Total No. of Questions : 12] [Total No. of Pages : 4

P1204

[2963]-397

T.E. (Computer Engineering) (2003 Course)

SOFTWARE ENGINEERING (310253)

Time : 3 Hours] *[Max. Marks :100*

Instructions to Candidates:

1) *Answer any 03 questions from each section.*
2) *Answers to the two sections should be written in separate books.*
3) *Neat diagrams must be drawn wherever necessary.*
4) *Figures to the right indicate full marks.*

SECTION - I

Q1) A) What is Software Engineering? What are the characteristics of software? Explain in detail following software myths: [8]

a) Management myths.

b) Practitioner's myths.

B) Explain in detail the Unified Process indicating workflows and process phases. What are the advantages of iterative development? Compare Iterative development with Incremental delivery approach. [9]

OR

Q2) A) What is Software Process? What are framework and unbrella activities? What is the importance of unbrella activities? Explain in detail all the process phases of waterfall process model and state merits/demerits of the same. [8]

B) Explain in detail all the levels of Capability Maturity Model Integration with key process areas. What is Process Assessment and how it can be performed ? Explain with suitable diagram. [9]

Q3) A) What do you mean by "principle"? List and explain core principles that focus on software engineering practice as a whole. List and explain in short : a) Communication practices b) Planning practices. [8]

B) What are the elements of system Engineering Hierarchy? With neat diagrams compare Business Process Engineering and Product Engineering. [9]

P.T.O.

OR

Q4) A) What are the steps involved in Software Engineering Practice? List and Explain in short : a) Modeling Practices b) Construction Practices.[8]

B) What do you mean by system modeling and simulation? With a neat example and diagram explain Hatley-Pirbhai Modeling. What is the role of Architecture Flow Diagram in developing system Flow diagram. [9]

Q5) A) Explain in detail Requirement Engineering Tasks. What are the important characteristics that requirements must preserve? How Requirements can be managed? [8]

B) List all the Analysis Rules of Thumb. What is domain analysis? Explain in detail following UML diagrams stating purpose and applicability:
a) Use-case diagrams b) Activity Diagrams. [8]

OR

Q6) A) Explain the following elements of Analysis model: [8]
a) Scenario - based elements b) behavioral elements.
Explain elements of Analysis pattern template. How requirements are negotiated and validated?

B) Explain with suitable example the following:
a) Data - flow model b) Control - flow model.
What are Entity / Boundary / Control classes and what is meant by responsibilities of class? [8]

SECTION - II

Q7) A) How analysis model is translated to Design Model? Explain in detail Design quality guidelines and attributes. What is meant by firmness, commodity and Delight that address good Software? What is the impact of diversification and convergence on software design? [9]

B) Explain Data design at component level with all the principles for data specification. Explain the following Architectural styles with merits/ demerits: [8]
a) Data - Centered Architecture.
b) Data - Flow Architecture.

OR

(12)

Q8) A) Explain in detail the following Design concepts:

a) Abstraction. b) Architecture

c) Modularity d) Refinement.

What is meant by Cohesion and coupling criterias that address the Functional Independence. List all the types of Cohesion. **[9]**

B) Explain with a suitable example along with all the steps:

a) Transform - flow mapping to Software Architecture.

b) Transaction - flow mapping to Software Architecture. **[8]**

Q9) A) What are strategic issues in Software Testing? Explain in detail: **[8]**

a) Top - down Integration Testing.

b) Bottom-up Integration Testing.

B) Explain in detail Basis Path Testing with following details:- **[9]**

a) Flow-graph notations.

b) Cyclomatic complexity.

c) Test case derivation.

What is the applicability of White-Box Testing?

OR

*10)*A) Explain in short following System Testing types: **[8]**

a) Recovery Testing.

b) Security Testing.

c) Stress Testing

d) Performance Testing.

What is debugging? Explain in detail Debugging process.

