UNIVERSITY OF COLOMBO, SRI LANKA

UNIVERSITY OF COLOMBO SCHOOL OF COMPUTING

DEGREE OF BACHELOR OF INFORMATION TECHNOLOGY (*EXTERNAL*)

Academic Year 2005/2006 – 2nd Year Examination – Semester 3

IT3102 – Object-Oriented Systems Development
PART 1 - Multiple Choice Question Paper

18th March, 2006
(ONE AND A HALF HOURS)

<u>Important Instructions:</u>

- 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 <u>one or more</u> 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 that helps analysts to work with users to determine system usage.

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

2) The UML …………. diagram provides a variety of symbols and encompasses a number of ideas, all to model the changes which just one object goes through.

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

3) …………relationship specifies an optional behaviour.

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

4) …………. literally means 'many forms', the concept that different objects can respond to the same message in different ways.

(a) Composition	(b) Aggregation	(c) Inheritance
(d) Encapsulation	(e) Polymorphism	

5) Objects hide their inner workings of their operations from the outside world and from other objects. This is called ………………..

(a) composition	(b) encapsulation	(c) generalization.
(d) polymorphism	(e) an object.	

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

(a) Program Structure diagram is a new diagram in UML 2.0.
(b) Visual Modelling is an abstraction that portrays the essentials of a system, making the problem easier to understand.
(c) The 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 reverse engineering.
(e) Each UML diagram provides the development team with a different perspective of the information system.

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

(a) Gane and Sarson, Shlaer Mellor and Extreme Programming are object oriented methodologies.
(b) RUP activities emphasize the creation and maintenance of models rather than paper documents.
(c) Establishment of the project plan and the architecture is done during the Elaboration phase of RUP .
(d) During the Elaboration phase, the focus turns towards analysis and design.
(e) During inception, it is common to create an executable prototype that serves as a proof of concept.

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

> (a) Use Case is a construct that helps analysts to work with users to determine system usage.
> (b) Actors represent anyone or any thing that must interact with the system.
>
> (c) *Extends* relationship shows the compulsory behavior of a Use Case.
> (d) A scenario is a collection of use cases initiated by an actor.
>
> (e) Scenario is another term used for a Use Case.

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

> (a) A Class diagram is a graphical illustration of a system's static object structure, showing object classes which the system is composed of as well as the relationships between those object classes.
> (b) A class is a set of objects which share common attributes and behaviour.
> (c) *Entity* and *Boundary* are the only two primary Class stereotypes in UML 2.0.
> (d) An aggregation relationship is discovered in a Class diagram when one finds classes in the initial model which have common attributes and operations.
> (e) Class diagrams show general definitional information about classes whereas an Object diagrams are used to model specific instances of classes at specific instants in time.

10) Consider the following statements in relation to Object Oriented concepts:

