

所別：網路學習科技研究所碩士班 科目：計算機概論

1. Create the heap tree for the following given keys: 9, 5, 3, 2, 7, 6, 14, 8, 13, 10. (5%)
2. Select data structures or algorithms from (a) to (k) to implement the following applications. Each application might have multiple choices. (10%)
  - 2-1. Database query optimizers frequently used it to index records.
  - 2-2. The dictionary look-up function that needs the index of words.
  - 2-3. The job scheduler that plans a serial schedule to execute jobs according to the precedence relationship between these jobs.
  - 2-4. A network routing protocol in which the routing algorithm must select an optimal path from source nodes to destination nodes.
  - 2-5. A calculator that must deal with the operator precedence and parenthesis
- (a) Stack (b) Queue (c) Splay Tree (d) Lexicographic search tree  
(e) AVL Tree (f) B-tree (g) Red-black tree (h) Kruskal's algorithm  
(i) Hashing (j) Dijkstra's algorithm (k) Topological sorting
3. What are threads? Describe a situation in which your program must contain several threads. (5%)
4. Name three frequent-used classes of objects such as *textfield* when you are programming a graphical user interface (or windows programming). (5%)
5. Describe the difference between User Datagram Protocol (UDP) and Transmission Control Protocol (TCP). (5%)
6. Socket is an entity for sending and receiving message between two end points on the Internet. Describe what attributes you should specify when you try to use a socket to send a message to a remote host. (5%)
7. Explain the following terms and relationship between them:
  - a. Blog and Web log (5%)
  - b. Wiki and Wikipedia (5%)
  - c. P2P and Client-server(5%)
8. (25%)

```
class A extends Thread {
    String[] sa;
    public A(String[] sa) {this.sa = sa;}
    public void run() {
        synchronized (sa) {
            while (!sa[0].equals("Done")) {
                try {sa.wait();} catch (InterruptedException ie) {}
            }
        }
        System.out.print(sa[1] + sa[2] + sa[3]);
    }
}
```

注意：背面有試題

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```
class B {
    private static String[] sa = new String[]{"Not Done", "X", "Y", "Z"};
    public static void main (String[] args) {
        Thread t1 = new A(sa); t1.start();
        synchronized (sa) {
            sa[0] = "Done";
            sa[1] = "A"; sa[2] = "B"; sa[3] = "C";
            sa.notify();
        }
    }
}
```

What is the result of attempting to compile and run the program? Why?

- a. Prints: XYZ
- b. Prints: AYZ
- c. Prints: ABZ
- d. Prints: ABC
- e. Compile-time error
- f. Run-time error
- g. None of the above

9. (25%)

```
class MWC201 {
    public static void main(String[] args) {
        int[][] a1 = {{1,2,3},{4,5,6},{7,8,9,10}};
        System.out.print(a1[0][2]+","+a1[1][0]+","+a1[2][1]);
    }
}
```

What is the result of attempting to compile and run the program? Please explain it?

- a. Prints: 3,4,8
- b. Prints: 7,2,6
- c. Compile-time error
- d. Run-time error
- e. None of the above