B) What categories of errors are traceable using Black-Box Testing? Explain in detail following Black-Box Testing methods:- **[9]**

a) Equivalence Partitioning

b) Boundary value Analysis.

c) Orthogonal Array Testing.

*Q11)*A) What do you mean by the terms: measure, measurement and metrics? List and explain measurement process activities. What are the attributes of effective software metrics? List the metrics for Analysis and Design model. [8]

B) Explain in detail Function-point metric. List all the value Adjustment factors. What are the metrics for specification quality? [8]

OR

*Q12)*A) What is Software Quality? Explain in detail:- [8]

a) McCall's Quality factors.

b) ISO 9126 Quality factors.

What are the difficulties in assessing software quality?

B) Explain in detail Architectural Design metrics. What is Design structure Quality Index? What is software maturity index? [8]

SOFTWARE ENGINEERING
(2003 Course)

Time: 3 Hours Max. Marks: 100

Instructions: *1) Answer **3** questions from Section **I** and **3** questions from Section **II**.*
*2) Answers to the **two** Sections should be written in **separate** books.*
*3) **Neat** diagrams must be drawn **wherever** necessary.*
*4) Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is **allowed**.*
*5) Assume **suitable** data, if necessary.*

SECTION – I

1. a) "To transform a 4GT implementation into product, the developer must conduct thorough testing, meaningful documentation and other solution integration" . Justify your answer. **6**

b) What is prototyping in software development ? Provide example of software development project that would be amenable to prototyping. And provide example of software development project that would be more difficult to prototype. **10**

OR

2. a) Why the software maturity framework was developed ? Explain the key process areas of capability maturity model. **10**

b) "Although the industry is moving towards component based assembly, most software continues to be custom built". **6**

3. a) How should we initiate communication between developer and customer to obtain the necessary information for scope ? Give scooping example. **8**

b) Explain the hierarchical system modeling. Build hierarchical "system of system" for a system product or service with which you are familiar. Your hierarchy should extend down to simple system element (hardware, software etc.) along at least one branch of the tree. **8**

OR

4. a) What is feasibility study ? Develop a checklist for attribute to be considered when a feasibility of system or product is to be evaluated. Discuss the interplay among the attributes and attempt to provide a method for grading each so that a quantitative "feasibility number" may be develop. **10**

   b) How system modeling and simulation help the software engineer ? **6**

5. a) Define the following terms with respect to data modeling with suitable example. **10**

   Data object, attributes, relationship, cardinality and modality.

   b) What are Hatley and Phirbai extensions ? Explain the relationship between data and control models. **8**

OR

6. a) Explain all the steps has to follow for object oriented analysis. **8**

   b) What is Behavioral modeling ? How do we model the software's reaction to some external event ? Give suitable example. **10**

SECTION – II

7. a) Explain the various design principles use for design process. **8**

   b) Discuss the relative merits and difficulties of applying data flow oriented design in the following areas. **10**

   i) communication software.

   ii) operating system software.

   iii) embedded microprocessor application.

   iv) computer graphics application.

OR

8. a) How do we design interface that **12**

   i) allows the user to maintain control

   ii) reduce the users memory load

   iii) are consistence.

   b) Define the terms: **6**

   i) functional independence

   ii) cohesion

   iii) coupling.

9. a) What question need to be answer in order to develop a project plan according to W^5HH principles ? 8

b) Explain size oriented metric ? What data should we collect to derive size oriented metrics ? 4

c) How do we measure the effectiveness of a software process ? 4

OR

10. a) What are the critical practices we will have to follow for performance based management of software projects ? 8

b) Explain how do we compute a function points ? 4

c) What are different metrics are available for software quality control ? How they control quality of software ? 4

11. a) Explain all the steps we should follow to reengineer a user interface. 6

b) Explain the following repository features with respect to software configuration management. 10

i) versioning

ii) dependency tracking and change management

iii) requirement tracing

iv) configuration management

v) audit trails.

