UNIVERSITI TUN HUSSEIN ONN MALAYSIA

FINAL EXAMINATION
SEMESTER II
SESSION 2014/2015

COURSE NAME   :   BASIC MATHEMATICS

COURSE CODE   :   BBR 23603

PROGRAMME CODE   :   2 BBR, 3 BBR

EXAMINATION DATE   :   JUNE/JULY 2015

DURATION   :   3 HOURS

INSTRUCTION   :   ANSWER **ALL** QUESTIONS

S1 (a) If S={0,1,2,3,4,5,6,7,8,9} and A={0,2,4,6,8}, B={1,3,5,7,9}, C={2,3,4,5}, and D={1,6,7}, list the elements of the sets corresponding to the following events:

(i) $(C' \cap D) \cup B$
(ii) $(S \cap C)'$
(iii) $A' \cup B'$
(iv) $A \cap C \cap D'$

(8 marks)

(b) Consider the experiment of the throwing a pair of dice. Let E be the event "sum is less than 9". Similarly, let F be the event "sum is even". Find

(i) E'
(ii) $E \setminus F$
(iii) $E \cap F$

(6 marks)

S2 (a) Solve the following inequality

(i) $\dfrac{x-1}{2-x} > 2$

(5 marks)

(ii) $\dfrac{(x-4)(3x+2)}{x-3} \le 0$

(5 marks)

(iii) $(x-1)(x+2)(x-3) > 0$

(4 marks)

S3 (a) If $\log_5 36 = 2.2265$ and $\log_5 4 = 0.8164$, evaluate $\log_5 9$

(2 marks)

(b) Simplify $\dfrac{\log_b \sqrt{3}}{\log_b 27}$

(3 marks)

(c) Solve the equation $2(3^{2x+1}) + 7(3)^x - 3 = 0$

(5 marks)

(d) Find the value of x and express in b that satisfies the equation $\log_b 2x - \log_b (x+2b) = 1$, where b is a positive integer

(4 marks)

S4   Given three points $A(-4, 0)$, $B(4, 6)$ and $C(-4, 6)$, find

      (a)   the distance between points A and B.

                                                    (2 marks)

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

                                                    (3 marks)

      (c)   point D, given that D is the midpoint of AB.

                                                    (3 marks)

      (d)   determine whether AB is perpendicular to CD.

                                                    (3 marks)

      (e)   the equation of a line that passes through points D and C.

                                                    (3 marks)

S5   (a)   Verify the identity $(\sec\theta + \tan\theta)(1 - \sin\theta) = \cos\theta$.

                                                    (3 marks)

      (b)   Find the exact value of $sin\dfrac{\pi}{4} + cos\dfrac{\pi}{3} - \tan\dfrac{\pi}{6}$ without using a calculator.

                                                    (3 marks)

      (c)   Solve the equation $2\ sin^2 t - cos\ t - 1 = 0$ for $0° \leq t \leq 360°$.

                                                    (8 marks)

S6   a)   Given that two vectors, $v = -2i + j + 4k$ and $w = i + 2j - 3k$. Find

           (i) $v + 2w$
           (ii) $|3v - w|$
           (iii) $|v|\,|w|$

                                                    (6 marks)

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

           (i) $a \bullet (b + c)$
           (ii)   the angle between vectors a and b.

                                                    (6 marks)

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(c) Find p x q for vectors $p = 3\underset{\sim}{i} + 4\underset{\sim}{j}$ and $q = \underset{\sim}{i} + 5\underset{\sim}{j} - 2\underset{\sim}{k}$.

(3 marks)

S7 (a) Solve the quadratic equation $3x^2 + 9x + 7 = 0$, and write in the form of $a+bi$.

(4 marks)

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

(i) $z_1 + 2z_2$

(ii) $z_1 z_2$

(iii) $\dfrac{z_1}{z_2}$

(7 marks)

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

(4 marks)

-END OF QUESTIONS-

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