



UNIVERSITY OF COLOMBO, SRI LANKA

UNIVERSITY OF COLOMBO SCHOOL OF COMPUTING

DEGREE OF BACHELOR OF INFORMATION TECHNOLOGY (*EXTERNAL*)

*Academic Year 2004/2005 – 2<sup>nd</sup> Year Examination – Semester 3*

***IT3102 – Object-Oriented Systems Development***

***PART 1 - Multiple Choice Question Paper***

**5<sup>th</sup> March, 2005**

**(ONE AND A HALF HOURS)**

**Important Instructions:**

- The duration of the paper is **1 ½ (one and a half) hours**.
- The medium of instruction and questions is English.
- The paper has **35** questions and **12** pages.
- All questions are of the MCQ (Multiple Choice Questions) type.
- All questions should be answered.
- Each question will have 5 (five) choices with one or more correct answers.
- All questions will carry equal marks.
- There will be a penalty for incorrect responses to discourage guessing.
- The mark given for a question will vary from -1 (*All the incorrect choices are marked & no correct choices are marked*) to +1 (*All the correct choices are marked & no incorrect choices are marked*).
- Answers should be marked on the special answer sheet provided.
- Note that questions appear on both sides of the paper.  
If a page is not printed, please inform the supervisor immediately.
- Mark the correct choices on the question paper first and then transfer them to the given answer sheet which will be machine marked. **Please completely read and follow the instructions given on the other side of the answer sheet before you shade your correct choices.**

**In questions 1-5, fill in the blanks with the most appropriate answer.**

- 1) The ..... is a construct for describing how a system will look to potential users.

(a) use Case	(b) actor	(c) class
(d) component	(e) package	

- 2) ..... diagrams visualize use cases and facilitate communication between analysts and users as well as between analysts and clients.

(a) Package	(b) Object	(c) State
(d) Class	(e) Use Case	

- 3) .....relationship specifies a whole-part association.

(a) A generalization	(b) An inheritance	(c) A multiple inheritance
(d) An aggregation	(e) An extend	

- 4) A UML state diagram presents the states an object can be in along with the ..... between the states and shows the starting point and end point of a sequence of state changes.

(a) associations	(b) aggregations	(c) realizations
(d) dependencies	(e) transitions	

- 5) In UML, the entity that initiates a use case is called .....

(a) a state.	(b) an actor.	(c) a class.
(d) a component.	(e) an object.	

- 6) Which of the following statements is/are correct regarding Visual Modelling with UML and Rational Rose?

(a) UML is a notation system that has become the standard in the system development world.
(b) Visual Modelling has a common vocabulary called the Unified Modelling Language.
(c) UML usecase model describes what a system is supposed to do, and how the system is implemented.
(d) Rational Rose has the capability to create models from existing components and applications, also known as forward engineering.
(e) Data Structure diagram is a new diagram in UML.

- 7) Which of the following statements is/are correct regarding Object Oriented Methodologies?

(a) Rational Unified Process (RUP), Shlaer Mellor and Extreme Programming are object oriented methodologies.
(b) RUP places strong emphasis on building systems based on a thorough understanding of how the delivered system will be used.
(c) Inception phase of RUP establishes the business case for the project.
(d) At the end of the inception phase, the life cycle objectives of the project are examined to decide whether to proceed with full- scale development.
(e) During the Elaboration phase of RUP, emphasis is placed on managing resources and controlling operations to optimise costs, schedules and quality.

8) Considering the following statements in relation to Use Case modelling, identify the correct statements.

- (a) A Use Case diagram models the users' expectations for using the system.
- (b) Actors represent anyone or any thing that must interact with the system.
- (c) *Include* relationship shows the compulsory behavior of a Use Case.
- (d) Use Case diagrams provide a simple and easily understood way for clients to view their requirements.
- (e) The goal of a Use Case diagram is to identify all the features which the clients expect the system to support and reveals all the details about the implementation of these features.

9) Which of the following statements is/are correct regarding identifying Classes, and drawing a Class diagram?

- (a) Class diagrams define the essential resources of a system and the relationships between them.
- (b) A Stereotype is a mechanism one can use to categorize classes.
- (c) *Entity* and *Boundary* are the two primary Class stereotypes in UML.
- (d) A Class is a category of things which has the same attributes and the same behaviours.
- (e) *Classes* represent the concepts which are to be modelled.

