KEMENTERIAN PENDIDIKAN TINGGI
JABATAN PENDIDIKAN POLITEKNIK DAN KOLEJ KOMUNITI

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

JABATAN MATEMATIK, SAINS DAN KOMPUTER

PEPERIKSAAN AKHIR

SESI I : 2026/2027

DBM20173: ENGINEERING MATHEMATICS 2

TARIKH : 29 OKTOBER 2026
MASA : 8.30 PAGI – 10.30 PAGI (2 JAM)

Kertas ini mengandungi **TUJUH (7)** halaman bercetak.

Struktur (4 soalan)

Dokumen sokongan yang disertakan : Formula

JANGAN BUKA KERTAS SOALAN INI SEHINGGA DIARAHKAN

(CLO yang tertera hanya sebagai rujukan)

TERBUKA

INSTRUCTION:

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

ARAHAN:

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

QUESTION 1

SOALAN 1

CLO1 (a) Simplify each of the following expressions:

Permudahkan setiap ungkapan yang berikut:

i. $\dfrac{3^{m+5}}{9^{2m-1}\times 27^{m+2}}$

[5 marks]

[5 *markah*]

ii. $2 + 4\log_3 x - 2\log_3 y + \frac{1}{2}\log_3 x$

[5 marks]

[5 *markah*]

CLO2 (b) Solve the following equations:

Selesaikan persamaan-persamaan berikut:

i. $2^{7-x} = 16\sqrt{2}$

[4 marks]

[*4 markah*]

ii. $9^{x+2} = 7$

[5 marks]

[*5 markah*]

iii. $\log_2(x+1) = \log_4 4x$

[6 marks]

[*6 markah*]

TERBUKA

QUESTION 2

SOALAN 2

CLO1 (a) Find the derivative $\frac{dy}{dx}$ of each of the following functions:

Tentukan pembezaan $\frac{dy}{dx}$ *bagi setiap fungsi yang berikut:*

i. $y = 6\sqrt{x} - 5x$

[3 marks]

[*3 markah*]

ii. $y = \frac{2x^4 - 3x^3 + 8}{x^2}$

[4 marks]

[*4 markah*]

CLO2 (b) Calculate the derivative $\frac{dy}{dx}$ for the following equations:

Kirakan pembezaan $\frac{dy}{dx}$ bagi persamaan berikut:

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

[4 marks]

[*4 markah*]

ii. $y = 4e^{2x} sin5x$

[5 marks]

[5 *markah*]

TERBUKA

CLO2 (c) Compute:

Hitungkan:

i. the derivative $\frac{dy}{dx}$ of the following parametric equation:

pembezaan $\frac{dy}{dx}$ *bagi persamaan parametrik berikut:*

$$x = 6t^2 + 2t^4$$

$$y = 4 \ln 5t$$

[4 marks]

[*4 markah*]

ii. the $\frac{\delta z}{\delta x}, \frac{\delta z}{\delta y}, \frac{\delta^2 z}{\delta y \delta x}$ *and* $\frac{\delta^2 z}{\delta y \delta x}$ for the function below:

$\frac{\delta z}{\delta x}, \frac{\delta z}{\delta y}, \frac{\delta^2 z}{\delta y \delta x}$ dan $\frac{\delta^2 z}{\delta x \delta y}$ *bagi fungsi di bawah:*

$$z = (5 - 3x)(2y + 4x)$$

[5 marks]

[*5 markah*]

TERBUKA

QUESTION 3

SOALAN 3

CLO2 (a) Calculate the stationary points and its nature of the equation $y = x^3 - 6x^2 + 9x + 4$.

Kirakan titik pegun dan sifatnya bagi persamaan $y = x^3 - 6x^2 + 9x + 4$.

[10 marks]

[*10 markah*]

CLO2 (b) Solve the following integrals by using the substitution method:

Selesaikan kamiran berikut dengan menggunakan kaedah penggantian:

i. $\int 8x\cos(4x^2 - 3)\, dx$

[4 marks]

[*4 markah*]

ii. $\int 4x^3 e^{x^4}\, dx$

[4 marks]

[*4 markah*]

CLO1 (c) Solve the following integrals:

Selesaikan kamiran berikut:

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

[3 marks]

[*3 markah*]

ii. $\int_{-1}^{2} (3x + 2)(2x - 2)\, dx$

TERBUKA

[4 marks]

[*4 markah*]

QUESTION 4

SOALAN 4

CLO2 (a) Solve the following integrals by using integration by parts.

Selesaikan kamiran berikut dengan menggunakan kamiran bahagian demi bahagian.

i. $\int x \ln x \, dx$

[5 marks]

[*5 markah*]

ii. $\int 2xe^x \, dx$

[5 marks]

[*5 markah*]

CLO1 (b)

i. Figure 4(b)i shows an enclosed region between the curve of $y = x^2 - 2x - 8$ and $x - axis$ between $x = -2$ and $x = 4$. Calculate the area of the shaded region.

