

**ISLAMIC UNIVERSITY OF TECHNOLOGY (IUT)**  
**ORGANISATION OF ISLAMIC COOPERATION (OIC)**

**Department of Computer Science and Engineering (CSE)**

**SEMESTER FINAL EXAMINATION**

**WINTER SEMESTER, 2017-2018**

**DURATION: 3 Hours**

**FULL MARKS: 150**

**CSE 4513: Software Engineering and Object Oriented Design**

Programmable calculators are not allowed. Do not write anything on the question paper.

There are 8 (eight) questions. Answer any 6 (six) of them.

Figures in the right margin indicate marks.

- |    |    |   |    |
|----|----|---|----|
| 1. | a) | Briefly describe prototyping software process model.  | 7  |
|    | b) | Elaborate the role of Software Requirement Specification (SRS) in Software Testing.   | 8  |
|    | c) | ISO 9001 provides guidelines for different aspects of software development process. One of the guidelines for Management is as follows: | 10 |

**Management Responsibility:**

- Management must have an effective quality policy.
- The responsibility and authority of all those whose work affects quality:
  - must be defined and documented.
- Responsibility of the quality system:
  - independent of the development process,
  - can work in an unbiased manner.
- The effectiveness of the quality system:
  - must be periodically by audited.

What SQA steps can an organization assume to fulfill the management requirements of ISO 9001?

- |    |    |   |    |
|----|----|---|----|
| 2. | a) | Observer is a pattern used in software design when there are multiple views of a single data/subjects. Briefly describe the observer pattern.   | 8  |
|    | b) | What are the other patterns in distributed environment that have similar characteristics as observer pattern? Mention two such patterns and discuss their implementation issues?  | 7  |
|    | c) | Design pattern is a proven solution to a well-researched problem. However, the pattern is applied to a particular context. In your software development project, you might have used some of the design patterns. Briefly explain how (in which context) you used any one of these patterns in your software project: <b>Adapter/factory/façade</b> . | 10 |
- 
- |    |    |   |         |
|----|----|---|---------|
| 3. | a) | Agile processes are normally customized in the software organizations to tune for the best productivity considering their situations. In the software development project, what agile process did you adapt for the development? List the number of customizations you made and explain the reasons for that. | 8       |
|    | b) | Briefly explain SCRUM agile process.  |         |
|    | c) | Prepare a Risk Information Sheet (RIS) for the following risk: 'A personality feature will be added to the software for better user experience' which has a risk probability of 80% and will cost \$20,000 dollars.   | 7<br>10 |



