BITS, PILANI – DUBAI
Academic City, Dubai
BE (Hons) CS IV Year - 2nd Sem

SOFTWARE ENGINEERING – BITS C461
COMPREHENSIVE EXAMINATION (Closed Book)

Date: 25 May 2009
Time: 3 hrs **Max Marks: 80**

Answer all questions

1. a. What is the difference between interoperability and portability? 2 mks

   b. Which of the development process models would you follow for the following projects? Give a brief justification and describe the model of your choice. 8 mks
   i) A data entry system for office staff that has never used computers before. The user-interface and user-friendliness are extremely important.
   ii) A Web site for an on-line store which always has a list of desired features it wants to add and add them quickly

2. a. A company implements the following SEI CMM key process areas: Requirements Management, Project planning, Configuration Management and Software Quality Assurance. What can you infer about the SEI CMM assessment level of the company. What does this organization have to do to reach the next level of SEI CMM. 4mks

   b. Discuss the significance and use of requirement engineering. What are the problems in the formulation of requirements? 6mks

   c. Draw an E-R diagram for the statement given below : 2 mks
   "Vendors quote prices for several parts along with quantity of parts."

3. A College has decided to standardize the way in which students are assessed, so that each taught module will have three instruments of assessment: a class test worth 10% of the overall assessment, coursework worth 30% and an examination worth 60%. The result of a student's overall assessment in a module is to be expressed in three ways: a percentage Mark for use by the examination panel, a Grade using the grading scheme outlined in table given below, and a Result of Pass, Re-sit or Fail.

Mark	Grade	Result
0–29	E	Fail
30–39	D	Resit
40–49	C	Pass
50–59	B2	Pass
60–69	B1	Pass
70–100	A	Pass

a. Draw the flow chart for the program fragment 4 mks
b. Draw the control flow graph (CFG) for the flow chart 2 mks
c. Calculate the number of independent paths 2 mks
d. List all the independent paths 4 mks

6. a. Why is it hard to achieve perfect quality in software engineering? Discuss. 4 mks

b. Described below is a description of a small system for a Video Rental Shop that rents out videos to customers. The information used in the system is stored in the following tables in the database.

- Video details - video id, video title, release date, number of copies
- Member details - member id, name, address, phone, date joined, overdue fines
- Rental details - video id, copy number, member id, rental date, due date, return date

The software system needs to provide the following functionality:

- to add, change and delete videos from the system
- to add, change and delete members' information
- to add and change rental information
- to add rental return information
- to make inquiries on videos using video id, video title, or release date
- to make inquiries on members using member id or name
- to provide a report of the videos in stock
- to provide a report of the members overdue fines
- to download a file from the web of the latest releases for input to the system

a. Name the user inputs described in the Business Scenario 1 mk
b. Name the user outputs described in the Business Scenario 1 mk
c. Name the user inquiries described in the Business Scenario 1 mk
d. Name the Files described in the Business Scenario 1 mk
e. Name the External Interfaces described in the Business Scenario 1 mk
f. Referring to the business scenario, calculate the Function Point Count for this system. Table to be used is given below: 3 mks

Weighting Factors	Simple	Average	Complex	Rating in this example
User Inputs	6	8	10	simple
User Outputs	5	7	8	simple
User Inquiries	2	4	5	simple
Files	4	5	6	simple
External Interfaces	3	5	7	average

7. Write short notes on any **two** of the following: 14 mks
a. DFD to Structure Chart Conversion
b. Architectural Styles
c. Black box testing

BITS, PILANI – DUBAI
Academic City, Dubai

BE (Hons) CS IV Year - 1st Sem
BITS C461 - Software Engineering (SE)
Test 2 (Open Book)

Date: 26 April 2009
Time: 50 min **Max Marks: 20**

Answer all questions

1. a. Based on the following description of the data types available in Java, construct a class diagram: 2 mks

There are 2 different data types in Java, namely primitive data types and class. The primitive data types are boolean, char, byte, short, int, long, float and double. A class consists of data members and methods.