OR

12. a) What is reverse engineering ? How the reverse engineering is used for 8

i) understanding processes

ii) understanding data.

b) Explain forward engineering for client/server architecture. 4

c) Write short note on "identification of objects in the software configuration". 4

SOFTWARE ENGINEERING
(2003 Course)

Time: 3 Hours Max. Marks: 100

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*2) Black **figures** to the right indicate full marks.*
*3) From Section – **I**, answer (**Q.1** OR **Q.2**) and (**Q.3** OR **Q.4**) and (**Q.5** OR **Q.6**).*
*4) From Section – **II**, answer (**Q.7** OR **Q.8**) and (**Q.9** OR **Q.10**) and (**Q.11** OR **Q.12**)*
*5) **Neat** diagrams must be drawn **wherever** necessary.*

SECTION – I

1. A) What is Software Process Model ? Explain the Incremental process models. **8**

   B) Explain in detail Process Patterns. What is the relationship between process and product ? **9**

OR

2. A) What is Software Component ? What is Component Based Software Development ? What are the issues to be considered in selection and usage of components ? **8**

   B) Explain in detail for project planning process area of CMMI: **9**

   a) Specific Goals and Specific Practices.

   b) Generic Goals and Generic Practices.

3. A) What is the importance of Planning practices in product development ? Whether planning should be iterative ? What is the relation between planning and quality ? **8**

   B) What factors should be considered while determining solution alternatives ? How it indicates Software Flexibility ? **9**

OR

4. A) What are the expected outcomes of analysis ? Explain following modelling practice issues: 8

   a) Information Domain representation of problem.

   b) Software Behaviour representation.

   B) What are the factors considered while performing system modelling ? Explain with a suitable example how systems simulation is useful aspect while designing the system. 9

5. A) Explain Class Responsibility Collaborator modelling ? What are elements of CRC template ? 8

   B) Draw level 0, level 1 and level 2 Data Flow Diagrams for Library Management System. The system incorporates details of users, various sections of library. The system keeps track of transactions on books, journals and reference material. The system generates reports on demand. 8

OR

6. A) Explain the need of Requirement Prioritisation ? How the requirements are prioritised ? 8

   B) What is Behaviour Modelling ? Draw Sequence diagrams for at least two scenarios for Account holder Transactions with Bank. Assume suitable scope and indicate it. 8

SECTION – II

7. A) What are Design Quality attributes ? What is the relationship between modularity and functional independence ? Whether High Cohesion and Low Coupling is practically achievable ? Justify your answer. 8

   B) Explain User Interface analysis and design process. How user participation results in good GUI design ? 9

OR

8. A) What do you mean by interface ? What is the role of interfaces in a class-based component level design ? 8

   B) What is Software Architecture ? What is architectural context diagram ? What are archetypes ? 9

9. A) Explain the following testing strategies for conventional software : 8
   a) Regression Testing.
   b) Smoke Testing.

   B) What are objectives of White-Box testing ? Explain in detail the following White Box testing techniques 9
   a) Data Flow Testing.
   b) Branch Testing.

OR

10. A) What is the difference between Verification and Validation ? What are the outcomes of verification and validation testing ? 8

   B) What is Fault-Based Testing ? What is meant by Testing Surface structure and Deep structure ? How Partition Testing is performed at class level ? 9

11. A) What is the importance of Conformance, Standards and Measurement in context of Software Quality ? How Software Quality is associated with phases of SDLC ? Explain the following Quality Factors. 8
   1) Correctness.
   2) Maintainability.

   B) Explain the metrics for testing. What is the importance of Testing Metrics ? 8

OR

12. A) What is the difference between Measure and Metric ? What are attributes of effective Software Metric ? 8

   B) Compute the function point value for a project with following information: 8
   1) Number of user inputs – 16
   2) Number of user outputs – 30
   3) Number of user enquiries – 12
   4) Number of files – 4
   5) Number of external interfaces – 2
   6) Number of algorithm counted – 7

   Assume all complexity values are average.

