

**SULIT**



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

**JABATAN MATEMATIK, SAINS DAN KOMPUTER**

**PENILAIAN ALTERNATIF**

**SESI 1 : 2021 / 2022**

**BBM20043 : CALCULUS FOR ENGINEERING TECHNOLOGY**

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**NAMA PENYELARAS KURSUS : LEE SOO LENG**

**KAEDAH PENILAIAN : PEPERIKSAAN ATAS TALIAN**

**JENIS PENILAIAN : SOALAN ESEI BERSTRUKTUR  
(2 SOALAN)**

**TARIKH PENILAIAN : 26 JANUARI 2022**

**TEMPOH PENILAIAN : 2 JAM**

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**LARANGAN TERHADAP PLAGIARISM (AKTA 174)**

**PELAJAR TIDAK BOLEH MEMPLAGIAT APA-APA IDEA, PENULISAN, DATA  
ATAU CIPTAAN ORANG LAIN. PLAGIAT ADALAH SALAH SATU  
PENYELEWENGAN AKADEMIK. SEKIRANYA PELAJAR DIBUKTIKAN  
MELAKUKAN PLAGIARISM, PENILAIAN BAGI KURSUS BERKENAAN AKAN  
DIMANSUHKAN DAN DIBERI GRED F DENGAN NILAI MATA 0.00.**

**(RUJUK BUKU ARAHAN-ARAHAN PEPERIKSAAN DAN KAEDAH PENILAIAN (Sarjana Muda) EDISI 2,  
2020, KLAUSA 15&16)**

**INSTRUCTION:**

This section consists of **TWO (2)** compulsory structured questions.  
Answer all questions.

**ARAHAN :**

*Bahagian ini mengandungi DUA (2) soalan berstruktur.  
Jawab semua soalan.*

**QUESTION 1****SOALAN 1**CLO2  
C3

(a) Solve  $\frac{dy}{dx}$  for the following functions by using rules of differentiation:

*Selesaikan  $\frac{dy}{dx}$  bagi fungsi-fungsi berikut menggunakan petua pembezaan:*

i.  $y = \frac{4x}{\sin 4x}$

[4 marks]

[4 markah]

ii.  $y = \sqrt{(e^{3x} - 1)(e^{3x} + 1)}$

[4 marks]

[4 markah]

CLO2  
C3

(b) Calculate the slope of the tangent at the point (-2, -1) for the curve:

*Kirakan kecerunan tangen pada titik (-2, -1) bagi lengkung:*

$$y = \sqrt[3]{2y - x^2 + 5}$$

[7 marks]

[7 markah]

CLO3  
C4

- (c) The surface area of a sphere is increasing at a rate of  $25 \text{ cm}^2/\text{s}$ .  
Find the rate of change of the volume (in  $\text{cm}^3/\text{s}$ ) when the radius of sphere is  $0.12\text{m}$ . Given that  $A = 4\pi r^2$  and  $V = \frac{4}{3}\pi r^3$ .

*Luas permukaan sebuah sfera menaik pada kadar  $25 \text{ cm}^2/\text{s}$ .*

*Cari kadar perubahan isipadu (dalam  $\text{cm}^3/\text{s}$ ) apabila jejari sfera  $0.12\text{m}$ .*

*Diberi bahawa  $A = 4\pi r^2$  dan  $V = \frac{4}{3}\pi r^3$*

[10 marks]

[10 markah]

CLO2  
C3**QUESTION 2**  
**SOALAN 2**

(a) Solve the following integrals using suitable method:

*Selesaikan kamiran-kamiran berikut menggunakan kaedah yang sesuai:*

i.  $\int \tan(3x + 1) dx$

[5 marks]

[5 markah]

ii.  $\int \frac{\ln 5x}{5} dx$

[5 marks]

[5 markah]

CLO3  
C3(b) Given a function of a curve as  $y = (x - 2)(x - 5)$ .*Diberi fungsi bagi satu lengkung sebagai  $y = (x - 2)(x - 5)$ .*

i. Sketch the shape of curve.

*Lakarkan bentuk lengkung tersebut.*

[2 marks]

[2 markah]

ii. Calculate the area bounded by the curve and the x-axis.

