SULIT

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

JABATAN MATEMATIK, SAINS & KOMPUTER

PEPERIKSAAN AKHIR

SESI JUN 2019

DBM20023 : ENGINEERING MATHEMATICS 2

TARIKH : 30 OKTOBER 2019
MASA : 8.30 PAGI - 10.30 PAGI (2 JAM)

Kertas ini mengandungi **LAPAN (8)** halaman bercetak.
Subjektif (4 soalan)
Dokumen sokongan yang disertakan : Formula

JANGAN BUKA KERTAS SOALAN INI SEHINGGA DIARAHKAN

(CLO yang tertera hanya sebagai rujukan)

SULIT

INSTRUCTION.

This section consists of **FOUR (4)** subjective questions. Answer **ALL** questions.

ARAHAN.

*Bahagian ini mengandungi **EMPAT (4)** soalan subjektif. Jawab **SEMUA** soalan.*

QUESTION 1

SOALAN 1

CLO1 C3

(a) Express each of the following expressions in the simplest form.

Nyatakan setiap ungkapan yang berikut dalam bentuk paling ringkas.

i. $\dfrac{a^{3+4n}}{a^{3n+2} \times a^{4-n}}$

[3 marks]

[*3 markah*]

ii. $log_5 \dfrac{1}{25}$

[4 marks]

[*4 markah*]

CLO2 C3

(b) Solve the following equations using a suitable method.

Selesaikan persamaan-persamaan berikut mengikut kaedah yang bersesuaian.

i. $3^{2x-1} \times 27^{3-x} = 1$

[4 marks]

[*4 markah*]

ii. $log_x 8 + log_x 4 = 5$

[4 marks]

[*4 markah*]

CLO1
C3

(c) Find the derivative for each of the following functions.
Cari pembezaan bagi setiap fungsi berikut.

i. $y = (2 - 3x)^2(x + 1)$

[5 marks]
[*5 markah*]

ii. $y = \dfrac{3x - 2}{x^2}$

[5 marks]
[*5 markah*]

QUESTION 2

SOALAN 2

CLO1
C3

(a) i. The parametric equations are given as $x = 5e^{3t}$ and $y = 3t^2 - t$.

Determine $\frac{dy}{dx}$.

Persamaan-persamaan parametrik diberi sebagai $x = 5e^{3t}$ dan $y = 3t^2 - t$.

Tentukan $\frac{dy}{dx}$.

[4 marks]

[*4 markah*]

ii. Use implicit differentiation to find $\frac{dy}{dx}$ if $4x^3 - \cos y = 7y$.

Gunakan pembezaan implicit untuk mendapatkan $\frac{dy}{dx}$ *sekiranya* $4x^3 - \cos y = 7y$.

[5 marks]

[*5 markah*]

CLO2
C3

(b) Differentiate the following equations.

Bezakan persamaan-persamaan berikut.

i. $y = 3\tan(x^2 - 5)$

[3 marks]

[3 *markah*]

ii. $y = \frac{\ln(1 - 4x)}{3}$

[3 marks]

[*3 markah*]

CLO2
C3

(c) Find the stationary points of the equation $= 1 + 12x - x^3$. Then, determine the nature of the stationary points.

Cari titik-titik pegun bagi persamaan $= 1 + 12x - x^3$ *. Kemudian, tentukan sifat-sifat titik tersebut.*

[10 marks]

[*10 markah*]

QUESTION 3

SOALAN 3

CLO1
C3

(a) Solve the following integrals.

Selesaikan kamiran-kamiran berikut.

i. $\int (6x^2 + 2x + 3)dx$

[3 marks]

[*3 markah*]

ii. $\int 4 \sin 4x \, dx$

[3 marks]

[*3 markah*]

iii. $\int \left(\frac{4}{3x - 6}\right) dx$

[2 marks]

[*2 markah*]

iv. $\int \left(5e^{\frac{x}{2}}\right) dx$

[2 marks]

[*2 markah*]

CLO2
C3

(b) Solve the definite integrals below.

Selesaikan kamiran-kamiran tentu berikut.

i. $\int_2^3 \frac{5}{x}\, dx$

[3 marks]

[*3 markah*]

ii. $\int_0^1 3e^{3x} - \frac{e^{5x}}{2e^{2x}}\, dx$

[6 marks]

[*6 markah*]

iii. $\int x^2 \sin x^3\, dx$

[6 marks]

[*6 markah*]

QUESTION 4

SOALAN 4

CLO1
C3

(a) i. By using partial fraction, determine.

Dengan menggunakan pecahan separa, tentukan.

$$\int \frac{2}{(x+4)(x+6)}dx$$

[6 marks]

[*6 markah*]

ii. Given an equation, $y = x^2 + 6$. Find the area under the graph bounded by the curve, y-axis, the lines $y = 12$ and $y = 16$.

Diberi persamaan $y = x^2 + 6$. *Carikan luas di bawah graf yang dilingkungi oleh lengkungan, paksi-y, garisan* $y = 12$ *dan* $y = 16$.

[6 marks]

[*6 markah*]

CLO2
C3

(b) By using integration by parts, calculate.