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SOFTWARE ENGINEERING

May-2008

(2003 Course)

Time : 3 Hours Max. Marks : 100

*Instructions : 1) Answers to the **two** Sections should be written in **separate** book.*
*2) Black figures to the **right** indicate **full** marks.*
*3) From Section **I**, answer (Q. 1 or Q. 2) and (Q. 3 or Q. 4) and (Q. 5 or Q. 6).*
*4) From Section **II**, answer (Q. 7 or Q. 8) and (Q. 9 or Q. 10) and (Q. 11 or Q.12).*
*5) **Neat** diagrams must be drawn **wherever** necessary.*

SECTION – I

1. A) What is meant by engineering the software ? What is meant by software evolution ? Explain the merits and demerits of incremental process model. **8**

B) What are the reasons to have a Software Process ? What are the issues addressed by Umbrella Activities in Layered Model of software engineering ? What are the levels of CMMI ? **9**

OR

2. A) List and explain management and customer myths. Why a late project can not be placed back on schedule by merely adding people to the project teams ? What is the impact of scope change on project deliverables ? **8**

B) What is the objective of Personal Software Process (PSP) ? What are the activities of PSP model ? What are the goals of Team Software Process (TSP) model ? What are the conditions in which Rapid Application Development Model is preferred ? **9**

3. A) In what sense practice is important to Managers and Software Engineers ? What are the steps carried out in problem understanding and solution planning ? What are the ways to examine the result ? **8**

P.T.O.

B) What is importance of Planning ? List and explain planning practices. What are the elements of Hatley-Pirbhai Modeling ? 9

OR

4. A) What is meant by "Principle" ? List and explain Seven Core Principles of Software Engineering. 8

B) What are the principles of 'Deployment" ? What is the role of feedback in deployment ? What are the elements of System Engineering Hierarchy ? 9

5. A) What is the difference between needs and requirements ? What are the problems in requirement elicitation ? Why requirements needs to be validated ? 8

B) List and explain analysis rules. How domain analysis is carried out ? How analysis classes are identified ? What are the essential characteristics of a class ? 8

OR

6. A) How stakeholder identification is performed ? What are the advantages of recognizing multiple viewpoints ? What is collaborative requirements gathering ? 8

B) What is meant by Scenario ? How scenario modeling is performed ? Develop an activity diagram for enrolment of students to a course. 8

SECTION – II

7. A) What is the relationship between analysis and design ? Which quality attributes design must satisfy ? What is the relationship between modularity and functional dependence ? 8

B) How architecture can be mapped to components ? What is meant by instantiation of the system ? What is the relationship between architecture and design ? 9

OR

8. A) What is meant by design class ? What are the types of design class ? A cohesive design should have high cohesive and low coupling. Justify. **8**

B) What are the categories of users ? What is the relationship between user model and design model ? The analysis and design process for user interfaces is iterative. Justify. **9**

9. A) What is the relationship between software life cycle phases – requirement engineering, analysis, design, implementation and testing ? Testing follows an "Outward" approach, starting at component level and moves towards component integration. Justify. **8**

B) What philosophy is followed for test case design while performing white-box testing ? For the following program block, show how independent program paths are identified and cyclomatic complexity is calculated using flow graph notations. **9**

```
begin
    int x, y, power ;
    float z ;
    input (x, y) ;
    if (y < 0)
        power = –y ;
    else
        power = y;
    z = 1;
    while (power ! = 0) {
        z = z* x ;
        power = power – 1;
    }
    if (y < 0)
    z = 1/z ;
    output (z);
    end
```

OR

10. A) What is the difference between verification and validation ? How Top-down and Bottom-up integration is achieved ? What is a stub and a cluster ? 8

B) What is the importance of test data in case of black-box testing ? What is test oracle ? With suitable example illustrate in which situations you will prefer boundary value analysis over equivalence partitioning. 9

11. A) What are the important factors in product revision ? How product revision is dependent on problem scope ? What are the challenges in deriving product metrics ? 8

B) Explain in detail metrics for testing. 8

OR

12. A) What are the attributes of software metrics ? Explain in detail coupling metrics. 8

B) Write short notes on : 8

a) Operation oriented metrics

b) User interface metrics.

