

University of Rajshahi
Department of Computer Science and Engineering
B.Sc. Engineering **Part-3 Odd Semester** Examination, 2023
Course: **CSE3111 (Software Engineering)**
Session: 2020-2021

Time: 03 Hours

Marks: 52.5

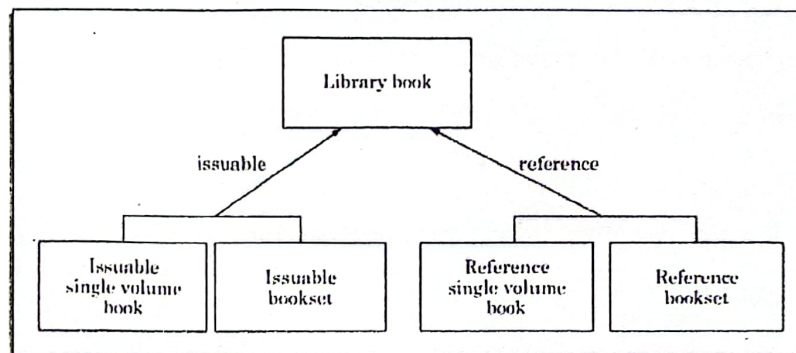
[Answer 06(Six) questions taking any 03(Three) questions from each section]

Section-A

1. a) Explain why feasibility analysis is very important before starting the development of a software project. 2.75
b) What are the basic questions pertaining to a project should be clearly understood by the analyst to obtain a good grasp of the problem? 2.0
c) Define decision tree and decision table. Draw the decision table for the 'conditions' and 'actions' of a traditional Library Management System. 4.0
2. a) What is the process flow in software engineering? Discuss various types of flows using block diagrams. 3.75
b) Compare the prototype model and the incremental software development 3.0
c) What are the primary causes of the software crisis? 2.0
3. a) Define '*cohesion*' and '*coupling*'. '*The greater the cohesion, the better the program design.*'-Explain. 3.0
b) What is functional independence? What advantages does it offer? 2.75
c) Explain how you can compare the modularity of two alternate designs. 3.0
4. a) What is meant by DFD balancing? Explain with an example. 3.0
b) What is a structure chart? How does it differ with a flow chart? 2.25
c) '*There should be at most one control relationship between any two modules in a structure chat.*' -What does it mean? Explain with '*properly-layered*' and '*poorly-layered*' two different arrangements of modules. 3.5

Section-B

5. a) Why is functional independence crucial for modular software design? How can it be measured? 3.0
- b) Describe the MVC framework, its components, and its benefits. 3.0
- c) Explain the brute-force debugging technique. 2.75
6. a) What is a class diagram? Explain the '*association*', '*aggregation*' and '*composition*' relationships in a class diagram. 4.0
- b) What is a dependency relationship? Explain with an example. 3.0
- c) Illustrate the inheritance relationships as shown in the figure below. 1.75



7. a) Define Code review and Code walkthrough. How do they differ? What are the major activities performed under a software test? 3.0
- b) Draw the schematic diagram of a typical testing process in terms of its activities carried out. 3.0
- c)

```
if (x>y)
    max = x;
else
    max = x;
/* should be max = y */
```

 2.75
- For the given code segment, the test suite { (x=3, y=2); (x=2, y=3) } can detect the error, whereas a larger test suite { (x=3, y=2); (x=4, y=3) ; (x=5, y=1) } does not detect the error. Explain.
8. a) What is the condition of coverage testing? Give example. 2.0
- b) Consider the following C program segment: 2.75
- ```
if(temperature > 150 || temperature > 50)
 seWarningtLightOn();
```
- The program statements have a bug in the second component condition that can be detected by multiple condition coverage, but not by branch coverage. Analyze and explain.
- c) Describe different types of performance testing of a software. 4.0



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B.Sc Engg. Part-3, Odd Semester, Examination-2022  
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*[Answer any Six (06) questions taking at least Three (03) from each of the sections]*

