4/12/17

Indian Institute of Engineering Science and Technology, Shibpur
B.Tech 7th Semester (CST) Examination 2017
Under 5-year Dual-Degree (B. Tech-M. Tech) Programme
Software Engineering CS-702

Full marks: 70 Time: 3 hours

All parts of a question are to be answered together
Answer mandatory questions 1 and 2 and any 2 from rest of the questions

1. **[Mandatory Question]** Mention the correct answer only -

a) Which of the following activity spans all stages of software development life cycle (SDLC)?
(i) Operation (ii) Testing (iii) Design (iv) Project management

b) Which term is not used in the context of UML use case diagram
(i) Association (ii) Include (iii) Aggregation (iv) Extend

c) Which of the following accounts for maximum effort during development of a typical software?
(i) Specification (ii) Design (iii) Coding (iv) Testing

d) In which of the following life cycle models, change request from customers later in the development cycle are easiest to handle?
(i) Iterative waterfall model (ii) Prototype model (iii) Evolutionary model (iv) V model

e) In Agile Process Model which is considered to be of less priority among the following?
(i) Customer collaboration (ii) Working software
(iii) Comprehensive design (iv) Accept changing requirements

f) A car has a starter, some lights, an AC, and some wheels. The driver operates first the starter, then lights, then AC and finally wheels. Which pair of diagrams is most useful to model the situation?
(i) Use cases & scenarios (ii) Use cases & Class (iii) Class & Sequence (iv) Class & State-chart

g) Which one of the following is a characteristic of a good Object Oriented Design
(i) Deep class hierarchy (ii) Large number of methods per class
(iii) Large message exchanges per use case (iv) Moderate number of methods per class

h) In which of the following integration approach the modules of a system are integrated and tested as on when they are available?
(i) Bottom-up (ii) Top-down (iii) Sandwich (iv) Big-bang

i) Which one of the following is not a software verification technique?
(i) Review (ii) Simulation (iii) Stress testing (iv) Unit testing

j) Among the following, which is not a feature of ISO 9000 for software industry?
(i) Testing of product against specification (ii) Domain expertise
(iii) Proper plans and adhering to it (iv) Configuration management

[10 x 1] = 10

2. **[Mandatory Question]** Answer **any** 10 questions out of 13 in **brief**.

a) What do you understand by the "99% complete" syndrome in the context of software development?
b) What is "V" model of Software Development Life Cycle?
c) What is the importance of coding standard followed in respective organization?
d) Name few types of testing those are used to test non-functional requirements?
e) What is Pair Programming in the context of Extreme Programming?
f) How can you determine whether a given design is modular or not?
g) How Intermediate COCOMO mitigates the drawbacks of Basic COCOMO model?
h) What is Decision Table technique to specify software requirements?
i) Explain the terms statement coverage, branch coverage, and path coverage.
j) What is the importance of Structure Chart?
k) What are the differences between Regression Testing and Smoke Testing?
l) How bottom-up approach of code integration achieved?
m) How the effort of each activity is estimated following weighted average estimation approach that is used in Gnatt Chart?

[10 x 3] = 30

3. a) Describe briefly the different stages in the Rapid Prototype life-cycle model of software development. Mention the applicability of this model.
b) Name and explain various types of "coupling" and "cohesion" those can exist in software design.

[6 + 9] = 15

4. Consider the following function in C programming language, which computes the Greatest Common Divisor of two integers (*line no in following code should NOT be altered, extend if needed*)

```
int computeGCD (int m, int n ) {
 1      int r = 0;
 2      if (m <= 0 || n <= 0) {
 3           return -1;      /* invalid inputs */
 4      }
 5      else {
 6           while ( r != 0 )
 7                r = m % n;
 8                m = n;
 9                n = r;
10           }
11     }
12     return n;
13 }
```

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 White Box test-cases those cover each of these LIPs.

[5 + 7 + 3] = 15

5. a) What is Boundary, Controller and Entity objects in the context of Object Oriented Design?
   b) Explain UML Sequence Diagram using a suitable example scenario.
   c) Mention the steps of obtaining ISO 9000 Certification.

[5 + 6 + 4] = 15

6. 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	6
B	Must be done first	3
C	Can only start when B is completed	2
D	Can only start when A and C are completed	11
E	Can only start when A and C are completed	7
F	Can only start when E is completed	6
G	Can only start when D and F are completed	5
H	Can only start when E is completed	10

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

[6 + 7 + 2] = 15