



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 Title: Advanced Data Base Management Systems	Semester: 6 - Semester
Course Code: CS120	Year: 2019

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

**Course Content**

Course Code: CS120	Course Title: Advanced Data Base Management Systems	
L-T-P: 3-0-0	Credits: 3	Contact Hrs: 48
Term Work Marks: 0	Theory Marks: 70	Total Marks: 100
Teaching Hrs: 48		Exam Duration: 3 hrs

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	4.00 hrs



Comparison of RDBMS, OODBMS, ORDBMS	
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 distributed databases, Recovery in distributed databases, An Overview of Client Server Architecture.	10.00 hrs
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



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	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
2. Subclasses, Super Classes, Inheritance, Specialization and generalization, Constraints and, characteristics of Specialization and generalization Relationship types of degree higher than two.	19-12-2018	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



3. 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	27-12-2018
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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
4. Persistent Programming Languages, OODBMS architecture, Storage Issues, Transactions Concurrency Control, Example of ODBMS	02-01-2019	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
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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
5. Introduction, Database design for an ORDBMS, Nested Relations, Collections, Storage Methods, Access Method, Query Processing, Optimization	11-01-2019	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
6. An Overview of SQL3, Implementation Issues for Extended types, Systems Comparison of RDBMS, OODBMS, ORDBMS	22-11-2018	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
7. Introduction, Architecture for parallel databases Parallel Query evaluation ,Parallelizing individual operations, Sorting, Joins.	11-01-2019	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 is 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
8. 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	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 is 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
9. 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	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
10. Active database concepts, Temporal database concepts, Spatial databases, Concepts and Architecture, Deductive databases, Query Processing, Mobile Databases, Geographic Information Systems.	12-12-2018	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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Question Paper Title: Compiler Design		
Total Duration (H:M): 3:00	Course: Advanced Database Management Systems	Maximum Marks: 70
Note: ANSWER ALL QUESTIONS IN PART A ANSWER ANY 5 QUESTIONS FROM PART B		

PART A				
Q.No.	Questions	Marks	CO	BL
1	Define “entity”? Mention the advantages of E-R model	2.00	CO1	L2
2	Mention any two guidelines to guide the design process for EER concepts.	2.00	CO1	L1
3	What is a type constructor? Mention and explain about the three most basic constructors	2.00	CO2	L2
4	Define Object Definition Language and Object Query Language	2.00	CO2	L3
5	Mention the different indexing schemes for indexing new types introduced in OODBMS and ORDBMS	2.00	CO2	L2
6	Write the differences between RDBMS and OODBMS.	2.00	CO3	L2
7	Define Distributed database and distributed database management system.	2.00	CO3	L2
8	Explain the three-tier client server architecture	2.00	CO4	L3
9	Define spatial data? Mention the different types of spatial data?	2.00	CO4	L1
10	Write about parallel databases	2.00	CO4	L2

PART B				
Q.No.	Questions	Marks	CO	BL
11	Consider a university database that keeps track of student and their majors, transcripts, registration and	10.00	CO1	L2



	<p>the university courses. Several sections of each course are offered and each section is related to the instructor who is teaching. It also keeps track of the sponsored research project of faculty and graduate students of the academic departments of the particular college. The database also keeps track of the research grants and contracts awarded to the university. A grant is related to one principle investigator and to all researchers it supports.</p> <p>Draw an extended ER diagram for the above examples. Show all the possible constraints. Make appropriate assumptions, wherever necessary.</p>			
12	Write short notes on the following a) Subclasses b) Super classes c) Generalization d) Specialization	10.00	CO1	L4
13	Explain with an example about the “specifying object behavior via naming and reachability	10.00	CO2	L2
14	a) Write any two differences between conceptual design of ODB and RDB.	5.00	CO3	L3
	b) Write the steps for mapping EER schema to an ODB schema	5.00	CO3	L4
15	Write short notes on the following a) Storage methods in ORDBMS	4.00	CO4	L2
	b) Query processing	6.00	CO4	L3
16	Explain the concurrency control mechanism in distributed systems	10.00	CO5	L3
17	What is fragmentation? Briefly describe the different fragmentation alternatives in distributed database management environment?	10.00	CO5	L4
18	Write short notes on the following: a) Semi structured data model.	5.00	CO5	L2
	b) XML applications.	5.00	CO5	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 Title: Compiler Design	Semester: 6 - Semester
Course Code: CS115	Year: 2019