b. Draw a class diagram and sequence diagram for the Java code given below: 3 mks

```
public class RoundObject {
        protected double radius;
        public RoundObject () { radius = 0.0; }
        public RoundObject (double r) { radius = r; }
        public void setRadius (double r) { radius = r; }
        public double getRadius () { return radius; }
}

public class Circle extends RoundObject {
        private double area;
        public Circle (double r) {super(r); }
        public void calcArea (double area) {
                area = 3.14 *radius*radius; }
        public void displayObject () {
                System.out.println("A Circle of Area " + area + " has");
                System.out.print("a Radius that is "+ radius);
                }
}

public class Demonstrate {
        public static void main (String args[]) {
                RoundObject circ = new Circle(100.0);
                circ.calcArea();
                circ.displayObject();
        }
}
```

2. The new Doors 2009 operating system is designed for multiple users. A user logs into the system by entering a username. Only if the username is valid, will the user be able to enter a password. Once logged in, the user may execute any number of normal commands. However, some commands, called *privileged commands*, require the user to enter a separate privileged command password. If the user enters a valid privileged command password, the system will allow exactly one privileged command to be executed by the user. This continues (executing regular, or privileged commands – with appropriate passwords) until the user logs out. Draw a UML State diagram to show the operation of the new Doors 2009 operating system as just described. 5 mks

3. Consider an interactive Web site which provides many different features to perform various tasks. Show that the architecture for this can be represented as a shared-data style as well as client-server style. Which one will you prefer and why? 4 mks

4. Read the code for ReturnAverage(...), and draw a flow chart and a control flow graph. Identify the number of independent paths and list them. 6 mks

```
/*
Function: ReturnAverage Computes the average of all those numbers in the input array in
the positive range [MIN, MAX]. The max size of the array is AS. The array size can be
smaller than AS in which case the end of input is denoted by -999.
*/
public static double ReturnAverage(int value[], int AS, int MIN, int MAX) {
        int i, ti, tv, sum;
        double av;
        i = 0; ti = 0; tv = 0; sum = 0;
        while (ti < AS && value[i] != -999) {
                ti++;
                if (value[i] >= MIN && value[i] <= MAX) {
                        tv++;
                        sum = sum + value[i];
                }
                i++;
        }
        if (tv > 0) av = (double)sum/tv;
        else av = (double) -999;
        return (av);
}
```

BITS, PILANI – DUBAI
Academic City, Dubai

BE (Hons) CS IV Year - II Sem
BITS UC461 - Software Engineering (SE)
Test 1 (Closed Book)

Date: 15 March 2009
Time: 50 min **Max Marks: 25**

Answer all questions

1. An SRS is being prepared for the client. Classify the following requirements statements from the SRS, into F for "functional", NF for "non-functional", C for "constraint" and X for "should not be a requirement". Justify your answer 6 mks
   a. If the alarm system is ringing, then the elevators (lifts) will proceed to the ground floor, open their doors and suspend further operations.
   b. The system will provide interface to audio/video system
   c. The system will use an array to hold the invoices.
   d. The application must run on Windows XP