> (i) *Encapsulation* states that when designing an object, one should separate what he knows about the object according to the following :
> - The minimum information needed to use the object.
> - The information required to make the object work properly.
> (ii) In polymorphism an operation can have the same name in different classes, and proceed differently in each class.
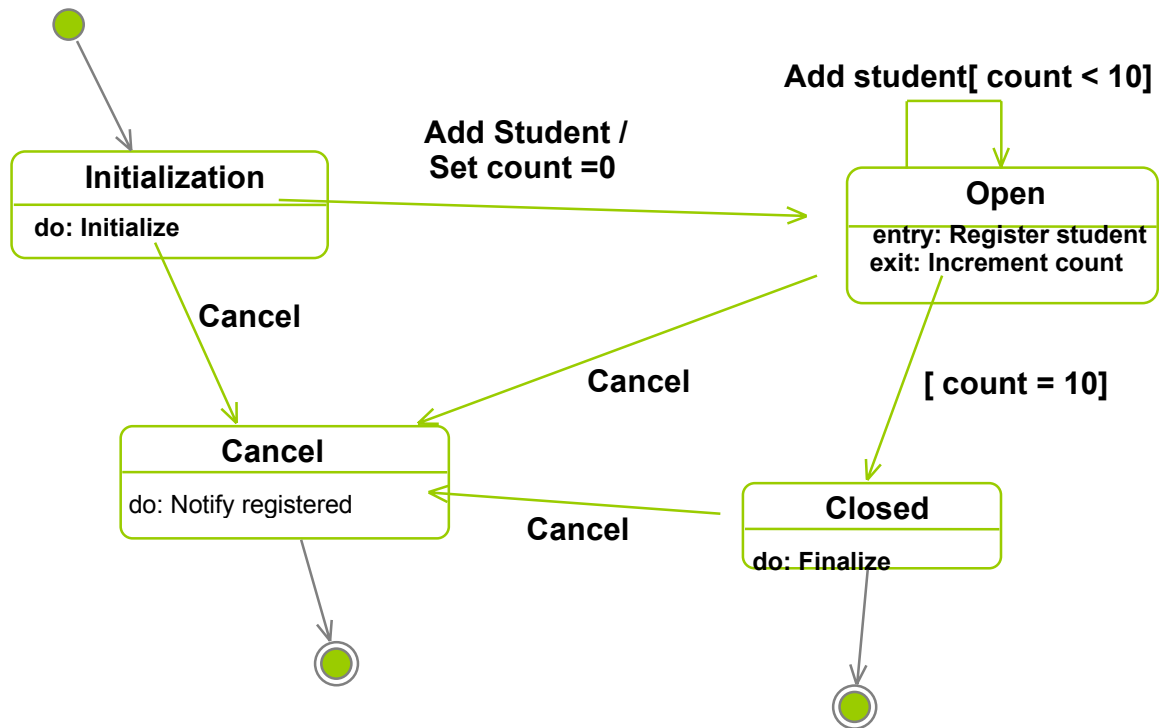> (iii) *Objects* communicate with each other through message interactions.

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) Composite Structure diagrams in UML 2.0 show object interactions organized around the objects and their links to each other.
> (b) A Communication diagram shows the physical architecture of a computer based system.
> (c) Component Diagrams contain mainly *components*, *interfaces* and *relationships*.
> (d) A Timing diagram is drawn to show how long an object is in a state.
> (e) An Interaction Overview diagram combines the flow control from an activity diagram with the message specification from the sequence diagram.

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

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Add student[count < 10]

Initialization

do: Initialize

Add Student /
Set count =0

Open

entry: Register student
exit: Increment count

Cancel

Cancel

[count = 10]

Cancel

do: Notify registered

Cancel

Closed

do: Finalize

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

> (a) It shows a State diagram for the *course* object in a Course Registration system.
> (b) It shows a set of objects drawn from an information system for a School Registration system.
> (c) Cancel and Add student are Use Cases.
> (d) 'Bulls Eye' symbols indicate stop states.
> (e) 'Solid Circle' symbol indicate the start state

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

> (a) Entry action is an action that accompanies all state transitions into a state.
> (b) *Exit : increment count* is an action that accompanies a state transition out of a state.
> (c) *Notify Registered* is an *action* that occurs when the state changes to cancel.
> (d) *Notify Registered* is an *event* that occurs when the state changes to cancel.
> (e) The diagram is an example for an activity diagram.

14) | Consider the following statements related to UML 2.0.

   (i) Composite Structure Diagram, Interaction Overview Diagram and Timing Diagram are new in UML 2.0.
  (ii) A composite structure diagram shows the components of a class as a diagram nested inside a large class rectangle.
  (iii) UML 2.0 takes the interface concept a step further by allowing one to model the connection between an interface and a class.

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 represents the passage of time in Activity diagrams.

(ii) ◯ is a symbol used in State diagrams to represent entry points to a state.

(iii) ⊗ symbol represents an exit point in State 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 2.0?

(a) A Sequence diagram is called a communication diagram in UML 2.0.
(b) Component diagrams are implementation-type diagrams which are used to graphically show the physical architecture of the software of the system.
(c) One can frame a sequence diagram by surrounding it with a border and adding a compartment in the upper left corner to contain information that identifies the diagram.
(d) Framing gives one a quick and easy way to reuse a part of a sequence diagram in another.
(e) A sequence diagram shows the sequence of messages exchanged between the objects needed to carry out the functionality of the scenario.

17) Consider the following statements related to UML 2.0.

(i) Time is represented in a sequence diagram in the vertical direction starting at the top and progressing towards the bottom.
(ii) A Communication diagram is another way of presenting the information in a sequence diagram.
(iii) The Communication diagram shows the associations among objects as well as the messages which pass from one object to another.

