Course Plan
IIIB.Tech II Semester

Department of
Computer Science and Engineering

SR Engineering College

Innovation . Creativity . Entrepreneurship

FMTH0301/Rev.5.2

Course Plan

Semester: **6 - Semester**	Year: **2019**
Course Title: **Advanced Data Base Management Systems**	Course Code: **CS120**
Total Contact Hours: **48**	Duration of Theory: 3 Hours
Theory Marks: **70**	Term Work Marks:
Lesson Plan Author: Mr. Ravi Kumar R	Last Modified Date: 04-10-2018
Checked By: Mr. Ravi Kumar R	Last Reviewed Date: 04-10-2018

Course Outcomes (COs):

At the end of the course the student should be able to:

1. Analyze database concepts in er& err modeling,oodbms.
2. Apply query processing, optimization techniques in ordbms.
3. Analyze the basic concepts of parallel and distributed databases and use of xml documents.
4. Analyze the query processing, concurrency control, and recovery mechanisms in ddb.
5. Distinguish various types of databases and their application.

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs)

Course Outcomes (COs) / Program Outcomes (POs)	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1. Analyze database concepts in er& err modeling.	3	3							3				3	3
2. Apply query processing,optimization techniques in ordbms.	3	3							3				3	3
3.Analyze the basic concepts of parallel and distributed databases and use of xml documents	3	3							3				3	3
4. Analyze the query processing, concurrency control, and recovery mechanisms in ddb.	3	3							3				3	3
5. Distinguish various types of databases and their application.	3	3							3				3	3

Content	Hrs
Unit - 1	
Chapter No. 1 - Introduction The Extended ER Model & Object Model Introduction, The ER Model Revisited, Motivation for Complex data types, User Defined abstract data types and structured types	6.00 hrs
Chapter No. 2 - Specialization & Generalization Subclasses, Super Classes, Inheritance, Specialization and generalization, Constraints and, characteristics of Specialization and generalization Relationship types of degree higher than two.	8.00 hrs
Unit - 2	
Chapter No. 3 - Object Oriented Databases Object-Oriented Databases: Introduction, Overview of Object Oriented Concepts, Object Identity, Object Structure, type constructors, Encapsulation of operations, Methods, Persistence, Type Hierarchies and Inheritance, Type Extents, Queries, Complex Objects, Database Schema design for OODBMS, QOL.	8.00 hrs
Chapter No. 4 - Persistent Programming Languages Persistent Programming Languages, OODBMS architecture, Storage Issues, Transactions Concurrency Control, Example of ODBMS	4.00 hrs
Unit - 3	
Chapter No. 5 - Object Relational And Extended Relational Databases Introduction, Database design for an ORDBMS, Nested Relations, Collections, Storage Methods, Access Method, Query Processing, Optimization	6.00 hrs
Chapter No. 6 - SQL3 An Overview of SQL3, Implementation Issues for Extended types, Systems Comparison of RDBMS, OODBMS, ORDBMS	4.00 hrs
Unit - 4	
Chapter No. 7 - Parallel and Distributed Databases and Client Server Architecture Introduction, Architecture for parallel databases Parallel Query evaluation ,Parallelizing individual operations, Sorting, Joins.	6.00 hrs
Chapter No. 8 - Distributed database concepts Data fragmentation, Replication, Allocation techniques for distributed database design, Query Processing in distributed databases, Concurrency control in	10.00 hrs

distributed databases, Recovery in distributed databases, An Overview of Client Server Architecture.	
Unit - 5	
Chapter No. 9 - Databases on the Web and Semi Structured Data- Introduction Web Interfaces to the Web, Overview of XML, Structure of XML Data, XML Applications, The Semi-Structured Data Model, Implementation Issues, Indexes OF text data	6.00 hrs
Chapter No. 10 - Enhanced Data Models for Advanced Application- Introduction Active database concepts, Temporal database concepts, Spatial databases, Concepts and Architecture, Deductive databases, Query Processing, Mobile Databases, Geographic Information Systems.	6.00 hrs

TEXT BOOKS:

1. RamezElmasri and Shamkant B. Navathe, “Fundamentals of Database Systems”, Pearson Education.

2. Raghu Ramakrishnan and Johannes Gehrke, “Data Base Management Systems”, McGraw Hill.

REFERENCES BOOKS:

1. A.Silberschatz, HF Korth and S.Sudarshan, “Data Base System Concepts”, McGraw Hill.

2. Peter Rob and Coronel, “Database Systems, Design, Implementation and Management”, Thomson Learning.

3. C J Date, “Introduction to Database Systems”, Pearson Education.

4. Leon Alexis, “Database Management Systems”, Vikas.

Course Code and Title: **CS120 / Advanced Data Base Management Systems**	
Chapter Number and Title: **1 - Introduction**	Planned Hours: **6.00 hrs**

Learning Outcomes:-

At the end of the topic the student should be able to:

	Topic Learning Outcomes	COs	BL
1	Explain various complex data types	CO1	L1
2	Differentiate between the existing ER and EER models	CO1	L1
3	Apply user defined abstract data types and structured data type to EER Models	CO1	L1
4	Distinguish between User defined and Structured Data Type	CO1	L1

Lesson Schedule

Lecture No. - Portion covered per hour	Planned Delivery Date	Actual Delivery Date
1. The Extended ER Model & Object Model Introduction, The ER Model Revisited, Motivation for Complex data types	03-12-2018	

Review Questions

Sl.No. - Questions	TLOs	BL
1. Explain about different data models in DBMS.	TLO1	L1
2. Compare between User defined and Structured Data Type.	TLO2	L3
3. Discuss about user defined abstract data types and structured data type to EER Models.	TLO3	L3
4. Explain class/subclass a) specialization b) generalization	TLO2	L2

Chapterwise Plan

Course Code and Title: **CS120 / Advanced Data Base Management Systems**	
Chapter Number and Title: **2 - Specialization & Generalization**	Planned Hours: **8.00 hrs**

Learning Outcomes:-

At the end of the topic the student should be able to:

	Topic Learning Outcomes	COs	BL
1	Explain the concepts of specialization and generalization in EER Models	CO1	L1
2	Compare the characteristics of Specialization and Generalization	CO1	L1
3	Compare the characteristics of Specialization and Generalization	CO1	L1
4	Design a conceptual schema for a particular database.	CO1	L1
5	Apply the concepts of inheritance in integrating of ER model.	CO1	L1
6	Design specialization, generalization and inheritance in class diagram.	CO1	L1

Lesson Schedule

Lecture No. - Portion covered per hour	Planned Delivery Date	Actual Delivery Date
1. Subclasses, Super Classes, Inheritance, Specialization and generalization, Constraints and, characteristics of Specialization and generalization Relationship types of degree higher than two.	19-12-2018	

Review Questions

Sl.No. - Questions	TLOs	BL
1. Explain the concepts of specialization and generalization in EER Models	TLO1	L1
2. Compare the characteristics of Specialization and Generalization	TLO2	L3

3. Design a conceptual schema for a particular database.	TLO3	L3
4. Apply the concepts of inheritance in integrating of ER model	TLO2	L2
5. Design specialization, generalization and inheritance in class diagram.	TLO2	L2

Course Code and Title: **CS120 / Advanced Data Base Management Systems**	
Chapter Number and Title: **3 - Object Oriented Databases**	Planned Hours: **8.00 hrs**

Learning Outcomes:-

At the end of the topic the student should be able to:

	Topic Learning Outcomes	COs	BL
1	Explain the basic concepts of object oriented databases	CO2	L2
2	Analyze the object structure in database	CO2	L2
3	Apply the usage of Inheritance in databases	CO2	L2
4	Execute the complex queries using Object Oriented Concepts.	CO2	L2
5	Design the database schema using OODBMS concepts	CO2	L2
6	Build the Queries using OQL	CO2	L2

Lesson Schedule

Lecture No. - Portion covered per hour	Planned Delivery Date	Actual Delivery Date
1. Object-Oriented Databases: Introduction, Overview of Object Oriented Concepts, Object Identity, Object Structure, type constructors, Encapsulation of operations, Methods, Persistence, Type Hierarchies and Inheritance, Type Extents, Queries, Complex Objects, Database Schema design for OODBMS, QOL.	27-12-2018	

Review Questions

Sl.No. - Questions	TLOs	BL
1. Explain the basic concepts of object oriented databases	TLO1	L1
2. Analyze the object structure in database	TLO2	L3
3. Apply the usage of Inheritance in databases.	TLO3	L3
4. Execute the complex queries using Object Oriented Concepts.	TLO2	L2
5. Design the database schema using OODBMS concepts.	TLO2	L2

Course Code and Title: **CS120 / Advanced Data Base Management Systems**	
Chapter Number and Title: **4 - Persistent Programming Languages**	Planned Hours: **4.00 hrs**

Learning Outcomes:-

At the end of the topic the student should be able to:

	Topic Learning Outcomes	COs	BL
1	Summarize how to make the objects Persistent.	CO2	L2
2	Explain internal Structure of OODBMS architecture	CO2	L2
3	Analyze the storage issues in databases	CO2	L2
4	Apply the concurrency control mechanisms in object oriented databases	CO2	L2
5	Distinguish the usage of Persistency in C++ Systems and ODMG C++	CO2	L2

Lesson Schedule

Lecture No. - Portion covered per hour	Planned Delivery Date	Actual Delivery Date
1. Persistent Programming Languages, OODBMS architecture, Storage Issues, Transactions Concurrency Control, Example of ODBMS	02-01-2019	