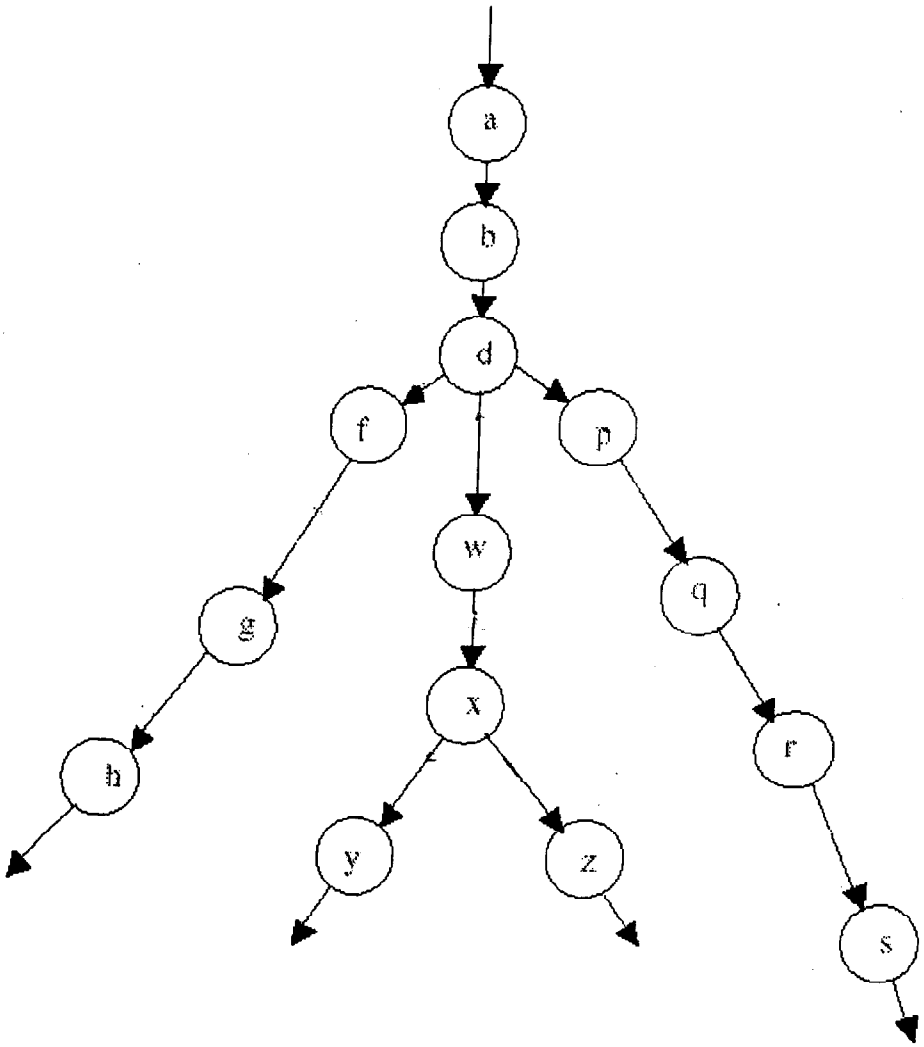
2. Suppose you have to build a product to determine the inverse of 3.748571 to four decimal places. Once the product has been implemented and tested, it will be thrown away. Which life-cycle model would you use? Give reasons for your answer. 2 mks

3. BITS Girls High School is implementing a new computerised system for its library. Once installed, students will need to use a computer terminal to check the availability of a book. The student's library card is then scanned into the system. The system searches through the student database to check the student's borrowing history. The student will be allowed to borrow a book if:
• she has no overdue books; and
• she currently has no more than four books on loan.
If the loan is disallowed, the librarian can still enter a code into the system to allow the loan.
Draw a DFD to represent the complete system. 10 mks

4. Using the DFD shown in figure 1, apply transaction analysis / transform analysis to the DFD and derive a structure chart. Clearly indicate your boundaries for transformation / transaction flow in the DFD before converting to structure chart and justify your choice. Your structure chart should have modules that correspond on a one-to-one basis with the processes / transforms in the figure. 5 mks

DTA

figure 1



5. Is the following pseudo code cohesive? If yes, justify your answer. If not, rewrite the pseudo code to make it cohesive. 2 mks

```
contact ( company , message ,  mode )
{
  if mode is by fax
  {
    sendFax ( company , message)
  }
  else if mode is by email
  {
    sendEmail ( company , message)
  }
  printAddressBook ( )
}
```

BITS, PILANI – DUBAI
Academic City, Dubai

BE (Hons) CS IV Year - 2nd Sem
Software Engineering – BITS C461
Quiz 3 B (Closed Book)

Date: 26 April 2009
Time: 15 min **Max Marks: 10**

Answer all questions

I. Multiple choice 7 mks

1. In UML, a state diagram
ac) depicts the different states of a class
b) depicts the same information as an activity diagram
c) depicts the different methods in a class
d) depicts the the different states of a method

2. Class C is inherited from class B and class B inherits from class A, class D is inherited from class A.
Which of the following is true
I] class C inherits class A attributes
II] class C inherits class B attributes
III] class D inherits class B attributes only
IV] class D inherits class A attributes only
a) I, II,III
b) I, II,IV
c) I,II,III,IV
d) II,III,IV

Questions 3 to 5 relate to Fig 1: Activity Diagram

3. The thick horizontal bar below ReeceiveJobRequest indicates:
a) One or the other outgoing branch will be taken, but not both.
b) The two branches are performed sequentially, from left to right.
c) The two branches are performed sequentially, in an undefined order..
d) Both outgoing branches must be taken in parallel.