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

**Course Content**

Course Code: CS118	Course Title: Artificial Intelligence	
L-T-P: 3-0-0	Credits: 3	Contact Hrs: 48
Term Work Marks: 0	Theory Marks: 70	Total Marks: 100
Teaching Hrs: 48		Exam Duration: 3 hrs

Content	Hrs
Unit - 1	
Chapter No. 1 - Introduction to Artificial Intelligence, Problems, Problem Spaces and Search, Heuristic Search Techniques Introduction to Artificial Intelligence: The AI problem domains, The underlying assumption, An AI technique, The level of the model, Criteria for success. Problems, Problem Spaces and Search: Defining the problem as a state space search, Production systems, Problem characteristics, Production system characteristics, Issues in the design of search programs, Additional problems	8.00 hrs
Unit - 2	
Chapter No. 2 - Knowledge Representation Issues, Using Predicate Logic, Representing Knowledge Using Rules Knowledge Representation Issues: Knowledge representations and mappings, Approaches to knowledge representation, Issues in knowledge representation, The Frame problem. Using Predicate Logic: Representing simple facts in logic, Representing Instance and Is-a-relationships, Computable functions and Predicates, Resolution, Natural Deduction. Representing Knowledge Using Rules: Procedural versus Declarative knowledge, Forward versus Backward Reasoning.	6.00 hrs
Unit - 3	
Chapter No. 3 - Weak slot and filler structures, Strong slot and filler structures, Game Playing Weak slot and filler structures: Semantic nets, Frames. Strong slot and filler structures: Conceptual Dependencies, Scripts, CYC. Game Playing: The Minimax Search procedure, Adding Alpha-Beta Cutoffs, Additional Refinements, Iterative	7.00 hrs



Deepening. Vision: Introduction, Defining the Problem, Overview of the Solution, Early Processing, Representing and Recognizing Scenes.	
Unit - 4	
Chapter No. 4 - Reasoning in Uncertain Situations, Understanding Natural Language Reasoning in Uncertain Situations: Introduction to Nonmonotonic Reasoning, Logic-Based Abductive Inference, Abduction - Alternative to Logic. Understanding Natural Language: Role of Knowledge in Language Understanding, Deconstructing Language - A Symbolic Analysis, Syntax, Syntax and Knowledge with ATN Parsers, Natural Language Applications.	6.00 hrs
Unit - 5	
Chapter No. 5 - Strong Method Problem Solving Overview of Expert System Technology, Rule-Based Expert Systems, Model-Based, Case Based and Hybrid Systems, Planning	5.00 hrs

Evaluation Scheme

Term Work Scheme

Assessment	Weightage in Marks
Mid Term1	20
Mid Term2	20
Assignment 1	10
Assignment 2	10
Term End Exam	70
Total	130



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	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	29-11-2018

Review Questions

Sl.No. - Questions	TLOs	BL
1. Consider the following 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	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	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	07-01-2019

Review Questions

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



Question Paper Title: SAMPLE		
Total Duration (H:M): 1:30	Course: Artificial Intelligence (CS118)	Maximum Marks: 20
Note:		