Review Questions

Sl.No. - Questions	TLOs	BL
1. Summarize how to make the objects Persistent	TLO1	L1
2. Explain internal Structure of OODBMS architecture	TLO2	L3
3. Analyze the storage issues in databases.	TLO3	L3
4. Apply the concurrency control mechanisms in object oriented databases.	TLO2	L2
5. Distinguish the usage of Persistency in C++ Systems and ODMG C++	TLO2	L2

Course Code and Title: **CS120 / Advanced Data Base Management Systems**	
Chapter Number and Title: **5 - Object Relational And Extended Relational Databases**	Planned Hours: **6.00 hrs**

Learning Outcomes:-

At the end of the topic the student should be able to:

	Topic Learning Outcomes	COs	BL
1	Justify the advantages of ORDBMS over RDBMS Database Design.	CO3	L3
2	Analyze ORDBMS storage implementation challenges	CO3	L3
3	Evaluate performance of query processing in ORDBMS	CO3	L3
4	Distinguish performance of query optimization in RDBMS and ORDBMS	CO3	L3

Lesson Schedule

Lecture No. - Portion covered per hour	Planned Delivery Date	Actual Delivery Date
1. Introduction, Database design for an ORDBMS, Nested Relations, Collections, Storage Methods, Access Method, Query Processing, Optimization	11-01-2019	

Review Questions

Sl.No. - Questions	TLOs	BL
1. Justify the advantages of ORDBMS over RDBMS Database Design.	TLO1	L1
2. Analyze ORDBMS storage implementation challenges	TLO2	L3
3. Evaluate performance of query processing in ORDBMS	TLO3	L3
4. Distinguish performance of query optimization in RDBMS and ORDBMS	TLO2	L2

Course Code and Title: **CS120 / Advanced Data Base Management Systems**	
Chapter Number and Title: **6 - SQL3**	Planned Hours: **4.00 hrs**

Learning Outcomes:-

At the end of the topic the student should be able to:

	Topic Learning Outcomes	COs	BL
1	Explain basic concepts of SQL3	CO4	L3
2	Analyze implementation issues for extended types for OODBMS,ORDBMS,RDBMS	CO4	L3
3	Differentiate the usage of OODBMS,ORDBMS,RDBMS	CO4	L3
4	Create some examples using OODBMS,ORDBMS,RDBMS for an application.	CO4	L3

Lesson Schedule

Lecture No. - Portion covered per hour	Planned Delivery Date	Actual Delivery Date
1. An Overview of SQL3, Implementation Issues for Extended types, Systems Comparison of RDBMS, OODBMS, ORDBMS	22-11-2018	

Review Questions

Sl.No. - Questions	TLOs	BL
1. Explain basic concepts of SQL3.	TLO1	L1
2. Analyze implementation issues for extended types for OODBMS,ORDBMS,RDBMS	TLO2	L3
3. Differentiate the usage of OODBMS,ORDBMS,RDBMS.	TLO3	L3
4.Create some examples using OODBMS,ORDBMS,RDBMS for an application	TLO2	L2

Course Code and Title: **CS120 / Advanced Data Base Management Systems**	
Chapter Number and Title: **7 - Parallel and Distributed Databases and Client Server Architecture**	Planned Hours: **6.00 hrs**

Learning Outcomes:-

At the end of the topic the student should be able to:

	Topic Learning Outcomes	COs	BL
1	Outline the physical architectures for Parallel Databases	CO3	L4
2	Analyze Optimization of a query for parallel execution	CO3	L4
3	Analyze how to parallelize individual operation in databases.	CO3	L4
4	Analyze the comparison between single and parallel query optimization.	CO3	L4

Lesson Schedule

Lecture No. - Portion covered per hour	Planned Delivery Date	Actual Delivery Date
1. Introduction, Architecture for parallel databases Parallel Query evaluation ,Parallelizing individual operations, Sorting, Joins.	11-01-2019	

Review Questions

Sl.No. - Questions	TLOs	BL
1. Outline the physical architectures for Parallel Databases	TLO1	L1
2. Analyze Optimization of a query for parallel execution	TLO2	L3
3. Analyze how to parallelize individual operation in databases	TLO3	L3
4. Analyze the comparison between single and parallel query optimization.	TLO2	L2

Course Code and Title: **CS120 / Advanced Data Base Management Systems**	
Chapter Number and Title: **8 - Distributed database concepts**	Planned Hours: **10.00 hrs**

Learning Outcomes:-

At the end of the topic the student should be able to:

	Topic Learning Outcomes	COs	BL
1	Outline the need for Fragmentation, types of fragmentation.	CO5	L4
2	Analyze the advantages and disadvantages of data replication	CO5	L4
3	Analyze how query processing in done in distributed systems.	CO5	L4
4	Explain how Concurrency control is handled in distributed databases	CO5	L4
5	Compare different types of recovery techniques in distributed databases	CO5	L4

Lesson Schedule

Lecture No. - Portion covered per hour	Planned Delivery Date	Actual Delivery Date
1. Data fragmentation, Replication, Allocation techniques for distributed database design, Query Processing in distributed databases, Concurrency control in distributed databases, Recovery in distributed databases, An Overview of Client Server Architecture.	11-02-2019	

Review Questions

Sl.No. - Questions	TLOs	BL
1. Outline the need for Fragmentation, types of fragmentation	TLO1	L1
2. Analyze the advantages and disadvantages of data replication	TLO2	L3
3. Analyze how query processing in done in distributed systems.	TLO3	L3
4. Explain how Concurrency control is handled in distributed databases.	TLO2	L2
5. Compare different types of recovery techniques in distributed databases	TLO3	L3

Course Code and Title: **CS120 / Advanced Data Base Management Systems**	
Chapter Number and Title: **9- Databases on the Web and Semi Structured Data- Introduction**	Planned Hours: **6.00 hrs**

Learning Outcomes:-

At the end of the topic the student should be able to:

	Topic Learning Outcomes	COs	BL
1	Distinguish between structured, Semi-structured and unstructured data.	CO5	L5
2	Outline different types of XML documents	CO5	L5
3	Analyze some applications of XML	CO5	L5
4	Show different types of approaches used for storing XML Documents	CO5	L5
5	Show how to extract XML documents from Relational Databases.	CO5	L5

Lesson Schedule

Lecture No. - Portion covered per hour	Planned Delivery Date	Actual Delivery Date
1. Web Interfaces to the Web, Overview of XML, Structure of XML Data, XML Applications, The Semi-Structured Data Model, Implementation Issues, Indexes OF text data	14-02-2019	

Review Questions

Sl.No. - Questions	TLOs	BL
1. Distinguish between structured, Semi-structured and unstructured data	TLO1	L1
2. Outline different types of XML documents	TLO2	L3
3. Analyze some applications of XML	TLO3	L3

Course Code and Title: **CS120 / Advanced Data Base Management Systems**	
Chapter Number and Title: **10 - Enhanced Data Models for Advanced Application-Introduction**	Planned Hours: **6.00 hrs**

Learning Outcomes:-

At the end of the topic the student should be able to:

	Topic Learning Outcomes	COs	BL
1	Explain design issues of Active databases.	CO5	L5
2	Analyze how to store a history of changes –temporal database, multimedia databases	CO5	L5
3	Explain the basic concepts of spatial databases	CO5	L5
4	Analyzes query processing in different types of databases	CO5	L5

Lesson Schedule

Lecture No. - Portion covered per hour	Planned Delivery Date	Actual Delivery Date
1. Active database concepts, Temporal database concepts, Spatial databases, Concepts and Architecture, Deductive databases, Query Processing, Mobile Databases, Geographic Information Systems.	12-12-2018	

Review Questions

Sl.No. - Questions	TLOs	BL
1. Explain design issues of Active databases.	TLO1	L1
2. Analyze how to store a history of changes –temporal database, multimedia databases	TLO2	L3
3. Explain the basic concepts of spatial databases	TLO3	L3
4. Analyzes query processing in different types of databases	TLO2	L2

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Course Plan

Semester: **6 - Semester**	Year: **2019**
Course Title: **Artificial Intelligence**	Course Code: **CS118**
Total Contact Hours: **48**	Duration of Theory: 3 Hours
Theory Marks: **70**	Term Work Marks:
Lesson Plan Author: Mr. Ramesh Dadi	Last Modified Date: 04-10-2018
Checked By: Mr. Ramesh Dadi	Last Reviewed Date: 04-10-2018

Course Outcomes (COs):

At the end of the course the student should be able to:

1. Explain the working principle of different ai application areas.
2. Able to solve the problems efficiently using the state space search and heuristic technique.
3. Builds the knowledge representation skills
4. Analyse the requirements for a given knowledge and its usage and implementation.
5. To be familiar with contemporary issues in knowledge representation

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs)

Course Outcomes (COs) / Program Outcomes (POs)	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1. Explain the working principle of different ai application areas..	**3**	**3**	**3**	**3**									**3**	**3**
2. Able to solve the problems efficiently using the state space search and heuristic technique	**3**	**3**	**3**	**3**									**3**	**3**
3. Builds the knowledge representation skills	**3**	**3**	**3**	**3**									**3**	**3**
4. Analyse the requirements for a given knowledge and its usage and implementation	**3**	**3**	**3**	**3**									**3**	**3**

5. To be familiar with contemporary issues in knowledge representation	**3**	**3**	**3**	**3**								**3**	**3**

Content	**Hrs**
Unit - 1	
Chapter No. 1 - Introduction to Artificial Intelligence Problems, Problem Spaces and Search, Heuristic Search Techniques	6.00 hrs
Unit - 2	
Chapter No. 1 - Knowledge Representation Issues, Using Predicate Logic, Representing Knowledge Using Rules	6.00hrs
Unit - 3	
3 - Weak slot and filler structures, Strong slot and filler structures, Game Playing	6.00hrs
Unit - 4	
4 - Reasoning in Uncertain Situations, Understanding Natural Language	6.00hrs
Unit-5	
: **5 - Strong Method Problem Solving**	6.00hrs

TEXT BOOKS:

1. Elaine rich and Kevin knight, “Artificial Intelligence”, 2nd Edition, Tata McGraw-Hill, ISBN No: 0-07-460081-8, 2002.

2. George F Luger, “Artificial Intelligence”, Fourth Edition, Pearson Education Asia., ISBN No: 81-7808-491-0, 2003.

REFERENCE BOOKS:

1. Eugene Charniak and Drew Mc Dermott, “Introduction to Artificial Intelligence”, Third Indian reprint 2000, Pearson Education, ISBN No: 81-7808-033-8, 2000.

