

**AUTUMN END SEMESTER EXAMINATION-2015**5<sup>th</sup> Semester B.Tech & B.Tech Dual Degree**SOFTWARE ENGINEERING (IT-3003)**

(Regular-2013 Admitted Batch)

**Full Marks: 60****Time: 3 Hours***Answer any SIX questions including Question No. I which is compulsory.**The figures in the margin indicate full marks.**Candidates are required to give their answers in their own words as far as practicable  
and all parts of a question should be answered at one place only.*

1. Answer all parts of the following question. [2 × 10]
- (a) What is the difference between code inspection and walk walkthrough?
  - (b) Which life cycle model do you recommend for developing software in each of the following applications:
    - (i) An object-oriented software development application
    - (ii) A compiler for a new language
    - (iii) The graphical user interface of a large software project
    - (iv) An extremely large software that would provide, monitor, and control cellular communication among its subscribers using a set of revolving satellites
  - (c) What is the purpose of the COCOMO model? How does it categorize software systems? Explain.
  - (d) What are the 3 types of software maintenance? Explain each type briefly.
  - (e) Explain any 2 reliability metrics.
  - (f) Explain the terms “synchronous operation” and “asynchronous operation” in the context of DFDs.
  - (g) What is the cyclomatic complexity of a program consisting of only statements with a sequential flow, i.e., without any decision and control statements?

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- (h) Why is the exploratory style of programming not advocated for software development?
- (i) Draw the control flow graph for the following code:
1.  $N = 10;$
  2.  $count = N;$
  3.  $sum = 0;$
  4.  $while(N > 0) \{$
  5.  $sum = sum + N;$
  6.  $N = N - 1; \}$
  7.  $avg = sum / count;$
- (j) What is meant by coverage based testing?
2. (a) Explain the evolutionary model of software development. [4]  
For what kinds of software development is it most suitable?  
What are its advantages and disadvantages?
- (b) Why is the spiral model of software development called a meta model? What criteria are used to select a particular software life cycle model for a given software project? [4]
3. (a) What is the main goal of software project management? [4]  
Mention some shortcomings of LOC (lines of code) as a metric of problem size in software project management.
- (b) Why is layered design of modules considered a good design solution? Explain. What are the differences between function-oriented design and object-oriented design? [4]
4. (a) Consider the following Road Repair and Tracking Software (RRTS) to be developed for automating various bookkeeping activities associated with the road repairing task of the Public Works Department of the Municipal Corporation of a large city. [4]  
  
A city corporation has branch offices at different suburbs of the city. Residents raise repair requests for different roads of the city. These would be entered into a computer system by a clerk. Soon after a repair request is raised, a supervisor visits

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the road and studies the severity of road condition. Depending on the severity of the road condition and the type of the locality (e.g. commercial area, busy area, relatively deserted area, etc.), he determines the priority for carrying out this repair work. The supervisor also estimates the raw material requirement for carrying out the repair work, the types and number of machines required, and the number and types of personnel required. Based on this data, the computer system should schedule the repair of the road depending on the priority of the repair work and subject to the availability of raw material, machines and personnel. The schedule report is used by the supervisor to direct different repair work. The manpower and machine that are available are entered by the city corporation administrator. He can change these data any time. Of course, any change to the available manpower and machine would require a reschedule of the projects. The Mayor of the city can request for various road repair statistics such as the number and type of repairs carried out over a period of time and the repair work outstanding at any point of time and the utilization statistics of the repair manpower and machine over any given period of time. The software should store the records using a free (public domain) database management system.

The software should run on both Windows and Unix machines. Draw DFD up to level 1 for the above problem.

- (b) Identify the functional and non-functional (with justification) requirements for the above problem. [4]
5. (a) Suppose you are developing a software product in organic mode. You have estimated the size of the product to be about 100,000 lines of code. Compute the nominal effort and development time. [4]
- Assume  $a_1 = 2.4$ ,  $a_2 = 1.05$ ,  $b_1 = 2.5$ ,  $b_2 = 0.38$   
State the advantages of using coding standards.
- (b) What is the necessity of software configuration management? Explain the activities involved in software configuration management. [4]

(3)

6. (a) Draw the CFG of the following code and find its cyclomatic complexity. [4]
- ```
1. while (str[i] != '\0') {  
2.     if(str[i] == ' ')  
3.         spaces++;  
4.     else  
5.         letters++;  
6. }  
7. printf("Count of letters = %d, count of spaces = %d\n", spaces, letters);
```
- (b) Explain the difference between the followings: [4]
- (i) Black-box testing and white-box testing
  - (ii) Alpha-testing and beta-testing
7. (a) Consider a program that checks if an input, a three-digit number, is divisible by 5. What are the equivalence classes of input data? Design an equivalence-class partitioning test suite for this program.  
Describe a boundary-value test suite for this application.  
What is the difference between error and failure in the context of software testing? [4]
- (b) An e-commerce software allows its customers to place orders, track orders and to cancel an existing order. The software requires validation of the customer before he proceeds to place, track or cancel an order. If the customer while placing an order requests delivery of the order within two business days, it is converted to an urgent order. Draw the corresponding use case diagram.  
What is the difference between “extends” relationship and “includes” in use case model in UML? [4]
8. Write short notes on any two of the followings. [4 × 2]
- (a) SEI Capability Maturity Model
  - (b) Interaction diagram in UML
  - (c) Approaches to debugging a software
  - (d) Performance testing

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