Q.No.	Questions	Marks	CO	BL
PART A				
1	What are the advantages of local search	2	CO1	
2	Define Best-first-search	2	CO2	
3	Define atomic sentence and complex sentence	2	CO2	
4	Represent the following sentence in predicate form "All the children like sweets"	2	CO2	
5	Define frame	2	CO2	
6	What is Min Max search procedure?	2	CO3	
7	What is abductive inference?	2	CO4	
8	Define symbolic reasoning?	2	CO5	
9	What is the role of inference engine?	2	CO4	
10	Write Advantages of rule based expert systems.?	2	CO2	
PART B				
11	Explain the approach of formulation for constraint satisfaction problems with example	10.00		
12	Explain about the different types of state space searches.	10.00	CO2	
13	Illustrate the use of first order logic to represent knowledge	10.00	CO1,CO2	



	Convert the following well formed formula into clause form with sequence of steps $\forall x: [\text{Roman}(x) \wedge \text{Know}(x, \text{Marcus})] \rightarrow [\text{hate}(x, \text{Caesar}) \vee (\forall y: \exists z: \text{hate}(y, z) \rightarrow \text{thinkcrazy}(x, y))]$			
14	Explain in detail about CYC knowledge base	10.00	CO2	
15	Explain ATN parsing with example grammar	10.00	CO3	
16	What are the limitations of Expert System.? Differentiate a Case Based Expert System from Model Based Expert System	10.00	CO4	
17	Explain forward versus backward reasoning.	10.00	CO5	
18	Explain problem solving using means-end – analysis	10.00	CO5	



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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 Title: Compiler Design	Semester: 6 - Semester
Course Code: CS115	Year: 2019

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**

Course Code: CS115	Course Title: Compiler Design	
L-T-P: 4-0-0	Credits: 4	Contact Hrs: 60
Term Work Marks: 0	Theory Marks: 70	Total Marks: 100
Teaching Hrs: 60		Exam Duration: 3 hrs

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	6.00 hrs



Type Checking, Type systems, Type expressions, Specification of a simple type checker, Equivalence of type expressions, Type Conversions.	
Unit – 4	
Chapter No. 6 - Intermediate Code Generation Construction of syntax trees, Directed acyclic graph, three address codes, Translation of Declarations, Assignment statements, Boolean Expressions, Backpatching.	5.00 hrs
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 Loudon, “Compiler Construction”, Vikas.
3. Leland L. Beck, “System Software : An Introduction to Systems Programming”, Addison Wesley.



Evaluation Scheme

Term Work Scheme

Assessment	Weightage in Marks
Mid Term1	20
Mid Term2	20
Assignment 1	10
Assignment 2	10
Term End Exam	70
Total	130

**Course Unitization for Minor Exams and Semester End Examination**

Topics / Chapters	Teaching Credits	No. of Questions in Mid Term1	No. of Questions in Mid Term2	No. of Questions in Assignment 1	No. of Questions in Assignment 2	No. of Questions in Term End Exam
Unit I						
1 –INTRODUCTION LEXICAL ANALYSIS	12.00	2.00	--	5.00	--	1.00
Unit II						
2 –SYNTAX ANALYSIS	24.00	2.00	--	5.00	--	2.00
Unit III						
3 –SYNTAX DIRECTED TRANSLATION SEMANTIC ANALYSIS	15.00	1.00	1.00	2.50	2.50	2.00
Unit IV						
4 –INTERMEDIATE CODE GENERATION RUNTIME ENVIRONMENT	15.00	--	2.00	--	5.00	2.00
Unit V						
5 –CODE OPTIMIZATION CODE GENERATION	9.00	--	2.00	--	5.00	1.00

Note

1. Each Question carries 20 marks and may consists of sub-questions.
2. Mixing of sub-questions from different chapters within a unit (only for Unit I and Unit II) is allowed in Minor I, II and Theory.
3. Answer 5 full questions of 20 marks each (two full questions from Unit I, II and one full questions from Unit III) out of 8 questions in Theory.