2. Dan W. Patterson, “Introduction to Artificial Intelligence and Expert Systems”, Prentice Hall of India, ISBN No: 81-203-0777-1, 2000.

Chapter wise Plan

Course Code and Title: **CS118 / Artificial Intelligence**	
Chapter Number and Title: **1 - Introduction to Artificial** Intelligence Problems, Problem Spaces and Search,Heuristic Search Techniques	Planned Hours: **8.00 hrs**

Learning Outcomes:-

At the end of the topic the student should be able to:

	Topic Learning Outcomes	COs	BL
1	Able to represent the problems in state space and able apply Heuristic Search Techniques on different problems	CO3	L2,L3

Lesson Schedule

Lecture No. - Portion covered per hour	Planned Delivery Date	Actual Delivery Date
1. Introduction to Artificial Intelligence: The AI problem domain	27-11-2018	

Review Questions

Sl.No. - Questions	TLOs	BL
1. Explain the representation of 8 puzzle problem and travelling sales person problem in state space search?	TLO1	L2

Course Code and Title: **CS118 / Artificial Intelligence**	
Chapter Number and Title: **2 - Knowledge Representation Issues, Using Predicate Logic, Representing Knowledge Using Rules**	Planned Hours: **6.00 hrs**

Learning Outcomes:-

At the end of the topic the student should be able to:

	Topic Learning Outcomes	COs	BL
1	Able to write Predicate Logic for given problems , and able to Representing Knowledge Using Rules	CO4	L2,L3

Lesson Schedule

Lecture No. - Portion covered per hour	Planned Delivery Date	Actual Delivery Date
1. Knowledge Representation Issues: Knowledge representations and mappings,	29-11-2018	

Review Questions

Sl.No. - Questions	TLOs	BL
1. Consider the fallowing sentences: John likes all kind of food Apples are food Chicken is food Anything anyone eats and is not killed by is food Bill eats peanuts and is still alive, Sue eats everything Bill eats (a) Translate these sentences into predicate logic (b) Prove that john likes peanuts	TLO1	L3

Course Code and Title: **CS118 / Artificial Intelligence**	
Chapter Number and Title: **3 - Weak slot and filler structures, Strong slot and filler structures, Game Playing**	Planned Hours: **7.00 hrs**

Learning Outcomes:-

At the end of the topic the student should be able to:

	Topic Learning Outcomes	COs	BL
1	Able to solve different game problems using min max and alpha beta pruning	CO4	L2,L3

Lesson Schedule

Lecture No. - Portion covered per hour	Planned Delivery Date	Actual Delivery Date

1. Weak slot and filler structures: Semantic nets	05-12-2018	

Review Questions

Sl.No. - Questions	TLOs	BL
1. Apply heuristic (Alpha-Beta procedure) on tic-tac-toe game to play?	TLO1	L3

Course Code and Title: **CS118 / Artificial Intelligence**	
Chapter Number and Title: **4 - Reasoning in Uncertain Situations,Understanding Natural Language**	Planned Hours: **6.00 hrs**

Learning Outcomes:-

At the end of the topic the student should be able to:

	Topic Learning Outcomes	COs	BL
1	Able to Understand Natural Language	CO4	L2,L3

Lesson Schedule

Lecture No. - Portion covered per hour	Planned Delivery Date	Actual Delivery Date
1. Reasoning in Uncertain Situations: Introduction to Nonmonotonic Reasoning	31-12-2018	

Review Questions

Sl.No. - Questions	TLOs	BL
1. Explain Recursion based search using example?	TLO1	L3

Course Code and Title: **CS118 / Artificial Intelligence**	
Chapter Number and Title: **5 - Strong Method Problem Solving**	Planned Hours: **5.00 hrs**

Learning Outcomes:-

At the end of the topic the student should be able to:

	Topic Learning Outcomes	COs	BL
1	Able apply Strong Method Problem Solving on expert systems	CO5	L3

Lesson Schedule

Lecture No. - Portion covered per hour	Planned Delivery Date	Actual Delivery Date
1. Overview of Expert System Technology	07-01-2019	

Review Questions

Sl.No. - Questions	TLOs	BL
1. explain Model-Based, Case Based and Hybrid Systems	TLO1	L3

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Course Plan

Semester: **6 - Semester**	Year: **2019**
Course Title: **Compiler Design**	Course Code: **CS115**
Total Contact Hours: **60**	Duration of Theory: 3 Hours
Theory Marks: **70**	Term Work Marks:
Lesson Plan Author: Mr. Nampally Vijay kumar	Last Modified Date: 04-10-2018
Checked By: Mr. Nampally Vijay kumar	Last Reviewed Date: 04-10-2018

Course Outcomes (COs):

At the end of the course the student should be able to:

1. Explain the design of a compiler given features of the languages.
2. Discuss the practical aspects of automata theory.
3. Apply the syntax and semantic rules to design an error free compiler.
4. Enhance the issues on source languages and storage allocation strategies for dynamic storage system.
5. Enhance the code generation and optimization technology.

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs)

Course Outcomes (COs) / Program Outcomes (POs)	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1. Explain the design of a compiler given features of the languages.	**3**	**3**	**3**	**3**									**3**	**3**
2. Discuss the practical aspects of automata theory.	**3**	**3**	**3**	**3**									**3**	**3**
3. Analyze the knowledge of compiler generation tools.	**3**	**3**	**3**	**3**									**3**	**3**
4. Apply the syntax and semantic rules to design an error-free compiler.	**3**	**3**	**3**	**3**									**3**	**3**
5. Compose the grammar according to the compiler rules.	**3**	**3**	**3**	**3**									**3**	**3**

Course Content

Content	Hrs
Unit – 1	
Chapter No. 1 - Introduction to Compiling Compiler, Analysis of the source program, The phases of a compiler, Cousins of the compiler, Concepts of Loaders, Linker, Interpreter, Assembler, The grouping of phases, Compiler writing tools.	5.00 hrs
Chapter No. 2 - Lexical Analysis The role of the lexical analyzer, Input buffering, Specification of tokens, Recognition of tokens, A Language for specifying lexical Analyzers, Finite automata, Design of a lexical analyzer, Optimization of DFA-based pattern matches.	8.00 hrs
Unit – 2	
Chapter No. 3 - Syntax Analysis The role of a parser, Context-free grammars, Writing a grammar, Parsing, Ambiguous grammar, Elimination of Ambiguity, Classification of parsing techniques – Top-down parsing –Back Tracking, Recursive Descent parsing, First and Follow- LL(1) Grammars, Non-Recursive descent parsing – Error recovery in predictive parsing. LR grammars, Bottom Up parsing – LR Parsers – Model of an LR Parsers – SR parsing, Operator Precedence Parsing, SLR parsing, CLR parsing, LALR parsing, Error recovery in LR Parsing, handling ambiguous grammars.	15.00 hrs
Unit – 3	
Chapter No. 4 - Syntax Directed Translation Syntax-directed definitions, S-attributed definitions, L-attributed definitions, Top-Down translation, Attribute grammar, S-attributed grammar, L-attributed grammar, Bottom-up evaluation of inherited attributes.	8.00 hrs
Chapter No. 5 - Semantic Analysis Type Checking, Type systems, Type expressions, Specification of a simple type checker, Equivalence of type expressions, Type Conversions.	6.00 hrs
Unit – 4	
Chapter No. 6 - Intermediate Code Generation Construction of syntax trees, Directed acyclic graph, three address codes,	5.00 hrs

Translation of Declarations, Assignment statements, Boolean Expressions, Backpatching.	
Chapter No. 7 - Run time Environments Source language issues, Storage organization, Storage-allocation strategies, Symbol tables, Activation records, Dynamic storage allocation techniques.	5.00 hrs
Unit – 5	
Chapter No. 8 - Code Optimization Introduction, The principal sources of optimization, Optimization of basic blocks, Basic blocks and Flowgraphs, Loops in flow graphs, data-flow analysis of flow graphs, DAG representation of flow graphs.	4.00 hrs
Chapter No. 9 - Code Generation Issues in the design of a code generator, the target machine code, Next use information, a simple code generator, Code-generation algorithm.	4.00 hrs

Text Books (List of Books as mentioned in the approved Syllabus):

1. Alfred V Aho, Ravi Sethi and Jeffry D. Ullman, “Compiler Principles, Techniques and Tools”, 16th Indian Reprint, Pearson Education Asia, 2004.

