MULTIMEDIA UNIVERSITY

STUDENT ID NO

MULTIMEDIA UNIVERSITY

FINAL EXAMINATION

TRIMESTER 2, 2017/2018

PMT0101 – MATHEMATICS I

(Foundation in Information Technology)

02 MARCH 2018
(9:00 A.M. – 11:00 A.M.)
(2 Hours)

INSTRUCTIONS TO STUDENT

1. This question paper consists of 5 pages with **FIVE** questions.

2. Attempt **ALL** questions. All questions carry equal marks and the distribution of the marks for each question is given.

3. Please write all your answers in the answer booklet provided.

4. **No calculators are allowed**.

5. **You are required to write all relevant steps** to obtain maximum marks.

No Calculators are allowed.
You are required to write proper steps.

QUESTION 1 [10 marks]

a) Simplify the expression and write your final expression as a fraction with no negative exponents. Assume all variables have non zero values.

$$\frac{m^7 \times \left(8e^3\right)^{\frac{1}{3}}}{\left(2m^{-2}e^3\right)^2}$$

[2 marks]

b) Rationalize the denominator for $\frac{4\sqrt{3}+2}{2\sqrt{3}-1}$ and simplify.

[2 marks]

c) Simplify the following expression and write your final expression as a single term. Assume all variables have positive values.

$$b^2\left(\sqrt{\frac{32a^3b}{c^4}}\right) - \frac{ac^2}{b}\sqrt{\frac{98ab^7}{c^8}}$$

[2 marks]

d) Factor the polynomial completely.

$27 - 8x^3$ [2 marks]

e) Find $\left(\frac{\sqrt{3}}{2} - \frac{1}{2}i\right)^2$ and write the final result in standard form $a+bi$, where a and b are real numbers. [2 marks]

Continued…

QUESTION 2 [10 marks]

a) i) Factorize completely $6x^3 - 5x^2 - 6x$.
Hence, solve $6x^3 - 5x^2 - 6x = 0$.

ii) Solve the inequality $6x^3 - 5x^2 - 6x \leq 0$.

Show clearly your Sign Diagram and give your final answer in interval notation.

[6 marks]

b) Solve $\sqrt{12x+13} = 2x+3$. Remember to check your answers.

[4 marks]

Continued…

QUESTION 3 [10 marks]

a) Given $f(x) = 2x - 3$ and $g(x) = (x-2)^2 + 1$, find

i) $f^{-1}(x)$,

ii) $(f^{-1} \circ g)(3)$.

iii) Determine the minimum point and *y*-intercept of g.

Hence, sketch the graph of g. Show clearly the minimum point and the *y*- intercept.

State its range in interval notation.

[5 marks]

b) Given the polynomial function $f(x) = x(x+3)^2(x-5)^3$.

i) What is the **degree** of *f* ?

ii) Determine **the zeros** of f **and their multiplicities**.
Also, determine whether the graph of *f* crosses or touches the *x*-axis at each zero.

iii) Determine its *y*-intercept.

iv) Determine the end behavior of *f*.

v) Sketch the graph of the polynomial function.
Make sure your graph shows all intercepts and exhibits the proper end behaviour.

[5 marks]

Continued…

QUESTION 4 [10 marks]

a) The graph of $f(x) = 2 - \log_3(x + a)$ passes through point $(26, -1)$.
Find the value of *a*.

[2 marks]

b) Solve $9^{-x+15} = 27^{x+3}$.

[2 marks]

c) Solve $\ln(x-1) - \ln(x+6) = \ln(x-2) - \ln(x+3)$.

[2 marks]

d) Find the value of *p*, if $(x-2)$ is a factor of function $P(x) = 2x^3 + px^2 - 4$.

Hence, use remainder theorem to find the remainder when the function $P(x)$ is divided by $(x+1)$.

[4 marks]

Continued…

QUESTION 5 [10 marks]

a) Find the value of k if the lines $3x + ky + 6 = 0$ and $5x - y - 1 = 0$ are perpendicular.

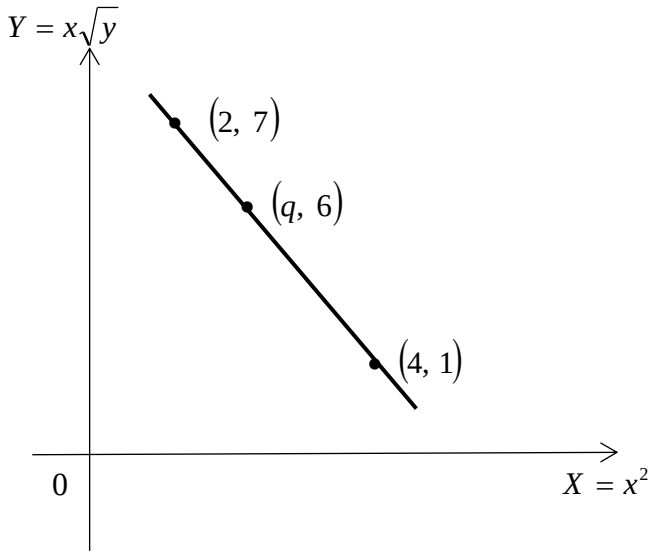
[2 marks]

b) Transform the equation of a circle $x^2 - 12x + y^2 + 12y + 36 = 0$ to the form $(x-h)^2 + (y-k)^2 = r^2$, where h, k and r are real numbers.
Hence, find the center and radius of the circle.

[3 marks]

c) Two variables x and y are related by an equation $y = f(x)$.

The figure below shows a straight line graph by plotting $Y = x\sqrt{y}$ against $X = x^2$. Points $(2, 7)$, $(q, 6)$ and $(4, 1)$ lie on the line.



i) Find the slope and Y-intercept of the line.

ii) Express $x\sqrt{y}$ in terms of x^2.

iii) Find the value of y when $x = 2$.

iv) A point $(q, 6)$ lies on the straight line. Find the value of q.

[5 marks]

End of Page.