Date:**Head of Department**



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	19-11-2018
2.Compilers	20-11-2018	20-11-2018
3.Analysis of the source program	21-11-2018	21-11-2018
4.The phases of a compiler	22-11-2018	22-11-2018
5.Cousins of the compiler	26-11-2018	26-11-2018
6.Concepts of Loaders, Linkers	27-11-2018	27-11-2018
7.The grouping of phases	28-11-2018	28-11-2018
8.Compiler writing tools	29-11-2018	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	03-12-2018
10.Input buffering	04-12-2018	04-12-2018
11.Specification of tokens	05-12-2018	05-12-2018



12.Recognition of tokens	06-12-2018	06-12-2018
13.A language for specifying lexical Analyzers	10-12-2018	10-12-2018
14.Finite Automata	11-12-2018	11-12-2018
15.Design of a lexical analyzer	12-12-2018	12-12-2018
16.Optimization of DFA-based pattern matchers	13-12-2018	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	Define Ambiguous 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	17-12-2018
18. Context-free grammars	18-12-2018	18-12-2018
19. Writing a grammar	19-12-2018	19-12-2018
20. Top-down parsing,	20-12-2018	20-12-2018
21. Bottom-down parsing	26-12-2018	26-12-2018
22. Operator Precedence parsing,	27-12-2018	27-12-2018
23. LR parsers	31-12-2018	31-12-2018
24. Using ambiguous grammars	31-12-2018	31-12-2018
25. Parser generators.	31-12-2018	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
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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 grammars, L-attributed grammars 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	02-01-2019
27.Construction of syntax trees Bottom-up evaluation of S-attributed definitions	03-01-2019	03-01-2019



28.L-attributed definitions	07-01-2019	07-01-2019
29.Top-Down translation	08-01-2019	08-01-2019
30.Bottom-up evaluation of inherited attributes	09-01-2019	09-01-2019
31.Space for attribute values at compile time,	10-01-2019	10-01-2019
32.Analysis of syntax directed definitions.	11-01-2019	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 \rightarrow IntConstant { \$0.val = \$1.lexval; } Expr \rightarrow Var { \$0.val = \$1.val; } Expr \rightarrow Expr B-op Expr { \$0.val = \$2.val(\$1.val,\$3.val); } B-op \rightarrow + { \$0.val = PLUS; } B-op \rightarrow * { \$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	21-01-2019
34. Specification of a simple type checker	22-01-2019	22-01-2019
35. Equivalence of type expressions.	23-01-2019	23-01-2019
36. Type Conversions.	24-01-2019	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	28-01-2019
38.Storage organization	29-01-2019	29-01-2019
39.Storage allocation Strategies	30-01-2019	30-01-2019
40.Symbol tables	31-01-2019	31-01-2019
41.Language facilities for dynamic storage allocation	04-02-2019	04-02-2019
42.Dynamic storage allocation Techniques.	05-02-2019	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	06-02-2019
44.Declarations, Assignment statements	07-02-2019	07-02-2019
45.Boolean expressions.	11-02-2019	11-02-2019
46.Back Patching	12-02-2019	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	13-02-2019
48.The principal sources of optimization	14-02-2019	14-02-2019
49.Optimization of basic blocks	18-02-2019	18-02-2019
50.Loops in flow graphs	19-02-2019	19-02-2019
51.Introduction to global data flow analysis	20-02-2019	20-02-2019
52.Code-improving transformations	21-02-2019	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	25-02-2019
54.The Target machine	26-02-2019	26-02-2019
55.Runtime storage management	27-02-2019	27-02-2019
56.Basic Blocks and flow graphs	28-02-2019	28-02-2019
57.Register allocation and assignment	04-03-2019	04-03-2019
58.The dag representation of basic blocks	05-03-2019	05-03-2019
59.Generating code from dags.	06-03-2019	06-03-2019
60.Code-generation algorithm	07-03-2019	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



Question Paper Title: Compiler Design		
Total Duration (H:M): 3:00	Course: Compiler Design	Maximum Marks: 70
Note: ANSWER ALL QUESTIONS IN PART A ANSWER ANY 5 QUESTIONS FROM PART B		

