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UNIVERSITI TUN HUSSEIN ONN MALAYSIA

**FINAL EXAMINATION
SEMESTER I
SESSION 2013/2014**

COURSE NAME : BASIC MATHEMATICS
COURSE CODE : BBR 23603
PROGRAMME : 2 BBR
EXAMINATION DATE : DECEMBER 2013/JANUARY 2014
DURATION : 3 HOURS
INSTRUCTION : ANSWER **FIVE (5)** QUESTIONS
FROM **SEVEN (7)** QUESTIONS

THIS QUESTION PAPER CONSISTS OF **NINE (9)** PAGES

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- Q1** (a) Let $S = \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12\}$, $A = \{2, 4, 6, 8, 10, 12\}$, $B = \{4, 8, 12\}$ and $C = \{3, 6, 9, 12\}$. Find

Biar $S = \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12\}$, $A = \{2, 4, 6, 8, 10, 12\}$, $B = \{4, 8, 12\}$ dan $C = \{3, 6, 9, 12\}$. Cari

- (i) $A \cap B$
- (ii) $A \cup B$
- (iii) $A \cap C$
- (iv) $B \cap C$

(8 marks)

- (b) Given $A = \{1, 2, 3\}$, $B = \{c, d\}$, and $C = \{7, 8\}$. Find

Diberi $A = \{1, 2, 3\}$, $B = \{c, d\}$, dan $C = \{7, 8\}$. Cari

- (i) $A \times B$
- (ii) $B \times C$
- (iii) $A \times B \times C$

(7 marks)

- (c) An experiment involves tossing a pair of dice, one yellow and one red, and recording the numbers that come up. If x equals to the outcome on the yellow dice and y the outcome of the red dice, describe the sample space S by listing the elements (x, y) .

Satu ujikaji dijalankan dengan melambung satu dadu kuning dan satu dadu merah dan hasilnya direkod. Jika x mewakili hasil daripada dadu kuning dan y mewakili hasil daripada dadu merah, senaraikan unsur-unsur (x, y) dalam ruang sampel S .

(5 marks)

- Q2** (a) Find the value of x for the following inequalities:

Cari nilai x bagi ketaksamaan berikut:

- (i) $5x - 15 \geq 3x + 7$
- (ii) $x^2 + 3x - 1 < 3$

(12 marks)

- (b) Solve the following inequality:

Selesaikan ketaksamaan berikut:

$$\frac{(x-30)(x-4)}{(2x-1)} \geq 0$$

(8 marks)

- Q3** (a) Assume all variables represent positive numbers. Simplify the following expressions

Anggap semua pembolehubah terdiri daripada nombor positif. Permudahkan ungkapan berikut:

(i)
$$\sqrt[3]{16y^3x^4} - \sqrt[3]{54y^3x^4}$$

(ii)
$$\frac{-3w-3w^2}{w^2-1}$$

(6 marks)

- (b) Solve the following equations.

Selesaikan persamaan berikut:

(i)
$$\log(x) + \log(x-1) = \log(8x-12) - \log(2).$$

(ii)
$$\log_2(x+3) + \log_2(x-3) = 4.$$

(6 marks)

- (c) The Department of Irrigation and Drainage (JPS) measures the water height
- h
- (in ft above sea level) for the Sembrong River at Parit Raja, and then finds the flow,
- y
- (in
- ft^3
- per second), using the formula:

$$y = 114.308e^{0.265(h-6.87)}.$$

Find the flow when the level at Sembrong River is 20.6 ft above sea level.

Jabatan Pengairan dan Saliran (JPS) mengukur paras air h (dalam ft atas paras laut) bagi Sungai Sembrong di Parit Raja, dan kemudiannya kadar alir air (dalam ft^3 se saat) ditentukan dengan menggunakan formula:

$$y = 114.308e^{0.265(h-6.87)}$$

Tentukan kadar alir air apabila paras air di Sungai Sembrong berada pada 20.6 ft atas paras laut.

(8 marks)

Q4 Given three points $A(7, -4)$, $B(-3, 8)$ and $C(0, \frac{5}{2})$, find

Diberi tiga titik $A(7, -4)$, $B(-3, 8)$ dan $C(0, \frac{5}{2})$, cari

(a) the distance between points A and B .

jarak antara titik A dan B .

(5 marks)

(b) the equation of a line that passes through points A and B .

persamaan garis lurus yang melepasi titik A dan B .

(7 marks)

(c) point D , given that D is the midpoint of AB . Hence, determine whether AB is perpendicular to CD or not.

titik D di mana D adalah titik tengah bagi garis lurus AB . Kemudiannya tentukan samada AB berserenjang dengan garis CD .

(8 marks)

Q5 (a) By sketching the angle, find the values of the following trigonometric functions:

Lakarkan sudut berikut, dan kemudiannya tentukan nilai-nilai bagi fungsi trigonometrinya.

