

SULIT



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

JABATAN MATEMATIK, SAINS & KOMPUTER

PEPERIKSAAN AKHIR

SESI JUN 2019

DBM2013 : ENGINEERING MATHEMATICS 2

TARIKH : 30 OKTOBER 2019

MASA : 11.15 PAGI - 1.15 PETANG (2 JAM)

Kertas ini mengandungi **SEPULUH (10)** halaman bercetak.

Bahagian A: Subjektif (1 soalan)

Bahagian B: Subjektif (4 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 that **MUST** be answered.

ARAHAN:

Bahagian ini mengandungi SATU (1) soalan subjektif yang WAJIB dijawab.

QUESTION 1**SOALAN 1**CLO1
C2

(a) Simplify the following expressions :

Permudahkan ungkapan-ungkapan berikut :

i. $4^x \div (256^{x-1} \times 128)$

[5 marks]

[5 markah]

ii. $\log_9 36 - \log_9 \frac{1}{9} - \log_9 4$

[5 marks]

[5 markah]

CLO1
C3

(b) i. Solve the following equations :

Selesaikan persamaan-persamaan yang berikut :

a) $2^{2x-5} = 64^{3x}$

[4 marks]

[4 markah]

b) $5^{x-3} = 3^x$

[6 marks]

[6 markah]

ii. Given that $\log_m 3 = p$ and $\log_m 5 = q$, write $\log_3 45$ in terms of p and q .*Diberi $\log_m 3 = p$ dan $\log_m 5 = q$, tuliskan $\log_3 45$ dalam sebutan p dan q .*

[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
C2

(a) Differentiate the following functions :

Bezakan fungsi-fungsi yang berikut :

i. $y = \frac{5}{7}x^3 - 4x^{-2} + \sin 3x$

[5 marks]

[5 markah]

ii. $y = -6(2x + 5)^{-4}$ (use Chain Rule)

(guna Petua Rantai)

[5 marks]

[5 markah]

CLO2
C3

(b) Solve each of the followings using a suitable method :

Selesaikan setiap yang berikut dengan menggunakan kaedah yang sesuai :

i. $y = (3x + 2)(4x - 1)^2$

[5 marks]

[5 markah]

ii. $y = \frac{2e^{5x}}{(x+3)^2}$

[6 marks]

[6 markah]

iii. $y = \cos^3 4x$

[4 marks]

[4 markah]

QUESTION 3

SOALAN 3

CLO2
C2

(a) Differentiate the following equations.

Bezakan persamaan - persamaan berikut.

i. $3y^2 - 5x^2 = 7 + 5y^3$

[4 marks]

[4 markah]

ii. $2x^3 + 5xy = \cos 2y + 9x$

[6 marks]

[6 markah]

CLO2
C3(b) i. Determine $\frac{dy}{dx}$ for the parametric equation below in terms of t .*Tentukan $\frac{dy}{dx}$ bagi persamaan parametrik di bawah dalam sebutan t .*

$$x = 2e^{3t} \qquad y = 7t^2 - 6$$

[5 marks]

[5 markah]

ii. Given that $z = 2x^4y^3 + 3x\sin 5y$. Calculate $\frac{\partial z}{\partial x}$, $\frac{\partial z}{\partial y}$ and $\frac{\partial^2 z}{\partial x \partial y}$.*Diberi $z = 2x^4y^3 + 3x\sin 5y$. Kirakan $\frac{\partial z}{\partial x}$, $\frac{\partial z}{\partial y}$ dan $\frac{\partial^2 z}{\partial x \partial y}$.*

[6 marks]

[6 markah]

- iii. A right circular cone radius increases at the rate of 4cm/minute. Calculate how fast is the cone's volume changing when the radius is 13cm and the height is 22cm. ($V_{cone} = \frac{1}{3}\pi r^2 h$).

Jejari bagi sebuah kon bersudut tepat meningkat pada kadar 4cm/minit. Kira berapa laju perubahan isipadu kon apabila jejari 13cm dan tinggi 22cm. ($V_{kon} = \frac{1}{3}\pi r^2 h$)

[4 marks]

[4 markah]

QUESTION 4

SOALAN 4

CLO2
C2

- (a) Determine the following integrals :
Tentukan kamiran-kamiran berikut :

i. $\int 12e^{2x} dx$

[2 marks]

[2 markah]

ii. $\int (2 - x)(1 + x) dx$

[4 marks]

[4 markah]

iii. $\int \left(\frac{-15}{3} + \sqrt{1+x} \right) dx$

[4 marks]

[4 markah]

CLO2
C3

(b) i) Solve the definite integrals below :

Selesaikan kamiran tentu berikut :

i. $\int_0^2 (3x^3 - 3x^2) dx$

[4 marks]

[4 markah]

ii. $\int_{-2}^{-1} \left(\frac{2x^5 - 7x}{x^4} \right) dx$

[6 marks]

[6 markah]

ii) Given that $\int_2^5 f(x) dx = 7$, solve $\int_5^2 [f(x) - 5] dx$ *Diberi $\int_2^5 f(x) dx = 7$, selesaikan $\int_5^2 [f(x) - 5] dx$*

[5 marks]

[5 markah]

QUESTION 5

SOALAN 5

CLO2
C2

- (a) Determine the integral for the following inverse trigonometric functions.

Tentukan kamiran bagi fungsi trigonometri songsang berikut.

i.
$$\int \frac{dx}{\sqrt{1-4x^2}}$$

[5 marks]

[5 markah]

ii.
$$\int \frac{12}{1+9x^2} dx$$

[5 marks]

[5 markah]

CLO2
C3

- (b) i) Solve the following using integration by part.

Selesaikan yang berikut dengan menggunakan kamiran bahagian demi bahagian.

$$\int \frac{x^{-2}}{2} \ln x dx$$

[7 marks]

[7 markah]

- ii) Calculate the volume of the solid generated by revolving the region between x-axis and parabola
- $y = x - x^2$
- through a complete revolution about the x-axis between the limits 0 to 1.

Kirakan isipadu pepejal yang terjana pada paksi – x dengan lengkung $y = x - x^2$ melalui satu putaran lengkap pada paksi – x di antara had 0 hingga 1.

[8 marks]

[8 markah]

SOALAN TAMAT

FORMULA SHEET FOR DBM2013

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.	$\frac{m}{a^n} = (\sqrt[n]{a})^m$	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.	$\frac{d}{dx}(x^n) = nx^{n-1}$ [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.	$\frac{d}{dx} [\tan^n u] = n \tan^{n-1} u \times \sec^2 u \times \frac{du}{dx}$	
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. $\frac{d}{dx} (\operatorname{cosec}^{-1} u) = \frac{-1}{ u \sqrt{u^2-1}} \frac{du}{dx}$
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.	$\int \frac{-1}{u\sqrt{u^2 - a^2}} du = \frac{1}{a} \operatorname{cosec}^{-1} \frac{u}{a} + c$	
Identity Trigonometry		
1.	$\cos^2 \theta + \sin^2 \theta = 1$	2. $1 + \tan^2 \theta = \sec^2 \theta$
3.	$1 + \cot^2 \theta = \operatorname{cosec}^2 \theta$	4. $\sin 2\theta = 2 \sin \theta \cos \theta$
5.	$\begin{aligned} \cos 2\theta &= 2 \cos^2 \theta - 1 \\ &= 1 - 2 \sin^2 \theta \\ &= \cos^2 \theta - \sin^2 \theta \end{aligned}$	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. $\operatorname{cosec} \theta = \frac{1}{\sin \theta}$
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		
$\int u dv = uv - \int v du$		