4. The thick horizontal bar above ScheduleJob indicates that:
a) ScheduleJob can take place when either [good credit] or [found employee] is true, but will normally require them both to be true.
b) ScheduleJob with only be executed if DetermineClientCredit or FindEmployeeToDoJob return and error.
c) ScheduleJob will take place when either [good credit] or [found employee] is true.
d) ScheduleJob will take place when both [good credit] and [found employee] are true.

5. Which of the following is false?
a) DeclineJob may end before DetermineClientCredit
b) ScheduleJob may end before DetermineClientCredit
c) DeclineJob may end before FindEmployeeToDoJob
d) DetermineClientCredit may end before ScheduleJob

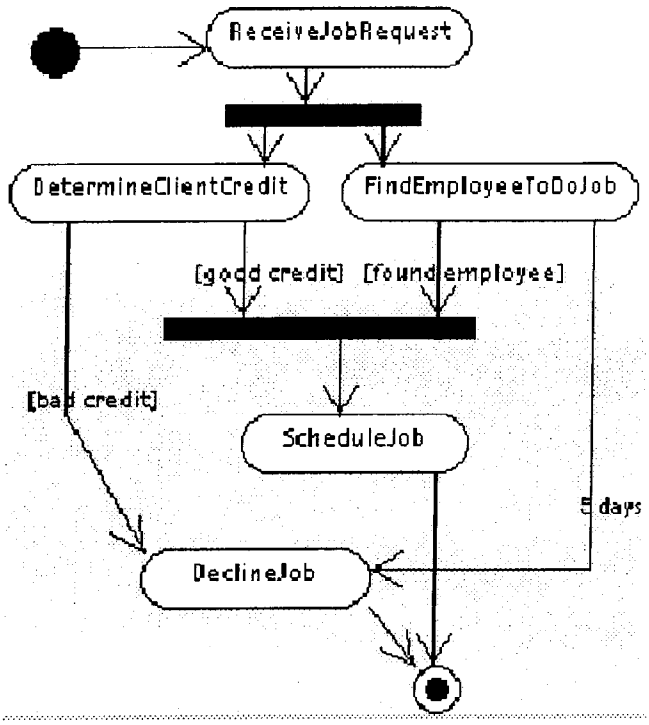


Fig 1: Activity Diagram

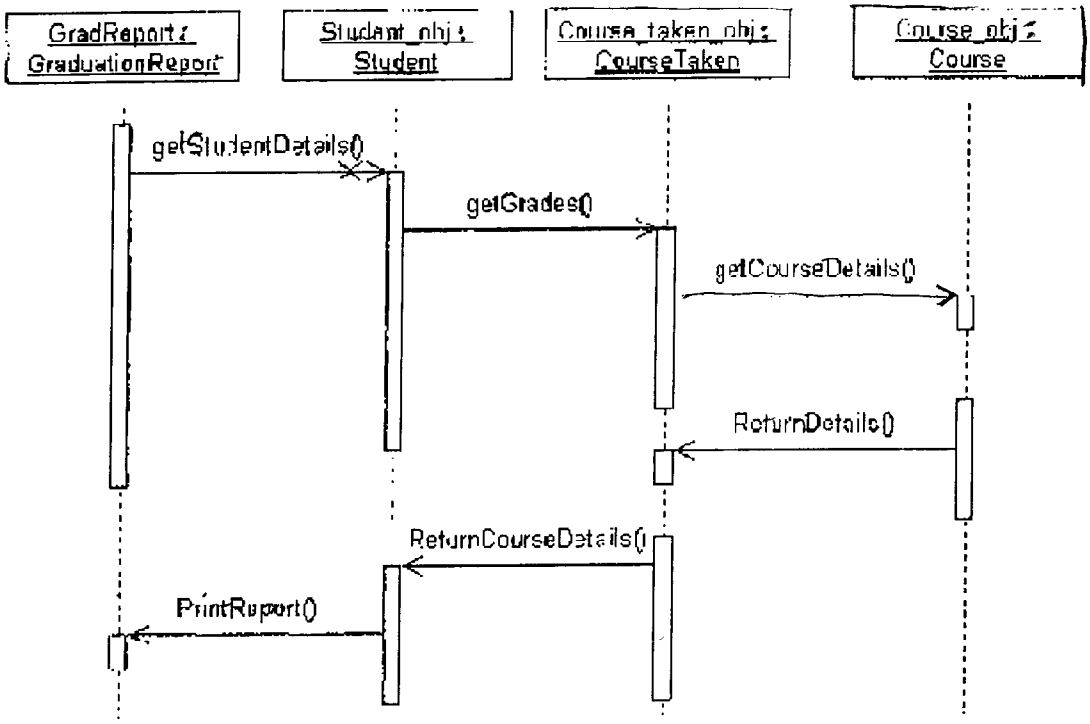
6. Vehicles can be of different kinds namely cars, planes and bicycles. They are modeled using inheritance. Which of the following statements is/are correct
a. A stop( ) method in the class cars can be overloaded by another method stop(int x) in same class cars
b. A stop( ) method cannot be overloaded if it is present in the class vehicles
c. A stop( ) method available in the classes cars, planes and bicycles is an example of overloading
d. A stop( ) method in the class cars cannot be overloaded by another method stop( ) in the class cars

