

BE (Hons) CS IV Year - 1st Sem
BITS C461 - Software Engineering (SE)
Test 1 (Closed Book)

Date: 19 October 2008

Time: 50 min

Max Marks: 25

Answer all questions

1. Name two alternatives to the waterfall model. What are the advantages and disadvantages of each model when used to plan a software development project? 5 mks

2. a. Requirement Specification documents often fail to describe the requirements clearly for the various people who need to read them. Describe five different types of mistakes made by the authors of these documents. 3 mks

- b. Who are the stakeholders for a new system? Give examples of at least three different types of stakeholders. 2 mks

3. a) Withdrawing money from a Bank contains the following three processes. Customers can withdraw money either using the ATM (process 1), from the counter inside the bank (process 2) or using the drive-in window (process 3). Draw a data flow diagram for process 3, that is for withdrawing cash at the drive-in window using the following narrative. When a customer wishes to withdraw cash at the drive-in window, he or she must write a cheque made out to cash. The cheque is sent to the teller office via vacuum tube. One of the four tellers enters the cheque account number and the amount on one of the terminals. The amount is subtracted from the current account balance in the account master file. A transaction slip is then printed with the cheque amount, updated account balance, and account number. The transaction slip and the amount is returned to the customer. 5 mks

- b) Convert the DFD drawn for process 3 described in question 3(a) to a structure chart. 5 mks

- c) Draw an ER diagram for modeling process 3 described in question 3(a) 5mks

BITS, PILANI – DUBAI
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BE (Hons) CS IV Year - 1st Sem
BITS UC461 - Software Engineering (SE)
Test 2 (Open Book)

Date: 27 November 2008

Time: 50 min

Max Marks: 20

Answer all questions. All questions carry equal marks.

1. Based on the following description of part of the syntax of a programming language, construct a class diagram showing the structure of programs written in the language:

Routines consist of a declaration part and a statement part. Variables local to the routine can be declared in the declaration part, and the statement part consists of a non-empty sequence of statements. Statements can be loops, conditionals or assignments, and each assignment contains a reference to the variable which is being assigned to.

2. You are asked to develop a program that inputs a sequence of integers and output the running average of the absolute values of the input numbers. The following is an example input and output:

Input: 1, -2, 3, -4, 5

Output: 1, 1.5, 2, 2.5, 3

Sketch a software architecture for the program using the “pipes & filters” architectural style. Briefly describe the function of each component of the system. State any assumptions you make.

3. Assume you were going to review the Java code given on the next page. You are to inspect it for consistency in naming, formatting, and understandability of style. You also are going to review it for correctness. Identify all of the things you find that you would raise during a code review. Identify each item by specifying the line number (if appropriate) and the problem.

```

/** // 1
 * Method to return the type of the triangle represented by three sides // 2
 * This only checks for whether a triangle is equilateral, isosceles, r scalene. // 3
 * return a string with a description of the type of a triangle // 4
 * param side_a the first side // 5
 * param side_b the second side, etc // 6
 */ // 7
public String triangleType(int side_a,int b, int c) // 8
{ // 9
    if(side_a == b) return "TRIANGLE_ISOCELES"; // 10
    if(side_a == c) { // 11
        return "TRIANGLE_ISOCELES"; // 12
    } // 13
    if(side_a == b && b == c){ // 14
        return "EQUILATERAL_TRIANGLE"; // 15
    } // 16
    return "SCALENE_TRIANGLE"; // 17
} // 18

```

4. The following function is to be tested for path coverage.

```

int m1(int a, int b, int c){
    if (a > 0 && b > 0) {
        while (a != b) {
            while (a > b) {
                a = a - b;
                while (c > (a + b)) {
                    c = c - 1;
                }
            }
            while (b > a) {
                b = b - a;
            }
        }
    } else {
        a = 0;
    }
    return a;
}

```

Draw a control flow graph for m1.

BITS, PILANI – DUBAI
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BE (Hons) CS IV Year - 1st Sem

Course No: BITS C461
Course Title: Software Engineering (SE)
Quiz -1.

