

**INSTRUCTIONS TO PAPER SETTERS:**

1. Question No. 1 should be compulsory and cover the entire syllabus. There should be 10 questions of short answer type of 2.5 marks each, having at least 2 questions from each unit.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions to evaluate analytical/technical skills of candidate. However, student may be asked to attempt only 1 question from each unit. Each question should be 12.5 marks including subparts, if any.
3. Examiners are requested to go through the Course Outcomes (CO) of this course and prepare the question paper accordingly, using Bloom's Taxonomy(BT) in such a way that every question be mapped to some or other CO and all the questions, put together, must be able to achieve the mapping to all the CO(s), in a balanced way.

**OBJECTIVE:** *In this course, the learner's will be able to develop expertise related to the following:-*

1. *To understand the iterative implementation of software projects.*
2. *To analyze projects using use case modeling tools.*
3. *To develop solutions for real-life cases using design models and patterns.*
4. *To understand and implement project design requirements for user interface, data layer and system control.*
5. *To apply modern case tools to develop solutions.*

**PRE-REQUISITES:**

- Software Engineering Concepts
- Object Oriented Programming Concepts
- [Pre-requisite based study material](#) (Website Course Material)
- Object Oriented Analysis and Design, NPTEL by Prof. Partha Pratim Das, Department of Computer Science and Engineering, IIT Kharagpur (08 Weeks) Link: <https://nptel.ac.in/courses/106105153/>

**COURSE OUTCOMES:**

After the completion of the theory course, the learners will be able to:

CO1	Illustrate system modeling and architecture using UML. (BTL2)
CO2	Apply suitable iterative process model. (BTL3)
CO3	Analyze requirements with use cases. (BTL4)
CO4	Appraise, analyze and design artifacts (BTL5)

CO5	Create domain models for analysis phase (BTL 6)
CO6	Design object solutions with patterns and architectural layers (BTL 6)

### UNIT – I

**Object Oriented Concepts:** Review of Objects and Classes. Links and association, Generalization and specialization, Inheritance, Grouping concepts, aggregation, composition, abstracts classes, Polymorphism, Metadata, Constraints, Reuse.

**Object Oriented Methodologies:** Introduction to Rational Unified Process, Comparison of Traditional Lifecycle Model vs Object Oriented lifecycle model.

**UML:** Origin of UML, 4+1 view architecture of UML

**Architecture:** Introduction, System development is model building, model architecture, requirements model, analysis model, the design model, the implementation model, test model. **[No. of Hrs.: 10]**

### UNIT – II

**Project Management and Inception Phase:** Project Management, the unified process and the inception phase, Project Monitoring and Control.

**Analysis:** Introduction, the requirements model, the analysis model – use cases and domain classes, use case modelling and Detailed Requirements.

**UML:** Use case model, Activity Diagram, System sequence Diagrams, Object Diagrams, Domain Class Model Diagrams. **[No. of Hrs. :10]**

### UNIT – III

**Construction:** Introduction, the design model, block design, working with construction. Use case realization: the design discipline within UP iterations.

**Designing the Subsystem:** Mapping design to code, Designing the data access layer, UI interfaces and system interfaces.

**Reusable Design Patterns:** Importance of design patterns, Basic design patterns –Singleton, Multiton, Iterator, Adapter, Observer.

**UML:** Communication Diagrams, Design Class Diagram, State Transition Diagram, Package Diagram, Component Diagram and Deployment Diagram. **[No. of Hrs: 12]**

### UNIT – IV

**Object Oriented Testing Techniques:** Testing Terminology, Types of test, Automatic Tests, Testing Strategies.

**Agile Process:** Agile Manifesto, Agile Principles, Introduction to Extreme Programming, Scrum, Lean processes. Case Studies. **[No. of Hrs.: 08]**

#### TEXT BOOKS:

1. John W. Satzinger, Robert B. Jackson and Stephen D. Burd, “Object Oriented Analysis and Design with Unified Process”, Cengage Learning, 1<sup>st</sup> Edition, 2014.
2. Mike O’Docherty, “Object Oriented Analysis and Design”, Wiley, 1<sup>st</sup> Edition, 2013.
3. Ivar Jacobson, Magnus Christerson, Patrick Jonsson and Gunar Overgaard, “Object Oriented Software Engineering-Use Case Driven Approach”, Pearson, 7<sup>th</sup> Impression, 2009.

#### REFERENCES:

1. Grady Booch, James Rumbaugh, Ivar Jacobson, “The UML User Guide”, Pearson, 2<sup>nd</sup> Edition, 2008.
2. Craig Larman, “Applying UML and Patterns – An Introduction to Object-Oriented Analysis and Design and Iterative Development”, Pearson, 3<sup>rd</sup> Edition, 2016.

3. Martin C Robert and Martin Micah, “Agile Principles, Patterns, and Practices in C#”, Pearson, 1<sup>st</sup> Edition, 2007.
4. Yogesh Singh and Ruchika Malhotra, “Object Oriented Software Engineering”, PHI, 1<sup>st</sup> Edition, 2012.
5. Mahesh P. Matha, “Object Oriented Analysis and Design using UML”, PHI, 1<sup>st</sup> Edition, 2008.
6. Michael Blaha and James Rumbaugh, “Object Oriented Modelling and Design with UML”, Pearson, 2<sup>nd</sup> Edition, 2013.

**OBJECTIVE:** In this course, the learners will be able to develop working expertise related to the following:-

1. Implement a real-life project using RUP.
2. Learn new case tools – Rational Rose/ Microsoft Visio/ Star UML.
3. Develop analysis model, design model and implementation model using the case tool resulting in the completion of project
4. Able to deploy the project.

### **COURSE OUTCOMES**

After the completion of the practical course, the students will be able to learn-

CO1	Apply object-oriented software engineering concepts to a project. (BTL3)
CO2	Analysing and constructing models and diagrams in analysis phase.(BTL6)
CO3	Creating design model diagrams for design phase.(BTL3)
CO4	Use advanced CASE tool.(BTL6)
CO5	Work in teams to design practical solutions for real life case studies using UML.(BTL6)