10) Consider the following statements in relation to object oriented concepts:

- (i) *Abstraction* means, simply to filter out an object's properties and operations until just those needed are left.
- (ii) *Encapsulation* means that an object hides what it does from other objects and from the outside world.
- (iii) *Objects* communicate with each other through message interactions.

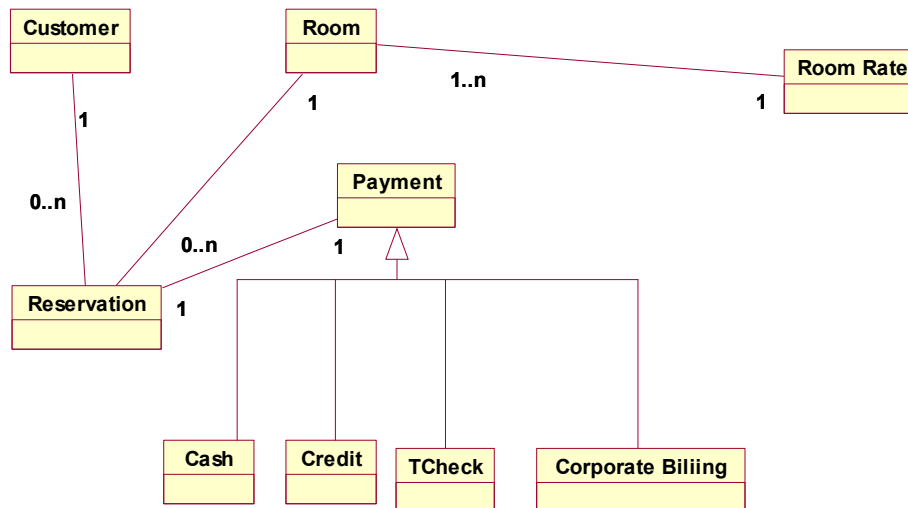
Which of the above statements is true?

- |                         |                        |                       |
|-------------------------|------------------------|-----------------------|
| (a) Only (i)            | (b) Only (i) and (iii) | (c) Only (i) and (ii) |
| (d) Only (ii) and (iii) | (e) All                |                       |

11) Which of the following statements is/are correct?

- (a) Communication diagrams show object interactions organized around the objects and their links to each other.
- (b) A collaboration diagram shows the physical architecture of a computer based system.
- (c) A composite structure diagram models the internal structure of classes.
- (d) An interaction Overview diagram is drawn to show how long an object is in a state.
- (e) In UML 2.0, the collaboration diagram is renamed as communication diagram.

Questions 12-13 will be based on the following diagram.



12) Which of the following statements is/are true about the above diagram?

- (a) It shows a set of classes drawn from an information system for a Hotel.
- (b) It shows a set of objects drawn from an information system for a School.
- (c) There is an association between *Room* and *Reservation*, specifying that a room has one reservation.
- (d) One reservation will be related to one room.
- (e) There is a composite relationship between the *Room* and the *Reservation* classes.

13) Which of the following statements is/are correct regarding the given diagram?

- (a) The relationship between *Cash* and *Payment* is a *generalization* relationship.
- (b) The relationship between *Customer* and *Reservation* is a simple *aggregation* relationship.
- (c) The relationship between *Customer* and *Reservation* is a *composition* relationship.
- (d) The relationship between *Payment* and *Reservation* is an *association* relationship.
- (e) There is a composite relationship between *Payment* and *Credit* classes.




14) Consider the following statements related to UML 2.0.

- (i) Composite Structure Diagram, Interaction Overview Diagram and the Timing Diagram are new in UML 2.0.
- (ii) State relevant symbols called connection points represent points of entry into a state or exits out of a state.
- (iii) Framing in a sequence diagram gives a quick and easy way to reuse part of one sequence diagram in another.

Which of the above statements is/are correct ?

- |                        |                         |                       |
|------------------------|-------------------------|-----------------------|
| (a) Only (i)           | (b) Only (ii) and (iii) | (c) Only (i) and (ii) |
| (d) Only (i) and (iii) | (e) All                 |                       |

15) Consider the following statements related to UML 2.0 :

- (i)  symbol in Activity diagrams represents the end of a specific sequence of activities.
- (ii)  symbol represents a component in Component diagrams.
- (iii)  symbol represents the passage of time in Activity diagrams.

Which of the above statements is/are correct?