Date: 12 October 2008

Time: 15 min

Max Marks: 10

ID NO: _____ NAME: _____

Note: Answer all questions. All questions carry equal marks

1. Expand the following 2 mks
 - a. RAD
 - b. CMMI

2. Differentiate between cohesion and coupling 3 mks

3. A company, No Blots, supplies ink cartridges for printers which are sold only through the internet. When customers place an order, the order is checked, a confirmation is sent back to the customer and the details of the order are sent to the warehouse. Draw the data flow diagram (DFD) for the No Blots online purchasing system. 5 mks

BITS, PILANI – DUBAI CAMPUS
Knowledge Village, Dubai

BE (Hons) CS IV Year – 1st Sem
Software Engineering – BITS C461
Quiz 2 A

Date: 27 October 2008

Time: 15 min

Max Marks: 10

Answer all questions

I. Multiple choice:

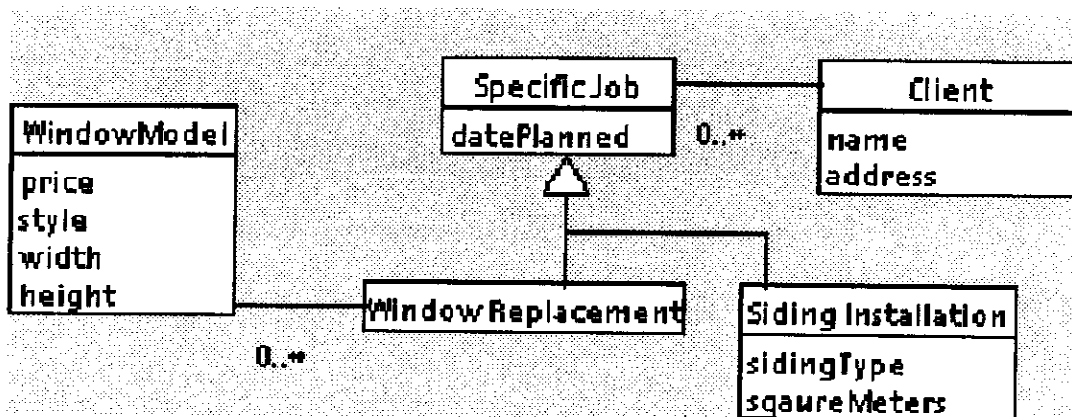
1. Which of the following statements are true?

- a. State diagrams are good at describing the behavior of an object across several use cases.
- b. To describe behavior that involves a number of objects in a use case, use interaction diagrams
- c. To describe behavior that involves a number of objects in several use cases, use activity diagrams
- d. All of the above

2. Which of the following statements are false about Deployment Diagrams?

- a. To show the physical relationships among software and hardware components for a given release.
- b. A node represents some kind of hardware.
- c. A component represents some kind of software source code
- d. A connection is the communication path between two hardware components

3. If datePlanned is declared as a private instance variable, in the class diagram given below, then:



- a) It will not be inherited by WindowReplacement
- b) Methods of Client will not be able to access it directly
- c) Methods of WindowReplacement will not be able to access it directly
- d) Methods of Siding Installation will be able to access it directly