**Section-A**

1. a) "Software Engineering is a systematic, disciplined, quantifiable approach to the development, operation and maintenance of software." -Explain with a real-life example. 3  
b) What do you mean by functional and non-functional requirements? Give examples. 2  
c) Consider a Library Membership System automation software (LMS) where it should support three options *New Member, Renewal and Cancel Membership*. Draw the decision tree and decision table of the system demonstrating the actions and decisions for each of the options. 3.75
2. a) Explain the generic phases of software engineering process. 2  
b) Write the main differences between the prototype and incremental development model. 3  
c) Compare between RAD and spiral software development model. 3.75
3. a) What is Use-Case model? Explain how the Use-Cases are represented in a Use-Case Model. For a library management system, the use-cases could be *issue-book, query-book, return-book, create-member, add-book*, etc. Draw the Use-Case diagram for the system. 4.25  
b) What do you mean by factoring of Use-Cases? Explain the *<<include>>* and *<<extends>>* relationships with proper examples. 4.5
4. a) A software system called RMS calculating software would read three integer numbers from the user in the range of -1000 and +1000 and then determine the root mean square (rms) of the three input numbers and display it. Draw the context diagram, Level-1 DFD and Structure chart for the software. 4.25  
b) Define Sequence diagram and Collaboration diagram. Draw the Sequence diagram for the use case '*renew-book*' of the Library Management System. Convert the sequence diagram to corresponding Collaboration diagram. 4.5

**Section-B**

5. a) Describe the characteristics of a good programming language. 3.75  
b) Explain why boundary value analysis is important in Black-Box testing. For a function that computes the square root of the integer values in the range of 0 and 5000, determine the boundary value test suite. 3  
c) What is coverage-based testing? Design a statement coverage-based test suite for the following Euclid's greatest common divisor (GCD) computation function: 2  

```
int computeGCD (int x,int y){
 while (x != y){
 if (x>y) then
 x=x-y;
 else y=y-x;
 }
 return x;
}
```

6. a) i) For the given code fragment, find the Control Flow Graph (CFG). Go step by step.  
 ii) Identify the Linear Independent Paths from the graph.  
 ii) Calculate the McCabe's Cyclomatic complexity using each of the available methods.

```
{ int i, j, k;
 for (i=0 ; i<=N ; i++)
 p[i] = 1;
 for (i=2 ; i<=N ; i++)
 {
 k = p[i]; j=1;
 while (a[p[j-1]] > a[k] {
 p[j] = p[j-1];
 j++;
 }
 p[j]=k;
 }
```

6

- b) What are the steps to carry out the path coverage-based testing? 2.75
7. a) Discuss the quality factors of a good software. 3.75  
 b) What are the different types of maintenance that a software product might need? Why are these maintenances required? 3  
 c) If a software product cost BDT 10,000,000 for development, compute the annual maintenance cost given that every year approximately 5 percent of the code needs modification. Identify the factors which render the maintenance cost estimation inaccurate. 2
8. a) What is meant by the 'size' of a software project? Why does a project manager need to estimate the size of the project? How is the size estimated? 2.75  
 b) Suppose you are the project manager of a software project requiring the following activities. 6

| Activity No. | Activity Name          | Duration (weeks) | Immediate Predecessor |
|--------------|------------------------|------------------|-----------------------|
| 1.           | Obtain requirements    | 4                | -                     |
| 2.           | Analyse operations     | 4                | -                     |
| 3.           | Define subsystems      | 2                | 1                     |
| 4.           | Develop database       | 4                | 1                     |
| 5.           | Make decision analysis | 3                | 2                     |
| 6.           | Identify constraints   | 2                | 5                     |
| 7.           | Build module 1         | 8                | 3,4,6                 |
| 8.           | Build module 2         | 12               | 3,4,6                 |
| 9.           | Build module 3         | 18               | 3,4,6                 |
| 10.          | Write report           | 10               | 6                     |
| 11.          | Integration and test   | 8                | 7,8,9                 |
| 12.          | Implementation         | 2                | 10,11                 |

- (a) Draw the Activity Network representation of the project.  
 (b) Determine ES, EF and LS, LF for every task.  
 (c) Draw the Gantt chart representation of the project.



