

CONFIDENTIAL



UTHM
Universiti Tun Hussein Onn Malaysia

UNIVERSITI TUN HUSSEIN ONN MALAYSIA

**FINAL EXAMINATION
SEMESTER 2
SESSION 2018/2019**

COURSE NAME : ENGINEERING MATHEMATICS I
COURSE CODE : BDA 14003
PROGRAMME CODE : BDD
EXAMINATION DATE : JUNE/JULY 2019
DURATION : 3 HOURS
INSTRUCTION : ANSWER FIVE (5) QUESTIONS
ONLY

THIS QUESTION PAPER CONSISTS OF **THREE (3)** PAGES

CONFIDENTIAL

TERBUKA

Q1 (a) Solve the domain and range of the following functions:

$$(i) \quad f(x) = \frac{2}{\sqrt{9-x^2}}$$

(5 marks)

$$(ii) \quad g(x) = \frac{50x}{x^2 - 3x - 4}$$

(5 marks)

(b) Examine the limit for the functions of :

$$(i) \quad \lim_{x \rightarrow 0} \frac{\frac{1+x}{2} - \frac{1}{2}}{x}$$

(5 marks)

$$(ii) \quad \lim_{x \rightarrow 4} \frac{\sqrt{x} - 2}{x - 4}$$

(5 marks)

Q2 (a) Solve this function $f(x) = (1 + x^5 \cot x)^{-8}$ using the Chain Rule

(4 marks)

(b) Solve the derivative $\cos(x^2 + 2y) + xe^{y^2} = 1$.

(8 marks)

(c) The radius, r of a spherical balloon at time, t seconds is given by $r = t^2 + t$. Find the:

(i) volume of the spherical balloon, v

(4 marks)

(ii) rate of change of the volume at $t = 4$ seconds

(4 marks)

Q3 (a) Identify the suitable method for the integration of $\int \frac{4x}{(1+x)^4} dx$

(6 marks)

(b) Solve the integrals of $\int \sin x \ln(\cos x) dx$

(6 marks)

- (c) By using the integration of partial fraction, prove that $\int_0^2 \frac{x^3 - x}{x^2 + 5} dx = 2 + \ln\left(\frac{5}{9}\right)^3$ (8 marks)
- Q4** (a) Find the arc length of the graph of $y = \frac{x^2}{2} - \frac{\ln x}{4}$ on the interval [2,4] (6 marks)
- (b) Solve the surface area of the solid obtained by rotating $y = \sqrt{9 - x^2}$ at $-2 \leq x \leq 2$ about the x-axis (6 marks)
- (c) Examine the volume of the solid generated when the region bounded by the curves $x = y^2$ and $y = x$ is rotated through 270° about the x-axis. (8 marks)
- Q5** (a) Find the composite functions of $(g \circ g)(x)$ and $(f \circ f)(x)$ with its domain of $f(x) = \sqrt{x}$ and $g(x) = \sqrt{2 - x}$ (8 marks)
- (b) Solve the value of k if $f(x)$ is continuous at every x ,

$$f = \begin{cases} 9x - 2 & x \leq 1 \\ kx^2 - 1 & x > 1 \end{cases}$$
 (6 marks)
- (c) Use L'Hospital's Rule to examine the limit of $\lim_{x \rightarrow \infty} \frac{4x^3 - 6x^2 + 1}{2x^3 - 10x + 3}$ (6 marks)
- Q6** (a) Find the integral $\int \tan^7 x \sec^3 x dx$ (6 marks)
- (b) Solve the integral $\int \frac{dx}{\sqrt{5 - 4x - x^2}}$ by using trigonometry substitution method (8 marks)
- (c) Solve the area of the region that is enclosed between $y = x^2$ and $y = x + 6$ (6 marks)

-END OF QUESTION-