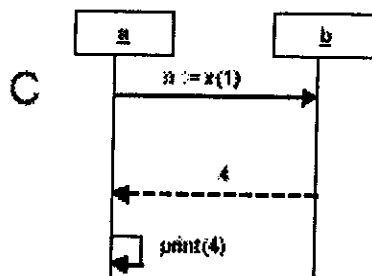
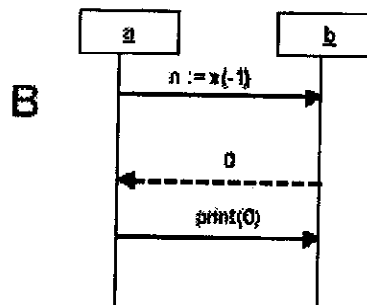
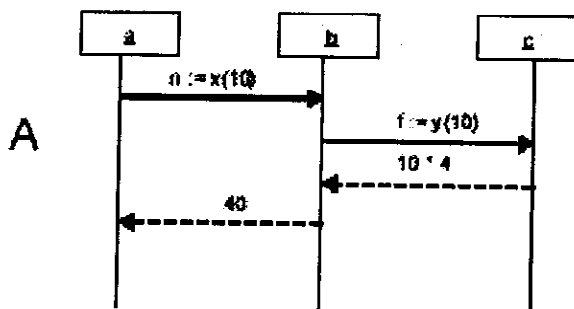
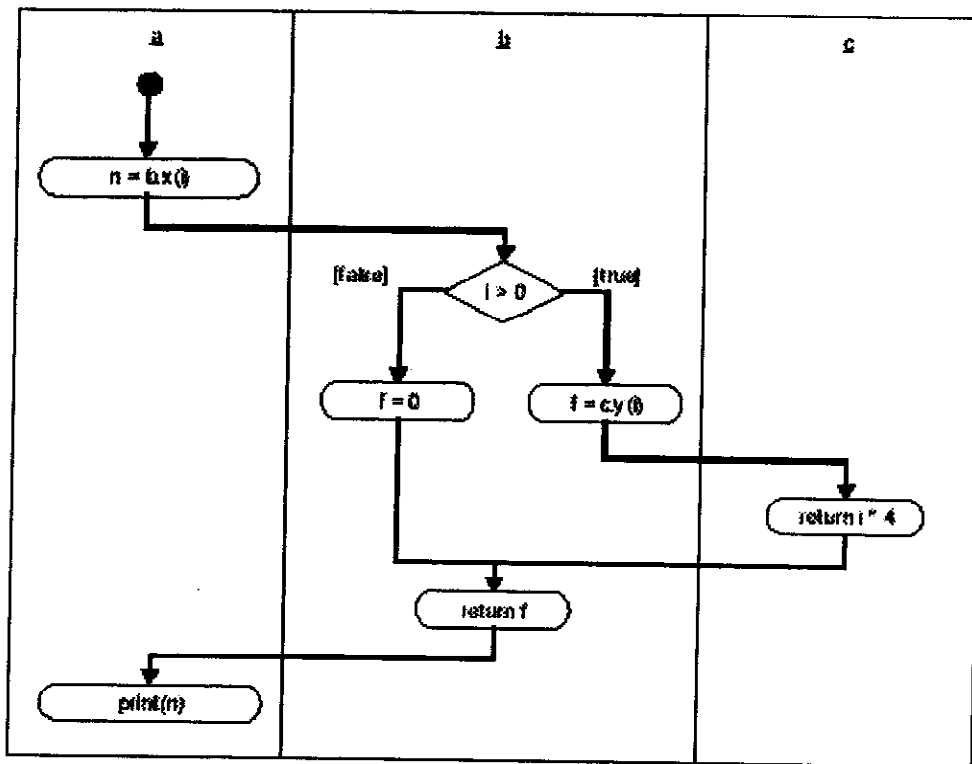
II. UML Diagram:

Choose and draw any one appropriate UML diagram to describe an elevator for a building with two floors with the following properties. The properties take precedence in the order in which they're described, and each description of an action takes one unit of time (no two actions may be done during the same unit of time):

- There are only 3 buttons: a button to go up on the ground floor, a button to go down on the top floor, and a button within the elevator.
- Whenever an elevator reaches a floor, both the button within the elevator and the button on that floor are turned off, and the elevator's doors open.
- If the elevator's doors are open, the elevator's doors close after waiting for one unit of time.
- If the button within the elevator is on and the doors are closed, the elevator goes to the other floor.
- If the button within the elevator is off and the doors are closed, but the button for the elevator's floor is on, the doors open.
- If the button within the elevator is off, the doors are closed, and the button for the other floor is on, the elevator goes to the other floor.
- Otherwise, the elevator stays still.

Users can turn on any of the buttons, but not in the middle of one of the elevator's actions.

4. Which sequence diagram is not valid if it comes from the same model as the activity diagram?



D. None of the above

BITS, PILANI – DUBAI CAMPUS
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BE (Hons) CS IV Year – 1st Sem
Software Engineering – BITS C461
Quiz 3 A (Closed Book)