- |                        |               |                         |
|------------------------|---------------|-------------------------|
| (a) Only (i) and (ii)  | (b) Only (ii) | (c) Only (ii) and (iii) |
| (d) Only (i) and (iii) | (e) All       |                         |

16) Which of the following is/are correct regarding diagrams in UML?

- |  |
|--|
| (a) A Sequence diagram and a collaboration diagram are both called communication diagrams.   |
| (b) A message in a communication diagram can be represented by placing an arrow near the association line that joins the two objects.      |
| (c) In an activity diagram, a swimlane is a segment that shows the activities performed by a particular role.                              |
| (d) A sequence diagram shows the sequence of messages exchanged between the objects needed to carry out the functionality of the scenario. |
| (e) The focus of control is a small rectangle that will let one know which object has control at a particular point in time.               |

17) Consider the following statements related to UML.

- (i) Time is represented in a sequence diagram as proceeding in the downward direction.
- (ii) A Communication diagram is used in UML to model the static aspect of a system.
- (iii) A Sequence diagram is used in UML to model the dynamic aspects of systems.

Which of the above statements is/are correct?

- |               |                       |                        |
|---------------|-----------------------|------------------------|
| (a) Only (i)  | (b) Only (i) and (ii) | (c) Only (i) and (iii) |
| (d) Only (ii) | (e) All               |                        |

18) Select from among the following, the correct statement(s) regarding C++.

- |   |
|---|
| (a) C++ variables must begin with a letter or a number.                                 |
| (b) <i>delete</i> is a valid variable.  |
| (c) Both <i>#int1</i> and <i>_float</i> are valid variables.                            |
| (d) C++ keywords cannot be used as variable names.                                      |
| (e) Data members in class, unless specified otherwise, are by default, <i>private</i> . |

19) Select from among the following, the correct statement(s) regarding UML diagrams.

- (a) Sequence diagrams and Collaboration diagrams model the same two elements: messages and objects.
- (b) Focus of control can only be shown on a communication diagram.
- (c) A communication diagram is an interaction diagram that emphasizes the time ordering of messages.
- (d) In UML, an object in a sequence diagram is drawn as a rectangle containing the name of the object, underlined.
- (e) UML diagrams can be drawn using the modelling tool 'Microsoft Visio'.

20) Consider the following program:


```
#include <iostream.h>
void main ()
{
    int loop=1;
    do {
        cout<<" Loop="<<loop; loop++; break;
    }
    while(loop<5);
}
```


Identify, from among the following, the correct descriptions in connection with the above program.

- (a) The loop is of the non-terminating type.
- (b) When executed, the program displays the following.  
Loop=1
- (c) If *break* is replaced with *continue*, the loop will never be terminated.
- (d) If *break* is replaced with *continue*, the program will display the following:  
Loop=1 Loop=2 Loop=3 Loop=4
- (e) The loop body will be repeated 4 times.

21) Select from among the following, the correct statement(s) related to state transition diagrams.

- (a) A state diagram focuses on the state changes in several objects.
- (b) The following are the two UML symbols used for initial and final states and these are two special states which may be defined for an object's state machine.  

  
Final State

  
Initial State
- (c) A rounded rectangle represent a state, and a line with an arrowhead represents a transition from one state to another.
- (d) A transition can occur in response to a trigger event and can entail an action.
- (e) A triggerless transition is a transition that occurs because of activities within a state, rather than in response to an event.

- 22) Consider the following statements in relation to state diagrams in UML:
- (i) A UML state diagram provides a variety of symbols and encompasses a number of ideas, to model the changes which just one object goes through.
  - (ii) An event in a state diagram is an occurrence that causes a transition.
  - (iii) The following is the UML state symbol with only the name of the compartment shown.

Reserved

Which of above statements is/are correct?

- |                        |                       |                         |
|------------------------|-----------------------|-------------------------|
| (a) Only (i) and (iii) | (b) Only (i) and (ii) | (c) Only (ii) and (iii) |
| (d) Only (iii)         | (e) All               |                         |

- 23) Consider the following incomplete statements related to structure and behaviour of an object in UML:

- (i) A/An ..... is a property of a class which describes the range of values that the property may hold in objects.
- (ii) The following is an example of a/an ..... attribute in UML.
  - *radius :integer*
- (iii) A/An ..... is the UML symbol used for *protected* attributes in objects.

Identify from among the following, the correct order to fill the above blanks.