2. D M Dhamdere, “Compiler Construction“, 2nd Edition, Mac Mellon India Ltd.

Reference:

1. Donovan, “Systems Programming”, McGraw Hill.

2. Kenneth C Louden, “Compiler Construction”, Vikas.

3. Leland L. Beck, “System Software : An Introduction to Systems Programming”, Addison Wesley.

Chapterwise Plan

Course Code and Title: **CS115 / Compiler Design**	
Chapter Number and Title: **1 - Introduction to Compiling**	Planned Hours: **5.00 hrs**

Learning Outcomes:-

At the end of the topic the student should be able to:

	Topic Learning Outcomes	COs	BL
1	**Define** the importance of Compiler and its working model	CO1	L1
2	**Explain** different phases and passes of Compiler.	CO1	L1
3	**Discuss** about Compiler writing tools LEX & YACC.	CO1	L2
4	**Compare** between Pass and Phase.	CO1	L2

Lesson Schedule

Lecture No. - Portion covered per hour	Planned Delivery Date	Actual Delivery Date
1.Introduction to Compiling	19-11-2018	
2.Compilers	20-11-2018	
3.Analysis of the source program	21-11-2018	
4.The phases of a compiler	22-11-2018	
5.Cousins of the compiler	26-11-2018	
6.Concepts of Loaders, Linkers	27-11-2018	
7.The grouping of phases	28-11-2018	
8.Compiler writing tools	29-11-2018	

Review Questions

Sl.No. - Questions	TLOs	BL
1. Explain different phases of a compiler.	TLO1	L1
2. Explain the different phases of a compiler. Showing the output of each phase, using the example of the following statement: Position:= initial + rate * 60	TLO2	L3
3. Differentiate between compiler and interpreter.	TLO3	L3
4.Explain the grouping of phases.	TLO2	L2
5.Construct FA from the given regular expression. (a*+b*)abb	TLO4	L3

Course Code and Title: **CS115 / Compiler Design**	
Chapter Number and Title: **2 - Lexical Analysis**	Planned Hours: **8.00 hrs**

Learning Outcomes:-

At the end of the topic the student should be able to:

	Topic Learning Outcomes	COs	BL
1	**Identify** the role of the lexical analyzer.	CO2	L1
2	**Define** Input buffering.	CO2	L1
3	**Identify** the Specification of tokens and Recognition of tokens.	CO2	L2
4	**Execute** the lexical Analyzer for a language.	CO2	L3
5	**Compute** FA from Regular Expression.	CO2	L3

Lesson Schedule

Lecture No. - Portion covered per hour	Planned Delivery Date	Actual Delivery Date
9.Lexical Analysis: The role of the Lexical Analyzer	03-12-2018	
10.Input buffering	04-12-2018	
11.Specification of tokens	05-12-2018	

12.Recognition of tokens	06-12-2018	
13.A language for specifying lexical Analyzers	10-12-2018	
14.Finite Automata	11-12-2018	
15.Design of a lexical analyzer	12-12-2018	
16.Optimization of DFA-based pattern matchers	13-12-2018	

Review Questions

Sl.No. - Questions	TLOs	BL
1. Explain the role of lexical analyzer.	TLO1	L1
2. Write about Input Buffering.	TLO2	L1
3. Briefly explain specification of tokens.	TLO2	L2
4. Write a program to perform the function of Lexical Analysis.	TLO3	L3
5. Define FA with example.	TLO4	L1
6. Construct optimization of FA	TLO4	L3

Course Code and Title: **CS115 / Compiler Design**	
Chapter Number and Title: **3 - Syntax Analysis**	Planned Hours: **15.00 hrs**

Learning Outcomes:-

At the end of the topic the student should be able to:

	Topic Learning Outcomes	COs	BL
1	Outline the importance of Context Free Grammar.	CO3	L1
2	Define Parsing.	CO3	L1
3	DefineAmbiguous grammar and explain the procedure for Elimination of Ambiguity.	CO3	L2
4	Discuss about the various parsing techniques.	CO3	L2

Lesson Schedule

Lecture No. - Portion covered per hour	Planned Delivery Date	Actual Delivery Date
17. Syntax Analysis: The role of the parser	17-12-2018	
18. Context-free grammars	18-12-2018	
19. Writing a grammar	19-12-2018	
20. Top-down parsing,	20-12-2018	
21. Bottom-down parsing	26-12-2018	
22. Operator Precedence parsing,	27-12-2018	
23. LR parsers	31-12-2018	
24. Using ambiguous grammars	31-12-2018	
25. Parser generators.	31-12-2018	

Review Questions

Sl.No. - Questions	TLOs	BL
1. Explain The role of a parser.	TLO1	L1
2. Define Context-free grammars with example.	TLO1	L1
3. Define Parsing and Ambiguous grammar with example.	TLO1	L1
4. Explain the procedure for Elimination of Ambiguity.	TLO2	L3
5. Classify the parsing techniques .	TLO2	L2
6. Discuss about Recursive Descent parsing.	TLO2	L2
7. Find First and Follow and verify the following grammar is LL(1) Grammar or not. E->E+T/T T->T*F/F F->id/(E)	TLO3	L3
8. Distinguish between Recursive and Non-Recursive descent parsing.	TLO3	L3
9. How Errors can be recover in predictive parsing.	TLO3	L3

10. Define LR grammars and Bottom Up parsing.	TLO3	L2
11. Define LR Parsers and explain the Model of an LR Parsers	TLO4	L2
12. Explain SR parsing and Operator Precedence Parsing,	TLO4	L3
13. Construct SLR parsing, CLR parsing and LALR parsing tables For the following grammar. E->E+T/T T->T*F/F F->id/(E)	TLO4	L3
14. How the parser can handle ambiguous grammars.	TLO4	L3

Course Code and Title: **CS115 / Compiler Design**	
Chapter Number and Title: **4 - Syntax Directed Translation**	Planned Hours: **8.00 hrs**

Learning Outcomes:-

At the end of the topic the student should be able to:

	Topic Learning Outcomes	COs	BL
1	Define Syntax Directed Translation.	CO3	L1
2	Define S-attributed definitions, L-attributed definitions	CO3	L1
3	Produce S-attributed grammers, L-attributed grammers for given input .	CO3	L2
4	Show Space for attribute values at compile time.	CO3	L3

Lesson Schedule

Lecture No. - Portion covered per hour	Planned Delivery Date	Actual Delivery Date
26.Syntax Directed Translation: Syntax-Directed definitions	02-01-2019	
27.Construction of syntax trees Bottom-up evaluation of S-attributed definitions	03-01-2019	

28.L-attributed definitions	07-01-2019	
29.Top-Down translation	08-01-2019	
30.Bottom-up evaluation of inherited attributes	09-01-2019	
31.Space for attribute values at compile time,	10-01-2019	
32.Analysis of syntax directed definitions.	11-01-2019	

Review Questions

Sl.No. - Questions	TLOs	BL
1. Give the Syntax directed definition of if-else statement.	TLO1	L3
2. Define a syntax-directed translation?	TLO1	L1
3. Define an attribute. Give the types of an attribute?	TLO2	L2
4. Write the grammar for flow-of-control statements?	TLO2	L3
5. How the value of synthesized attribute and inherited attribute is computed?	TLO3	L4
6. Are the attributes in the following CFG synthesized or inherited? Give reasons: Var→ IntConstant {$0.*val* = $1.*lexval*;} Expr → Var {$0.*val* = $1.*val*;} Expr → Expr B-op Expr {$0.*val* = $2.*val*($1.*val*,$3.*val*);} B-op → + {$0.*val* = *PLUS*;} B-op → * {$0.*val* = *TIMES* ;}	TLO3	L4
7. Compare the different implementations of three address codes with examples	TLO4	L3
8. Describe the syntax directed translation procedure for assignment statements with integers and mixed types and explain.	TLO4	L3

Course Code and Title: **CS115 / Compiler Design**	
Chapter Number and Title: **5 - Semantic Analysis**	Planned Hours: **6.00 hrs**

Learning Outcomes:-

At the end of the topic the student should be able to:

	Topic Learning Outcomes	COs	BL
1	Define Type Checking and Type System for given expression.	CO3	L1
2	Produce Type expressions for given source program.	CO3	L3
3	Memorize various dynamic storage allocations.	CO3	L2
4	Analyze runtime environment for a programming language.	CO3	L2
5	Define type conversions in the compilers.	CO3	L2

Lesson Schedule

Lecture No. - Portion covered per hour	Planned Delivery Date	Actual Delivery Date
33. Type checking: Type systems	21-01-2019	
34. Specification of a simple type checker	22-01-2019	
35. Equivalence of type expressions.	23-01-2019	
36. Type Conversions.	24-01-2019	

Review Questions

Sl.No. - Questions	TLOs	BL
1.Write and discuss the specification of simple type checker for statements,expressions and functions.	TLO1	L2
2.Explain about type checking and type system.	TLO2	L1
3.Write SDD for specification of simple type checker.	TLO2	L3
4.Discuss about equivalence of type expressions.	TLO3	L3
5.Differentiate implicit and explicit type conversion.	TLO3	L3
6.Write the procedure of type conversion with in assignment?	TLO4	L3

Course Code and Title: **CS115 / Compiler Design**	
Chapter Number and Title: **6 - Run time Environments**	Planned Hours: **5.00 hrs**

Learning Outcomes:-

At the end of the topic the student should be able to:

	Topic Learning Outcomes	COs	BL
1	Outline different source language issues.	CO4	L2
2	Explain the memory Storage organization for compilers.	CO4	L2
3	Illustrate the symbol table and activation record.	CO4	L3
4	Analyze the dynamic storage allocation techniques.	CO4	L3

Lesson Schedule

Lecture No. - Portion covered per hour	Planned Delivery Date	Actual Delivery Date
37.Runtime Environments: Source language	28-01-2019	
38.Storage organization	29-01-2019	
39.Storage allocation Strategies	30-01-2019	
40.Symbol tables	31-01-2019	
41.Language facilities for dynamic storage allocation	04-02-2019	
42.Dynamic storage allocation Techniques.	05-02-2019	

