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UNIVERSITI TUN HUSSEIN ONN MALAYSIA

**FINAL EXAMINATION
SEMESTER I
SESSION 2019/2020**

COURSE NAME : MATHEMATICS 1
COURSE CODE : BBP 10603
PROGRAMME CODE : BBA/BBB/BBD/BBE/BBF/BBG
EXAMINATION DATE : DECEMBER 2019 / JANUARY 2020
DURATION : 3 HOURS
INSTRUCTION : ANSWER ALL QUESTIONS

THIS QUESTION PAPER CONSISTS OF SIX (6) PAGES

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- Q1** (a) Given points $A(1,-5)$ and $B(2,-2)$ lie on a cartesian plane.
- (i) If a straight line is drawn between points A and B , what is the slope of the line? [2 marks]
- (ii) Calculate the distance from points A and B . [2 marks]
- (b) The coordinates of P , Q and R are given as $(2,7)$, $(-4,3)$ and $(8,-2)$ respectively.
- (i) Show that line PQ is perpendicular to line PR . [3 marks]
- (ii) Find the linear equation of line PQ . [2 marks]
- (c) A line WX is parallel to YZ . Given that the points on line YZ are $Y(-3,5)$ and $Z(6,-1)$ respectively. Find the equation of line WX that pass through point $K(3,-4)$. [5 marks]
- (d) Given that Ahmad's salary is RM15 per hour and he works for 8 hours daily.
- (i) By letting $x =$ working hours and $y =$ salary, write a linear equation to represent the above situation in (d) in terms of $y = mx+c$ [3 marks]
- (ii) If he earns a RM5 bonus on Monday & Tuesday, how much Ahmad earns weekly if he works 5 days a week? [3 marks]
- Q2** (a) Find the roots of $2x^2 = -x + 3$ by using factorization method. [3 marks]
- (b) Solve the following equations using quadratic formula method:
- (i) $x(3x + 6) = 2$ [4 marks]
- (ii) $\frac{2}{x} + \frac{3}{x+2} = 1$ [4 marks]
- (c) Sketch the graph of $y = x^2 + 3x - 10$. [5 marks]

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- (d) **DIAGRAM Q2(d)** shows a rectangular shape where the shaded area is about to be cut out. If the remaining area of the larger area is $35m^2$, find the value of k .

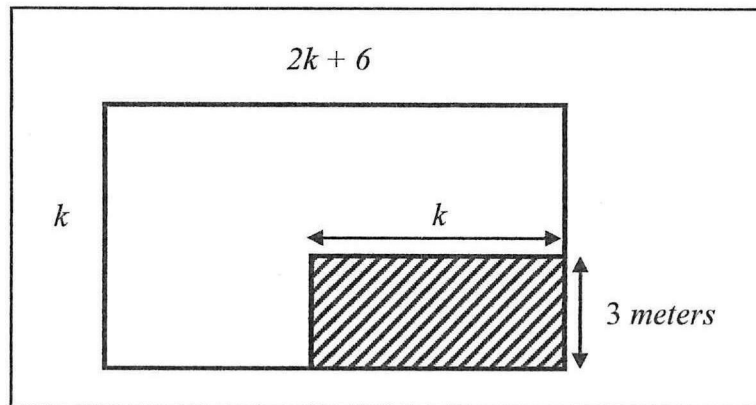


DIAGRAM Q2(d)

[4 marks]

- Q3** (a) Solve the following inequalities:

(i) $-5 < 3 - 4x \leq 23$

(ii) $|3x - 5| < 7$

[4 marks]

- (b) Decompose $\frac{x^2 + 5x - 12}{(x+1)(x-3)^2}$ into partial fraction.

[6 marks]

- (c) Given that $\tan \theta = \frac{1}{2}$ and $\cos \alpha = \frac{1}{\sqrt{2}}$. Without using calculator, find the value of:

(i) $\csc \theta$

(ii) $\sec \theta$

(iii) $\cot \alpha$

[6 marks]

- (d) Prove that $\frac{\cot x}{\csc x} = \cos x$

[4 marks]

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Q4 (a) Find the inverse matrik $A = \begin{bmatrix} -5 & 4 \\ 4 & -3 \end{bmatrix}$

[4 marks]

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

$$3x + 8y - z = -18$$

$$2x + y + 5z = 8$$

$$2x + 4y + 2z = -4$$

[6 marks]

(c) Simplify the following expression:

(i) $(2 - 3i)(3 + i)$

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

[4 marks]

(d) Solve $z = \frac{1+2i}{3+1}$. Hence, express your answer in Polar Form.

[6 marks]

Q5 (a) Given the vectors $\mathbf{u} = \langle 2, -6, 3 \rangle$ and $\mathbf{v} = \langle 2, -1, 2 \rangle$. Find:

(i) $\mathbf{u} \cdot \mathbf{v}$

(ii) $\mathbf{u} \times \mathbf{v}$

(iii) the angle between \mathbf{u} and \mathbf{v}

[6 marks]

(b) Given the vectors $\mathbf{r} = 3\mathbf{i} + 5\mathbf{j} + 2\mathbf{k}$ and $\mathbf{s} = 4\mathbf{i} - 3\mathbf{j} - 5\mathbf{k}$. Find:

(i) $|\mathbf{r}| + |\mathbf{s}|$

[2 marks]

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

[3 marks]

(iii) $|3\mathbf{r} - 2\mathbf{s}|$

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[3 marks]

- (c) Given the vectors $\mathbf{a} = \mathbf{i} + 2\mathbf{j} - \mathbf{k}$, $\mathbf{b} = 2\mathbf{i} - 3\mathbf{j} + 5\mathbf{k}$ and $\mathbf{c} = -\mathbf{i} + 3\mathbf{j} - 2\mathbf{k}$. Find the value of:

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

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

[6 marks]

-END OF QUESTIONS-

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FINAL EXAMINATION FORMULA

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Linear equations:

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

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

Quadratic equation:

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

Trigonometry:

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

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

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

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

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

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

Solution of Systems of linear:

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

Complex Numbers:

$$i^2 = -1$$

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

Vectors:

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

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

$$y = mx + c$$

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

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

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

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

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

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

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

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

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