- |                                  |                                     |                                |
|----------------------------------|-------------------------------------|--------------------------------|
| (a) attribute, <i>public</i> , # | (b) attribute, <i>private</i> , #   | (c) service, <i>public</i> , # |
| (d) service, <i>private</i> , +  | (e) attribute, <i>protected</i> , + |                                |

- 24) Some questions related to UML with possible answers are given below.

- (i). How does one represent multiplicity in class diagrams?  
At one end of the association line, one puts the number of objects from the class at the end that relates to one object in the class at the other end.
- (ii). Describe a way of representing the relationship between a component and its interface in UML.  
One can use a small circle to represent the interface, connected by a solid line to the component.
- (iii). Which UML diagram is appropriate for modelling a business process?  
A UML activity diagram is the one appropriate for modelling business processes.

Which of the above question-answer combinations is/are valid?

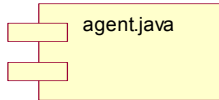
- |                        |                         |                       |
|------------------------|-------------------------|-----------------------|
| (a) Only (iii)         | (b) Only (ii) and (iii) | (c) Only (i) and (ii) |
| (d) Only (i) and (iii) | (e) All                 |                       |

- 25) Consider the following incomplete statements related to architectural views in UML:
- (i) ..... addresses what the system should provide in terms of the services to its users.
  - (ii) ..... focuses on the run-time implementation structure of the system and addresses the performance, scalability and throughput of the system.
  - (iii) ..... is used for distributed systems only.
  - (iv) ..... demonstrates and validates the logical, process, component and deployment views.
  - (v) ..... addresses the actual software module organization within the development environment.

Identify from among the following, the correct order to fill the above blanks.

- (a) Logical view, Component view, Deployment view, Implementation view, Implementation view
- (b) Use case view, Implementation view, Process view, Implementation view, Component view
- (c) Use case view, Process view, Deployment view, Use case view, Implementation view
- (d) Logical view, Process view, Deployment view, Use case view, Implementation view
- (e) Use case view, Process view, Component view, Use case view, Component view

- 26) Select from among the following, the correct statement(s) in relation to component diagrams and deployment diagrams.

- (a) A Component diagram models physical implementation of the software.
  - (b) The UML 2.0 notation for a *component* is given below.
- 
- (c) A component provides interfaces which allow other components to access it.
  - (d) The main item in a deployment diagram is a *node* which is a generic name given for a computing resource.
  - (e) A complete description of the system is most likely to contain a number of different deployment diagrams, each focused on a different aspect of the system management.

- 27) Examine the contents of the following **Column A** against those of **Column B**.

Column A	Column B
(i) It is a segment in an activity diagram that shows the activities performed by a particular role.	(A) Implementation view
(ii) Is part of a sequence diagram	(B) Swimlane
(iii) A combination of modelling techniques from activity diagrams and interaction diagrams	(C) Interaction fragment
(iv) It is like a flow chart.	(D) Activity diagram
(v) Programming Language, Database access method of the system etc., are decided.	(E) Interaction overview diagram

The following gives a matching of the contents of **Column A** with those of **Column B**.

- (a) (i)-B, (ii)-C, (iii)-A, (iv)-E, (v)-D
- (b) (i)-B, (ii)-C, (iii)-E, (iv)-A, (v)-D
- (c) (i)-C, (ii)-B, (iii)-D, (iv)-A, (v)-E
- (d) (i)-D, (ii)-A, (iii)-B, (iv)-C, (v)-E
- (e) (i)-B, (ii)-C, (iii)-E, (iv)-D, (v)-A



- 28) The following variable type in C++ allows one to return large data structures via methods without the overhead of copying them.

(a) friend	(b) static	(c) reference
(d) new	(e) free	

- 29) Some questions related to UML with possible answers are given below.

- (i) What is the type of the arrow used to model inclusion and extension?  
A dependency arrow.
- (ii) How does one model inclusion and extension?  
For inclusion arrow should be labelled with the keyword <<inclusion>> and for extension it should be labelled with the keyword <<extension>>.
- (iii) In a sequence diagram, how does one show an *activation* and what does it represent?  
*Activation* is represented by a small narrow rectangle on an object's life line. It represents the time period during which the object performs an action.

Which of the above question-answer combinations is/are valid?

