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**UNIVERSITI TUN HUSSEIN ONN MALAYSIA**

**FINAL EXAMINATION  
SEMESTER II  
SESSION 2017/2018**

COURSE NAME : MATHEMATICS II  
COURSE CODE : BBM 10403  
PROGRAMME CODE : BBA/ BBB/ BBD/ BBE/ BBF/ BBG  
EXAMINATION DATE : JUNE/ JULY 2018  
DURATION : 3 HOURS  
INSTRUCTION : ANSWERS ALL QUESTIONS

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THIS QUESTION PAPER CONSISTS OF SIX (6) PAGES

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**Q1**

(a) Sketch the graph of  $y = \sqrt{x - 3}$ . Hence, determine the domain and range of the equation (3 marks)

(b) Sketch the graph of the following function:

(i)  $y = 3 \cos 2x$  (2 marks)

(ii)  $y = 4 \sin \frac{1}{2}x$  (2 marks)

(c) Let  $f(x) = 2x + 3$  and  $g(x) = -x^2 + 1$ . Find  $f \circ g(x)$  and  $g \circ f(x)$ . Hence, find  $f \circ g(2)$  and  $g \circ f(0)$  (8 marks)

(d) (i) Find the inverse of  $f(x) = (x - 2)^3$  (2 marks)

(ii) Show that  $g(x) = \frac{4}{x-5}$  is the inverse of  $f(x) = 5 + \frac{4}{x}$  (3 marks)

**Q2**

(a) Compute the limits of the following functions:

(i)  $\lim_{x \rightarrow 0} \sqrt{x + 4}$  (2 marks)

(ii)  $\lim_{x \rightarrow -5} \frac{x^2 - 25}{x + 5}$  (2 marks)



(iii)  $\lim_{x \rightarrow 0} \frac{(2+x)^2 - 4}{x}$

(3 marks)

(iv)  $\lim_{t \rightarrow 0} \frac{\sqrt{t+9} - 3}{t}$

(4 marks)

(v)  $\lim_{x \rightarrow 3} \sqrt[3]{\frac{t^2 - 1}{2t^3 + t^2 - t + 4}}$

(3 marks)

(b) Sketch the graph of  $f(x) = \begin{cases} x^2 - 1, & x < 0 \\ x - 1, & 0 \leq x < 3 \\ 12 - x^2, & x \geq 3 \end{cases}$

Hence determine whether  $f(x)$  is continuous at  $x = 0$  and  $x = 3$

(6 marks)

**Q3**

(a) Find  $\frac{dy}{dx}$  for the following function

(i)  $y = x^3 \cos x$

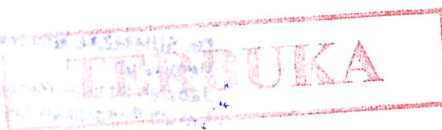
(3 marks)

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

(3 marks)

(iii)  $xy^3 - y^3 = x + 2$

(3 marks)



(b) Given that  $y = (x^2 + 2x)(2x + 3)$ , find  $y'$ ,  $y''$  and  $y'''$  (5 marks)

(c) The radius of a circle is increasing at the rate of 5cm per minute. Find

(i) the rate of change for the area of the circle when its radius is 12cm (4 marks)

(ii) the radius of the circle when its area is increasing at a rate of  $50\pi \text{ cm}^2$  per minute (2 marks)

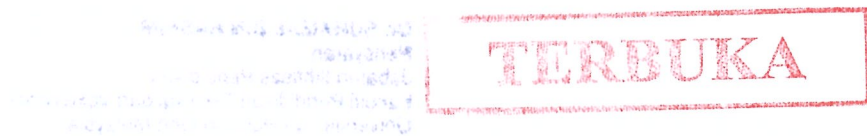
**Q4** (a) Find

(i)  $\int \left( \frac{x^5 + 3x^4 - 7}{x^3} \right) dx$  (3 marks)

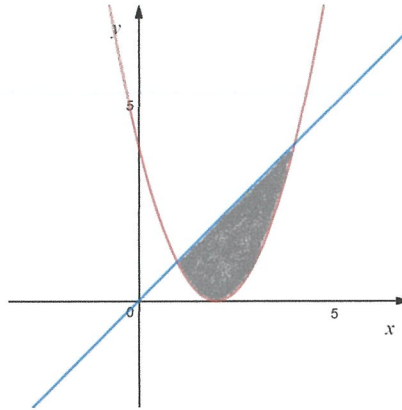
(ii)  $\int_1^2 (x + 2)(x + 3) dx$  (3 marks)

(b) Solve  $\int 4x(2x^2 - 3)^6 dx$  by using integration by substitution method (4 marks)

(c) Solve  $\int x^2 \ln x dx$  by using integration by parts method (4 marks)



(d) Question 4(d) is based on figure Q4(d). Find the area bounded by the curve  $y = x^2 - 4x + 4$  and the line  $y = x$



**Figure Q4(d)**

**Q5**

(a) Solve the following:

(i) It is given an arithmetic progression is 5, 7, 9, ....., 87. Find the number of terms of this progression.

(3 marks)

(ii) The first three terms of an arithmetic progression are  $3h, k, h+2$

i. Express  $k$  in terms of  $h$ .

(1 marks)

ii. Find the 10<sup>th</sup> term of progression in term of  $h$ .

(2 marks)

(iii) The sum of the first  $n$  terms of a progression is given by  $S_n = 3n^2 - 28n$ . Find

i. the common difference

(1 marks)

ii. the sixth term

(2 marks)

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(b) Solve the following:

(i) It is given that  $(x + 4)$ ,  $(x - 2)$  and  $(x - 4)$  are the three consecutive terms of a geometric progression.

i. Find the integer value of  $x$ .

(2 marks)

ii. Hence, calculate the sum to infinity of the progression if  $(x - 2)$  is its fourth term.

(2 marks)

(ii) The  $n^{\text{th}}$  term of a geometric progression,  $T_n$ , is given by  $T_n = \left(\frac{2}{3}\right)^{n+1}$ . Find

i. the common ratio

(2 marks)

ii. the sum to infinity of the progression.

(2 marks)

(c) Smile Florist sold 200 roses on the first week of 2016. After that, the number roses sold decreased by 8 stalks a week until the 5<sup>th</sup> week. On the 6<sup>th</sup> week, the florist decided to have a sale and the number of roses sold increased by 100% compared to the week before.



Calculate the number of roses that was sold in the six weeks.

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**-END OF QUESTIONS-**