Course Code:0714 02 CSE 3103	**Year: Third**	**Term: First**
Course Title: Software Engineering and Information Systems		
Course Status: Core		
Credit: 3.00		
Prerequisite(s): None		
Rationale	This course is designed to provide basic knowledge of software engineering principles and practices to information system development of the intermediate level students of Computer Science and Engineering.	

	Course Contents	**CLOs**
	Section A	
1	**Software:** Its Nature and Qualities, Software engineering practice, software myths, engineering ethics.	1
2	**Information System Development Environment:** Information System Analysis, Role of System Analyst, SDLC, Modern Approaches to System Development, Different Types of IS.	1,2
3	**The Software Process:** Process Models: waterfall, incremental, evolutionary, concurrent; Personal and Team software process; Agile development: XP, Scrum, feature driven development, lean software development.	1
4	**Software Requirements:** Identifying stakeholders, eliciting requirements, developing use cases, validating requirements, Project Feasibility Analysis, BPP, SOW, SOPS.	3,5
5	**System Modeling:** Context, interaction, structural, behavioral models, data modeling.	3
	Section B	
1	**Architectural Design:** Architectural decisions, styles, design pattern, mapping with data flow.	3
2	**Software Design:** Object-oriented view, cohesion, coupling, UML, implementation issues, open source development, coding, system implementation best practices for software development	3
3	**Software Testing:** Unit testing, Integration Testing, System Testing, Acceptance Testing, Installation, maintenance, release testing, test driven development.	4
4	**Cost Model:** Cost estimation techniques, Algorithmic cost modeling, COCOMO.	5
5	**Software Metrics:** Function-oriented metrics, Size-oriented metrics, Risk analysis and management, Software maintenance.	6

Table of Contents

CSE 22 Batch

Course Teacher: Dr. Kazi Masudul Alam
CT Questions :

Course Title: Software Engineering and Information Systems, CT: 1, Time: 45 minutes, Marks: 30

1.	Brief describe the software process framework activities.	10
2.	List the umbrella activities required in the software development process.	10
3.	Distinguish between the V-model and incremental software process models.	10

Course Title: Software Engineering and Information Systems, CT: 2-A, Time: 45 minutes, Marks: 30

An online bookstore allows customers to browse and purchase books, while employees of the bookstore manage inventory and process orders. A third-party supplier updates stock availability through an automated system when required. When a customer places an order, the employee checks inventory levels, and if stock is low, the supplier is notified to restock. Otherwise the request is fulfilled. The system tracks all transactions and updates in real-time.

	Answer any three (3) questions.	
1.	Use case for order placement and restocking.	10
2.	Activity / Swimlane diagram for order processing.	10
3.	DFD-1 for data movement between customer orders and supplier updates. Consider data storages.	10
4.	Sequence diagram for order placement and order fulfillment.	10

Course Title: Software Engineering and Information Systems, CT: 2-B, Time: 45 minutes, Marks: 30

A hospital uses a system to manage patient appointments. Patients book appointments online or by phone, doctors review their schedules and confirm availability. Receptionists finalize the appointments and if required handle cancellations or rescheduling of appointments. Once there is a successfully confirmed appointment, the system sends reminders to patients and updates the doctor's calendar automatically.

	Answer any three (3) questions.	
1.	Use case for booking and confirmation of appointments.	10
2.	Activity / Swimlane diagram for successful appointment workflow.	10
3.	DFD-1 in case of data movement for booking an appointment. Consider data storages.	10
4.	Sequence diagram for successful booking confirmation.	10

Course Title: Software Engineering and Information Systems, CT: 3, Time: 45 minutes, Marks: 30

