

Code: AC16/AT13  
Time: 3 Hours

Subject: SOFTWARE ENGINEERING  
Max. Marks: 100

**DECEMBER 2010**

NOTE: There are 9 Questions in all.

- Question 1 is compulsory and carries 20 marks. Answer to Q.1 must be written in the space provided for it in the answer book supplied and nowhere else.
- The answer sheet for the Q.1 will be collected by the invigilator after half an hour of the commencement of the examination.
- Out of the remaining EIGHT Questions answer any FIVE Questions. Each question carries 16 marks.
- Any required data not explicitly given, may be suitably assumed and stated.

**Q.1 Choose the correct or the best alternative in the following: (2×10)**

a. Level-O DFD is similar to

- (A) System diagram (B) Use case diagram  
(C) Context diagram (D) ER diagram

b. In Putnam resource allocation model, technology factor C is defined as

- (A)  $C = SK^{-1/3} t_d^{-4/3}$  (B)  $C = SK^{1/3} t_d^{4/3}$   
(C)  $C = SK^{1/3} t_d^{-4/3}$  (D)  $C = SK^{-1/3} t_d^{4/3}$

c. FAN-IN of a component A is defined as

- (A) Components related to A  
(B) Count of components that can call or pass control to A  
(C) Components dependent to A  
(D) Components exclusive to A

d. The process of transforming a model into source code is

- (A) Re-engineering (B) Reverse engineering  
(C) Forward engineering (D) Structural engineering

e. If requirements are frequently changing, which model is to be selected

- (A) RAD model (B) Waterfall model  
(C) Spiral model (D) Prototype model

f. Compilers that take the design specified in a design language as input are

- (A) Consistency checkers (B) Critical design review  
(C) Walkthroughs (D) None of the above

- g. Which one of the following is not a verification activity?
- (A) Reviews (B) Path testing  
(C) Walkthrough (D) Acceptance testing
- h. The relationship of data elements in a module is called
- (A) Modularity (B) Coupling  
(C) Cohesion (D) None of the above
- i. Weakness of boundary value analysis and equivalence partitioning is
- (A) Not effective  
(B) Do not explore combinations of input circumstances  
(C) Explore combinations of input circumstances  
(D) Action is taken under varying set of conditions
- j. In Logarithmic Poisson execution model,  $\theta$  is known as
- (A) Failure intensity exponential parameter  
(B) Failure intensity function parameter  
(C) Failure intensity increment parameter  
(D) Failure intensity decay parameter

**Answer any FIVE Questions out of EIGHT Questions.  
Each question carries 16 marks.**

- Q.2** a. Explain various levels of Capability Maturity Model. (5)
- b. Compare the following software life cycle models - evolutionary model and spiral model. Also mention the applications where these are used. (5)
- c. What is coupling? Write a note on various types of coupling. (6)
- Q.3** a. Explain the following prototypes used in problem analysis phase in SRS:  
i. Throw-away prototype  
ii. Evolutionary prototype (6)
- b. Explain various components of SRS. (4)
- c. Develop a requirement specification document for a library management system. Also draw relevant E-R diagram. Use object-oriented analysis technique for analysis. (6)
- Q.4** a. Give application of bottom-up design and top-down design. (3)
- b. Consider railway reservation system. Design the following models:  
(i) Structural model (ii) Object-oriented model (4)

- c. For a given software design, explain the following representation
  - (i) Process Design Language (PDL)
  - (ii) Logic/Algorithm design
  - (iii) State modeling of classes

**Q.5** a. What is software metric? Why do you require metrics for software? Explain various features of data structure metrics. Define program weakness and give its equation. (8)

b. Compute the function point value for a project with the following specification. Number of user inputs = 20, number of user outputs = 70, number of user enquiries = 15, number of files = 4, number of external interfaces = 6. Assume that all weighting factors = 4 and complexity adjustment values = 7. Also assume 15 algorithms have been counted. (8)

**Q.6** a. Explain various types of software risks and explain various risk control activities. (6)

b. A software development with estimated size at 15000 LOC is to be developed such that technology factor is 1400. Manpower build up  $D_o=20$ , calculate minimum development time, total development man power cost, difficulty, peak manning, development peak time and development productivity. Give the comments on the project. (8)

- c. Write metric equation for the following:
  - (i) Difficulty metric equation
  - (ii) Trade-off between time and cost

**Q.7** a. Explain software reliability and hardware reliability. (6)

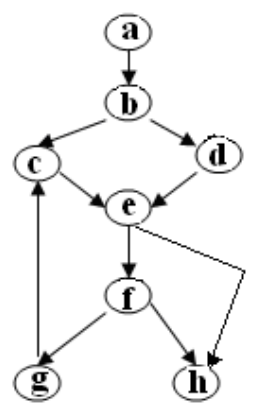
b. Explain the following reliability models and give their respective equations:
 

- (i) Calendar Time Component model
- (ii) Basic model

c. Assume that the initial failure intensity is 20 failures/CPU hr. The failure intensity decay parameter is 0.04/failure. Assume 40 failures are experienced. Find the logarithmic Poisson model at 20 and 35 CPU hr of execution. (4)

**Q.8** a. Explain various functional testing techniques. Give their applications. (6)

b. Consider the following graph and calculate the cyclomatic complexity by (5)



- (i) McCabe's equation
  - (ii) Predicate method
  - (iii) Region method
- c. Explain features of static and dynamic testing tools. (5)
- Q.9** a. Draw the flow chart of software maintenance process. Mention the features of each block. (5)
- b. Explain any two of the following software maintenance models. Also give their advantages and disadvantages:
- (i) Boehm's model
  - (ii) Reuse oriented model
  - (iii) Iterative enhancement model (6)
- c. Explain various configuration management activities in software maintenance. (5)