7. Vehicles can be of different kinds namely cars, planes and bicycles. They are modeled using inheritance. Which of the following statements is/are correct
a. A stop( ) method in the class cars can be overridden by another method stop(int x) in same class vehicles
b. A stop( ) method in the class vehicles can overridden by another stop( ) method in the class cars

c. A stop( ) method available in the classes cars, planes and bicycles is an example of overriding
d. A stop( ) method in the class cars cannot be overridden by another method stop( ) in the class cars

Short answer:

8. Draw a collaboration diagram for the sequence diagram given below 3 mks



BITS, PILANI – DUBAI
Academic City, Dubai

BE (Hons) CS IV Year - 2nd Sem
Software Engineering – BITS C461
Quiz 3 A (Closed Book)

Date: 26 April 2009
Time: 15 min **Max Marks: 10**

Answer all questions

I. Multiple choice 7 mks

1. In UML, a state diagram
a) depicts the different methods in a class
b) depicts the the different states of a method
c) depicts the different states of a class
d) depicts the same information as an activity diagram

2. Class C is inherited from class B and class B inherits from class A, class D is inherited from class A.
Which of the following is true
I] class C inherits class A attributes
II] class C inherits class B attributes
III] class D inherits class B attributes only
IV] class D inherits class A attributes only
a) I, II,III
b) I,II,III,IV
c) II,III,IV
d) I, II,IV

Questions 3 to 5 relate to Fig 1: Activity Diagram

3. The thick horizontal bar below ReeceiveJobRequest indicates:
a) One or the other outgoing branch will be taken, but not both.
b) Both outgoing branches must be taken in parallel.
c) The two branches are performed sequentially, from left to right.
d) The two branches are performed sequentially, in an undefined order..

4. The thick horizontal bar above ScheduleJob indicates that:
a) ScheduleJob will take place when either [good credit] or [found employee] is true.
b) ScheduleJob will take place when both [good credit] and [found employee] are true.
c) ScheduleJob can take place when either [good credit] or [found employee] is true, but will normally require them both to be true.
d) ScheduleJob with only be executed if DetermineClientCredit or FindEmployeeToDoJob return and error.

5. Which of the following is false?
a) DeclineJob may end before FindEmployeeToDoJob
b) DeclineJob may end before DetermineClientCredit
c) ScheduleJob may end before DetermineClientCredit
d) DetermineClientCredit may end before ScheduleJob