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SOFTWARE ENGINEERING
(2003 Course)

Time: 3 Hours

Max. Marks: 100

Instructions: 1) *Answer any* **3** *questions from* **each** *Section.*
2) *Answers to the* **two** *Sections should be written in* **separate** *books.*
3) *Neat diagrams must be drawn* **wherever** *necessary.*
4) *Black figures to the* **right** *indicate* **full** *marks.*

SECTION – I

1. A) What is the importance of software engineering ? What is meant by software evolution ? What are management and customer myths ? 8

B) Explain in detail the following :

a) Prototyping model b) Concurrent development model. 9

OR

2. A) Explain in detail software engineering layers . What is the role of modeling and construction in software process models ? 8

B) Explain in detail Personal and Team Process models. 9

3. A) What is the importance of principles and practices in software engineering ? Explain in detail coding principles and concepts. 8

B) What are elements of system ? What are the issues relevant to domain view ? What factors are addressed by element view in system hierarchy ? 9

OR

4. A) What is the difference between verification and validation ? Explain in detail testing principles and deployment issues. 8

B) How system modeling is achieved using UML ? What is the purpose of activity diagram ? Explain activity diagram with suitable example. 9

5. A) Why requirement engineering is considered to be communication intensive activity ? What do you mean by requirement negotiation and validation ? List requirement validation checklist. 8

B) Explain in Domain Analysis. Discuss in short : Data objects, Cardinality and Modality in data models. **8**

OR

6. A) What is collaborative requirement gathering ? What is the relation between usecases and functional requirements ? What are the elements of usecase template? **8**

B) Explain : a) Control specification b) Process specification.

What is the importance of state representations ? **8**

SECTION – II

7. A) What is the importance of software design ? What is the relation between analysis and design ? What are types of design classes ? **9**

B) Why architecture is important ? Explain in detail :

a) Call-return architecture

b) Layered architecture. **8**

OR

8. A) Explain in detail the following :

a) Architectural design elements

b) Component-level design elements

c) Deployment-level design elements. **9**

B) What are the golden rules of interface design ? Explain in detail all the rules. **8**

9. A) What is the objective of Testing ? What are unit testing considerations ? What is the difference between test stub and driver ? What are the problems associated with Top-down integration ? **9**

B) In relation with white-box testing technique, explain:

a) Condition Testing b) Loop Testing. **8**

OR

10. A) What is the role of user in Testing ? How testing strategy is selected and applied ? Compare testing with debugging. **9**

B) What is the objective of Black-box Testing ? Explain :

a) Graph-based testing b) Test completion criteria. **8**

11. A) What are measurement principles ? Explain in detail Goal-oriented software measurement. **8**

B) Explain the metrics for source code. What are the factors affecting source code metric investigation ? **8**

OR

12. A) Explain in detail product metrics landscape. **8**

B) What are the factors that address software quality ? Why Performance/ Reliability/Robustness/Reusability are important from product perspective viewpoint ? **8**

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May-09 Regular

T.E. (Computer) (Semester – II) Examination, 2009
SOFTWARE ENGINEERING
(2003 Course)

Time : 3 Hours Max. Marks : 100

Instructions: *1) Answers to the **two** Sections should be written in **separate** answer books.*
*2) Figures to the **right** indicate **full** marks.*
*3) From Section **I**, answer (Q. 1 or Q. 2) and (Q. 3 or Q. 4) and (Q. 5 or Q. 6)*
*4) From Section **II**, answer (Q. 7 or Q. 8) and (Q. 9 or Q. 10) and (Q. 11 or Q. 12)*
*5) Neat diagrams must be drawn **wherever** necessary.*
*6) Make suitable assumptions **wherever** appropriate and relevant.*