Review Questions

Sl.No. - Questions	TLOs	BL
1. Mention the different storage allocation strategies.	TLO1	L2
2. What are the different storage allocation strategies?	TLO1	L2
3. What are steps needed to compute the next use information?	TLO2	L3
4. Explain the issues in design of code generator.	TLO2	L3
5. Discuss run time storage management of a code generator.	TLO3	L3

Elaborate storage organization.		
6. Write detailed notes on parameter passing.	TLO3	L2
7. What is an activation record for a procedure?	TLO3	L3
8. Draw the diagram of the general activation record and give the purpose of any two fields.	TLO4	L3
9. What is stack allocation?	TLO4	L2
10. Define a symbol table.	TLO4	L2

Course Code and Title: **CS115 / Compiler Design**	
Chapter Number and Title: **7 - Intermediate Code Generation**	Planned Hours: **5.00 hrs**

Learning Outcomes:-

At the end of the topic the student should be able to:

	Topic Learning Outcomes	COs	BL
1	Discuss the importance of Intermediate code generation in Compilation process.	CO4	L3
2	Construct syntax trees for different expressions.	CO4	L3
3	Construct DAG for different expressions.	CO4	L3
4	Explain about Back patching.	CO4	L2

Lesson Schedule

Lecture No. - Portion covered per hour	Planned Delivery Date	Actual Delivery Date
43.Intermediate Code Generation: Intermediate languages	06-02-2019	
44.Declarations, Assignment statements	07-02-2019	
45.Boolean expressions.	11-02-2019	
46.Back Patching	12-02-2019	

Review Questions

Sl.No. - Questions	TLOs	BL
1. What are the methods of representing a syntax tree?	TLO1	L1
2. Give the Syntax directed definition of if else statement.	TLO1	L2
3. What is back patching?	TLO1	L1
4. What are the applications of DAG?	TLO2	L1
5. Explain peephole optimization.	TLO2	L1
6. How would you represent the following equation using the DAG, a: =b*c + b*c. What is the purpose of DAG?	TLO2	L3
7. What is the intermediate code representation for the expression a or b and not c ?	TLO3	L3
8. What is a three address code? Mention its types. How would you implement the three address statements? Explain with examples.	TLO3	L3
9. Give the semantic rules for declarations in a procedure.	TLO3	L2
10. Explain how the types and relative addresses of declared names are computed and how scope information is dealt with.	TLO4	L3

Course Code and Title: **CS115 / Compiler Design**	
Chapter Number and Title: **8 - Code Optimization**	Planned Hours: **4.00 hrs**

Learning Outcomes:-

At the end of the topic the student should be able to:

	Topic Learning Outcomes	COs	BL
1	Outline the principal sources of optimization	CO5	L1
2	Illustrate Optimization of basic blocks, Loops in flow graphs.	CO5	L2
3	Discuss the Code-improving transformations.	CO5	L3
4	Construct DAG representation for flow graphs	CO5	L3

Lesson Schedule

Lecture No. - Portion covered per hour	Planned Delivery Date	Actual Delivery Date
47.Code Optimization: Introduction	13-02-2019	
48.The principal sources of optimization	14-02-2019	
49.Optimization of basic blocks	18-02-2019	
50.Loops in flow graphs	19-02-2019	
51.Introduction to global data flow analysis	20-02-2019	
52.Code-improving transformations	21-02-2019	

Review Questions

Sl.No. - Questions	TLOs	BL
1. What are called optimizations and what is an optimization compiler?	TLO1	L2
2. Explain the principal sources of optimization with example	TLO1	L2
3. Explain in detail about loop optimization techniques.	TLO2	L2
4. Define flow graph.	TLO2	L1
5. What is data flow analysis? How are dummy blocks with no statements indicated in global data flowanalysis?	TLO2	L2
6. What do you meant by data-flow engine?	TLO3	L2

7. What are the characteristics of peephole optimization?	TLO3	L2
8. What do you mean by data flow equations?	TLO3	L2
9. Write the grammar for flow-of-control statements?	TLO4	L3

10 .draw the flow graph for the following procedure.
void quicksort(int m, int n)
{
inti, j;
int v, x;
if (n <= m) return;
i = m-1; j = n; v = a[n];
while(1) {
do i = i+ 1; while (a[i] < v);
do j = j+ 1; while (a[j] > v);
if(i>= j) break;
x = a[i]; a[i] = a[j]; a]j] = x;
}
x = a[i]; a[i] = a[n]; a]n] = x; quicksort(m, j); quicksort(i+1, n);
}
Identify and eliminate induction variables in the same.
	TLO4	L4

11. Construct the DAG for the following basic block d : = b * c e : = a +b b : = b * c a : = e – d	TLO4	L4

Course Code and Title: **CS115 / Compiler Design**	
Chapter Number and Title: **9 - Code Generation**	Planned Hours: **4.00 hrs**

Learning Outcomes:-

At the end of the topic the student should be able to:

	Topic Learning Outcomes	COs	BL
1	Discuss issues in the design of a code generator.	CO5	L1
2	Justify the target machine code from input values	CO5	L3
3	Explain the code generation algorithm with example	CO5	L3
4	Define the function of code generator in compiler	CO5	L3

Lesson Schedule

Lecture No. - Portion covered per hour	Planned Delivery Date	Actual Delivery Date
53.Code Generation: Issues in the design of a code generator	25-02-2019	
54.The Target machine	26-02-2019	
55.Runtime storage management	27-02-2019	
56.Basic Blocks and flow graphs	28-02-2019	
57.Register allocation and assignment	04-03-2019	
58.The dag representation of basic blocks	05-03-2019	
59.Generating code from dags.	06-03-2019	
60.Code-generation algorithm	07-03-2019	

Review Questions

Sl.No. - Questions	TLOs	BL
1. Write the step to partition a sequence of 3 address statements into basic blocks.	TLO1	L2
2. Mention the criteria for code improving transformations.	TLO1	L2

3. Mention the function preserving, code improving transformations.	TLO1	L2
4. What is code motion? Give an example.	TLO2	L1
5. What is constant folding?	TLO2	L2
6. What are induction variables? What is induction variable elimination?	TLO2	L2
7. What is a cross compiler? Give an example.	TLO2	L2
8. What are calling sequences and give brief notes on its types.	TLO3	L2
9. When does a dangling reference occur? Give its impact on programs.	TLO3	L3

FMTH0301/Rev.5.2

Course Plan

Semester: **6 - Semester**	Year: **2019**
Course Title: **Cryptographyy and Network Security**	Course Code: **CS116**
Total Contact Hours: **60**	Duration of Theory: 3 Hours
Theory Marks: **70**	Term Work Marks:
Lesson Plan Author: Mrs. RoopaGoje	Last Modified Date: 04-10-2018
Checked By: Mrs. RoopaGoje	Last Reviewed Date: 04-10-2018

Course Outcomes (COs):

At the end of the course the student should be able to:

1. Explain different security attacks and services.
2. Compare the concepts of private and public encryption techniques.
3. Analyze key management and authentication services.
4. Analyze ip security and web security concepts.
5. Design effective intrusion detection systems through firewall architecture.

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs)

Course Title: Cryptographyt and Network Security	Semester: 6 - Semester
Course Code: CS116	Year: 2019

Course Outcomes (COs) / Program Outcomes (POs)	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1. 1. explain different security attacks and services.	**3**													
2. 2. compare the concepts of private and public encryption techniques.	**3**													
3. 3. analyze key management and authentication services.		**3**												
4. 4. analyzeip security and web security concepts.		**3**												
5. 5. design effective intrusion detection systems through firewall architecture.			**3**							**2**			**3**	

Course Content

Content	Hrs
Unit - 1	
Chapter No. 1 - Security Attacks Model of network security, Security attacks, services and attacks, OSI security architecture	3.00 hrs
Chapter No. 2 - Classical encryption techniques Classical encryption techniques – SDES, Block cipher Principles, DES, Strength of DES. Block cipher design principles, Block cipher mode of operation, Evaluation criteria for AES, RC4	6.00 hrs
Chapter No. 3 - Differential and linear cryptanalysis Differential and linear cryptanalysis, Placement of encryption function, traffic confidentiality	3.00 hrs
Unit - 2	
Chapter No. 4 - Authentication Authentication requirement, Authentication function,MAC,Hash function, Security of hash function and MAC, SHA, HMAC, CMAC, Digital signature and authentication protocols, DSS.	10.00 hrs
Unit - 3	
Chapter No. 5 - Public key cryptography Public key cryptography and RSA, Key distribution, Key management, Diffie Hellman key exchange .	6.00 hrs
Chapter No. 6 - Authentication applications Authentication applications – Kerberos, X.509	5.00 hrs
Unit - 4	
Chapter No. 7 - Authentication services Authentication services - E-mail security (Pretty Good Privacy (PGP) and S/MIME).	4.00 hrs
Chapter No. 8 - IP security IP security - IP Security Overview, IP Security Architecture, Authentication Header, Encapsulating Security Payload, Combining Security Associations and Key Management.	4.00 hrs
Chapter No. 9 - Web Security Web security- Web Security Requirements, Secure Socket Layer (SSL) and	4.00 hrs

Transport Layer Security (TLS), Secure Electronic Transaction (SET).	
Unit - 5	
Chapter No. 10 - Intruders & Trusted Systems Intruder – Intrusion detection system, Virus and related threats, Countermeasures, Firewalls design principles, Trusted systems.	6.00 hrs