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 always begin with a letter .
(b) -*Var* is a valid variable.
(c) Both *int1* and *_float* are valid variables.
(d) C++ keywords in uppercase can be used as variable names.
(e) Data members in class, unless specified otherwise, are by default, *private*.

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

(a) Sequence diagrams and Communication diagrams model the same two elements: messages and objects.
(b) Focus of control can only be shown on a Sequence diagram.
(c) A Sequence 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) Deployment diagrams show the software components, processes and devices which make up the system's architecture.

20) Consider the following program:

```
#include <iostream.h>
    void main ()
    {
       int loop=-1;
       do {
           ++loop; cout<<" 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=0
(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 Loop=5
(e) The loop body will be repeated 5 times.

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

(a) A statechart diagram describes the life of one object in terms of the events which trigger changes in the object's state.
(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.

Initial State   Final State
(c) A statechart diagram identifies both the external events and internal events which can change the object's state.
(d) A statechart diagram models the events which trigger a transition from one state to another state.
(e) An event on a statechart diagram corresponds to a message on a sequence diagram.

22) Consider the following statements in relation to *Role names* in associations between two classes :
   (i) Role names have to be used with association names.
   (ii) If there is a relationship between *Company* and *Person* then one could use *Employee* or *Employer* as role names to convey an employment relationship.
   (iii) The role name is placed on the association near the class that it modifies.

   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) The following statements are related to *Role/Role names* in associations.
   (i) When one class associates with another, each one usually plays a role within that association.
   (ii) A Role name may be placed on one or both ends of an association line.
   (iii) If *Company* and *Person* are two classes in a class diagram that has an association relationship, one could use an association name called "employs" or the role names of "Employer" and "Employee" to convey an employment relationship.

   Which of the above statements is/are are correct?

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

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

   (i). What does it mean for a Use Case to include another Use Case?
      Including a Use Case means that one Use Case incorporates the steps of another Use Case.
   (ii). How do you represent an object's *lifeline* in a sequence diagram?
      The *lifeline* is a dashed line descending from an object that represents the existence over time of an object .
   (iii). Which of the following UML diagrams give a static view of a system?
      Class, Object, Use Case, State, Sequence
      Only Class, Object and Use Case Diagrams.

   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 multiplicity indicators and their meanings.

Indicator   Meaning
(i)   0..*   Zero or More
(ii)   1..*   One or More
(iii) 0..1   Zero or One
(iv)   4..7,9   4,5,6,7 or 9
(v)   1-2   1 or 2

Which of the above is/are correct?

(a) (i), (ii) and (iii) only
(b) (ii) and (iii) only
(c) (i),(ii),(iii) and (iv) only
(d) (i), (ii) and (iv) only
(e) All

26) Select from among the following, the correct statement(s) in relation to relationships between classes/objects in Class diagrams.

(a) An association is a unidirectional semantic connection between classes.
(b) An aggregation is a specialized form of association in which a whole is related to its part(s).
(c) Multiplicity is the number of instances which participates in a relationship.
(d) There are two multiplicity indicators for each association or aggregation one at each end of the relationship line.
(e) If a class is in an association with itself , the relationship is referred to as a reflexive association.

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

Column A	Column B
(i) It is the UML diagram that adds the dimension of time to object interactions.	(A) Communication Diagram
(ii) It is the diagram that has the overall framework of an activity diagram and interaction diagrams as activities.	(B) Interaction Overview Diagram (C) Composite Structure Diagram (D) Sequence diagram (E) Activity Diagram
(iii) It is like a flow chart which shows the steps, decision points and branches.	
(iv) It is the UML diagram that shows how objects are organized according to the links among objects.	

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

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

28) Which of the following is/are valid storage classes specifiers in C++ which tell the compiler how the variables are to be treated?

(a) auto   (b) extern   (c) volatile
(d) static   (e) register

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29) Some questions related to UML with possible answers are given below.
    (i) Q. What is the type of the arrow used in a sequence diagram to represent a message sent to the receiving object that involves a return message?
        A. A filled arrowhead at the end of a solid line
    (ii) Q. What is the type of arrow used to show a return message in a sequence diagram?
        A. Open-stick arrowhead with a dashed line
    (iii) Q. What is the type of arrow used to show an asynchronous message in a sequence diagram in which the sender transfers control to the receiver and does not wait for the operation to complete?
        A. Open-stick arrowhead

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++.

(a) The value that the following line of code places in the *total* variable is 67.
    int total =67.432;
(b) In the following program segment, fractional part of *d1* will be discarded.
    double d1=6.52; int i1;
      i1=d1;
(c) The following characters are permitted to be used in a C++ identifier.
    Letters, digits and underscore character
(d) *static* storage specifier is used to declare something that is defined elsewhere in the program.
(e) *A static* variable is initialized only once before the program can access it.

31) Consider the following program.

