UTHM
Universiti Tun Hussein Onn Malaysia

UNIVERSITI TUN HUSSEIN ONN MALAYSIA

FINAL EXAMINATION
(ONLINE)
SEMESTER II
SESSION 2019/2020

COURSE NAME	:	MATHEMATICS 1
COURSE CODE	:	BBP 10603
PROGRAMME CODE	:	BBA/BBB/BBD/BBE/BBF/BBG
EXAMINATION DATE	:	JULY 2020
DURATION	:	3 HOURS
INSTRUCTION	:	ANSWER **ALL** QUESTIONS

THIS QUESTION PAPER CONSISTS OF **SIX (6)** PAGES

Q1 (a) Given that points $A=(3,-3)$, $B=(7,-6)$ and $C=(5,0)$ lie on a Cartesian plane.

(i) Find the distance between points A and B.

[2 marks]

(ii) If the slope of line BC is 3, find the value of y.

[2 marks]

(b) Given that point P is the midpoint of line QR. The coordinates of point Q and R are $(-11,0)$ and $(5,8)$ respectively.

(i) Find the coordinate of point P.

[2 marks]

(ii) Hence, find a linear equation that passes through point P.

[2 marks]

(c) Determine whether the lines $3x-4y=12$ and $8x+6y=11$ are parallel, perpendicular, or neither.

[2 marks]

(d) Find the equation of the line which passes through the point $(3,-4)$ and is parallel to the line $2x-5y=20$.

[3 marks]

(e) An e-hailing service company, DropBy charges a boarding fare RM3 for each trip. Extra RM0.50 is charged for every additional kilometer.

(i) By assuming $x=$ distance in kilometer and $y=$ fare, write a linear equation represents this situation.

[2 marks]

(ii) Sketch a graph to represent the fare of DropBy Company for at least three (3) points.

[3 marks]

(iii) Alice travel by using DropBy company service for a distance of $32km$. How much fare that Alice has to pay?

[2 marks]

Q2 (a) Find the roots of $6w^2 - 11w + 3 = 0$ by using factorization method.

[2 marks]

(b) Given that the roots of equation $ax^2 - bx + 15 = 0$ are $\frac{3}{2}$ and 5. Find the values of a and b.

[3 marks]

(c) Solve the following to find the value of x:

(i) $(2m+1)(m-3) = 5m(m-3)$

[3 marks]

(ii) $5 = \frac{10}{x^2} - \frac{3}{x}$

[3 marks]

(d) Sketch the graph of $y - x^2 - 4x - 21$

[5 marks]

(e) **DIAGRAM Q2(e)** shows a rectangle ***ABCD***, where the shaded area ***BED*** is about to be cut out. Given that the length of ***AB*** is $(x-3)cm$, the width ***AC*** is $(x-2)cm$ and the length of ***CE*** is $3cm$. If the remaining total area after the cut out is $20cm^2$, find the value of x.

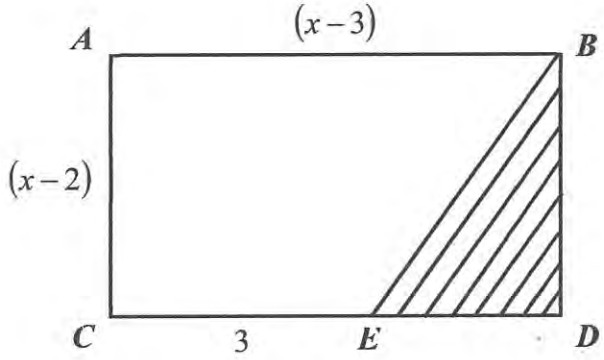

DIAGRAM Q2(e)

[4 marks]

Q3 (a) Solve the following inequalities:

(i) $3x - 7 \leq 2(x-9)$

(ii) $|5x+2| \geq 7$

[4 marks]

(b) Jerry is planning his holiday soon. He allocated RM60 per night for his hotel room and RM140 for his meals for the whole holiday. Express this situation in terms of inequalities and solve.

[2 marks]

(c) Decompose $\frac{2x^3+5x}{(x^2+3)^2}$ into partial fraction

[4 marks]

(d) Given that point $J-(6,-8)$ in a cartesian plane and θ is the terminal side angle. Calculate:

(i) $\sin\theta$

(ii) $\cos\theta$

(iii) $\tan\theta$

[6 marks]

(e) Prove trigonometric identity $(1-\cos\theta)(1+\cos\theta)(1+\cot^2\theta)=1$.

[4 marks]

Q4 (a) Calculate $2\begin{bmatrix}3 & -1 & 0\\ 2 & 4 & -2\end{bmatrix}-\begin{bmatrix}0 & 5 & 1\\ 1 & -3 & 3\end{bmatrix}$

[2 marks]

(b) Show that $B^{-1}\begin{bmatrix}-3 & 1\\ 5 & -2\end{bmatrix}$ is the inverse of $B\begin{bmatrix}-2 & -1\\ -5 & -3\end{bmatrix}$

[2 marks]

(c) By using Cramer's rule, solve the following system of linear equations:

$$\begin{aligned} 2x + 3y - z &= 1\\ 4x + y - 3z &= 11\\ 3x - 2y + 5z &= 21 \end{aligned}$$

[6 marks]

(d) Simplify the following expressions in form of $a+bi$.

(i) $\frac{8i}{1+2i}$

(ii) $5(2-3i)^2$

(iii) $3(\cos 232° + i\sin 232°)$

[6 marks]

(e) Express complex number $7 \quad 5i$ into Polar form.

[4 marks]

Q5 (a) Given the vectors $\mathbf{a} = \begin{pmatrix} -1 \\ 3 \\ 5 \end{pmatrix}$ and $\mathbf{b} = \begin{pmatrix} 0 \\ 4 \\ -2 \end{pmatrix}$. Find:

(i) $\mathbf{a} \bullet \mathbf{b}$

(ii) $\mathbf{a} \times \mathbf{b}$

(iii) the angle between **a** and **b**

[6 marks]

(b) Given the vectors $\mathbf{p} \quad \langle -4,-3,1 \rangle$, $\mathbf{q} = \langle 0,2,-5 \rangle$ and $\mathbf{r} = \langle \quad 2,1, \quad 1 \rangle$. Find:

(i) $|\mathbf{p}| + |\mathbf{q}| + |\mathbf{r}|$

[2 marks]

(ii) $|3\mathbf{p} - \mathbf{s} + 2\mathbf{r}|$

[3 marks]

(iii) $|-\mathbf{p}| - |2\mathbf{q}| + 3|\mathbf{r}|$

[3 marks]

(c) Given the vectors $\mathbf{u} = -2\mathbf{i} + 3\mathbf{j} - \mathbf{k}$, $\mathbf{v} = 4\mathbf{j} + 2\mathbf{k}$ and $\mathbf{w} = 3\mathbf{i} - 5\mathbf{j}$. Calculate

(i) $\mathbf{a} \times (\mathbf{b} \times \mathbf{c})$

(ii) $(\mathbf{a} \times \mathbf{b}) + 2\mathbf{c} - \mathbf{a}$

[6 marks]

-END OF QUESTIONS-

FINAL EXAMINATION FORMULA

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Linear equations:

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

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

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

$y = mx + c$

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

Quadratic equation:

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

Trigonometry:

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

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

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

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

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

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

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

$\tan 2\alpha = \frac{2\tan\alpha}{1 - \tan^2\alpha}$

$AA^{-1} = A^{-1}A = I$

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

$a^2 + b^2 = c^2$

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:

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

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