Text Books (List of books as mentioned in the approved syllabus)

1. William Stallings, Cryptography & Network Security, 4, Pearson Education, 2010

2. William Stallings and Lawrie Brown, Computer Security: Principles and Practice, 3, PHI, 2008

References

1. Charlie Kaufman, Radia Perlman, Mike Speciner, Network Security, Private communication in public world, 2nd edition, PHI, 2002

2. Bruce Schneier, Neils Ferguson, Practical Cryptography, Wiley Dreamtech India Pvt Ltd, 2003

Chapterwise Plan

Course Code and Title: **CS116 / Cryptography and Network Security**	
Chapter Number and Title: **1 - Security Attacks**	Planned Hours: **3.00 hrs**

Learning Outcomes:-

At the end of the topic the student should be able to:

	Topic Learning Outcomes	COs	BL
1	Recognise the Network security model.	CO1	L1
2	Summarize the Security attacks.	CO1	L2

Lesson Schedule

Lecture No. - Portion covered per hour	Planned Delivery Date	Actual Delivery Date
1. Model of network security	19-11-2018	19-11-2018
2. Security attacks, services and attacks	20-11-2018	20-11-2018
3. OSI security architecture	22-11-2018	22-11-2018

Review Questions

Sl.No. - Questions	TLOs	BL
1. Explain the model network model	TLO1	L1
2. Compare passive and active security threats?	TLO2	L2

Course Code and Title: **CS116 / Cryptography and Network Security**	
Chapter Number and Title: **2 - Classical encryption techniques**	Planned Hours: **6.00 hrs**

Learning Outcomes:-

At the end of the topic the student should be able to:

	Topic Learning Outcomes	COs	BL

1	Analyze the encryption techniques.	CO2	L4
2	Explain the DES algorithm.	CO2	L2
3	Analyze basic cipher mode of operation.	CO2	L4

Lesson Schedule

Lecture No. - Portion covered per hour	Planned Delivery Date	Actual Delivery Date
1. Classical encryption techniques	23-11-2018	23-11-2018
2. SDES	26-11-2018	26-11-2018
3. Block cipher Principles, DES, Strength of DES.	27-11-2018	27-11-2018
4. Block cipher design principles,	29-11-2018	29-11-2018
5. Block cipher mode of operation,	30-11-2018	30-11-2018
6. Evaluation criteria for AES, RC4	03-12-2018	03-12-2018

Review Questions

Sl.No. - Questions	TLOs	BL
1. Demonstrate the SDES algorithm	TLO3	L4
2. Illustrate the Feistel cipher?	TLO3	L4

Course Code and Title: **CS116 / Cryptography and Network Security**	
Chapter Number and Title: **3 - Differential and linear cryptanalysis**	Planned Hours: **3.00 hrs**

Learning Outcomes:-

At the end of the topic the student should be able to:

	Topic Learning Outcomes	COs	BL
1	Compare differential and linear cryptanalysis.	CO2	L4

Lesson Schedule

Lecture No. - Portion covered per hour	Planned Delivery Date	Actual Delivery Date
1. Differential and linear cryptanalysis	04-12-2018	04-12-2018
2. Placement of encryption function	06-12-2018	06-12-2018
3. traffic confidentiality	07-12-2018	07-12-2018

Review Questions

Sl.No. - Questions	TLOs	BL
1. Distinguish between a block cipher and a stream cipher?	TLO1	L4
2. Compare differential and linear cryptanalysis?	TLO1	L4

Course Code and Title: **CS116 / Cryptography and Network Security**	
Chapter Number and Title: **4 - Authentication**	Planned Hours: **10.00 hrs**

Learning Outcomes:-

At the end of the topic the student should be able to:

	Topic Learning Outcomes	COs	BL
1	Explain Digital Signature Standard.	CO3	L2
2	Recognise Authentication Protocols.	CO3	L1
3	Explain types of attacks in authentication.	CO3	L2
4	Explain confidentiality and authentication.	CO3	L2
5	Analyze authentication functions	CO3	L4
6	Analyze Hash Function like SHA, HMAC, CMAC.	CO3	L4

Lesson Schedule

Lecture No. - Portion covered per hour	Planned Delivery Date	Actual Delivery Date
1. Authentication requirement	10-12-2018	
2. Authentication function	11-12-2018	
3. MAC,Hash function	13-12-2018	
4. Security of hash function and MAC,	14-12-2018	
5. SHA	17-12-2018	
6. HMAC	18-12-2018	
7. CMAC	20-12-2018	
8. Digital signature and authentication protocols	21-12-2018	
9. DSS.	24-12-2018	

Review Questions

Sl.No. - Questions	TLOs	BL
1. List the types of attacks addressed by message authentication?	TLO2	L1
2. Explain the design objectives of HMAC	TLO6	L4

Course Code and Title: **CS116 / Cryptography and Network Security**	
Chapter Number and Title: **5 - Public key cryptography**	Planned Hours: **6.00 hrs**

Learning Outcomes:-

At the end of the topic the student should be able to:

	Topic Learning Outcomes	COs	BL
1	Analyze the principles of public key cryptosystems.	CO2	L4
2	Apply RSA algorithm to generate public and private keys.	CO2	L3
3	Analyze the Key distribution in PKC.	CO3	L4
4	Discuss the key exchange protocols.	CO3	L2

Lesson Schedule

Lecture No. - Portion covered per hour	Planned Delivery Date	Actual Delivery Date
1. Public key cryptography	27-12-2018	
2. RSA	28-12-2018	
3. Key distribution	31-12-2018	
4. Key management	03-01-2019	
5. Diffie Hellman key exchange .	04-01-2019	

Review Questions

Sl.No. - Questions	TLOs	BL
1. Generate a private key for the following :In RSA system the public	TLO2	L3

key of a given user is e=31, n=3599		
2. Generate an appropriate solution for :Consider a diffie-Hellman scheme with a common prime q=11 and a primitive root α=2 , then if user A has public key Y=9 then A's private key is ?	TLO4	L2

Course Code and Title: **CS116 / Cryptography and Network Security**	
Chapter Number and Title: **6 - Authentication applications**	Planned Hours: **5.00 hrs**

Learning Outcomes:-

At the end of the topic the student should be able to:

	Topic Learning Outcomes	COs	BL
1	Compare Kerberos version 4 and version 5.	CO3	L4
2	Develop authentication certificate using X.509	CO3	L5

Lesson Schedule

Lecture No. - Portion covered per hour	Planned Delivery Date	Actual Delivery Date
1. Authentication applications	07-01-2019	
2. Kerberos version 4	08-01-2019	
3. kerberos version 5	10-01-2019	
4. X.509	11-01-2019	
5. X.509 certificate revocation	14-01-2019	

Review Questions

Sl.No. - Questions	TLOs	BL
1. Explain Kerberos version 5 with neat sketch	TLO1	L4
2. Explain X.509 certificate with neat sketch	TLO1	L4

Course Code and Title: **CS116 / Cryptography and Network Security**	
Chapter Number and Title: **7 - Authentication services**	Planned Hours: **4.00 hrs**

Learning Outcomes:-

At the end of the topic the student should be able to:

	Topic Learning Outcomes	COs	BL
1	Analyze authentication and confidentiality in email security.	CO3	L4

Lesson Schedule

Lecture No. - Portion covered per hour	Planned Delivery Date	Actual Delivery Date
1. E-mail security -Pretty Good Privacy (PGP)	21-01-2019	
2. Pretty Good Privacy (PGP)	22-01-2019	
3. E-mail security -S/MIME	24-01-2019	
4. S/MIME	25-01-2019	

Review Questions

Sl.No. - Questions	TLOs	BL
1. Analyze the five principle services provided by PGP	TLO1	L4
2. Explain different cryptographic algorithms used in S/MIME	TLO1	L4

Course Code and Title: **CS116 / Cryptographyt and Network Security**	
Chapter Number and Title: **8 - IP security**	Planned Hours: **4.00 hrs**

Learning Outcomes:-

At the end of the topic the student should be able to:

	Topic Learning Outcomes	COs	BL
1	Analyze IPSec services.	CO4	L4
2	Analyze key management in IP Security.	CO4	L4

Lesson Schedule

Lecture No. - Portion covered per hour	Planned Delivery Date	Actual Delivery Date
1. IP Security Overview, IP Security Architecture	28-01-2019	
2. Authentication Header	29-01-2019	
3. Encapsulating Security Payload	31-01-2019	
4. Combining Security Associations and Key Management.	01-02-2019	

Review Questions

Sl.No. - Questions	TLOs	BL
1. Explain authentication Header in IP Security.	TLO1	L4
2. Explain Oakley Key determination protocol	TLO1	L4

Course Code and Title: **CS116 / Cryptography and Network Security**	
Chapter Number and Title: **9 - Web Security**	Planned Hours: **4.00 hrs**

Learning Outcomes:-

At the end of the topic the student should be able to:

	Topic Learning Outcomes	COs	BL
1	Explain the security mechanism using SSL and TLS.	CO4	L2
2	Design a basic SET encryption standard for secured online transactions.	CO4	L5

Lesson Schedule

Lecture No. - Portion covered per hour	Planned Delivery Date	Actual Delivery Date
1. Web Security Requirements	04-02-2019	
2. Secure Socket Layer (SSL)	05-02-2019	
3. Transport Layer Security (TLS)	07-02-2019	
4. Secure Electronic Transaction (SET).	08-02-2019	

Review Questions

Sl.No. - Questions	TLOs	BL
1. Differentiate SSL and TLS protocols	TLO1	L2
2. Develop a basic online application using web security protocols	TLO2	L5

