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UNIVERSITI SAINS MALAYSIA

First Semester Examination  
Academic Session 2001/2002

September 2001

**CIT502 – Object-Oriented Programming and Software Engineering**

Duration : 3 hours

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**INSTRUCTION TO CANDIDATE:**

- Please ensure that this examination paper contains **FOUR** questions in **FIVE** printed pages before you start the examination.
  - Answer **ALL** questions.
  - You can choose to answer either in Bahasa Malaysia or English.
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ENGLISH VERSION OF THE QUESTION PAPER

1. (a) Methods can be easily implemented either recursively or iteratively. Compare the two approaches and discuss why a programmer might implement one approach over the other.

[6/100]

- (b) Write the equivalent **while** loop for the following **for** loop and describe what the segment does.

```
i. for (int x=19; x<=1; x+=2)
    System.out.println(x);
```

[6/100]

- (c) What will be printed when the following codes are executed?

```
int m[ ][ ] = {{2, 4, 6}, {1, 3, 5}, {3, 9, 27}, {8, 16, 24}};
int k[ ][ ];
k= new int [3][4];
```

```
for (int i=0; i < 4; i++) {
    for (int j=0; j < 3; j++) {
        switch (i) {
            case 0 :
                k[j][i] = m[i][j] - 1;
                break;
            case 1 :
                k[j][i] = m[i][j] + 3;
                break;
            case 2 :
                k[j][i] = m[i][j] / 3;
                break;
            case 3 :
                k[j][i] = m[i][j]++;
                break;
        } /* end switch */
    }
}
```

```
for (int i=0; i < 3; i++) {
    System.out.println( );
    for (int j=0; j<4; j++) {
        System.out.print(k[i][j]);
    }
}
```

[7/100]

- (d) What does the following segment do?

```

for (int i=1; i<=3; i++){
    for (int j=1; j<=4; j++){
        for (int k=1; k<=5; k++)
            System.out.print (“#”);
        System.out.println();
    }
    System.out.println();
}

```

[6/100]

2. (a) Write a program segment that will swap the contents of two variables.

[3/100]

- (b) Write an applet that reads 10 numbers (each between 1 and 70) and store this in an array. For each number read, your program should draw a line containing that number of adjacent asterisks. For example, if your program reads the number the number seven, it should print \*\*\*\*\*.

[11/100]

- (c) The Fibonacci series may be defined recursively as follows:

$$\begin{aligned} \text{fibonacci}(0) &= 0 \\ \text{fibonacci}(1) &= 1 \\ \text{fibonacci}(n) &= \text{fibonacci}(n-1) + \text{fibonacci}(n-2) \end{aligned}$$

Write a recursive method that will produce Fibonacci(n) and show how the method would evaluate for n=5.

[11/100]

3. (a) Draw a class diagram to show the relationship between project, activity, task, work product and resources in software engineering concepts.

[5/100]

- (b) Explain briefly the following terminologies:

- (i) Super-class
- (ii) Card CRC (“class-responsibility-collaboration”)
- (iii) Polymorphism
- (iv) Aggregation

[4/100]

- (c) Models are used to represent the real world. They can be categorized into three main types: the functional model, the object model and the dynamic model. Explain each of them.

[6/100]

- (d) A mathematics text book consists of the title page, the contents list, chapters and the index. Each chapter has a title, sections and possibly subsections. Each of these is made up of paragraphs, which can be either text or formulae.

Draw a class diagram to represent this information.

[5/100]

- (e) Read the following scenario and draw a sequence diagram to represent what happens in the paragraph below:

Little Miss Muffet sat on a chair  
 Eating her satay  
 There came a big spider which sat down beside her  
 And frightened Miss Muffet away

[5/100]

4. The Cinderella Dress Agency hires out top quality evening wear at top quality prices. Clients usually phone some weeks before an event to make an appointment to choose a gown. At this stage the staff at Cinderella simply record the date and time of the appointment, the type of event and the client's name and phone number. Once the client has chosen a gown, a reservation is made recording the gown reference, client details and the date the gown is required. At this stage the client has to pay a 10% deposit of the hire fee. When the gown is collected, the client pays for the hire in full, plus a further deposit for the gown; this is reimbursed when the gown is returned. For established clients, details are also kept of their size, age and the type of gowns they prefer.

- (a) Draw a class diagram to represent this information.

[5/100]

- (b) (i) List attributes and operations for the following classes:

- (1) Reservation
- (2) Appointment
- (3) Client
- (4) Established client

[4/100]

- (ii) Write the declaration of classes above in JAVA.

[4/100]

- (c) Write a scenario to show what happens when a client reserves a gown for an event.

[3/100]

- (d) Draw a sequence diagram to represent the information in the scenario.

[3/100]

- (e) Gowns are bought in new by the dress agency and are then available for hire. After each hiring a gown is cleaned. Gowns that become damaged are disposed of and those that are unpopular or become unfashionable are withdrawn and given to the local charity shop.

Draw a state diagram to represent this information about a gown.

[6/100]