Universiti Tun Hussein Onn Malaysia

UNIVERSITI TUN HUSSEIN ONN MALAYSIA

FINAL EXAMINATION
SEMESTER I
SESSION 2019/2020

COURSE NAME	:	MATHEMATICS 1
COURSE CODE	:	BBM 10303
PROGRAMME CODE	:	BBE / BBF
EXAMINATION DATE	:	DECEMBER 2019 / JANUARY 2020
DURATION	:	3 HOURS
INSTRUCTION	:	ANSWER **ALL** QUESTIONS

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

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 passess 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]

(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.

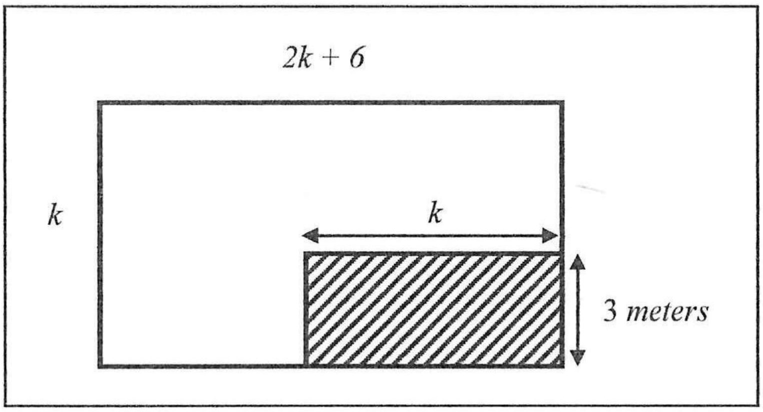

DIAGRAM Q2(d)

[4 marks]

Q3 (a) Solve the following inequalities:

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

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

[4 marks]

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

[6 marks]

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

(i) $\csc\theta$

(ii) $\sec\theta$

(iii) $\cot\alpha$

[6 marks]

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

[4 marks]

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:

$$\begin{aligned} 3x &+ 8y &- z &= -18 \\ 2x &+ y &+ 5z &= 8 \\ 2x &+ 4y &+ 2z &= -4 \end{aligned}$$

[6 marks]

(c) Simplify the following expression:

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

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

[4 marks]

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

[6 marks]

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

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

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

(iii) the angle between **u** and **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) $|3\mathbf{r} - 2\mathbf{s}|$

[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-

FINAL EXAMINATION FORMULA

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Linear equations:

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

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

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

$$y=mx+c$$

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

Quadratic equation:

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

Trigonometry:

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

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

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

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

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

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

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

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

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

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

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:

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

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