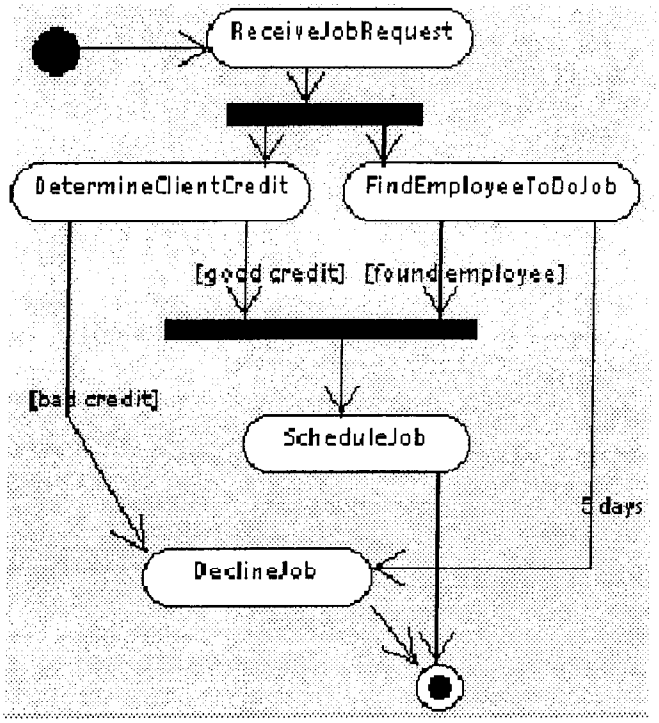


Fig 1: Activity Diagram

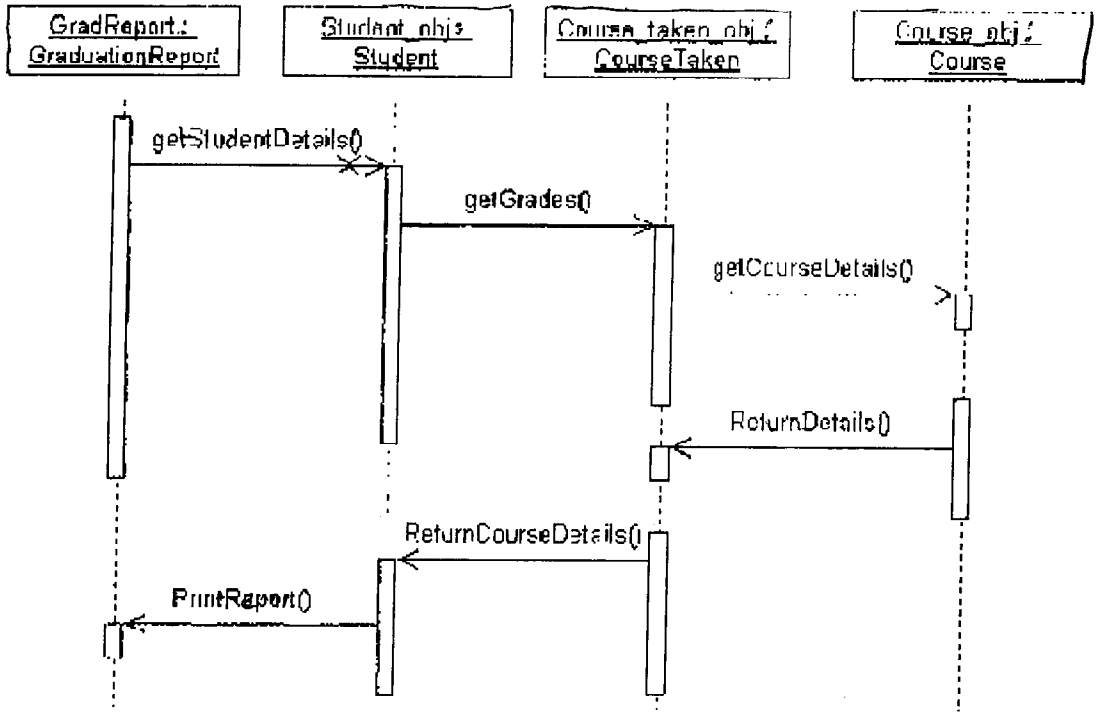
6. Vehicles can be of different kinds namely cars, planes and bicycles. They are modeled using inheritance. Which of the following statements is/are correct
a. A stop( ) method available in the classes cars, planes and bicycles is an example of overloading
b. A stop( ) method in the class cars cannot be overloaded by another method stop( ) in the class cars
c. A stop( ) method in the class cars can be overloaded by another method stop(int x) in same class cars
d. A stop( ) method cannot be overloaded if it is present in the class vehicles

7. Vehicles can be of different kinds namely cars, planes and bicycles. They are modeled using inheritance. Which of the following statements is/are correct
a. A stop( ) method available in the classes cars, planes and bicycles is an example of overriding
b. A stop( ) method in the class cars cannot be overridden by another method stop( ) in the class cars

c. A stop( ) method in the class cars can be overridden by another method stop(int x) in same class vehicles
d. A stop( ) method in the class vehicles can overridden by another stop( ) method in the class cars

Short answers:

3. Draw a collaboration diagram for the sequence diagram given below 3 mks



BITS, PILANI – DUBAI
Academic City, Dubai
BE (Hons) CS IV Year - 2nd Sem

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

Date: 25 March 2009 **Time: 15 min** **Max Marks: 10**

ID NO:_____ **NAME:**_____

Note: Answer all questions.