Dengan menggunakan kamiran bahagian demi bahagian, kirakan.

i. $$\int_2^4 \frac{1}{x^2} \ln x \ dx$$

[6 Marks]

[*6 Markah*]

ii. $$\int x^4 \cos x \ dx$$

[7 Marks]

[*7 Markah*]

SOALAN TAMAT

FORMULA SHEET FOR DBM20023

EXPONENTS AND LOGARITHMS			
LAW OF EXPONENTS		**LAW OF LOGARITHMS**	
1.	$a^m \times a^n = a^{m+n}$	8.	$\log_a a = 1$
2.	$\frac{a^m}{a^n} = a^{m-n}$	9.	$\log_a 1 = 0$
3.	$(a^m)^n = a^{m \times n}$	10.	$\log_a b = \frac{\log_c b}{\log_c a}$
4.	$a^0 = 1$	11.	$\log_a MN = \log_a M + \log_a N$
5.	$a^{-n} = \frac{1}{a^n}, a \neq 0$	12.	$\log_a \frac{M}{N} = \log_a M - \log_a N$
6.	$a^{\frac{m}{n}} = (\sqrt[n]{a})^m$	13.	$\log_a N^P = P \log_a N$
7.	$(ab)^n = a^n b^n$	14.	$N = a^x \Leftrightarrow \log_a N = x$
DIFFERENTIATION			
1.	$\frac{d}{dx}[k] = 0$, k is constant	2.	$\frac{d}{dx}[ax^n] = nax^{n-1}$ [Power Rule]
3.	$\frac{d}{dx}[f(x) \pm g(x)] = f'(x) \pm g'(x)$	4.	$\frac{d}{dx}[a\{u(x)\}^n] = na\{u(x)\}^{n-1} \cdot u'(x)$ [Composite]
5.	$\frac{d}{dx}\left[ae^{u(x)}\right] = ae^{u(x)} \cdot u'(x)$	6.	$\frac{d}{dx}[a\ln u(x)] = \frac{a}{u(x)} \cdot u'(x)$
7.	$\frac{d}{dx}[a \sin u(x)] = a \cos u(x) \cdot u'(x)$	8.	$\frac{d}{dx}[a \sin^n u(x)] = an \cos u(x) \cdot \sin^{n-1} u(x) \cdot u'(x)$
9.	$\frac{d}{dx}[a \cos u(x)] = -a \sin u(x) \cdot u'(x)$	10.	$\frac{d}{dx}[a \cos^n u(x)] = -an \sin u(x) \cdot \cos^{n-1} u(x) \cdot u'(x)$
11.	$\frac{d}{dx}[a \tan u(x)] = a\, sec^2 u(x) \cdot u'(x)$	12.	$\frac{d}{dx}[a \tan^n u(x)] = an \tan^{n-1} u(x) \cdot sec^2 u(x) \cdot u'(x)$
13.	$\frac{d}{dx}[y\{u(x)\}] = \frac{dy}{du} \times \frac{du}{dx}$ [Chain Rule]	14.	$\frac{d}{dx}[u(x) \cdot v(x)] = u\frac{dv}{dx} + v\frac{du}{dx}$ [Product Rule]
15.	$\frac{d}{dx}\left[\frac{u(x)}{v(x)}\right] = \frac{\left(v\frac{du}{dx} - u\frac{dv}{dx}\right)}{(v)^2}$ [Quotient Rule]	16.	$\frac{dy(t)}{dx(t)} = \frac{dy(t)}{dt} \times \frac{dt}{dx(t)}$ [Parametric Equation]

INTEGRATION			
1.	$\int k\ dx = kx + c$, k is constant	2.	$\int ax^n dx = \frac{ax^{n+1}}{(n+1)} + c \quad ;\{n \neq -1\}$
3.	$\int [f(x) \pm g(x)]\ dx = \int f(x)\,dx \pm \int g(x)\,dx$	4.	$\int a[u(x)]^n dx = \frac{a[u(x)]^{n+1}}{(n+1)\cdot u'(x)} + c \quad ;\{n \neq -1\}$
5.	$\int_a^b f(x)dx = F(b) - F(a)$	6.	$\int \frac{a}{[u(x)]^n}\ dx = \frac{a\ln[u(x)]}{u'(x)} \quad ;\{n = 1\}$
7.	$\int e^{u(x)}\ dx = \frac{e^{u(x)}}{u'(x)} + c$	8.	$\int a\sin u(x)\ dx = -\frac{a\cos u(x)}{u'(x)} + c$
9.	$\int a\cos u(x)dx = \frac{a\sin\ u(x)}{u'(x)} + c$	10.	$\int a\sec^2 u(x)\ dx = \frac{a\tan u(x)}{u'(x)} + c$
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.	$A_y = \int_a^b x\ dy$
VOLUME UNDER CURVE			
1.	$V_x = \pi\int_a^b y^2\ dx$	2.	$V_y = \pi\int_a^b x^2\ dy$
INTEGRATION BY PARTS			
$\int u\,dv = uv - \int v\,du$			