

4/12/17

Indian Institute of Engineering Science and Technology, Shibpur
B.E. (CST) 7th Semester Examination 2017

Software Engineering (CS - 701)

Time: 3 hours

Full marks: 70

Use same answer booklet to attempt questions from all groups

Group A

Attempt any 2 questions from this group (15x2 = 30 marks)

1. Consider the following function in C programming language, which finds largest odd number from a list of positive integers (*line no in the following code should NOT be altered, extend if needed*)

```

unsigned int largestOddNumber(unsigned int arrayElems[],
                             unsigned char numOfElems){
01     int index = 0;
02     unsigned int largestOddNumber = 0;
03     while(index < numOfElems) {
04         unsigned int tempElem = arrayElems[index];
05         if(1 == tempElem%2) {
06             if(tempElem > largestOddNumber)
07                 largestOddNumber = tempElem;
08         }
09         index++;
10     }
11     return largestOddNumber;
12 }

```

- a) Draw the Control Flow Graph (CFG) for the above function.
- b) Compute the McCabe's Cyclomatic complexity of the above function applying all possible approaches and find all Linearly Independent Paths (LIPs) in the CFG.
- c) Suggest different White Box test-cases those cover each of these LIPs.

$$[5 + 7 + 3] = 15$$

2. An Order-Register consists of many Orders. Each Order consists of upto 10 order items. Each order item contains the name of the item, its quantity and the date by which it is to be delivered. Each order item is described by an item-order-specification object having details such as its vendor addresses, unit price and manufacturer.

- a) Identify all Classes involved in the above mentioned fact.
- b) Draw a class diagram using the UML Syntax to represent above fact, mentioning -
 - i. Every class with attributes and declaration of behaviors with access specifiers.
 - ii. The relationship between Classes using standard UML notation and cardinality.

$$[5 + (5+5)] = 15$$

3. A certain project can be split into 8 distinct activities A, B, ..., H. The time (in weeks) to complete each activity is as given below, along with the dependencies between the tasks.

Activity	Order / dependency	Estimated time (in weeks)
A	Must be done first	5
B	Can only start when A is completed	2
C	Can only start when A is completed	8
D	Can only start when A is completed	6
E	Can only start when B is completed	3
F	Can only start when C and E are completed	5
G	Can only start when D is completed	4
H	Can only start when F and G are completed	7

- Draw the Activity Network for the project following the convention of AOA and AON.
- For each activity compute the following parameters so that the overall project can be completed as early as possible -
 - Earliest time at which it can start
 - Latest time at which the activity must start
 - Slack time
- Find the Critical Path and Minimum Time to complete the project.

$$[6 + 7 + 2] = 15$$

Group B

Attempt any 4 questions from this group (10x4 = 40 marks)

- What are the characteristics of good software?
 - Describe briefly the different stages of Waterfall model. Mention its limitations.
$$[3 + 7] = 10$$
- What is "Cohesion" in the context of software design? Name and explain various types of Cohesion that can exist.
 - Discuss Structure Analysis and Structure Design in the context Function oriented design.
$$[5 + 5] = 10$$
- What is "Association" class relationship? Mention various types of Association relationships.
 - Describe UML State-chart diagram using a suitable example.
$$[5 + 5] = 10$$
- What are Functional and Non-functional requirements of a software system?
 - Explain "Decision Tree" and "Decision Table" techniques to specify requirements with a suitable example.
$$[4 + 6] = 10$$
- What are Black-box and White-box testing? Explain with example.
 - Give a brief description on how "Top-down" integration is performed. Mention advantages and disadvantages of this approach
$$[5 + 5] = 10$$
- Write short notes on following -
 - Agile Model of software development
 - COCOMO
$$[5 + 5] = 10$$