*Kirakan luas rantau yang dibatasi oleh lengkung dan paksi-x.*

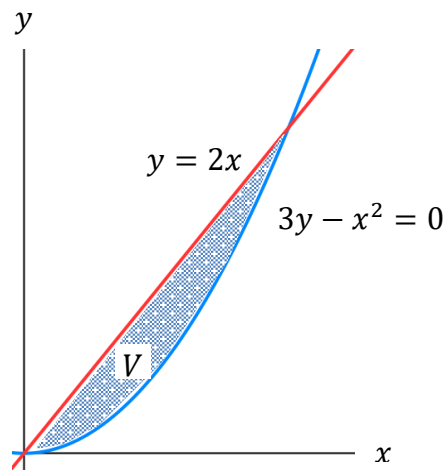
[5 marks]

[5 markah]

CLO3  
C4

- (c)  $V$  is the region bounded by the curve  $3y - x^2 = 0$  and the line  $y = 2x$ . Find the volume generated when the region  $V$  is rotated through  $360^\circ$  about the  $x$ -axis.

*V ialah kawasan yang dibatasi oleh lengkung  $3y - x^2 = 0$  dan garisan  $y = 2x$ . Dapatkan isipadu yang terhasil apabila kawasan  $V$  diputarakan  $360^\circ$  pada paksi- $x$ .*



[8 marks]

[8 markah]

**SOALAN TAMAT**

## BBM20043 : TABLE OF FORMULA

## DIFFERENTIATION

$$\frac{dy}{dx} = \frac{dy}{du} \times \frac{du}{dx}$$

$$\frac{d}{dx}(u \cdot v) = u \frac{dv}{dx} + v \frac{du}{dx}$$

$$\frac{d}{dx}\left(\frac{u}{v}\right) = \frac{v \frac{du}{dx} - u \frac{dv}{dx}}{v^2}$$

$$\frac{dy}{dx} = \frac{dy}{dt} \times \frac{dt}{dx}$$

$$\frac{d^2y}{dx^2} = \frac{d}{dt}\left(\frac{dy}{dx}\right) \times \frac{dt}{dx}$$

$$\frac{d}{dx}(k) = 0; k = \text{constant}$$

$$\frac{d}{dx}(x^n) = nx^{n-1}$$

$$\frac{d}{dx}(\ln|u|) = \frac{1}{u} \cdot \frac{du}{dx}$$

$$\frac{d}{dx}(e^u) = e^u \cdot \frac{du}{dx}$$

$$\frac{d}{dx}(\cos u) = -\sin u \cdot \frac{du}{dx}$$

$$\frac{d}{dx}(\sin u) = \cos u \cdot \frac{du}{dx}$$

$$\frac{d}{dx}(\tan u) = \sec^2 u \cdot \frac{du}{dx}$$

$$\frac{d}{dx}(\cot u) = -\operatorname{cosec}^2 u \cdot \frac{du}{dx}$$

$$\frac{d}{dx}(\sec u) = \sec u \tan u \cdot \frac{du}{dx}$$

$$\frac{d}{dx}(\operatorname{cosec} u) = -\operatorname{cosec} u \cot u \cdot \frac{du}{dx}$$

## INTEGRATION

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

$$\int k dx = kx + C; k = \text{constant}$$

$$\int x^n dx = \frac{x^{n+1}}{n+1} + C; n \neq -1$$

$$\int \frac{1}{u} du = \frac{\ln|u|}{du/dx} + C$$

$$\int e^u du = \frac{e^u}{du/dx} + C$$

$$\int \sin u du = \frac{-\cos u}{du/dx} + C$$

$$\int \cos u du = \frac{\sin u}{du/dx} + C$$

$$\int \sec^2 u du = \frac{\tan u}{du/dx} + C$$

$$\int \operatorname{cosec}^2 u du = \frac{-\cot u}{du/dx} + C$$

$$\int \sec u \tan u du = \frac{\sec u}{du/dx} + C$$

$$\int \operatorname{cosec} u \cot u du = \frac{-\operatorname{cosec} u}{du/dx} + C$$

**BBM20043 : TABLE OF FORMULA****TRIGONOMETRIC IDENTITIES**

$$\tan x = \frac{\sin x}{\cos x}$$

$$\cos^2 x + \sin^2 x = 1$$

$$\sec^2 x = 1 + \tan^2 x$$

$$\operatorname{cosec}^2 x = 1 + \cot^2 x$$

$$\sin 2x = \cos^2 x - \sin^2 x$$

$$= 1 - 2 \sin^2 x$$

$$= 2 \cos^2 x - 1$$

$$\tan 2x = \frac{2 \tan x}{1 - \tan^2 x}$$

**AREA BOUNDED BY AXIS**

$$A = \int_a^b y \, dx$$

$$A = \int_a^b x \, dy$$

**AREA BOUNDED BY AXIS**

$$V = \pi \int_a^b y^2 \, dx$$

$$V = \pi \int_a^b x^2 \, dy$$