1.	A small software development team is working on a high-risk project with very tight deadlines and constantly changing customer requirements. The software needs to be extremely reliable, and the client expects frequent releases with minimal bugs. Developers and customers can collaborate closely, and the team has the capacity to implement practices like pair programming, continuous integration, and test-driven development (TDD). Apply an agile methodology to describe the necessary functional processes.	15
2.	An online travel platform integrates services from various third-party providers: flights from multiple airlines, hotel bookings from different hospitality companies, car rentals from national agencies, and a secure payment gateway. When a customer plans a trip, the platform coordinates all these services—checking availability, making reservations, and processing payments—into a single workflow. The platform itself doesn't own these services but orchestrates them to deliver a smooth end-to-end booking experience. Describe the necessary system architecture functionality.	15

Course Title: **Software Engineering and Information Systems, CT: 4, Time: 45 minutes, Marks: 30**

1.	Imagine yourself as a project manager overseeing the development of a mission-critical online banking software system. Given the need to deliver a high-quality product within a constrained timeline, outline the essential types of testing you would enforce on your development and testing teams. For each type of test, briefly explain your reasoning behind its selection to ensure the reliability, security, and performance of the system.	15
2.	Why is software project estimation crucial, and what are the key types of estimation metrics? Provide a brief description of each to highlight their importance in project planning and execution.	15

Term Final:

Khulna University, Khulna

Computer Science and Engineering Discipline

3rd Year, Term I, Examination 2025

Session: 2023-2024

Course No: 071402 CSE 3103

Full Title of Course: Software Engineering and Information System

Full Marks: 60 Time: 03 Hours

- The figures in the margin indicate full marks. The questions are of equal value.
- Use separate sheet for each section.

Section A

There are **FOUR** questions in this section. Answer any **THREE** questions

1	a)	Explain the software engineering process and its key stages.	05
	b)	Identify and explain common software myths.	05
2	a)	Describe the incremental process model and its advantages over the waterfall model.	05
	b)	Discuss the evolutionary process model and its application in modern software projects.	05
3	a)	What is software architecture? Explain the primary elements of representing a software architecture with example.	05
	b)	Describe three traditional techniques for collecting information during analysis, along with their challenges.	05
4	a)	Explain the tasks that encompasses the requirements engineering process in the case of software development.	05
	b)	What is UML used for? Develop uses cases for a library management system.	05

Section B

There are **FOUR** questions in this section. Answer any **THREE** questions

5		A hospital uses a system to manage patient appointments. Patients book appointments online or by phone, doctors review their schedules and confirm availability. Receptionists finalize the appointments and if required handle cancellations or rescheduling of appointments. Once there is a successfully confirmed appointment, the system sends reminders to patients and updates the doctor's calendar automatically.	
	a)	Design the sequence diagram for a successful booking confirmation event.	05
	b)	Design the DFD-1 in case of data movement for booking an appointment. Consider necessary data storages.	05
6	a)	Compare and contrast the MVC, Layered, and Client-Server architectural patterns.	05
	b)	An online travel platform integrates services from various third-party providers: flights from multiple airlines, hotel bookings from different hospitality companies, car rentals from national agencies, and a secure payment gateway. When a customer plans a trip, the platform coordinates all these services, checking availability, making reservations, and processing payments—into a single workflow. The platform itself doesn't own these services but orchestras them to deliver a smooth end-to-end booking experience. Propose the necessary system architecture functionality in details.	05
7	a)	Write one pass and one fail test case for testing each of the following two functions. After that, construct four test functions based on those test cases.	05

```
def multiplication(num1, num2):
        result = 0
        for _ in range(num2):
            result += num1
        return result

def calculate_power(base, exponent):
        result = 1
        for _ in range(exponent):
          result *= base
        return result
```

	b)	Explain the procedural steps of the Top-down integration test.	03
	c)	What are the strategic issues of Testing a software system?	02
8	a)	Describe the basic COCOMO model and explain how COCOMO II improves upon it by incorporating modern software development practices.	05
	b)	What is software project estimation? Define and differentiate between size-oriented and function-oriented metrics.	05

CSE’18 Batch
Course Teacher :

Khulna University, Khulna

Computer Science and Engineering Discipline

3rd Year Term **I** Examination 2021

Session: **2019-2020**

Course No.: **CSE-3103**

Full Title of the Course: Software Engineering

Full Marks: **36** Time: **01 Hour 30 Minutes**

- The figures in the right margin indicate the full marks.
- Use separate answer sheet for each section.