PART A				
Q.No.	Questions	Marks	CO	BL
1	Differentiate between compiler and interpreter.	2.00	CO1	L2
2	What is a regular expression?	2.00	CO1	L1
3	What is a “handle”?	2.00	CO2	L2
4	Mention any two benefits that are offered by Grammars.	2.00	CO2	L3
5	Define Syntax tree.	2.00	CO2	L2
6	What is meant by static checking?	2.00	CO3	L2
7	Define LR(0) grammar.	2.00	CO3	L2
8	Mention the three desirable properties of memory managers.	2.00	CO4	L3
9	What is parsing?	2.00	CO4	L1
10	Define Symbol table.	2.00	CO4	L2



PART B				
Q.No.	Questions	Marks	CO	BL
11	a) Explain the terms a) Token b) Pattern c) Lexeme	6.00	CO1	L2
	b) Explain the role of Lexical Analyzer in compilation process.	6.00	CO1	L2
12	a) Draw a NFA that accepts $aa^* bb^*$	4.00	CO1	L4
	b) Write the regular expressions for the following languages over the alphabet $\{0, 1\}$ i) Strings containing exactly two 0's ii) Strings that begin or end with 00 or 11 iii) Strings that contain even number of 1's	6.00	CO2	L4
13	a) What is bottom-up parsing?	2.00	CO2	L2
	b) What is meant by LL(1) class of Grammars?	3.00	CO2	L2
	c) Explain Shift-Reduce Parsing.	5.00	CO3	L3
14	a) What is a syntax-directed definition(SDD)?	2.00	CO3	L3
	b) Explain the two kinds of attributes for nonterminals.	5.00	CO3	L4
	c) What is a dependency graph?	3.00	CO4	L2
15	a) What is the role of DAG in target code generation?	4.00	CO4	L2
	b) Explain how the following techniques help code optimization: i)Constant Propagation ii) Redundancy Elimination	6.00	CO4	L3
16	What is Peephole Optimization? Explain the different Peephole Optimization techniques.	10.00	CO5	L3
17	a) Briefly explain the logical structure of a compiler front end.	4.00	CO5	L4



	b) Give DAG representation scheme for the following expression $((a + b) - c) * d - e$	6.00	CO5	L4
18	Write about a) Copy Propagation	3.00	CO5	L2
	b) Dead-Code Elimination	3.00	CO5	L2
	c) Reaching Definitions in Data Flow analysis	4.00	CO5	L2



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: Cryptography 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**

Course Code: CS116	Course Title: Cryptography and Network Security	
L-T-P: 4-0-0	Credits: 4	Contact Hrs: 60
Term Work Marks: 0	Theory Marks: 70	Total Marks: 100
Teaching Hrs: 60		Exam Duration: 3 hrs

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 Transport Layer Security (TLS), Secure Electronic Transaction (SET).	4.00 hrs
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

Evaluation Scheme

Term Work Scheme

Assessment	Weightage in Marks
MID-I	20
Total	20

**Course Unitization for Minor Exams and Semester End Examination**

Topics / Chapters	Teaching Credits	No. of Questions in MID-I
Unit I		
1 - Security Attacks	3.00	0
2 - Classical encryption techniques	6.00	0
3 - Differential and linear cryptanalysis	3.00	0
Unit II		
4 - Authentication	10.00	0
Unit III		
5 - Public key cryptography	6.00	0
6 - Authentication applications	5.00	0
Unit IV		
7 - Authentication services	4.00	0
8 - IP security	4.00	0
9 - Web Security	4.00	0
Unit V		
10 - Intruders & Trusted Systems	6.00	0

Note

1. Each Question carries 20 marks and may consists of sub-questions.
2. Mixing of sub-questions from different chapters within a unit (only for Unit I and Unit II) is allowed in Minor I, II and Theory.
3. Answer 5 full questions of 20 marks each (two full questions from Unit I, II and one full questions from Unit III) out of 8 questions in Theory.

