UNIVERSITI TUN HUSSEIN ONN MALAYSIA

FINAL EXAMINATION
SEMESTER 1
SESSION 2019/2020

COURSE NAME	:	ENGINEERING MATHEMATICS I
COURSE CODE	:	BDA 14003
PROGRAMME CODE	:	BDD
EXAMINATION DATE	:	DECEMBER 2019/JANUARY 2020
DURATION	:	3 HOURS
INSTRUCTION	:	ANSWER FIVE (5) QUESTIONS ONLY

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

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

(i) $f(x) = \sqrt{6 + x - x^2}$

(5 marks)

(ii) $h(x) = \dfrac{10}{\sqrt{16 - x^2}}$

(5 marks)

(b) Examine the limit for the functions of :

(i) $\displaystyle\lim_{x \to 8} \dfrac{2x^2 - 17x + 8}{8 - x}$

(4 marks)

(ii) $\displaystyle\lim_{z \to 0} \dfrac{z}{3 - \sqrt{z + 9}}$

(6 marks)

Q2 (a) Calculate this function $f(x) = \sin\left(\sqrt{1 + \cos x}\right)$ using the Chain Rule method

(5 marks)

(b) Examine the derivative function of $x^2 \tan(y) + y^{10} \sec(x) = 2x$ using Implicit Differentiation method

(7 marks)

(c) The amount of air in the balloon at any time, t is given by $v(t) = \dfrac{6\sqrt[3]{t}}{4t + 1}$. Find the:

(i) rate of change of the volume, $\dfrac{dv}{dt}$

(4 marks)

(ii) balloon being filled or drained when $t = 8$ seconds?

(4 marks)

Q3 (a) Identify the suitable method for the integration of $\displaystyle\int_0^8 x\sqrt{1 + x}\,dx$

(6 marks)

(b) Calculate the integrals of $\displaystyle\int_0^1 4x^2 e^{-2x}\,dx$

(8 marks)

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(c)   Examine the integral by using partial fraction method $\int \dfrac{x^2+x+3}{x+2}dx$

(6 marks)

Q4   (a)   Solve the arc length of the graph $y=\dfrac{1}{3}\left(x^2+2\right)^{\frac{3}{2}}$ on the interval $[0,1]$

(10 marks)

(b)   Examine the area of the surface that is generated by revolving the portion of the curve $y=x^2$ between $x=1$ and $x=2$ about the y-axis

(10 marks)

Q5   (a)   Let the function as $f(x)=\dfrac{x^2-1}{|x-1|}$

      (i)   Find $\lim\limits_{x\to1^+} f(x)$

(5 marks)

      (ii)   Find $\lim\limits_{x\to1^-} f(x)$

(5 marks)

      (iii)   Does $\lim\limits_{x\to1} f(x)$ exits?

(2 marks)

(b)   Use L'Hospital's Rule for the limit of $\lim\limits_{z\to0}\dfrac{\sin(2z)+7z^2-2z}{z^2(z+1)^2}$

(8 marks)

Q6   (a)   Solve the integral $\int \sqrt{5-4x-x^2}$ by using trigonometry substitution method

(10 marks)

(b)   Solve the volume of the solid that is obtained when the region under the curve $y=\sqrt{x}$ over the interval $[1, 4]$ is revolved at about $90°$, $180°$, $270°$ and $360°$ of the x-axis

(10 marks)

-END OF QUESTION-TERBUKA

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