Date: 18 November 2008

Time: 15 min

Max Marks: 10

Answer all questions

I. Multiple choice:

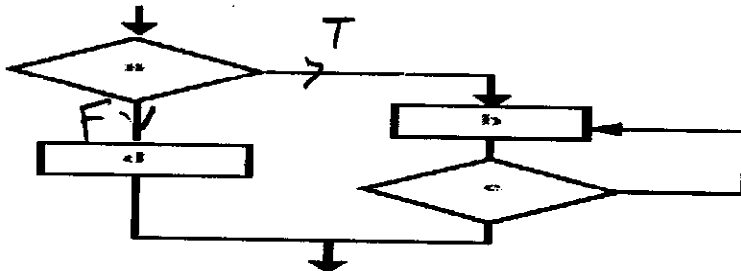
1. A vehicle has several parts such as the set of wheels and the engine. Busses and cars are examples of some vehicles found on the roads. Consider the following classes :

- (i) Engine and Vehicle
- (ii) Vehicle and Car
- (iii) Vehicle and Road

The correct relationships between the above classes are

- (a) (i) aggregation (ii) association (iii) inheritance.
- (b) (i) aggregation (ii) inheritance (iii) association.
- (c) (i) inheritance (ii) aggregation (iii) association.
- (d) (i) association (ii) inheritance (iii) association.
- (e) (i) aggregation (ii) inheritance (iii) aggregation.

2. Consider the following flow chart.



Choose the correct code fragment(s) which show(s) its logic.

- (a) if a then
 repeat b until c
 else d
- (b) if a then d
 else
 repeat c until b
- (c) if a then d
 else
 repeat b until c
- (d) if a then d
 else
 do b while c
- (e) if a then d
 else
 while b do c

3. In Java the size of int is

- a. 8 b. 16 c. 32 d. 64 e. 128

4. Which of the following is not a reserved word in Java

- a. super b. new c. implement d. extends e. none of the above

II.. Indicate the result of compiling / executing the following pieces of code. If there is an error indicate the error:

a. class Test {
 void display()
 { System.out.println("Hello");
 public static void main(String args[])
 { display();
 }
 }

b. class Test {
 String x;
 Test(String a){x = a;}
 void display()
 { System.out.println("Hello",x);
 public static void main(String args[])
 { Test t = new Test("Brother");
 t. display();
 }
 }

c. interface Test {
 void display()
 { System.out.println("Hello");}

SOFTWARE ENGINEERING – BITS UC461
COMPREHENSIVE EXAMINATION (Closed Book)

Date: 30 Dec 2008
Time: 3 hrs

Max Marks: 80

Answer all questions

1. a. What is the difference between
i. CMMI Level 2 and Level 3
ii. Incremental and iterative process models

Solution:

- i. CMMI Level 2 (Repeatable): Basic project managements processes are in place to track cost, schedule, and functionality. (In a position to repeat earlier successes – good software practices)

Key Process Areas: Configuration management (CM), Quality assurance (QA), Sub-contract management, Project tracking (PT), Project planning (PP), Requirements management (RM)