1. Represent the following information as an ER diagram:

Each member of the Elm Street Club has a unique membership id which is composed of a number and the initial of the member. In addition each member has a name, phone, job, date of birth and an address. Each member can invite up to 10 guests and the guest can be invited by only one member. Each guest has the following attributes: name, job, phone number, and is associated with a unique member 5 mks

2. Given the relation R(W,X,Y,Z) with FDs F = {WX→Y; W→Z} shown below. What values could be inserted for the missing W and Z column values. The domain for Z is {z1,z2,z3,z4,z5,z6,z7} and the domain for W is {w1,w2,w3,w4}. 2 mks

W	X	Y	Z
w1	x1	y1	z1
w1	x2	y2	
	x1	y1	z3
w4	x1	y4	z4

3. Given the relation schema R(W,X,Y,Z) and functional dependencies

F ={Y→W, X→Z}.

Which functional dependency causes a violation of second normal form and why? 3mks

BITS, PILANI – DUBAI
Academic City, Dubai
BE (Hons) CS IV Year - 2nd Sem

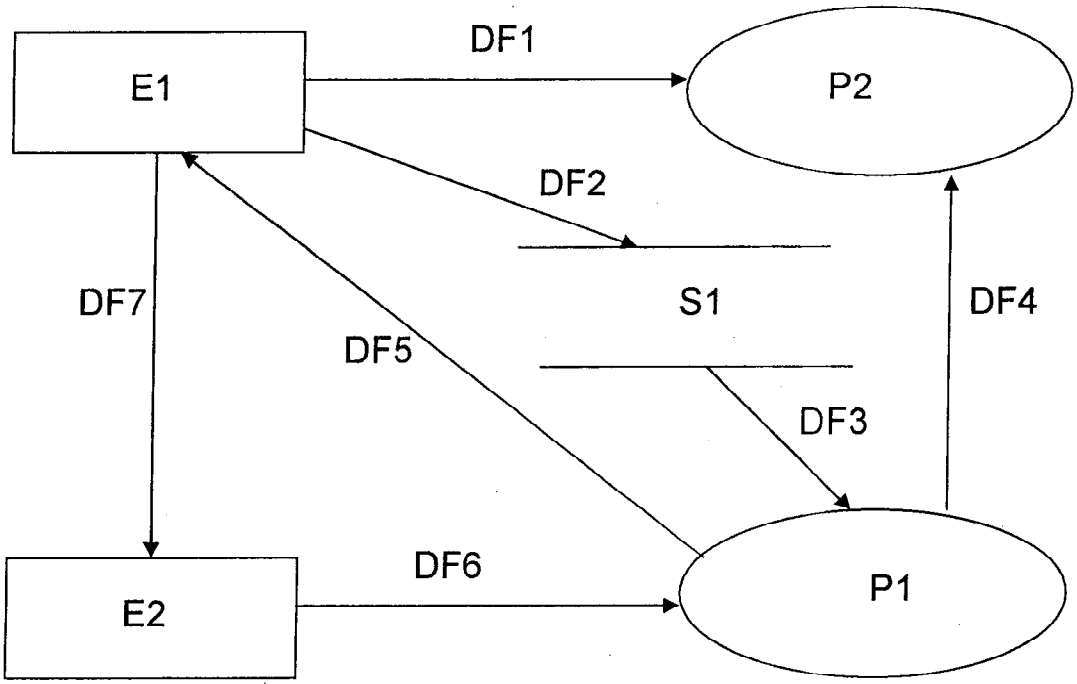
Course No: BITS C461
Course Title: Software Engineering (SE)
Quiz -1-A

Date: 2 March 2009 **Time: 15 min** **Max Marks: 10**

ID NO:_____ **NAME:**_____

Note: Answer all questions. All questions carry equal marks

1. List the errors in this DFD 5 mks



2. Whenever an account holder wants to withdraw some cash he presents a cheque or withdrawal slip. The account is checked for the requisite balance. If the necessary balance exists, the cash is paid and the account updated. The account holder's pass book is updated, indicating the withdrawal. Draw a context level diagram. 5 mks

BITS, PILANI – DUBAI
Academic City, Dubai
BE (Hons) CS IV Year - 2nd Sem

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

Date: 25 March 2009 **Time: 15 min** **Max Marks: 10**

ID NO:_____ **NAME:**_____

Note: Answer all questions.

