



UNIVERSITI TUN HUSSEIN ONN MALAYSIA

FINAL EXAMINATION SEMESTER I SESSION 2009/2010

SUBJECT NAME : ALGORITHM ANALYSIS
SUBJECT CODE : BIT 3173
COURSE : 3 BIT
EXAMINATION DATE : NOVEMBER 2009
DURATION : 2 HOURS 30 MINUTES
INSTRUCTION : ANSWER ALL QUESTIONS

THIS PAPER CONTAINS OF 4 PAGES

Q1 (a) Write a bubble sort algorithm in pseudocode. (5 marks)

(b) Use the bubble sort to sort 3, 1, 5, 7, 4, showing the list obtained at each step. (5 marks)

Q2 (a) Show that $x^4 + 9x^3 + 4x + 7$ is $O(x^4)$. (4 marks)

(b) Write an insertion sort program to put the n elements in increasing order using C language. (4 marks)

(c) What is the average number of comparisons used by the insertion sort to sort n distinct elements? (2 marks)

Q3 (a) Use Kruskal's algorithm to design the communications network for the **Figure Q3 (a)** below:

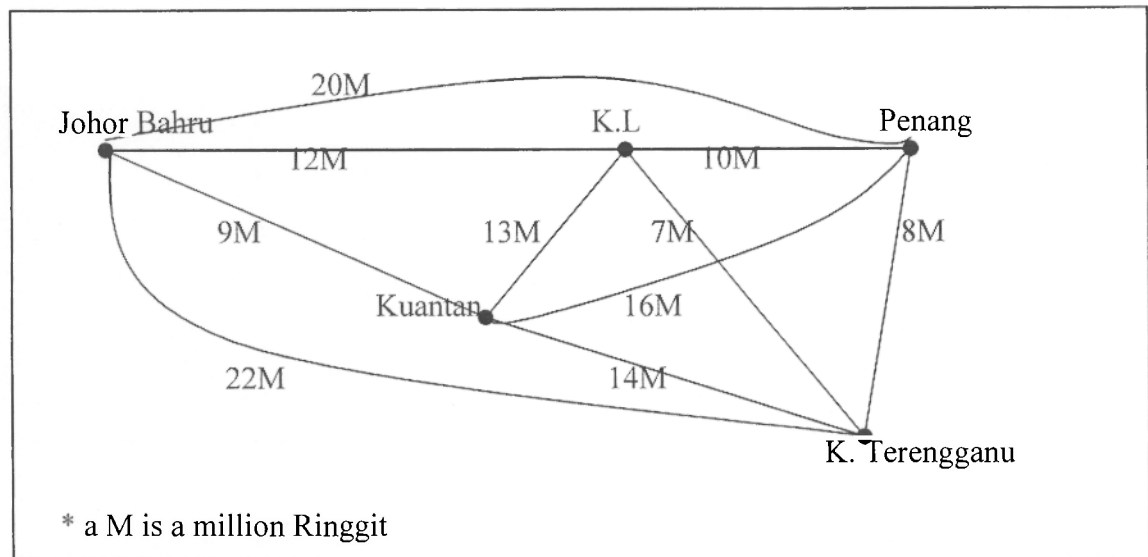


Figure Q3 (a)

(5 marks)

- (b) Find a spanning tree with minimal total weight containing the edges $\{e,i\}$ and $\{g,k\}$ in the weighted graph in **Figure Q3 (b)** below:

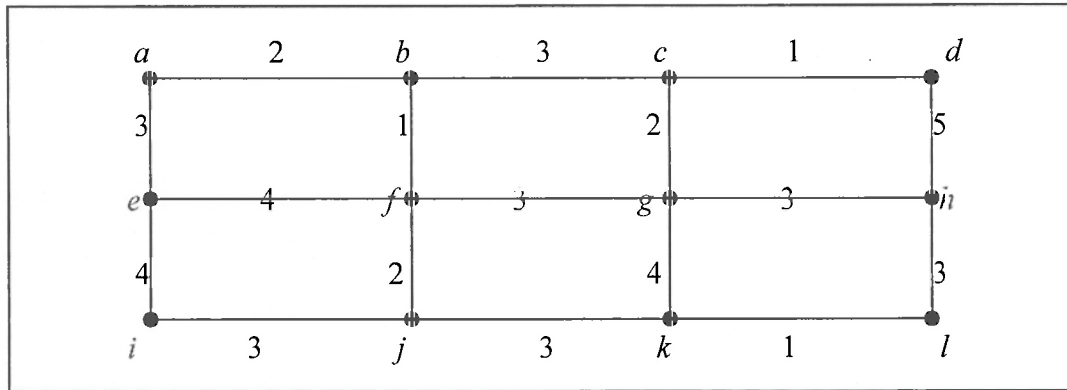


Figure Q3 (b)

(5 marks)

- Q4** (a) Describe how binary search work to search for 25 in the list below:

2 5 7 10 13 17 21 25 30 37 42

(5 marks)

- (b) Estimate the number of comparisons used by a binary search.
[suggestion: use appendix to support your answer]

(5 marks)

FINAL EXAMINATION

SEMESTER / SESSION: SEM I / 2009/2010

COURSE : 3 BIT

SUBJECT : ALGORITHM ANALYSIS

CODE : BIT 3173

Formulae

Let f be an increasing function that satisfies the recurrence relation

$$f(n) = af(n/b) + c$$

Whenever n is divisible by b , where $a \geq 1$, b is an integer greater than 1, and c is a positive real number. Then

$$f(n) \text{ is } \begin{cases} O(n^{\log_b a}) & \text{if } a > 1 \\ O(\log n) & \text{if } a = 1 \end{cases}$$

Furthermore, when $n = b^k$, where k is a positive integer ,

$$f(n) = C_1 n^{\log_b a} + C_2$$

where $C_1 = f(1) + c/(a-1)$ and $C_2 = -c/(a-1)$