```
# include <iostream.h>                    void show(int f, float s, long t)
 void show(int=1,float=2.3, long =4);     {
                                            cout<<" "<<f;
int main()                                  cout<<" "<<s;
{                                           cout<<" "<<t; cout<<'\n';
  show();                                  }
  show(5);
  show(9,10.11, 12L);
return 0;
}
```

Which of the following would be the output of the above program?

(a) 1 2.3 4	(b) 1 2.3 4	(c) 1 2.3 4
5 0 0	1 2.3 4	5 2.3 4
9 10 12	1 2 3 4	9 10 12
(d) 1 2.3 4	(e) error	
5 2.3 4		
9 10.11 12		

32) Consider the following program.

```
#include <iostream.h>                    int GetRadius(void)
  class circle                           {
  {                                        return(radius);
    private :                             }
      int radius;
      float CalculateArea(void)            void DisplayArea(void)
      {                                    {
        return                              cout<<"Arear of the Circle"<<    CalculateArea();
(3.14*radius*radius);                      }
      }                                   ~circle() {}
    public :                             };
      int colour;
      circle(int r)                    void main(void)
      {                                {
        radius=r;                        circle Mycircle(5);
        colour=0;                        cout<< Mycircle.GetRadius()<<'\n';
      }                                  cout<< Mycircle.colour<<'\n';
    void SetRadius(int r)                Mycircle.SetRadius(10);
      {                                  Mycircle.DisplayArea()<<'\n';
        radius=r;colour=255;           }
      }
    void SetRadius(int r, int c)
      {
        radius=r;colour=c;
      }
  }
```

From among the given statements, identify the correct one(s).

(a) The program displays the following output.
5
0
31.4
(b) The program displays the following output.
0
255
314
(c) The program displays the following output.
5
0
314
(d) The program displays the following output.
5
255
314
(e) Gives compilation errors.

33) Consider the following program.

```cpp
#include <iostream.h>
                                    static int c=1;
    void disp();                    int sum(int a,int b)
    int sum(int,int);                {
                                      c = a + b + c;
    void main()                       return(c);
    {                               }
     int x,y,s;
     cin>>x;                         void disp()
     cin>>y;                         {
     s=sum(x,y);                      cout<<c;
     cout<< s <<'\n';               }
     s=sum(x,y);
     cout<<s<<'\n';
     disp();
    }
```

Which of the following will be correct?

(a) If x=2 and y=3, the program will display the following:
    6
    11
    11

(b) If x=1.5 and y=2.5, the program will display the following:
    1
    4
    5

(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 1 for variable c.

34) Consider the following program.

```
class complex                          complex complex::operator+(complex &a) {
    {                                    complex z;
    float real,imag;                     z.real=real+a.real;
     public : complex                    z.imag=imag+a.imag;
operator+(complex&);                     return z;
       complex() { }                     }
       complex(float r, float s)     void main()
          { real=r; imag=s;}             {
 void printcomplex( )                    complex var1(1.2,3.4), var2(4.5,6.5), outc;
          {                              outc=var1+var2;
cout<<"Real                              outc.printcomplex();
component="<<real<<'\n';                 }
cout<<"Imaginary
component="<<imag;
       }
       };
```

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

(a) has a compilation error	(b) Output will be ***Real component = 5.7*** Imaginary component = 9..9	(c) This program uses C++'s complex operator facility
(d) This program uses C++'s operator overloading facility.	(e) Output will be ***Real component = 4.5*** Imaginary component = 6..5	

35) If the operator+ method is replaced with operator-, which of the following would be correct about the above program?

(a) has a compilation error	(b) Output will be ***Real component = 5.7*** Imaginary component = 9.9	(c) has a run time error
(d) Compiler will change operator- to operator+	(e) Output will be ***Real component = -2.3*** Imaginary component = -3.1	

*****

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