SECTION A

There are **FOUR** questions in this section. Answer any **THREE** questions.

Q1.	(a)	State and explain essential attributes of a good software.	03
	(b)	What is waterfall model? Why is the pure waterfall model of software development not recommended for large size software projects?	03
Q2.	(a)	What is use-case diagram? What is ‘Extend’ and ‘Include’ in use cases?	02
	(b)	What does associations in class diagram mean? Draw a class diagram of a online messaging application.	04
Q3.	(a)	What is RAD model? What is the benefit of RAD model?	02
	(b)	What are the fundamental activities that are common to all types of software process models?	02
	(c)	What is the major work product produced in Elaboration phase of unified process?	02
Q4.	(a)	What is the purpose of CMMI? What process areas required to achieve a maturity level? Discuss in brief.	02
	(b)	Is it possible to combine process models? If so, provide an example.	02
	(c)	Design a use-case diagram of course registration system of Khulna University. Consider your actors are students, teachers, administrator of the system, etc.	02

SECTION B

There are **FOUR** questions in this section. Answer any **THREE** questions.

Q5. (a) Present a guideline for interface testing. 03

(b) Differentiate among integration testing, system testing, and acceptance testing. 03

Q6. (a) Draw a flowchart of a factorial series generation algorithm. Then calculate the cyclomatic complexity of that algorithm in any one method. 04

(b) What is the purpose of stress testing? Give some example projects where you can use stress testing. 02

Q7. (a) What do you know about 'bathtub curve'? Draw a curve that will show software idealized and actual failure curve. 03

(b) Why software engineering called a layered technology? Give some umbrella activities that are important to develop an e-commerce web application. 02

(c) Justify the following statement – 01
"Until I get the program running, I have no way of assessing its quality."

Q8. Consider you are the team lead of a big IT company. You need to design a new software called "Online Education System". Discuss the following- 06

1) List some list of tasks if you want to follow unified process model.
2) Draw the activity diagram of your new system.
3) List some testing techniques that your team should follow to develop a high-quality application.

SE CT-3

1. Explain how the particular architectural style of a system should depend on no-functional system requirement.
2. When Client-Server architecture is used? Describe the advantages and disadvantages of Client-Server model.

1. What is the difference between computer science and software engineering? Explain the attributes that are essential for a good software. 10
2. What is reuse oriented software engineering? Briefly explain the stages of reuse oriented software engineering. 10
3. Describe the advantages and disadvantages of incremental software delivery. 10

SE CT-02

1. Describe the problems with the agile methods.
2. Write some of the extreme programming practices and discuss them.

Khulna University, Khulna

Computer Science and Engineering Discipline

3rd Year, Term I Examination 2019

Session: 2018-2019

Course No: CSE 3103

Full Title of Course: **Software Engineering**

Full Marks: 60 Time: 03 Hours

- The Figures in the margin indicate full marks. The questions are of equal value.
- Use separate sheet for each section.

SECTION A

There are **FOUR** questions in this section. Answer any **THREE** questions.

1. a) Define software engineering? What is the difference between software engineering and system engineering? 03
   b) Briefly describe four diversetypes of application software. 04
   c) What is software engineering ethics? Is there any standard of acceptable behavior? Briefly explain. 03

2. a) What are the fundamental activities that are common to all types of software process models? 03
   b) Discuss the benefits of incremental development model over waterfall model. List out two problems of incremental model. 04
   c) Briefly explain two ways for coping with changing system requirements. 03

3. a) What is the manifesto of agile software development? Describe the key principles of agile methods. 03
   b) What are the key features of testing in extreme programming? 04
   c) Do you think pair programming is comparable in terms of productivity with two people working independently? If "yes" then show your reasons. 03

4. a) What is software prototyping? Systems developed as throwaway prototypes should not be released as final products, why? 04
   b) Why it is important to write at least a short document of system requirements? Specify few ways of writing system requirement specification. 03
   c) Discuss different types of checks that should be carried out during requirement validation process. 03

SECTION B

There are **FOUR** questions in this section. Answer any **THREE** questions.