(i) $\sin 140^\circ$

(ii) $\cos 250^\circ$

(iii) $\tan 250^\circ$

(9 marks)

- (b) Verify the identity $\cos^2 x (1 + \tan^2 x) = 1$

Buktikan identiti $\cos^2 x (1 + \tan^2 x) = 1$

(5 marks)

- (c) Based on the following given information, find the area of sector.

Berdasarkan maklumat yang diberi di bawah, tentukan luas sektor.

- (i) Radius, $r = 8$ and angle, $\theta = 1.15$ rad

Jejari, $r = 8$ dan sudut, $\theta = 1.15$ rad

- (ii) Angle, $\theta = 72^\circ$ and radius, $r = 9$

Sudut, $\theta = 72^\circ$ dan jejari, $r = 9$

(6 marks)

- Q6** (a) Given that two vectors, $\mathbf{v} = -2\mathbf{i} + \mathbf{j} + 4\mathbf{k}$ and $\mathbf{w} = \mathbf{i} + 2\mathbf{j} - 3\mathbf{k}$. Find

Diberi dua vektor, $\mathbf{v} = -2\mathbf{i} + \mathbf{j} + 4\mathbf{k}$ dan $\mathbf{w} = \mathbf{i} + 2\mathbf{j} - 3\mathbf{k}$. Cari

- (i) $\mathbf{v} + 2\mathbf{w}$

- (ii) $|\mathbf{3v} - \mathbf{w}|$

- (iii) $|\mathbf{v}| - |\mathbf{w}|$

(9 marks)

- (b) If $\mathbf{a} = 2\mathbf{i} - 2\mathbf{j} + 3\mathbf{k}$, $\mathbf{b} = 5\mathbf{i} + 8\mathbf{j} + \mathbf{k}$ and $\mathbf{c} = -4\mathbf{i} + 3\mathbf{j} - 2\mathbf{k}$, find

Jika $\mathbf{a} = 2\mathbf{i} - 2\mathbf{j} + 3\mathbf{k}$, $\mathbf{b} = 5\mathbf{i} + 8\mathbf{j} + \mathbf{k}$ dan $\mathbf{c} = -4\mathbf{i} + 3\mathbf{j} - 2\mathbf{k}$, cari

- (i) $\mathbf{a} \cdot \mathbf{b}$

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

(6 marks)

- (d) Find $\mathbf{p} \times \mathbf{q}$ and $\mathbf{q} \times \mathbf{p}$ for vectors $\mathbf{p} = 3\mathbf{i} + 4\mathbf{j}$ and $\mathbf{q} = \mathbf{i} + 5\mathbf{j} - 2\mathbf{k}$.

Cari $\mathbf{p} \times \mathbf{q}$ dan $\mathbf{q} \times \mathbf{p}$ bagi vektor $\mathbf{p} = 3\mathbf{i} + 4\mathbf{j}$ dan $\mathbf{q} = \mathbf{i} + 5\mathbf{j} - 2\mathbf{k}$.

(5 marks)

- Q7** (a) Solve the quadratic equation $3x^2 + 9x + 7 = 0$, and write in the form of $a + bi$.

Selesaikan persamaan kuadratik $3x^2 + 9x + 7 = 0$, dan tuliskan jawapannya dalam bentuk $a + bi$.

(5 marks)

- (b) If $z_1 = -2 + 3i$ and $z_2 = 1 - 4i$, find

Jika $z_1 = -2 + 3i$ dan $z_2 = 1 - 4i$, cari

(i) $z_1 + 2z_2$

(ii) $z_2 - iz_1$

(iii) $z_1 z_2$

(iv) $\frac{z_1}{z_2}$

(8 marks)

- (c) Given that $Z_1 = 2 + i$ and $Z_2 = -2 + 4i$. If $\frac{1}{Z_3} = \frac{1}{Z_1} + \frac{1}{Z_2}$, find Z_3 in the form of $a + bi$.

Diberi $Z_1 = 2 + i$ dan $Z_2 = -2 + 4i$. Jika $\frac{1}{Z_3} = \frac{1}{Z_1} + \frac{1}{Z_2}$, cari Z_3 dalam bentuk $a + bi$

(7 marks)

-SOALAN TAMAT-

FINAL EXAMINATION

SEMESTER / SESSION: SEM I 2012/2013

PROGRAMME : IJAZAH SARJANA MUDA PENDIDIKAN
SEKOLAH RENDAH DENGAN KEPUJIAN

COURSE : MATEMATIK ASAS

COURSE CODE : BBR 23603

FORMULAS**Set**Intersection: $A \cap B = \{x \mid x \in A \text{ and } x \in B\}$ Union: $A \cup B = \{x \mid x \in A \text{ or } x \in B\}$ Cartesian product: $A \times B = \{(a, b) : (a \in A) \text{ and } (b \in B)\}$ **Real number system**Absolute value: $|x \pm a| < k \Leftrightarrow -k < x \pm a < k$, where a and k are constants

$$|x \pm a| \leq |x \pm b| \Leftrightarrow |x \pm a|^2 \leq |x \pm b|^2 \Rightarrow (x \pm a)^2 \leq (x \pm b)^2$$

$$|x \pm a| \geq |x \pm b| \Leftrightarrow |x \pm a|^2 \geq |x \pm b|^2 \Rightarrow (x \pm a)^2 \geq (x \pm b)^2, \text{ where } a \text{ and } b \text{ are constants}$$

