Universiti Tun Hussein Onn Malaysia

UNIVERSITI TUN HUSSEIN ONN MALAYSIA

FINAL EXAMINATION
SEMESTER II
SESSION 2016/2017

COURSE NAME	:	MATHEMATICS I
COURSE CODE	:	BBM 10303
CODE PROGRAMME	:	BBA/BBB/BBD/BBE/BBF/BBG
DATE	:	JUNE 2017
DURATION	:	3 HOURS
INSTRUCTION	:	ANSWER **ALL** QUESTIONS

THIS QUESTION PAPER CONSISTS OF **FIVE (5)** PAGES

Q1

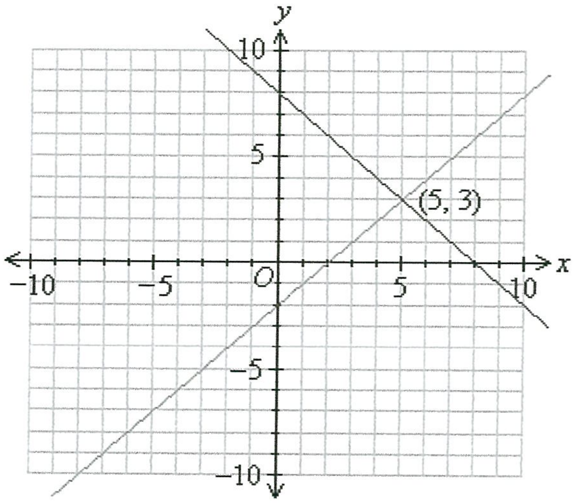

FIGURE Q1

(a) Find the length of the line segment with the point (-2, 10) and point (12, -2)

(3 marks)

(b) Find the slope of the line by going from point (0, 8) and point (8, 0)

(3 marks)

(c) Find the equation of the straight line from point (0, 8) and point (8, 0)

(4 marks)

(d) Find the equation of the straight line that passes through the point (5, 3) and is perpendicular to the straight line from point (0, 8) and point (8, 0)

(5 marks)

(e) Find the equation of the straight line that passes through the point (0, 8) and is parallel to the straight line from point (0, 2) and point (5, 3)

(5 marks)

Q2 (a) Using the method of factorization, solve the following quadratic equations

(i) $2(2x^2 + x) = x^2 - 3x + 2$

(4 marks)

TERBUKA

(ii) $\frac{1}{x} + \frac{3}{(x-2)} = \frac{5}{8}$

(5 marks)

(b) Solve $x^2 + \frac{2}{3}x = \frac{1}{3}$ the following quadratic equation by using quadratic formula

(4 marks)

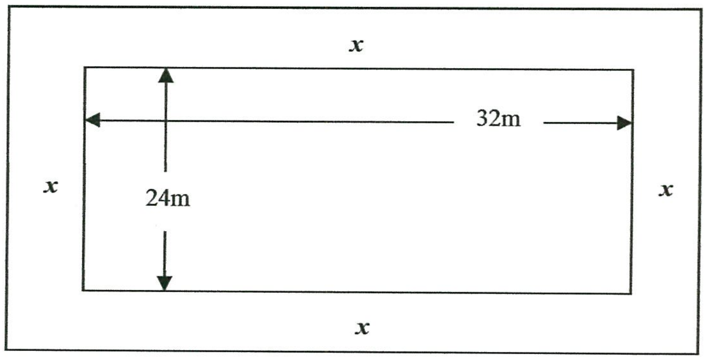

FIGURE Q2(C)

(c) John's garden is rectangular in shape with a length of 32 meters and width of 24 meters as shown in FIGURE Q2(C). He wants to have a pedestrian pathway installed all around to increase the total area to 1200 square meters. What will be the width of the pathway?

(7 marks)

Q3 (a) Solve each of the following inequalities

(i) $4x+3 \geq 2(3x-1)$

(ii) $|-3x-1| \geq 5$

(6 marks)

(b) Express $\dfrac{2x+16}{x^2+x-6}$ in partial fractions

(4 marks)

(c) If $Q(3,-4)$ be a point on the terminal side of an angle θ. Find the value of the following

(i) $\sin\theta$

(ii) $\cos\theta$

(iii) $\tan\theta$

TERBUKA

(6 marks)

(d) Prove that $\dfrac{\tan\theta}{1-\cot\theta}+\dfrac{\cot\theta}{1-\tan\theta}=1+\tan\theta+\cot\theta$

(4 marks)

Q4 (a) Given $Z_1 = 5 + 12i$ and $Z_2 = 1 - \sqrt{3}i$, find the following expressions in polar form.