Date:**Head of Department**



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	10-12-2018
2. Authentication function	11-12-2018	11-12-2018
3. MAC, Hash function	13-12-2018	13-12-2018
4. Security of hash function and MAC,	14-12-2018	14-12-2018
5. SHA	17-12-2018	17-12-2018
6. HMAC	18-12-2018	18-12-2018
7. CMAC	20-12-2018	20-12-2018
8. Digital signature and authentication protocols	21-12-2018	21-12-2018
9. DSS.	24-12-2018	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	27-12-2018
2. RSA	28-12-2018	28-12-2018
3. Key distribution	31-12-2018	31-12-2018
4. Key management	03-01-2019	03-01-2019
5. Diffie Hellman key exchange .	04-01-2019	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 $a=2$, 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	07-01-2019
2. Kerberos version 4	08-01-2019	08-01-2019
3. kerberos version 5	10-01-2019	10-01-2019
4. X.509	11-01-2019	11-01-2019
5. X.509 certificate revocation	14-01-2019	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	21-01-2019
2. Pretty Good Privacy (PGP)	22-01-2019	22-01-2019
3. E-mail security -S/MIME	24-01-2019	24-01-2019
4. S/MIME	25-01-2019	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	28-01-2019
2. Authentication Header	29-01-2019	29-01-2019
3. Encapsulating Security Payload	31-01-2019	31-01-2019
4. Combining Security Associations and Key Management.	01-02-2019	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	04-02-2019
2. Secure Socket Layer (SSL)	05-02-2019	05-02-2019
3. Transport Layer Security (TLS)	07-02-2019	07-02-2019
4. Secure Electronic Transaction (SET).	08-02-2019	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	11-02-2019
2. Intrusion detection system	12-02-2019	12-02-2019
3. Virus and related threats	14-02-2019	14-02-2019
4. Countermeasures	15-02-2019	15-02-2019
5. Firewalls design principles	18-02-2019	18-02-2019
6. Trusted systems.	19-02-2019	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



Question Paper Title: III B.Tech II Sem		
Total Duration (H:M): 3	Course: Cryptography and Network Security (CS116)	Maximum Marks: 70
Note:		

A				
Q.No.	Questions	Marks	CO	BL
1	What is security attack and what are the types.	2.00	CO1,	
2	Briefly define about Steganography.	2.00	CO1,	
3	What is digital signature?	2.00	CO3,	
4	List the stages in each round of AES Cipher.	2.00	CO2,	
5	What is the Brute force Attack?	2.00	CO1,	
6	List down the four phases of virus.	2.00	CO5,	
7	What is x.509 standard?	2.00	CO4,	
8	What are honey pots?	2.00	CO5,	
9	What is masquerading?	2.00	CO5,	
10	Define weak collision property of a hash function.	2.00	CO3,	

B				
Q.No.	Questions	Marks	CO	BL
11	With a neat diagram explain briefly about a model for network security.	10.00	CO1,	
12	With a neat diagram, explain about a symmetric cipher model.	10.00	CO1,	
13	Explain different stages present in the AES algorithm	10.00	CO2,	
14	Explain briefly about the different block cipher models of operations-CFB, OFB, and CTR.	10.00	CO2,	



15	What is Kerberos? Explain how it provides authenticated service?	10.00	CO3,	
16	Briefly explain Diffie Hellman Key exchange with an example	10.00	CO3,	
17	Explain authentication functions in detail	10.00	CO3,	
18	Explain firewalls and how they prevent intrusions.	10.00	CO5,	



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 Title: Software Engineering	Semester: 6 - Semester
Course Code: CS114	Year: 2019

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

Course Code: CS114	Course Title: Software Engineering	
L-T-P: 4-0-0	Credits: 4	Contact Hrs: 60
Term Work Marks: 0	Theory Marks: 70	Total Marks: 100
Teaching Hrs: 60		Exam Duration: 3 hrs