Exponents, logarithms and radicalsEquivalence of exponent and logarithm: $x = b^n \Leftrightarrow \log_b x = n$ Logarithmic identities: $\log_b x^k = k \log_b x$

$$\log_b \left(\frac{x}{y} \right) = \log_b x - \log_b y$$

$$\log_b (xy) = \log_b x + \log_b y$$

Coordinate GeometrySlope of a line: $m = \frac{y_2 - y_1}{x_2 - x_1}$ Equation of a line: $y = mx + c$ The distance between two points P and Q is $d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$ The mid-point of the straight line joining two points $P(x_1, y_1)$ and $Q(x_2, y_2)$ is $\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \right)$

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Trigonometry

$$\sec \theta = \frac{1}{\cos \theta}, \quad \csc \theta = \frac{1}{\sin \theta}, \quad \cot \theta = \frac{\cos \theta}{\sin \theta} = \frac{1}{\tan \theta}$$

The exact value of trigonometric functions:

Angle θ	Angle θ (radian)	$\sin \theta$	$\cos \theta$	$\tan \theta$
0°	0	0	1	0
30°	$\frac{\pi}{6}$	$\frac{1}{2}$	$\frac{\sqrt{3}}{2}$	$\frac{1}{\sqrt{3}}$
45°	$\frac{\pi}{4}$	$\frac{1}{\sqrt{2}}$	$\frac{1}{\sqrt{2}}$	1
60°	$\frac{\pi}{3}$	$\frac{\sqrt{3}}{2}$	$\frac{1}{2}$	$\sqrt{3}$

The main basic trigonometry identities:

- (1) $\sin^2 \theta + \cos^2 \theta = 1$
- (2) $\sec^2 \theta = 1 + \tan^2 \theta$
- (3) $\csc^2 \theta = 1 + \cot^2 \theta$

Conversion of radian and degree: Half a circle, π radian = 180° Arc length, $s = r\theta$

$$\text{Area of Sector} = \frac{1}{2} \times \theta \times r^2 \quad (\text{when } \theta \text{ is in radians})$$

$$\text{Area of Sector} = \frac{\theta}{360^\circ} \times \pi r^2 \quad (\text{when } \theta \text{ is in degrees})$$

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VectorFor vectors $\mathbf{a} = a_1\mathbf{i} + a_2\mathbf{j} + a_3\mathbf{k}$ and $\mathbf{b} = b_1\mathbf{i} + b_2\mathbf{j} + b_3\mathbf{k}$ with any scalar λ , then

(1) $\lambda(\mathbf{a} \pm \mathbf{b}) = \lambda(a_1 \pm b_1)\mathbf{i} + \lambda(a_2 \pm b_2)\mathbf{j} + \lambda(a_3 \pm b_3)\mathbf{k}$

(2) The length (or magnitude) for \mathbf{a} is $|\mathbf{a}| = \sqrt{a_1^2 + a_2^2 + a_3^2}$

(3) Scalar product of \mathbf{a} and \mathbf{b} is $\mathbf{a} \cdot \mathbf{b} = a_1 b_1 + a_2 b_2 + a_3 b_3$

(4) Vector product of \mathbf{a} and \mathbf{b} is

$$\mathbf{a} \times \mathbf{b} = \begin{vmatrix} \mathbf{i} & \mathbf{j} & \mathbf{k} \\ a_1 & a_2 & a_3 \\ b_1 & b_2 & b_3 \end{vmatrix} = (a_2 b_3 - a_3 b_2)\mathbf{i} - (a_1 b_3 - a_3 b_1)\mathbf{j} + (a_1 b_2 - a_2 b_1)\mathbf{k}$$

Complex NumberImaginary number, i is defined as $i^2 = -1$ or $i = \sqrt{-1}$ If $z = a + bi$, then its conjugate is $\bar{z} = a - bi$ Roots of quadratic equation $ax^2 + bx + c = 0$ is given by $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ For $z_1 = a_1 + b_1 i$ and $z_2 = a_2 + b_2 i$, then

(1) $z_1 \pm z_2 = (a_1 + a_2) \pm (b_1 + b_2)i$

(2) $z_1 z_2 = (a_1 + b_1 i)(a_2 + b_2 i) = a_1 a_2 + (a_1 b_2 + a_2 b_1)i + b_1 b_2 i^2 = a_1 a_2 - b_1 b_2 + (a_1 b_2 + a_2 b_1)i$

(3) $\frac{1}{z_1} = \frac{1}{a_1 + b_1 i} = \frac{1}{a_1 + b_1 i} \left(\frac{a_1 - b_1 i}{a_1 - b_1 i} \right), \quad \frac{1}{z_2} = \frac{1}{a_2 + b_2 i} = \frac{1}{a_2 + b_2 i} \left(\frac{a_2 - b_2 i}{a_2 - b_2 i} \right)$