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**B. Sc. (Engg.) Part-III Even Semester Examination 2021**  
**Course: CSE-3211 (Software Engineering)**  
**Full Marks: 52.5      Time: 3(Three) Hours**  
**Answer 06 (Six) questions taking any 03 (Three) from each section**

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 2021-2022

**Section-A**

1. a) Define Software and Software Engineering. 3  
 b) Is software engineering applicable when WebApps are built? If so, how might it be modified to accommodate the unique characteristics of WebApps? 3  
 c) Many modern applications change frequently before they are presented to the end user and then after the first version has been put into use. Suggest a few ways to build software to stop deterioration due to change. 2.75
  
2. a) What are the major causes of the software crisis? 2  
 b) Write the SDLC phases and the documents they produce. 2.50  
 c) Briefly explain the Incremental process model and its advantages over Waterfall model. 4.25
  
3. a) Define requirements engineering. State various types of software requirements. 2.50  
 b) Write and briefly explain various requirements engineering tasks. 4.25  
 c) Why is it that many software developers don't pay enough attention to requirements engineering? Are there ever circumstances where you can skip it? 2
  
4. a) What are the issues of software project management concerns? 2  
 b) Which factors need to be considered to build a software project team? 2.25  
 c) What are software project metrics? Why it is necessary? 2.25  
 d) Compare size-oriented metrics and function-oriented metrics to measure a software process and product. 2.25

**Section-B**

5. a) How the software requirements model could be translated into the design model? 2.50  
 b) Write the characteristics of a good software design. 3.25  
 c) Explain the quality attributes of software design. 3
  
6. a) State and briefly explain the important design concepts that span software development. 5  
 b) Discuss the layered software architecture with the necessary diagram. 2.25  
 c) Define i) Functional Independence, ii) Cohesion, and iii) Coupling with respect to modular software design. 1.50
  
7. a) Describe in brief about alpha and beta testing. 2  
 b) What is the main aim of writing a successful test? 2  
 c) State some SQA activities that are encompassed by software verification and validation process. 2.50  
 d) Define smoke testing. Discuss its benefits. 2.25
  
8. a) What are the technical risk and business risk of a project? 3  
 b) Besides counting errors and defects, are there other countable characteristics of software that imply quality? What are they and can they be measured directly? 3  
 c) Considering each of the four aspects of the cost of quality, which do you think is the most expensive and why? 2.75

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**Answer 06(Six) questions taking any 03(Three) questions from each part**

**Part-A**

- |    |                                                                                                                                 |      |
|----|---------------------------------------------------------------------------------------------------------------------------------|------|
| 1. | a) Define software and explain evolving role of software. What is the difference between generic and bespoke software products? | 2.75 |
|    | b) Draw the failure curves for hardware and software.                                                                           | 2    |
|    | c) What is software engineering? Describe the different software components in detail.                                          | 4    |
| 2. | a) Discuss Rational Unified Process and its phases.                                                                             | 5.75 |
|    | b) State the Agility principles.                                                                                                | 3    |
| 3. | a) Write the characteristics of a good software requirement. Why it is difficult to get good requirement?                       | 3.5  |
| 4. | b) Differentiate between functional and non-functional requirement.                                                             | 3    |
|    | c) State the format of a SRS document.                                                                                          | 2.25 |
| 4. | a) Discuss the four P's of effective project management.                                                                        | 4    |
|    | b) When is a project get into jeopardy?                                                                                         | 2.5  |
|    | c) What is the W <sup>3</sup> HH principle?                                                                                     | 2.25 |

**Part-B**

- |    |                                                                                                                                  |      |
|----|----------------------------------------------------------------------------------------------------------------------------------|------|
| 5. | a) What are the goals of software design process?                                                                                | 1.5  |
|    | b) Why is functional independence important for effective modular software design? How could we measure functional independence? | 3    |
|    | c) What is UML? Why we use UML?                                                                                                  | 1.75 |
|    | d) Compare data-centered and data flow software architecture.                                                                    | 2.5  |
| 6. | a) Write the software testing principles.                                                                                        | 2.25 |
|    | b) What does mean by software testability? Briefly explain its characteristics.                                                  | 5.5  |
|    | c) When the orthogonal array testing can be applied?                                                                             | 1    |
| 7. | a) What does mean by software verification and validation?                                                                       | 2    |
|    | b) Explain the top-down integration testing. Why problems may occur in top-down integration?                                     | 3.75 |
|    | c) Distinguish between alpha and beta testing.                                                                                   | 3    |
| 8. | a) Differentiate between reactive and proactive risk management.                                                                 |      |
|    | b) Discuss about the different types of software risks.                                                                          |      |
|    | c) Define Software Quality Assurance (SQA). Write down the different roles of an SQA group.                                      | 3.75 |