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	5.00 hrs



Specification Languages, Prototyping Requirements, Requirements Documentation, Validation, and Verification, Measuring Requirements, Choosing a Specification Technique	
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 Object-Oriented Designs in the UML, Object-Oriented Design Patterns, Other Design Considerations, Object-Oriented Measurement, Design Documentation	5.00 hrs
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. Pedrycz Witold and Peters James F, Software Engineering, John Wiley
3. Hans van Vliet, Software Engineering: Principles and Practice, 3rd Edition, TMH

Evaluation Scheme

Term Work Scheme

Assessment	Weightage in Marks
MID 1	20
MID 2	20
Assignment	10
End Exam	70
Total	120



Course Unitization for Minor Exams and Semester End Examination

Topics / Chapters	Teaching Credits	No. of Questions in MID 1	No. of Questions in MID 2	No. of Questions in Assignment	No. of Questions in End Exam
Unit I					
1 - Why Software Engineering	5.00	0	0	0	0
2 - Modeling the Process and Life Cycle	4.00	0	0	0	0
3 - Planning and Managing the Project	4.00	0	0	0	0
Unit II					
4 - Capturing the Requirements	5.00	0	0	0	0
5 - Designing the Architecture	4.00	0	0	0	0
6 - Designing the Modules	5.00	0	0	0	0
Unit III					
7 - Writing the Programs	4.00	0	0	0	0
8 - - Testing the Programs	4.00	0	0	0	0
9 - Testing the System	4.00	0	0	0	0
Unit IV					
10 - Delivering the System	4.00	0	0	0	0
11 - Maintaining the System	4.00	0	0	0	0
Unit V					
12 - Evaluating Products, Processes, and Resources	4.00	0	0	0	0
13 - Improving Predictions, Products, Processes, and Resources	4.00	0	0	0	0
14 - The Future of Software Engineering	5.00	0	0	0	0



Note

1. Each Question carries 20 marks and may consists of sub-questions.
2. Mixing of sub-questions from different chapters within a unit (only for Unit I and Unit II) is allowed in Minor I, II and Theory.
3. Answer 5 full questions of 20 marks each (two full questions from Unit I, II and one full questions from Unit III) out of 8 questions in Theory.

Date:

Head of Department



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	19-11-2018
2. What Is Software Engineering, How Successful Have We Been	20-11-2018	20-11-2018
3. What Is Good Software, Who Does Software Engineering	21-11-2018	21-11-2018
4. A Systems Approach, An Engineering Approach	22-11-2018	22-11-2018
5. Members of the Development Team, How Has Software Engineering Changed?	23-11-2018	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	24-11-2018
7. Develop Tools and Techniques for software Process Modelling	26-11-2018	30-11-2018
8. Analysing Practical Process Modelling	03-12-2018	05-12-2018

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	07-12-2018
10. Tracking Progress, Project Personnel	08-12-2018	13-12-2018
11. Effort Estimation, Risk Management, The Project Plan	14-12-2018	19-12-2018

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	21-12-2018
13. Identifying the types of requirements	22-12-2018	22-12-2018
14. Modeling Notations, Prototyping Requirements	24-12-2018	27-12-2018
15. Requirements Documentation, Validation and Verification	28-12-2018	03-01-2019

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	07-01-2019
17. Modeling Architectures, Architectural Styles and Strategies	08-01-2019	09-01-2019
18. Architecture Design Review	15-01-2019	16-01-2019
19. Examine Architecture Design Review m6	10-01-2019	14-01-2019
20. Designing the Architecture:	03-01-2019	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	19-11-2018
22. Create an Object-Oriented Designs in the UML	21-01-2019	21-01-2019
23. Apply Object-Oriented Design Patterns	22-01-2019	25-01-2019
24. Design Documentation	26-01-2019	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	28-01-2019
26. Identifying program guidelines	29-01-2019	29-01-2019
27. Evaluate programming processes	30-01-2019	31-01-2019
28. Justify Documentation	01-02-2019	02-02-2019

