



注意事項：

1. 【答案】請書寫於答案卷上，且不可書寫任何可辨別個人姓名或特殊標記，違反者以零分計算。
2. 答案卷書寫題號依序作答，不必抄題。
3. 請於試題紙上填寫准考證號碼，繳卷時「試題」、「答案卷」一併繳回。

(每題 10 分，共 100 分)

1. The following graph G has

$$V(G) = \{a, b, c, d, e, f, g, h, i, j\}$$

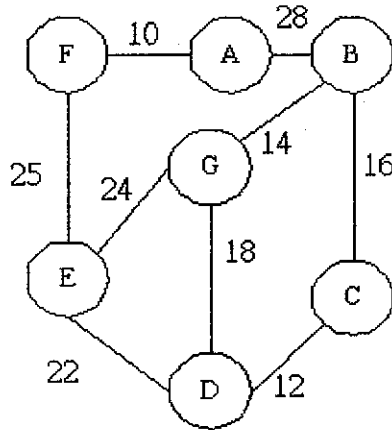
$$E(G) = \{(a, b), (b, c), (b, d), (c, e), (d, e), (d, f), (f, g), (f, h), (g, h), (h, i), (h, j)\}$$

Answer the following questions:

- (a) Find the spanning tree of G using the depth-first strategy beginning with vertex a.
- (b) Find the spanning tree of G using the breadth-first strategy beginning with vertex a.

2. Compare multiprogramming and multitasking.

3. Use Prim algorithm to draw the minimum cost spanning tree and calculate the minimum cost.



4. Why do relational databases need normalization? What would happen without normalization? What are its purposes?

5. Explain the SDLC. What is the SDLC step?

6. Explain the differences between stacks and queues.

7. Draw the binary search tree that will be constructed for the list of 8 numbers presented in the following orders and inserted into a previously empty binary search tree. Besides, calculate the average searching cost of the constructed binary search tree.

6, 2, 37, 15, 9, 7, 11, 20.

8. Please answer the following questions about operating system:

- (a) What is the deadlock problem?
- (b) Describe what conditions hold, the deadlock will arise?
- (c) Please give the solution to solve deadlocks when deadlock happened.

9. Describe "Two-phase Locking Protocol" and "Timestamp-based Protocol", respectively.

10. What is the purpose of translation look-aside buffer (TLB)? Please explain the difference between "TLB Miss" and "Page Fault".