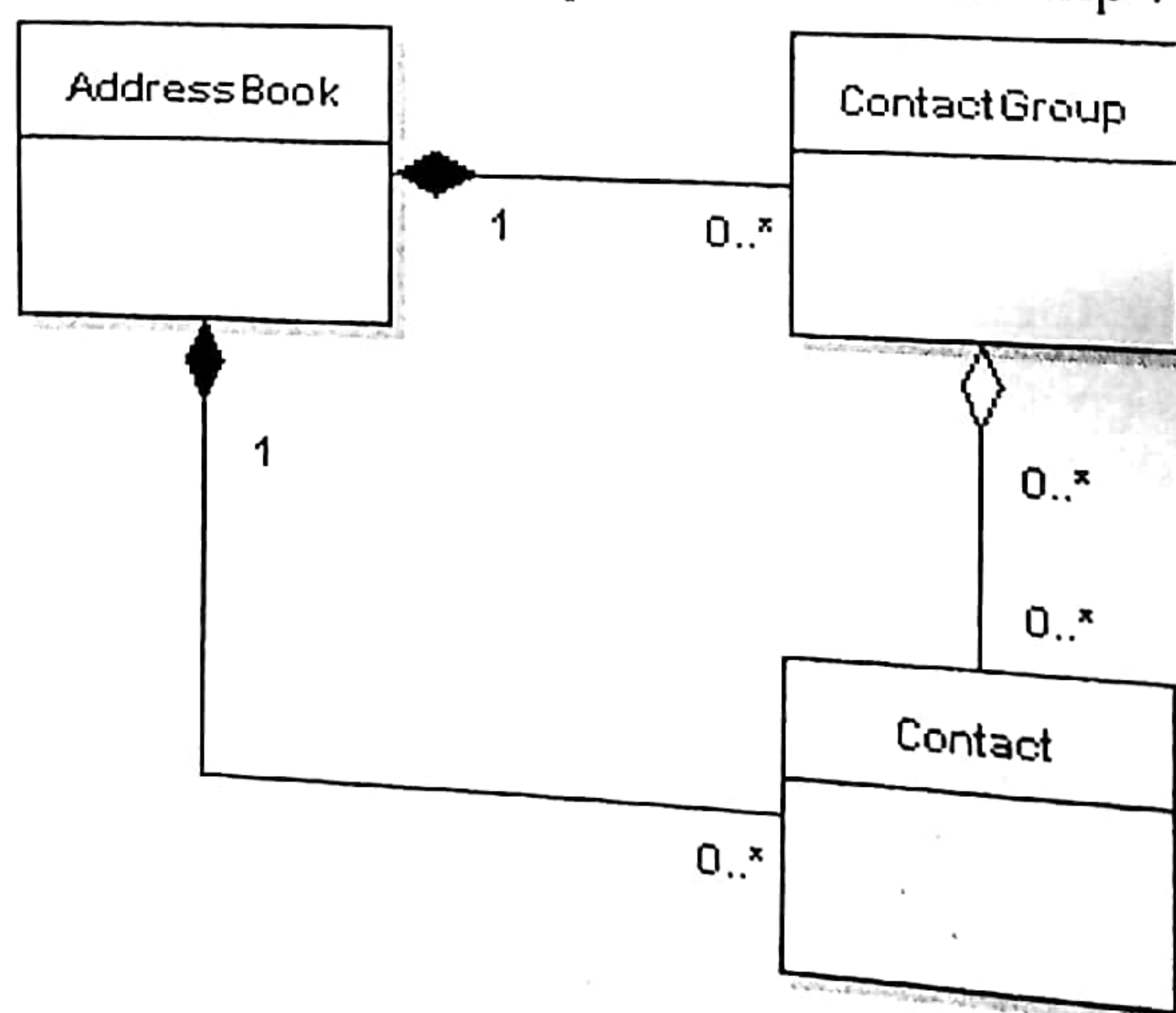
4. a) Briefly explain the use case based project size/ cost estimation technique. 7  
 b) Soft skill is very important for achieving individual and group success. What are the soft skills did you practice during the project work on software development? 6  
 c) Explain driver and stub code for software testing. Write a driver code for testing the following code snippet. Do you feel if any stub code will be necessary to write? If yes, the write the stub code also. 6

```
class GPS{
    public point3D adjustGPS(){
        Point3D gpsVal= System.getGPS();
        gpsVal.adjustXYZ(5,10,0);
        return gpsVal;
    }
}
```

- d) White box testing introduces a metric called code coverage which measures how much code is covered by a set of test cases. Consider the following decisions statements (e.g. if, switch, while, for etc.) and write appropriate test cases so that each side of the decisions are covered at least once. 6

```
int x, y;
x = c.readInt ();
y = c.readInt ();
if (y == 0)
    c.println ("y is zero");
else
    if (x == 0)
        c.println ("x is zero");
    else
    {
        for (int i = 1; i <=x ; i++)
        {
            if (i % y == 0)
                c.println (i);
        }
    }
}
```

5. a) Briefly describe Service Oriented Architecture (SOA). 7  
 b) Testing is a never ending activity and hence a testing strategy is needed to restrict the testing effort within the budget. One of the strategies can be: 'to find the vital few and test them'. Discuss the role of 'Cyclomatic Complexity', 'Call Graph', 'No of functions in a class' Metrics in finding the 'vital few'. How do you even define the 'vital few'? 6  
 c) Describe the following aggregation and composition relationship : 6





d) Change is difficult and costly to accommodate in typical software process model. Explain why? How does the agile process model accommodate change then? Show the cost savings of agile process using a chart/graph. 6