(i) $\dfrac{Z_1}{Z_2}$

(3 marks)

(ii) $Z_1 Z_2$

(2 marks)

(b) Let $Z = 1 + \sqrt{3}i$, find Z^5 using De Moivre's Theorem

(5 marks)

(c) Hashim feeds his cats with different mixture of three types of food, namel X, Y, and Z, as given below

Food X: 10mg protein, 5mg carbohydrates, 15mg vitamins
Food Y: 15mg protein, 10mg carbohydrates, 5mg vitamins
Food Z: 15mg protein, 5mg carbohydrates, 15mg vitamins

Assume that cats require 190mg of protein, 95mg of carbohydrates and 160mg of vitamins

(i) Form a system of linear equations based on the above information

(5 marks)

(ii) Find how many grams of each food should Hashim feed his cats daily to satisfy their nutrient requirements using Cramer's rule

(5 marks)

Q5 (a) Given **u** = $i - 3j + 7k$ and **v** = $8i - 2j - 2k$, determine the following expressions

(i) **u . v**
(ii) **u** × **v**
(iii) the angle between **u** and **v**

(9 marks)

(b) Given **a** = $3i - 2j + 3k$, **b** = $j - 4k$ and **c** = $2i + 4j + 6k$. Find:

(i) **a . (b** × **c)**

(ii) **(a** × **b) . c**

(6 marks)

(c) Sketch the graph of $\dfrac{(x-1)^2}{64} + \dfrac{(y-8)^2}{25} = 1$ and locate the foci.

(5 marks)

-END OF QUESTIONS-

Linear equations:

$$d=\sqrt{(x_2-x_1)^2+(y_2-y_1)^2}$$

$$(\bar{x},\bar{y})=\left(\frac{x_1+x_2}{2},\frac{y_1+y_2}{2}\right)$$

$$slope=\frac{y_2-y_1}{x_2-x_1}, x_2\neq x_1$$

$$y=mx+c$$

$$y-y_1=m(x-x_1)$$

Quadratic equation:

$$x=\frac{-b\pm\sqrt{b^2-4ac}}{2a}$$

Trigonometry:

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

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

$$\cot^2\theta+1=\csc^2\theta$$

$$\sin 2\alpha=2\sin\alpha\cos\alpha$$

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

$$\sin(\alpha\pm\beta)=\sin\alpha\cos\beta\pm\cos\alpha\sin\beta$$

$$\cos(\alpha\pm\beta)=\cos\alpha\cos\beta\mp\sin\alpha\sin\beta$$

$$\tan(\alpha\pm\beta)=\frac{\tan\alpha\pm\tan\beta}{1\mp\tan\alpha\tan\beta}$$

$$\tan 2\alpha=\frac{2\tan\alpha}{1-\tan^2\alpha}\quad AA^{-1}=A^{-1}A=I$$

Solution of Systems of linear:

$$A_{ij}=(-1)^{i+j}M_{ij}$$

$$x_1=\frac{|D_{x1}|}{|D|}, x_2=\frac{|D_{x2}|}{|D|}, x_3=\frac{|D_{x3}|}{|D|}$$

Complex Numbers:

$$i^2=-1$$

$$z=re^{i(\theta+2k\pi)}$$

$$e^{i\theta}=\cos\theta+i\sin\theta$$

Vectors:

$$|v|=\sqrt{v_1^2+v_2^2+v_3^2}$$

$$\cos\theta=\frac{a\cdot b}{|a||b|}$$

Conic sections:

Circle:

$$x^2+y^2=r^2$$

$$(x-h)^2+(y-k)^2=r^2$$

Parabola:

$$x^2=4py$$

Vertical: $(x-h)^2=4p(y-k)$

Horizontal: $(y-k)^2=4p(x-h)$

Ellipse:

$$\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$$

$$\frac{(x-h)^2}{a^2}+\frac{(y-k)^2}{b^2}=1$$

Hyperbola:

$$\frac{(y-k)^2}{a^2}-\frac{(x-h)^2}{b^2}=1$$

$$\frac{(x-h)^2}{a^2}-\frac{(y-k)^2}{b^2}=1$$