5. a) Design a use case diagram of course registration system of Khulna University. Consider your actors are students, teachers, administrator of the system, etc. 04
   b) What type of UML diagram type is used for interaction modeling? Draw a class diagram for a hospitals patient management system. 04
   c) What is Alpha and Beta testing? 02

6. a) When client-server architecture is used? Discuss the advantages and disadvantages of client-server architecture in brief. 04
   b) How the choice of a particular architectural style depends on non-functional system requirements? 04
   c) When Pipe and Filter architecture is used? 02

7. a) How do you differentiate between validation testing and verification testing? 02
   b) What are the typical stages of testing that commercial software should go through? 03
   c) Discuss different types of interfaces between components of a program. Briefly explain the errors that can occur in those interfaces. 05

8. a) How does unit testing help in Test Driven Development (TDD)? 03
   b) Present a general guideline for interface testing. 03
   c) Design software architecture for a library system, which allows controlled electronic access to copyright material from a group of libraries. 04

KHULNA UNIVERSITY, KHULNA Date : 02/05/2017

Computer Science and Engineering Discipline

3rd Year, Term II, Examination 2017

Session: 2015 - 2016

Course No: CSE 3203

Full Title of Course: **Software Engineering and Information System**

Full Marks: 60 Time: 03 Hours

- The figures in the margin indicate full marks. The questions are of equal value.
- Use separate sheet for each section.

Section A

There are **FOUR** questions in this section. Answer any **THREE** questions.

1. (a) Describe the essential attributes of good software. 03
   (b) What is the most important difference between generic software product development and custom software development? 03
   (c) What are the differences of waterfall and incremental software development process? 04

2. (a) Describe the main activities in the software design process and outputs of these activities. 05
   (b) Compare and contrast the Scrum approach to project management with conventional plan-based approaches. 03
   (c) When would you recommend against the use of an agile method for developing a software? 02

3. (a) Explain why test-first development helps the programmer to develop a better understanding of the system requirements. What are the difficulties with test first development? 04
   (b) Why the productivity rate of programmers working as a pair might be more than half that of two programmers working individually? 03
   (c) Briefly explain White box testing and Black box testing. 03

4. (a) What is JAD? How does it help group members? 03
   (b) What are case tools? Give some examples. How does it help in system development? 03
   (c) Extreme programming expresses user requirements as stories, with each story written on a card. Discuss the advantages and disadvantages of this approach to requirements description. 04

Section B

There are **FOUR** questions in this section. Answer any **THREE** questions.

5. (a) Define system and systems engineering. Contrast with software engineering. 04
   (b) What are the steps of system development life cycle (SDLC)? Why is it considered to be spiral? 04
   (c) Describe the role of system analysts in information system development. 02

6. (a) List and describe the common skills and activities of a project manager. 03
   (b) Describe several project evaluation criteria. 03
   (c) Describe the concept of the time value of money. How does the discount rate affect the value of $1 today versus one year from today? 04

7. (a) List common traditional methods of collecting information system requirements. Compare and contrast various methods. What are the limitations of methods? 04
   (b) Compare and contrast group interview process with individual interview. 03
   (c) What are the general guidelines for conducting interviews? 03

8. (a) What is a Baseline Project Plan? What does it specify and what are its objectives and components? 04
   (b) What are the differences between closed and open-ended questions? 02
   (c) What is a data flow diagram? What characteristics and functions of data in information systems are modeled by DFD? 04

Class Test – 3

1. List different phases in the SDLC. Write down input, deliverables, and output from each phase of SDLC cycle. 10
2. List common traditional methods of collecting information system requirements. Compare and contrast various methods. What are the limitations of methods? 10

Class Test - 1

What are the four important attributes that all professional software should have? Explain. 10

What are the major process activities? Describe each of them. 10

Write short notes on ***Waterfall Model*** and ***Incremental Development Model***.