1. Represent the following information as an ER diagram:

Each member of the Rotary Club has a unique membership id which is composed of a number and the initial of the member. In addition each member has a name, phone, job, date of birth and an address. Each member can invite up to 10 guests and the guest can be invited by only one member. Each guest has the following attributes: name, job, phone number, and is associated with a unique member

2. Given the relation R(A,B,C,D) with FDs F = {AB→C; A→D} shown below. What values could be inserted for the missing D and A column values. The domain for D is {d1,d2,d3,d4,d5,d6,d7} and the domain for A is {a1,a2,a3,a4}.

A	B	C	D
a1	b1	c1	d1
a1	b2	c2	
	b1	c1	d3
a4	b1	c4	d4

3. Given the relation schema R(A,B,C,D) and functional dependencies

F ={A→C, D→B}.

Which functional dependency causes a violation of second normal form?

BITS, PILANI – DUBAI
Academic City, Dubai
BE (Hons) CS IV Year - 2nd Sem

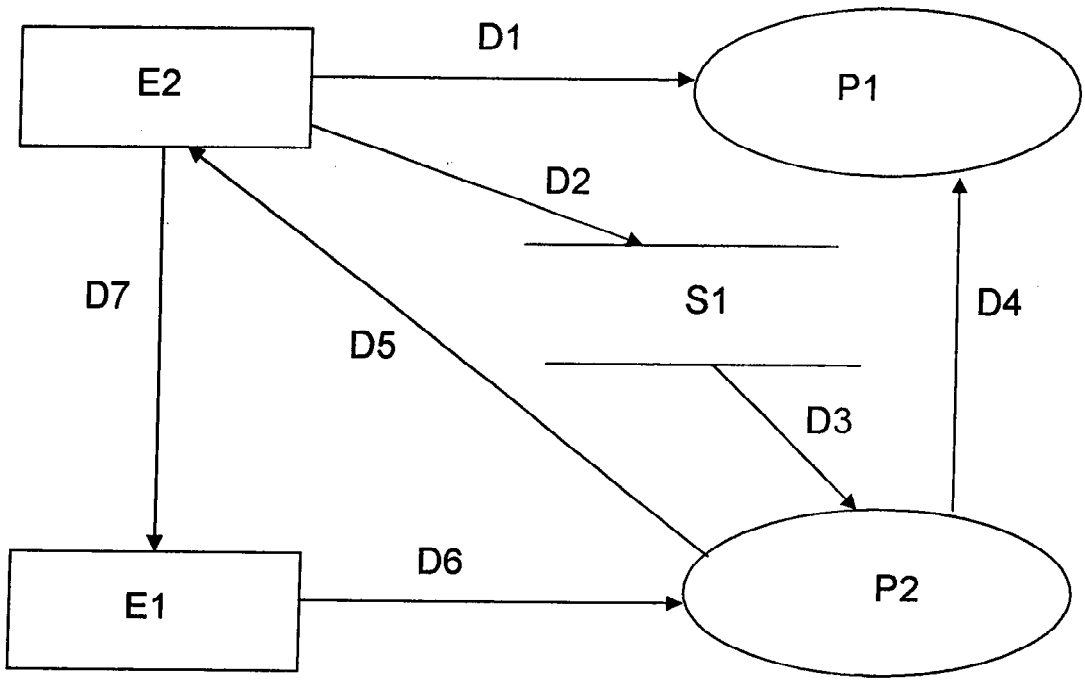
Course No: BITS C461
Course Title: Software Engineering (SE)
Quiz -1-B

Date: 2 March 2009 **Time: 15 min** **Max Marks: 10**

ID NO:_____ **NAME:**_____

Note: Answer all questions. All questions carry equal marks

1. List the errors in this DFD 5 mks



8

2. In Company Macrosoft, after the Finance Department receives attendance details from all other departments, the total salary to be paid is calculated. Total salary is calculated based on how many days each employee has worked. Once the total salary figures are ready the tax, to be deducted, is calculated. The pay slips are then printed. Draw a context level diagram. 5 mks

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