UNIVERSITI TUN HUSSEIN ONN MALAYSIA

FINAL EXAMINATION
SEMESTER II
SESSION 2011/2012

COURSE NAME	:	DISCRETE STRUCTURE
COURSE CODE	:	BIT 11103/BIT1113
PROGRAMME	:	BACHELOR OF INFORMATION TECHNOLOGY
EXAMINATION DATE	:	JUNE 2012
DURATION	:	2 HOURS AND 30 MINUTES
INSTRUCTION	:	ANSWER **FIVE (5)** OUT OF **SIX (6)** QUESTIONS

THIS QUESTION PAPER CONSISTS OF SIX (6) PAGES

Instructions: Answer any FIVE (5) questions ONLY

Q1   (a)   Draw the digraphs based on the information stated in **Table Q1**.

Table Q1

Vertex	a	b	c	d
In-degree	3	2	1	2
Out-degree	3	1	4	0

(10 marks)

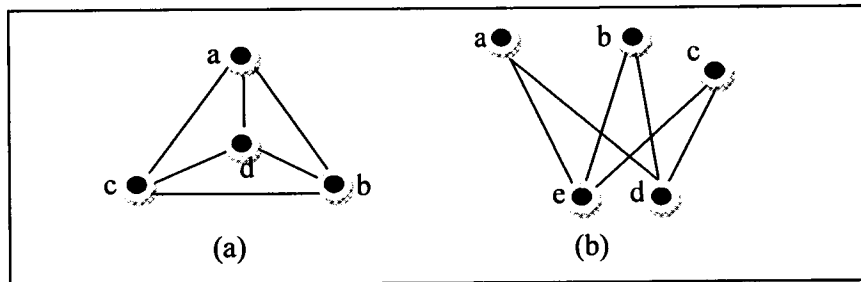(b)   Answer the following questions based on **Figure Q1b**.

Figure Q1b

(i)   Which of the following graphs are Eulerian and/or Hamiltonian.

(ii)   Which of the graphs are semi-Hamiltonian? Give a semi-Hamiltonian path where possible.

(10 marks)

Q2   Draw the digraphs whose vertices and arcs are as follows:

a)   V = {u, v, w, x}, A = {vw, wu, wv, wx, xu}

b)   V = {1, 2, 3, 4, 5, 6, 7, 8},
        A = {12, 22, 23, 24, 34, 35, 67, 68, 78}.

(20 marks)

Q3 (a) Determine whether the following expressions are **TRUE** or **FALSE**?

(i) $| \varnothing | = 1$
(ii) $| \{x, x\} | = 2$
(iii) $| \cup \cap \varnothing | = 0$

(6 marks)

(b) What can you say about two sets P and Q if:

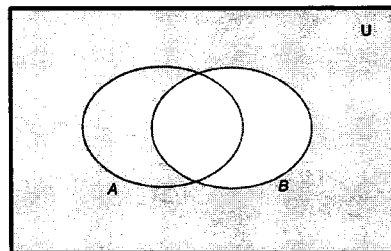(i) $P \cap Q' = \varnothing$?
(ii) $P \square Q = P$?

(4 marks)

(c) Draw the Venn diagram that represents the following notation:

(i) $A' \square B$

(ii) $A \cap B'$

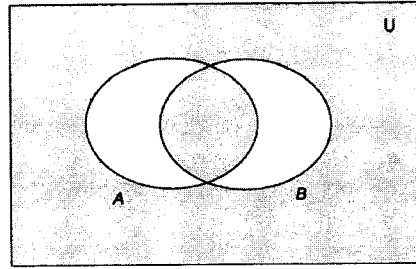(iii) $(A \cap B)'$

(iv) $A' \square B'$

(v) $(A \square B)'$

(5 marks)

(d) Identify the sets represented by each of the shaded areas below, using the set notation symbols $\cap$, $\square$ and ' only:
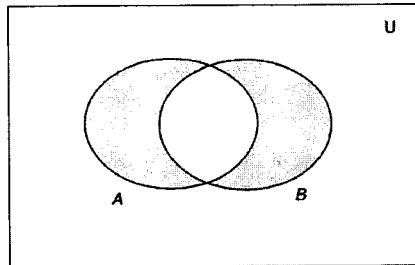
(i)

(ii)

(iii)

(5 marks)

Q4 (a) Answer all the following questions.

(i) Based on the article by Edward deBONO, define thinking, logical thinking and problem solving? Give an example to each of the explanation.

(6 marks)

(ii) In how many ways can a committee of FIVE (5) be formed from a group of 8 (EIGHT) people consisting of 3 boys, 3 girls and a brother-sister pair if

- there is no restriction in the selection
- the committee must include the brother-sister pair

(4 marks)

(b) Mariam and Mai Lin were cleaners of a swimming pool. So far they were able to keep the algae level at 100 per cubic meter of water. One day Mariam accidentally put a liquid fertilizer into the pool. The algae grew like crazy where every hour it grew by a factor of five.

Make a table illustrating this situation.

4

Time (in hours)	Number of Algae
1	100
2	
3	
4	
5	

(4 marks)

(c) Find number of algae, A (3).

(2 marks)

(d) Graph the function. Identify the problem encountered during the graphing.

(4 marks)

Q5 (a) Prove by induction

(i) $\Sigma i^2 = 1 + 4 + 9 + .. \ n^2 = [n(n+1)(2n+1)]/6$ for $n \in P$.

(6 marks)

(b) Find the value of an investment valued RM10, 000 after the 5th year if rate of interest is 5% per annum?

(4 marks)

(c) Write a pseudo code for Factorial n

(10 marks)

Q6 (a) A school principal wants the total marks of 200 students in PMR (Penilaian Menengah Rendah) examination to be sorted from the highest to the lowest. Design a coding with MAX-MIN solution. You may use MAX, MIN, and TMP as temporary storages. The MAX and MIN values must be printed out.

(12 marks)

(b) Given n=31 and m = 7. Find n DIV m and n MOD m.

(8 marks)