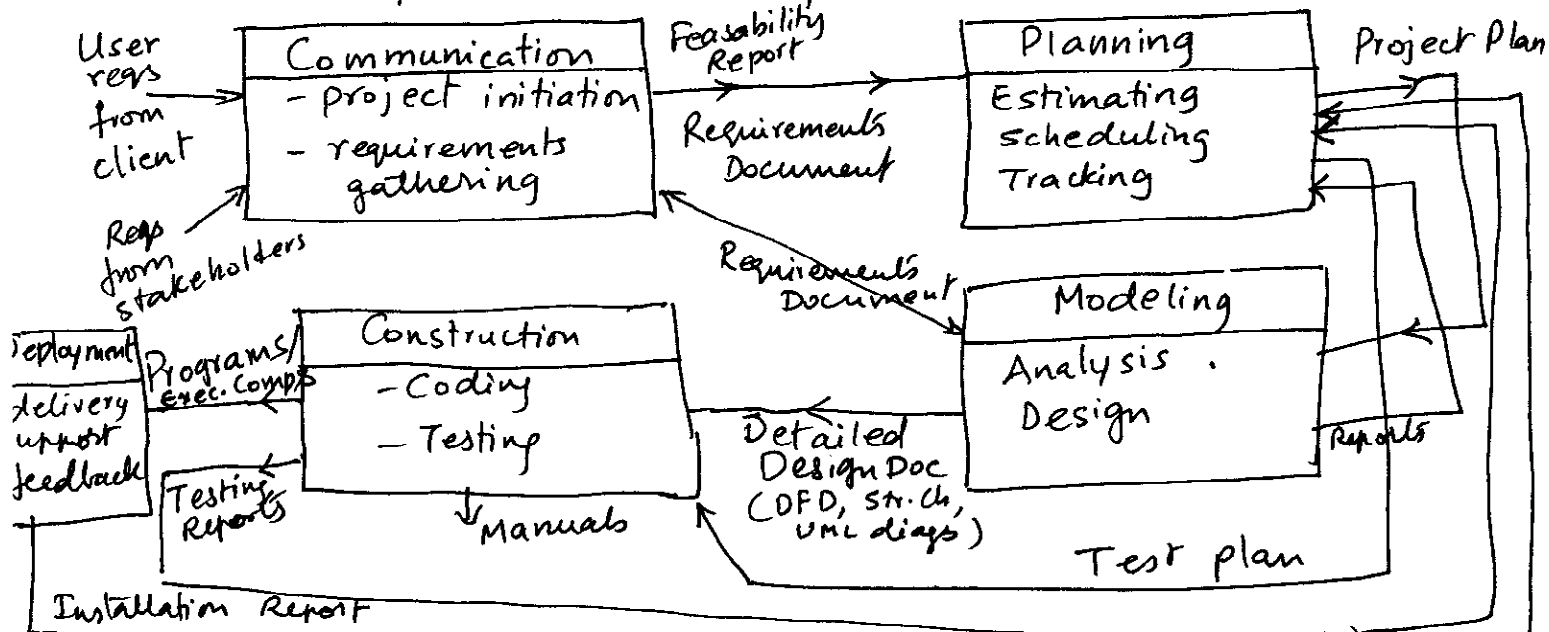
CMMI Level 3 (Defined): Process is documented, standardised and integrated into a standard software process which is applicable for all the projects in the organisation

Key Process Areas: Peer reviews (PR), Intergroup coordination (IC), Software product engineering (PE), Integrated software management (IM), Training program (TP), Organization Process Focus (PF), Organization Process Definition (PD)

- ii. In the incremental model, the product is delivered in stages with each stage adding new functionality to an existing base system. Each component delivered is complete. In the iterative model, the entire product is initially delivered with all components, but with many components having limited functionality (e.g., inefficient, simplistic). Each successive release completes functionality of one or more components.

- b. Describe the essential phases in the life cycle of software development. For each phase, describe its purpose, inputs, and outputs.

Answer: Refer class notes for details.



2 a. Module A calls module B and passes data D. Module B uses only a subset of D. Name the kind of coupling between A and B. Apart from this what are the other kinds of coupling. Rank them from worst to best:

Solution:

It is Stamp Coupling. It tends to expose more data than the modules needs

The other kinds of coupling are: Data Coupling, Control Coupling, Common Coupling, Content Coupling

Coupling is a measurement of how much a module is tied to or dependent upon other modules. Loose coupling indicates that a proposed change to one module will be less likely to impact the rest of the system. The looser the coupling the better the design. Ranking from the worst / tight coupling to best / loose coupling order is shown below:

Content Coupling -> Common Coupling -> Control Coupling -> Stamp Coupling -> Data Coupling

The ranking is because of the following reasons

Data Coupling: Two modules are data-coupled if they communicate by parameter, each parameter being an elementary piece of data. Only required dependency

Stamp Coupling

Two modules are stamp coupled if they communicate using a composite data item such as a record in C. Tends to expose more data than the modules needs, which might prove disastrous.

Control Coupling: Two modules are control coupled if one passes to the other a piece of data intended to control the internal logic of the other. This is far more disastrous.

Common Coupling: Two modules are commonly coupled if they refer to the same global data area. Anybody and everybody can make changes. This is a grievous disaster

Content coupling: Here one module refers to the inside of another in any way. One module can change the data inside another or one module can alter a statement in another. Most disastrous

b. Suppose you are tasked to build an Automated Examination System for a high school, with the following desired functionality:

- 1 - Teachers shall input an exam with the key (answers) to the exam;
- 2 - Students shall request an exam to take;
- 3 - Students shall provide answers for a granted exam;
- 4 - The system shall automatically grade the exam;
- 5 - Both teachers and students shall be able to view scores.

Draw a context level diagram. Refine the context diagram and draw the Level-1 data flow diagram showing the functionality listed above.