(a) Only (ii)	(b) Only (iii)	(c) Only (i) and (iii)
(d) Only (ii) and (iii)	(e) All	

- 30) Identify from among the following the correct statement(s) related to C++.

- |   |
|---|
| <p>(a) In the following program segment, <i>i</i> will be converted to a double and then assigned to <i>d</i>.<br/>double d; int i;<br/>d=i;</p> <p>(b) In the following program segment, fractional part of <i>d</i> will be discarded.<br/>double d; int i;<br/>i=d;</p> <p>(c) If <i>i</i> is an <i>int</i>, then<br/>( <i>double</i> ) <i>i</i> will cast the value of <i>i</i> so that the expression has type <i>double</i>. Variable <i>i</i> itself remains unchanged.</p> <p>(d) C++ variables can be declared anywhere within a program, before they are used.</p> <p>(e) <code>::</code> is called the scope resolution operator in C++.</p> |
|---|

- 31) Consider the following program.

```
#include <iostream>
using namespace std;
void Default(int=5, float= 11.5);

void main ()
{
    Default(10);
}
```

```
void Default(const int x, const float y)
{
    cout<<x*y<<"\n";
}
```

Which of the following would be correct about the above program?

(a) gives 57.5 as the output	(b) gives 50 as the output	(c) gives 110 as the output
(d) has a compilation error	(e) gives 115 as the output	

32) Consider the following program.

```
#include <iostream.h>
class baseClass
{
protected: int a,b;
public :
    baseClass(int i, int j)
    {
        a=i; b=j;
    }
    void show()
    {
        cout<<a<<' '<<b<<"\n";
    }
};
```

```
class derivedClass : public baseClass
{
    int c;
public :
    derivedClass( int x, int y, int z):
    baseClass(x,y)
    {
        c=z;
    }
    void show()
    {
        cout<<a<<' '<<b<<" "<<c<<"\n";
    }
};
void main()
{
    baseClass ob1(3,4); derivedClass ob2(1,2,5);
    ob2.show(); ob1.show();
}
```

From among the following identify the correct statement(s).

- (a) The program displays the following output.  
1 2 5  
3 4
- (b) The program displays the following output.  
3 4  
1 2 5
- (c) If the base class *show* function is removed from the given program, it will give the following output.  
1 2  
3 4
- (d) If the derived class *show* function is removed from the given program, it will give the following output.  
1 2  
3 4
- (e) If the derived class *show* function is removed from the given program, it will give a compilation error.

33) Consider the following program.

```
#include <iostream.h>

void disp();
int sum(int,int);

void main()
{
    int x,y,s;
    cin>>x;
    cin>>y;
    s=sum(x++,y++);
    cout<< s <<"\n";
    s=sum(x++,y++);
    cout<<s<<"\n";
    disp();
}
```

```
static int c=0;
int sum(int a,int b)
{
    c = a + b + c;
    return(c);
}

void disp()
{
    cout<<c;
}
```

Which of the following will be correct?

- (a) If x=2 and y=3, the program will display the following:  
5  
12  
12
- (b) If x=1.5 and y=2.5, the program will display the following:  
1  
4  
4
- (c) If x='A' and y='B', the program will give a compilation error.
- (d) If *disp()* function call in the main function is replaced with the statement *cout<<c*, the program will give a compilation error.
- (e) If *disp()* function call in the main function is replaced with the statement *cout<<c*, the program will display 0 for variable c.

Questions 34-35 will be based on the following program.

34) Consider the following program.

```
# include <iostream.h>
class Bclass
{
public: int a,b;
    Bclass(int i, int j)
    {
        a=i;
        b=j;
    }
};

int sum(Bclass x)
{
    return x.a+x.b;
}

void main()
{
    Bclass n(3,2);
    cout<<sum(n);
}
```

Which of the following would be correct about the above program?

- |                             |                             |                            |
|-----------------------------|-----------------------------|----------------------------|
| (a) has a compilation error | (b) gives 5 as the output   | (c) gives 12 as the output |
| (d) gives 0 as output       | (e) gives 3, 2, 5 as output |                            |

35)

If the integer data members  $a$  and  $b$  are declared as private, Which of the following would be correct about the above program?

- |                             |                           |                        |
|-----------------------------|---------------------------|------------------------|
| (a) has a compilation error | (b) gives 5 as output     | (c) gives 12 as output |
| (d) gives 0 as output       | (e) gives 3,2,5 as output |                        |

\*\*\*\*\*