Course Code and Title: **CS116 / Cryptography and Network Security**	
Chapter Number and Title: **10 - Intruders & Trusted Systems**	Planned Hours: **6.00 hrs**

Learning Outcomes:-

At the end of the topic the student should be able to:

	Topic Learning Outcomes	COs	BL
1	Explain different types of virus and their countermeasures.	CO5	L2
2	Differentiate the types of intruders.	CO5	L4
3	Analyze a basic Intrusion detection system	CO5	L4
4	Explain the need for firewall.	CO5	L2
5	Design a basic security system using an appropriate cryptographic algorithm.	CO5	L5

Lesson Schedule

Lecture No. - Portion covered per hour	Planned Delivery Date	Actual Delivery Date
1. Intruder	11-02-2019	
2. Intrusion detection system	12-02-2019	
3. Virus and related threats	14-02-2019	
4. Countermeasures	15-02-2019	
5. Firewalls design principles	18-02-2019	
6. Trusted systems.	19-02-2019	

Review Questions

Sl.No. - Questions	TLOs	BL
1. List the design goals of firewall.	TLO4	L2
2. Design a basic Intrusion Detection system for a given scenario.	TLO5	L5

FMTH0301/Rev.5.2

Course Plan

Semester: **6 - Semester**	Year: **2019**
Course Title: **Software Engineering**	Course Code: **CS114**
Total Contact Hours: **60**	Duration of Theory: 3 Hours
Theory Marks: **70**	Term Work Marks:
Lesson Plan Author: Mr. HarshavardhanAwari	Last Modified Date: 04-10-2018
Checked By: Mr. HarshavardhanAwari	Last Reviewed Date: 04-10-2018

Course Outcomes (COs):

At the end of the course the student should be able to:

1. Define a plan to the software product by adopting suitable process model
2. Design a architecture for the given project
3. Create the programs according to programming standards.
4. Apply various testing strategies on the product.
5. Evaluate the product performance.

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs)

Course Outcomes (COs) / Program Outcomes (POs)	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1. Define a plan to the software product by adopting suitable process model	3	2								1	2	2	3	3
2. Design a architecture for the given project	3	3	3					2					2	3
3. Create the programs according to programming standards.	3	3			2								3	2

4. Apply various testing strategies on the product.	**3**	**3**	**2**										**2**	**3**
5. Evaluate the product performance.	**3**	**3**		**2**				**1**					**3**	**2**

Course Content

Content	Hrs
Unit - 1	
Chapter No. 1 - Why Software Engineering What Is Software Engineering, How Successful Have We Been, What Is Good Software, Who Does Software Engineering, A Systems Approach, An Engineering Approach, Members of the Development Team, How Has Software Engineering Changed?	5.00 hrs
Chapter No. 2 - Modeling the Process and Life Cycle The Meaning of Process, Software Process Models, Tools and Techniques for Process Modeling, Practical Process Modeling	4.00 hrs
Chapter No. 3 - Planning and Managing the Project Tracking Progress, Project Personnel, Effort Estimation, Risk Management, The Project Plan, Process Models and Project Management	4.00 hrs
Unit - 2	
Chapter No. 4 - Capturing the Requirements The Requirements Process, Requirements Elicitation, Types of Requirements, Characteristics of Requirements, Modeling Notations, Requirements and Specification Languages, Prototyping Requirements, Requirements Documentation, Validation, and Verification, Measuring Requirements, Choosing a Specification Technique	5.00 hrs
Chapter No. 5 - Designing the Architecture The Design Process, Decomposition and Views, Modeling Architectures, Architectural Styles, and Strategies, Achieving Quality Attributes, Collaborative Design, Architecture Evaluation and Refinement, Documenting Software Architectures, Architecture Design Review, Software Product Lines	4.00 hrs
Chapter No. 6 - Designing the Modules Design Methodology, Design Principles, Object-Oriented Design, Representing	5.00 hrs

Object-Oriented Designs in the UML, Object-Oriented Design Patterns, Other Design Considerations, Object-Oriented Measurement, Design Documentation	
Unit - 3	
Chapter No. 7 - Writing the Programs Programming Standards and Procedures, Programming Guidelines, Documentation, The Programming Process	4.00 hrs
Chapter No. 8 - - Testing the Programs Software Faults and Failures, Testing Issues, Unit Testing, Integration Testing, Testing Object-Oriented Systems, Test Planning, Automated Testing Tools, When to Stop Testing	4.00 hrs
Chapter No. 9 - Testing the System Principles of System Testing, Function Testing, Performance Testing, Reliability, Availability, and Maintainability, Acceptance Testing, Installation Testing, Automated System Testing, Test Documentation, Testing Safety-Critical Systems	4.00 hrs
Unit - 4	
Chapter No. 10 - Delivering the System Training, Documentation	4.00 hrs
Chapter No. 11 - Maintaining the System The Changing System, The Nature of Maintenance, Maintenance Problems, Measuring Maintenance Characteristics, Maintenance Techniques, and Tools, Software Rejuvenation	4.00 hrs
Unit - 5	
Chapter No. 12 - Evaluating Products, Processes, and Resources Approaches to Evaluation, Selecting an Evaluation Technique, Assessment vs. Prediction, Evaluating Products, Evaluating Processes, Evaluating Resources	4.00 hrs
Chapter No. 13 - Improving Predictions, Products, Processes, and Resources Improving Prediction, Improving Products, Improving Processes, Improving Resources, General Improvement Guidelines	4.00 hrs
Chapter No. 14 - The Future of Software Engineering How Have We Done?, Technology Transfer, Decision-Making in Software Engineering, The Professionalization of Software Engineering: Licensing, Certification, and Ethics	5.00 hrs

Text Books (List of books as mentioned in the approved syllabus)

1. Roger S Pressman, Software Engineering: A Practitioner's Approach , 6th Edition, TMH

2. Ian Sommerville, Software Engineering, 7th, TMH

References

1. Shari Lawrence P Fleeger and Joanne M. Atlee, Software Engineering: Theory and Practice, 4th, Pearson Education

2. PedryczWitold and Peters James F, Software Engineering, John Wiley

3. Hans van Vliet, Software Engineering: Principles and Practice, 3rdEdition, TMH

Chapterwise Plan

Course Code and Title: **CS114 / Software Engineering**	
Chapter Number and Title: **1 - Why Software Engineering**	Planned Hours: **5.00 hrs**

Learning Outcomes:-

At the end of the topic the student should be able to:

	Topic Learning Outcomes	COs	BL
1	Explanation for software engineering	CO1	L1
2	To elaborate software scope	CO1	L2
3	Identify the members of the development team	CO2	L2
4	Examine the changes in software engineering	CO4	L4

Lesson Schedule

Lecture No. - Portion covered per hour	Planned Delivery Date	Actual Delivery Date
1. Explanation for software engineering	19-11-2018	
2. What Is Software Engineering, How Successful Have We Been	20-11-2018	
3. What Is Good Software, Who Does Software Engineering	21-11-2018	

4. A Systems Approach, An Engineering Approach	22-11-2018	
5. Members of the Development Team, How Has Software Engineering Changed?	23-11-2018	

Review Questions

Sl.No. - Questions	TLOs	BL
1. Explanation for software engineering	TLO1	L1
2. What Is Good Software, Who Does Software Engineering	TLO1	L1
3. Members of the Development Team, How Has Software Engineering Changed?	TLO1	L1

Course Code and Title: **CS114 / Software Engineering**	
Chapter Number and Title: **2 - Modeling the Process and Life Cycle**	Planned Hours: **4.00 hrs**

Learning Outcomes:-

At the end of the topic the student should be able to:

	Topic Learning Outcomes	COs	BL
1	Define a Software Process Models	CO1	L1
2	Develop Tools and Techniques for software Process Modelling	CO2	L3
3	Analysing Practical Process Modelling	CO1	L4

Lesson Schedule

Lecture No. - Portion covered per hour	Planned Delivery Date	Actual Delivery Date
6. Modeling the Process and Life Cycle:	24-11-2018	
7. Develop Tools and Techniques for software Process Modelling	26-11-2018	
8. Analysing Practical Process Modelling	03-12-2018	

Review Questions

Sl.No. - Questions	TLOs	BL
1. Identify the the different process models and write the pros and cons and which model is best suitable for which situation.	TLO2	L3
2. ExplainAnalysing Practical Process Modelling	TLO2	L3

Course Code and Title: **CS114 / Software Engineering**	
Chapter Number and Title: **3 - Planning and Managing the Project**	Planned Hours: **4.00 hrs**

Learning Outcomes:-

At the end of the topic the student should be able to:

	Topic Learning Outcomes	COs	BL
1	Design a Software Process Model	CO1	L3
2	Create a Software Project Plan	CO3	L6
3	Predict a Risk Management Ideas	CO2	L4

Lesson Schedule

Lecture No. - Portion covered per hour	Planned Delivery Date	Actual Delivery Date
9. Planning and Managing the Project:	06-12-2018	
10. Tracking Progress, Project Personnel	08-12-2018	
11. Effort Estimation, Risk Management, The Project Plan	14-12-2018	

Review Questions

Sl.No. - Questions	TLOs	BL
1. Identify the List risks for the given example project	TLO2	L6
2. Calculate effort estimation for the given project	TLO3	L4

Course Code and Title: **CS114 / Software Engineering**	
Chapter Number and Title: **4 - Capturing the Requirements**	Planned Hours: **5.00 hrs**

Learning Outcomes:-

At the end of the topic the student should be able to:

	Topic Learning Outcomes	COs	BL
1	Analyse about the project and process requirements	CO2	L4
2	Identifying the types of requirements	CO2	L1
3	Inspect the capturing requirements	CO4	L5
4	Analyse regarding validation and verification	CO3	L4