Rajah 4(b)i menunjukkan kawasan tertutup antara lengkung $y = x^2 - 2x - 8$ *dan* $x - axis$ *antara* $x = -2$ *dan* $x = 4$. *Kirakan luas kawasan berlorek.*

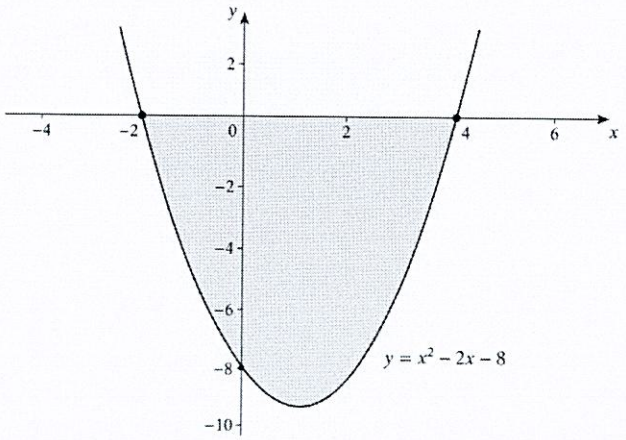

Figure 4(b)i/ *Rajah 4(b)i*

[7 marks]

[*7 markah*]

TERBUKA

ii. Figure 4(b)ii shows an enclosed region between the curve of $y = x^2 + 2$ and the line $y = x + 8$. Calculate the volume of the solid formed when it is rotated through 360° on the x –axis.

Rajah 4(b)ii menunjukkan kawasan tertutup bagi lengkung $y = x^2 + 2$ *dan garis* $y = x + 8$. *Kirakan isipadu pepejal yang terhasil apabila kawasan tersebut diputarkan sebanyak* 360° *pada paksi* $- x$.

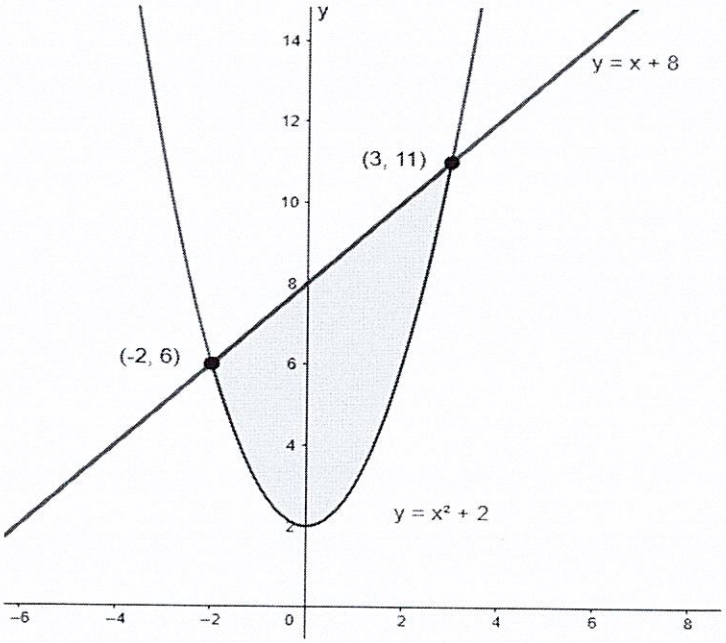

Figure 4(b)ii/ Rajah 4(b)ii

TERBUKA

[8 marks]
[*8 markah*]

SOALAN TAMAT

FORMULA SHEET FOR DBM20173

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.	$\frac{d}{dx}(k) = 0, k \text{ is constant}$	2.	$\frac{d}{dx}(ax^n) = anx^{n-1}$ [Power Rule]
3.	$\frac{d}{dx}(ax+b)^n = n(ax+b)^{n-1} \times \frac{d}{dx}(ax+b)$ [Composite Rule]		
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.	$\frac{dy}{dx} = \frac{dy}{du} \times \frac{du}{dx}$ [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.	$\int k\ dx = kx + c, k\ is\ constant$	4.	$\int_a^b f(x)dx = F(b) - F(a)$
5.	$\int \frac{1}{x}\ dx = \ln\ \lvert x\rvert + c$	6.	$\int \frac{1}{ax+b}\ dx = \frac{1}{a} \times \ln\ \lvert ax+b\rvert + c$
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.	$\int \sin(ax+b)\ dx = -\frac{1}{a} \times \cos(ax+b) + c$		
13.	$\int \cos(ax+b)\ dx = \frac{1}{a} \times sin(ax+b)\ + c$		
14.	$\int sec^2(ax+b)\ dx = \frac{1}{a} \times \tan(ax+b) + c$		

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