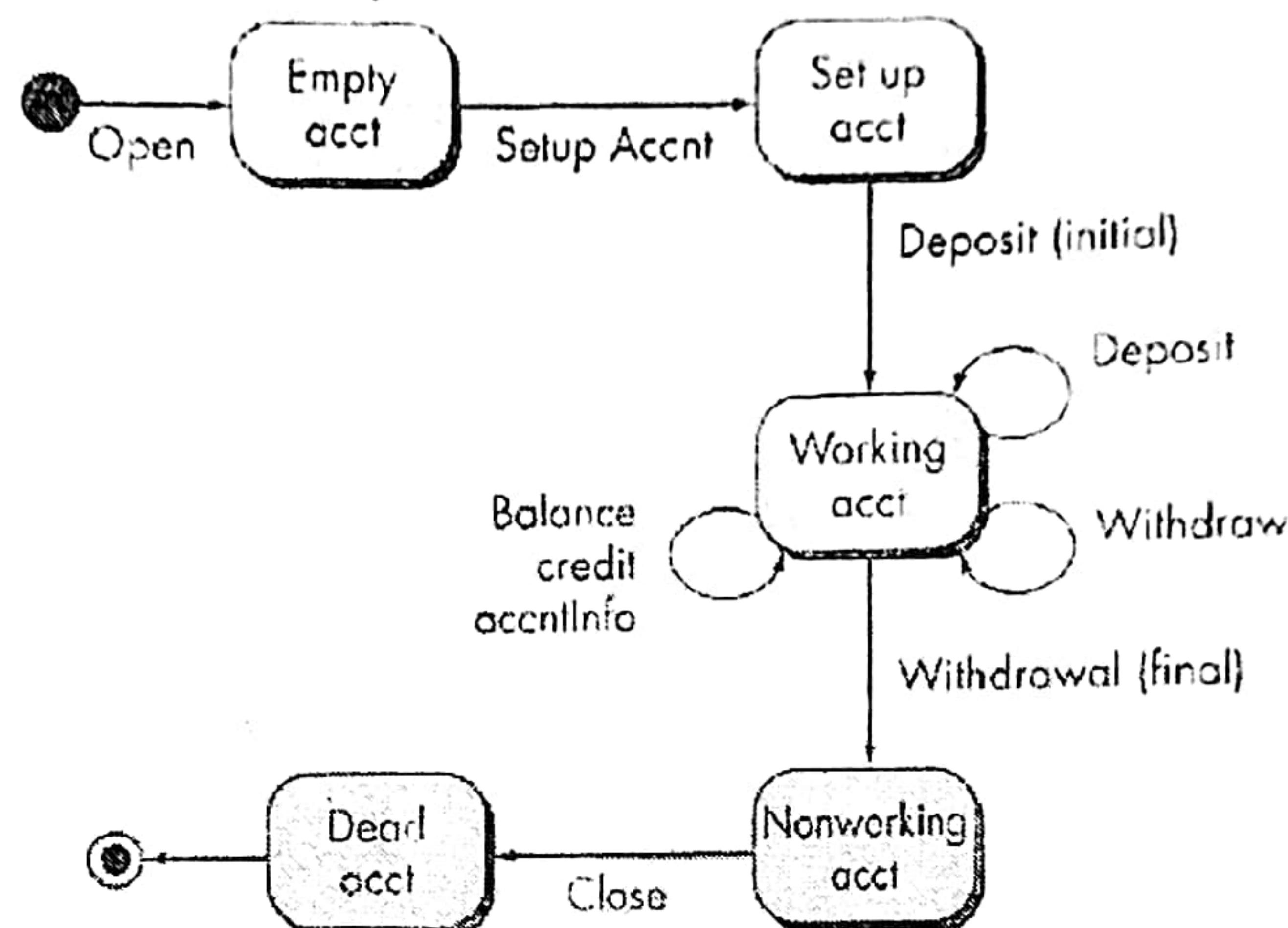
6. a) What is a 'critical path' in PERT/CPM? How is it calculated? 7

b) Explain the following Babich's equation for company A with respect to its rivals B and C. 6

$$A_{t+1} = A_t(1 - x) + B_t y \left[ \frac{A_t}{A_t + C_t} \right] + C_t z \left[ \frac{A_t}{A_t + B_t} \right] + G \left[ \frac{A_t}{A_t + B_t + C_t} \right]$$

c) Define Error Index (EI). Why is it defined as a quality metric? 6

d) What is a test case? Given the following state diagram, enumerate a number of test cases to verify all the possible states of the system. 6



7. a) Briefly describe waterfall model. When can waterfall process model be more productive even over agile process models? 10

b) What are cohesion and coupling? What are their impacts on the modularity and extendibility of software? 7

c) Write a short note on class diagram and object diagram. 8

8. a) Briefly explain the architecture of a web application and explain how the input from a HTML form are propagated and processed in the server. 10

b) 'Islands of Automation' is a proven anti-pattern that arises from finding isolated solutions to different problems of a big system. Briefly explain the Islands of Automation with its architecture. How can the anti-pattern be corrected with its architecture and technologies? 8

c) Explain the following graph that shows the relationship between effort and delivery time in project scheduling. 7