SECTION – I

1. a) Explain the generic process framework activities. 5
   b) Explain with neat diagram, the prototyping model for software development. What are its drawbacks ? 6
   c) Explain in detail the various phases of the unified process. 6

OR

2. a) Explain the umbrella activities which are applied throughout the software process. 5
   b) Explain with neat diagram, the spiral model for software development. 6
   c) Write short note on Rapid Application Development (RAD) model. 6

3. a) Explain data architecture, applications architecture and technology infrastructure, as part of Business Process Engineering. 7
   b) What three domains are considered during analysis modelling ? Explain. 6
   c) Explain the following factors that should be considered when constructing a system model : 4
      i) Assumptions ii) Constraints

OR

P.T.O.

4. a) Explain system engineering hierarchy with neat labeled diagram. 7

b) Discuss role/use of any three UML diagrams for system modelling. 6

c) In brief state what you understand by terms : 4

i) Pareto principle in software testing

ii) System Simulation tools

5. a) Explain concept of entity classes and boundary classes. For "Banking System", give example of one entity class and one boundary class. 4

b) What are the various elements of use case template ? 4

c) What is meant by domain analysis ? Explain. 4

d) For "Library Management system", make your assumptions about the scope of the system, identify four use cases and depict them in a diagram. 4

OR

6. a) Explain in detail, Class Responsibilities Collaborator (CRC) modelling. 4

b) In the context of behavioral modelling, explain state diagrams. 4

c) Explain negotiation and specification as the requirements engineering tasks. 4

d) Explain with examples, the Association and Dependency relationships between two analysis classes. 4

SECTION – II

7. a) Explain the following design concepts : 4

i) Refactoring ii) Abstraction

b) Explain the User Interface analysis and design process with diagram. 6

c) Explain the following : 7

i) Interface design elements

ii) Deployment level design elements.

OR

8. a) Explain in short the following design concepts : 4

i) Refinement ii) Design patterns

b) What is software architecture ? Why it is important ? 6

c) What is the purpose of architectural context diagram ? Explain with figure, the structure of architectural context diagram. 7

9. a) Explain bottom-up integration testing strategy in detail. 6

b) Explain recovery testing as a type of system testing. 3

c) For the following program block, draw a flow graph, identify all the independent program paths from the flow graph and calculate cyclomatic complexity from the flow graph. 8

/* num_of_entries is an integer input parameter, sum is an integer output parameter and a is an integer array containing num_of_entries of elements*/

Program block for Q. 9 c)

```
pos_sum(a, num_of_entries, sum)

    sum = 0
    int i = 1

    while (i<=num_of_entries)

        if a[i] > 0

            sum = sum + a[i]

        endif

        i=i+1

    end while

end pos_sum
```

OR

10. a) Explain the following : 6
    i) Alpha and beta testing
    ii) Unit test environment

b) Differentiate between black box and white box testing. 3

c) Explain how Loop testing and Regression testing are useful in the context of software testing. 8

11. a) Explain in detail the Function Point (FP) metric. 6

b) Explain the following concepts : 6

i) Measures and measurement

ii) Goal oriented software measurement

c) Explain the following class based design metrics for Object Oriented (OO) systems : 4

i) Depth of the inheritance tree (DIT)

ii) Coupling between object classes (CBO)

OR

12. a) Write short note on McCall's quality factors. 6

b) Give short explanation for following : 6

i) Average number of parameters per operation as an operation-oriented metric

ii) Size as a measurable characteristic of an object oriented design

c) Explain the following design metrics, which have a direct influence on the testability of an Object Oriented (OO) system : 4

i) Percent public and protected (PAP)

ii) Public access to data members (PAD).
