi berikut.

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

[3 marks]
[3 markah]

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

[4 marks]
[4 markah]

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

[5 marks]
[5 markah]

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

[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 pegun bagi lengkung $y = 3x^3 + 2x$ dan tentukan titik maksimum dan titik minimum.

[8 marks]
[8 markah]

$$\cos = -\sin$$

$$\sin = \cos$$

$$\tan = \sec^2$$

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) $\int (2x^2 + 3)dx$ *MR*

[2 marks]
[2 markah]

(ii) $\int (4t + 7)^4 dt$ *L*

[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]

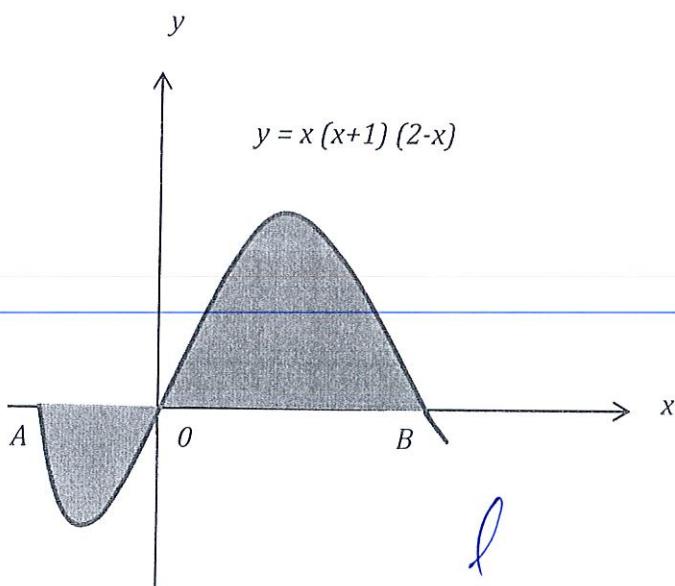
(ii) $\int \frac{2x}{(x+1)(x-3)} dx$

[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

FORMULA**BASIC EXPONENT AND LOGARITHM**

$$a^x = y \Leftrightarrow \log_a y = x$$

EXPONENT LAWS	LOGARITHM LAWS
$a^m \times a^n = a^{m+n}$ $\frac{a^m}{a^n} = a^{m-n}$ $(a^m)^n = a^{mn}$	$\log_a x + \log_a y = \log_a xy$ $\log_a x - \log_a y = \log_a \frac{x}{y}$ $\log_a x^n = n \log_a x$

CHANGING THE BASE

$$\log_a b = \frac{\log_c b}{\log_c a}$$

$$\log_a b = \frac{1}{\log_b a}$$

DIFFERENTIATION	INTEGRATION
$\frac{d}{dx}(k) = 0; \quad k = \text{constant}$ $\frac{d}{dx}(x^n) = nx^{n-1}$ $\frac{d}{dx}(\ln x) = \frac{1}{x}$ $\frac{d}{dx}(e^x) = e^x$ $\frac{d}{dx}(\sin u) = \cos u \frac{du}{dx}$ $\frac{d}{dx}(\cos u) = -\sin u \frac{du}{dx}$ $\frac{d}{dx}(\tan u) = \sec^2 u \frac{du}{dx}$ $\frac{d}{dx}(\cot u) = -\operatorname{cosec}^2 u \frac{du}{dx}$ $\frac{d}{dx}(\sec u) = \sec u \tan u \frac{du}{dx}$ $\frac{d}{dx}(\operatorname{cosec} u) = -\operatorname{cosec} u \cot u \frac{du}{dx}$	$\int (k) dx = kx + c; \quad k = \text{constant}$ $\int x^n dx = \frac{x^{n+1}}{n+1} + c : n \neq 1$ $\int \frac{1}{x} dx = \ln x + c$ $\int e^x dx = e^x + c$ $\int \sin x dx = -\cos x + c$ $\int \cos x dx = \sin x + C$ $\int \sec^2 x dx = \tan x + c$ $\int \operatorname{cosec}^2 x dx = -\cot x + c$ $\int \sec x \tan x dx = \sec x + c$ $\int \operatorname{cosec} x \cot x dx = -\operatorname{cosec} x + c$
DIFFERENTIATION OF PRODUCT RULE	DIFFERENTIATION OF QUOTIENT RULE

$\frac{d}{dx}(uv) = u \frac{dv}{dx} + v \frac{du}{dx}$	$\frac{d}{dx}\left(\frac{u}{v}\right) = \frac{v \frac{du}{dx} - u \frac{dv}{dx}}{v^2}$
DIFFERENTIATION OF INVERSE TRIGONOMETRIC	INTEGRATION OF INVERSE TRIGONOMETRIC
$\frac{d}{dx}(\sin^{-1} u) = \frac{1}{\sqrt{1-u^2}} \frac{du}{dx}$	$\int \frac{du}{\sqrt{a^2-u^2}} = \sin^{-1} \frac{u}{a} + c$
$\frac{d}{dx}(\cos^{-1} u) = \frac{-1}{\sqrt{1-u^2}} \frac{du}{dx}$	$\int \frac{-du}{\sqrt{a^2-u^2}} = \cos^{-1} \frac{u}{a} + c$
$\frac{d}{dx}(\tan^{-1} u) = \frac{1}{1+u^2} \frac{du}{dx}$	$\int \frac{du}{a^2+u^2} = \frac{1}{a} \tan^{-1} \frac{u}{a} + c$
$\frac{d}{dx}(\cot^{-1} u) = \frac{-1}{1+u^2} \frac{du}{dx}$	$\int \frac{-du}{a^2+u^2} = \frac{1}{a} \cot^{-1} \frac{u}{a} + c$
$\frac{d}{dx}(\sec^{-1} u) = \frac{1}{u\sqrt{u^2-1}} \frac{du}{dx}$	$\int \frac{du}{ u \sqrt{u^2-a^2}} = \frac{1}{a} \sec^{-1} \frac{u}{a} + c$
$\frac{d}{dx}(\cosec^{-1} u) = \frac{-1}{u\sqrt{u^2-1}} \frac{du}{dx}$	$\int \frac{-du}{ u \sqrt{u^2-a^2}} = \frac{1}{a} \cosec^{-1} \frac{u}{a} + c$
AREA UNDER CURVE	VOLUME UNDER CURVE
$A_x = \int_a^b y \, dx$	$V_x = \pi \int_A^B y^2 \, dx$
$A_y = \int_a^b x \, dy$	$V_y = \pi \int_A^B x^2 \, dy$
TRIGONOMETRIC IDENTITIES	INTEGRATION BY PARTS
$\cos^2 x + \sin^2 x = 1$ $\sec^2 x = 1 + \tan^2 x$ $\cosec^2 x = 1 + \cot^2 x$ $\sin 2x = 2 \sin x \cos x$ $\cos 2x = \cos^2 x - \sin^2 x$ $= 1 - 2 \sin^2 x$ $= 2 \cos^2 x - 1$ $\tan 2x = \frac{2 \tan x}{1 - \tan^2 x}$	$\int u \, dv = uv - \int v \, du$