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	04-02-2019
30. Faults and Failures	05-02-2019	06-02-2019
31. Testing Object-Oriented Systems	07-02-2019	08-02-2019
32. Analyse some Automated Testing Tools	09-02-2019	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	11-02-2019
34. Analyze Automated System Testing	12-02-2019	12-02-2019
35. Justify about Test Documentation	13-02-2019	13-02-2019
36. Testing Safety-Critical Systems	14-02-2019	16-02-2019

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	18-02-2019
38. Justify documentation	19-11-2018	19-11-2018
39. Recommended methods to maintain the system	20-02-2019	20-02-2019
40. Identify the Problems	21-02-2019	21-02-2019
41. Analyse on techniques and tools	22-02-2019	22-02-2019
42. Interpret Software Rejuvenation	23-02-2019	23-02-2019

Review Questions

Sl.No. - Questions	TLOs	BL
1. Explain about Software 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	25-02-2019
44. Identify the Problems	26-02-2019	26-02-2019
45. Analyse on techniques and tools	27-02-2019	27-02-2019
46. Interpret Software Rejuvenation	28-02-2019	28-02-2019

Review Questions

Sl.No. - Questions	TLOs	BL
1. Explain about Software 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	02-03-2019
48. Examine on processes and resources	04-03-2019	05-03-2019
49. Compare Assessment vs. Prediction	06-03-2019	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	08-03-2019
51. Create an innovative product	08-03-2019	08-03-2019
52. Plans to improve processes, products and resources	09-03-2019	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	12-03-2019
54. Create an innovative design thinking	13-03-2019	15-03-2019
55. Identify the methods to maintain the systems	16-03-2019	19-03-2019

Review Questions

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



Question Paper Title: III B.Tech. I Sem. (RA15) Regular Examinations, Oct/Nov – 2018 SOFTWARE ENGINEERING (CSE & IT)		
Total Duration (H:M): 3.00	Course: Software Engineering (CS114)	Maximum Marks: 70
Note: PART – A Answer ALL questions (10X2=20) All questions carry equal marks PART – B Answer any FIVE questions (5X10 50)All questions carry equal marks		

A				
Q.No.	Questions	Marks	CO	BL
1	Mention the software engineering layers?	2.00	CO1,CO2,	
2	List various activities of software engineering process framework?	2.00	CO2,CO3,	
3	What is feasibility study?	2.00	CO2,CO3,	
4	Differentiate between functional non-functional software requirements	2.00	CO4,	
5	What do object models describe?	2.00	CO1,CO3,CO5,	
6	What are the FURPS quality attributes represent that a target for all software design	2.00	CO3,CO5,	
7	List out the McCall's quality factors?	2.00	CO5,	
8	What are the metrics for maintenance?	2.00	CO4,	
9	What is RMMM plan?	2.00	CO5,	
10	Define quality assurance?	2.00	CO5,	

B				
Q.No.	Questions	Marks	CO	BL
11	What is process model? Explain RAD model and spiral model with their respective diagrams?	10.00	CO1,CO2,	
12	a)plain software engineering as a layered technology?	10.00	CO3,CO4,	



	b) What are capability levels in CMMI. Make a case for them?			
13	What is system modelling? Draw a context model for ATM system. Explain how the interactions are made?	10.00	CO3,CO5,	
14	a) Illustrate the structure of software requirements documents? b) What are technical criteria for good design to evaluate the quality of a design representation?	10.00	CO4,CO5,	
15	What is design engineering? Give the golden rules in user interface design?	10.00	CO4,CO3,	
16	What do you understand by path testing? Explain your answer with an example?	10.00	CO5,CO3,	
17	a)What are the product metrics for source code ? b)Explain about Risk refinement?	10.00	CO4,CO5,	
18	Explain about Quality Control and standards like ISO 9000 and 9001?	10.00	CO4,	