Lesson Schedule

Lecture No. - Portion covered per hour	Planned Delivery Date	Actual Delivery Date
12. The Requirements Process, Requirements Elicitation	20-12-2018	
13. Identifying the types of requirements	22-12-2018	
14. Modeling Notations, Prototyping Requirements	24-12-2018	
15. Requirements Documentation, Validation and Verification	28-12-2018	

Review Questions

Sl.No. - Questions	TLOs	BL
1. Identifying the types of requirements	TLO2	
2. Requirements Documentation, Validation and Verification	TLO3	L5

Course Code and Title: **CS114 / Software Engineering**	
Chapter Number and Title: **5 - Designing the Architecture**	Planned Hours: **4.00 hrs**

Learning Outcomes:-

At the end of the topic the student should be able to:

	Topic Learning Outcomes	COs	BL
1	Analysis of Design Process, Decomposition, and Views	CO4	L4
2	Illustrate Architecture Evaluation and Refinement	CO3	L2
3	Develop the design Modelling architecture	CO2	L3
4	Examine Architecture Design Review	CO4	L4

Lesson Schedule

Lecture No. - Portion covered per hour	Planned Delivery Date	Actual Delivery Date
16. The Design Process, Decomposition and Views	04-01-2019	
17. Modeling Architectures, Architectural Styles and Strategies	08-01-2019	
18. Architecture Design Review	15-01-2019	
19. Examine Architecture Design Review m6	10-01-2019	
20. Designing the Architecture:	03-01-2019	

Review Questions

Sl.No. - Questions	TLOs	BL
1. Designing the Architecture: for given project	TLO3	L3
2. Examine Architecture Design Review for the given project	TLO3	L3

Course Code and Title: **CS114 / Software Engineering**	
Chapter Number and Title: **6 - Designing the Modules**	Planned Hours: **5.00 hrs**

Learning Outcomes:-

At the end of the topic the student should be able to:

	Topic Learning Outcomes	COs	BL
1	Analyse about Design Methodology	CO1	L2
2	Create an Object-Oriented Designs in the UML	CO4	L6
3	Apply Object-Oriented Design Patterns	CO3	L3
4	Design Documentation	CO1	L3

Lesson Schedule

Lecture No. - Portion covered per hour	Planned Delivery Date	Actual Delivery Date
21. Analyse about Design Methodology	17-11-2018	
22. Create an Object-Oriented Designs in the UML	21-01-2019	
23. Apply Object-Oriented Design Patterns	22-01-2019	
24. Design Documentation	26-01-2019	

Review Questions

Sl.No. - Questions	TLOs	BL
1. Design OOAD models for the given project	TLO4	L3

Course Code and Title: **CS114 / Software Engineering**	
Chapter Number and Title: **7 - Writing the Programs**	Planned Hours: **4.00 hrs**

Learning Outcomes:-

At the end of the topic the student should be able to:

	Topic Learning Outcomes	COs	BL
1	Evaluate design documentation	CO1	L5
2	Identifying program guidelines	CO2	L1
3	Evaluate programming processes	CO4	L5
4	Justify Documentation	CO3	L2

Lesson Schedule

Lecture No. - Portion covered per hour	Planned Delivery Date	Actual Delivery Date
25. Evaluate design documentation	28-01-2019	
26. Identifying program guidelines	29-01-2019	
27. Evaluate programming processes	30-01-2019	
28. Justify Documentation	01-02-2019	

Review Questions

Sl.No. - Questions	TLOs	BL
1. list program guide lines	TLO1	L5

Course Code and Title: **CS114 / Software Engineering**	
Chapter Number and Title: **8 - - Testing the Programs**	Planned Hours: **4.00 hrs**

Learning Outcomes:-

At the end of the topic the student should be able to:

	Topic Learning Outcomes	COs	BL
1	Software Faults and Failures	CO4	L3,L4
2	Test Planning, Automated Testing Tools	CO5	L2,L3

Lesson Schedule

Lecture No. - Portion covered per hour	Planned Delivery Date	Actual Delivery Date
29. Importance about Software Faults and Failures	04-02-2019	
30. Faults and Failures	05-02-2019	
31. Testing Object-Oriented Systems	07-02-2019	
32. Analyse some Automated Testing Tools	09-02-2019	

Review Questions

Sl.No. - Questions	TLOs	BL
1. explain about faults and failures	TLO1	L3

Course Code and Title: **CS114 / Software Engineering**	
Chapter Number and Title: **9 - Testing the System**	Planned Hours: **4.00 hrs**

Learning Outcomes:-

At the end of the topic the student should be able to:

	Topic Learning Outcomes	COs	BL
1	Evaluate the Principles of System Testing	CO4	L5
2	Analyze Automated System Testing	CO5	L4
3	Justify about Test Documentation	CO3	L2
4	Testing Safety-Critical Systems	CO5	L3

Lesson Schedule

Lecture No. - Portion covered per hour	Planned Delivery Date	Actual Delivery Date
33. Evaluate the Principles of System Testing	11-02-2019	
34. Analyze Automated System Testing	12-02-2019	
35. Justify about Test Documentation	13-02-2019	
36. Testing Safety-Critical Systems	14-02-2019	

Review Questions

Sl.No. - Questions	TLOs	BL
1. write the test cases for the given project	TLO3	L2

Course Code and Title: **CS114 / Software Engineering**	
Chapter Number and Title: **10 - Delivering the System**	Planned Hours: **4.00 hrs**

Learning Outcomes:-

At the end of the topic the student should be able to:

	Topic Learning Outcomes	COs	BL
1	Adapt training	CO4	L1
2	Justify documentation	CO5	L2

Lesson Schedule

Lecture No. - Portion covered per hour	Planned Delivery Date	Actual Delivery Date
37. Adapt training	18-02-2019	
38. Justify documentation	19-11-2018	
39. Recommended methods to maintain the system	20-02-2019	
40. Identify the Problems	21-02-2019	
41. Analyse on techniques and tools	22-02-2019	
42. Interpret Software Rejuvenation	23-02-2019	

Review Questions

Sl.No. - Questions	TLOs	BL
1. Explain aboutSoftware Rejuvenation	TLO2	L2

Course Code and Title: **CS114 / Software Engineering**	
Chapter Number and Title: **11 - Maintaining the System**	Planned Hours: **4.00 hrs**

Learning Outcomes:-

At the end of the topic the student should be able to:

	Topic Learning Outcomes	COs	BL
1	Recommended methods to maintain the system	CO4	L1
2	Identify the Problems	CO5	L1
3	Analyse on techniques and tools	CO5	L4
4	Interpret Software Rejuvenation	CO3	L2

Lesson Schedule

Lecture No. - Portion covered per hour	Planned Delivery Date	Actual Delivery Date
43. Recommended methods to maintain the system	25-02-2019	
44. Identify the Problems	26-02-2019	
45. Analyse on techniques and tools	27-02-2019	
46. Interpret Software Rejuvenation	28-02-2019	

Review Questions

Sl.No. - Questions	TLOs	BL
1. Explain aboutSoftware Rejuvenation		

Course Code and Title: **CS114 / Software Engineering**	
Chapter Number and Title: **12 - Evaluating Products, Processes, and Resources**	Planned Hours: **4.00 hrs**

Learning Outcomes:-

At the end of the topic the student should be able to:

	Topic Learning Outcomes	COs	BL
1	Discuss the methods to evaluate the product	CO3	L1
2	Examine on processes and resources	CO4	L4
3	Compare Assessment vs. Prediction	CO5	L4

Lesson Schedule

Lecture No. - Portion covered per hour	Planned Delivery Date	Actual Delivery Date
47. Discuss the methods to evaluate the product	01-03-2019	
48. Examine on processes and resources	04-03-2019	
49. Compare Assessment vs. Prediction	06-03-2019	

Review Questions

Sl.No. - Questions	TLOs	BL
1. Compare Assessment vs. Prediction	TLO2	L4

Course Code and Title: **CS114 / Software Engineering**	
Chapter Number and Title: **13 - Improving Predictions, Products, Processes, and Resources**	Planned Hours: **4.00 hrs**

Learning Outcomes:-

At the end of the topic the student should be able to:

	Topic Learning Outcomes	COs	BL
1	Improve the prediction of software product	CO4	L2
2	Create an innovative product	CO3	L6
3	Plans to improve processes, products and resources	CO5	L2

Lesson Schedule

Lecture No. - Portion covered per hour	Planned Delivery Date	Actual Delivery Date
50. Improve the prediction of software product	07-03-2019	
51. Create an innovative product	08-03-2019	
52. Plans to improve processes, products and resources	09-03-2019	

Review Questions

Sl.No. - Questions	TLOs	BL
1. Create an innovative product	TLO2	L6

Course Code and Title: **CS114 / Software Engineering**	
Chapter Number and Title: **14 - The Future of Software Engineering**	Planned Hours: **5.00 hrs**

Learning Outcomes:-

At the end of the topic the student should be able to:

	Topic Learning Outcomes	COs	BL
1	Create a product	CO4	L6
2	Create an innovative design thinking	CO3	L6
3	Identify the methods to maintain the systems	CO5	L1

Lesson Schedule

Lecture No. - Portion covered per hour	Planned Delivery Date	Actual Delivery Date
53. Create a product	11-03-2019	
54. Create an innovative design thinking	13-03-2019	
55. Identify the methods to maintain the systems	16-03-2019	

Review Questions

Sl.No. - Questions	TLOs	BL
1. Identify the methods to maintain the systems	TLO2	L6