SOFTWARE ENGINEERING (18CS120)

III B.Tech: II Sem   **L: 3   T:1   P: C:4**

Name of the Instructor(s): **A. Harshavardhan, Lilith Mohan / D. Ramesh**

No. of Hours/week: **4**

Total number of hours planned: **65**

Pre-requisite
- Computer Programming,
- Object Oriented Programming Concepts

Learning Resources
Handouts, Canvas

Required Resources
- Software Engineering: Theory and Practice, Fourth Edition By Shari Lawrence Pfleeger, Joanne M. Atlee
- Roger S Pressman, "Software Engineering: A Practitioner's Approach",Sixth Edition, TMH
- Ian Sommerville, "Software Engineering" Seventh Edition, TMH
- Hans van Vliet, "Software Engineering: Principles and Practice" ,Third Edition TMH

Reading Material:
- Lecture Notes

Additional Resources :
- Nptel Videos
- IIT Karaghpur SE Virtual Lab

How to Contact Instructor:
- In-person and office hours: 3 p.m to 5.00 p.m on Wednesday and Thursday, In cabin
   - Email address: harshavgse@gmail.com, ramesh_d@srecwarangal.ac.in, kothanda_raman_d@srecwarangal.ac.in
   - Phone numbers: 9247282623,9848142720,9944380724
   - LMS: Kahoot and Google classroom
   - Mails and LMS will be check every day at 8.00 P.M

Technology Requirements:
- Learning management system (Google classroom / Kahoot)
- Star UML / Umbrella / Rational Rose

Overview of Course:
- **What is the course about: its purpose?**
- Software Engineering is a part of computer science in which several kind of method, thoughts and techniques used for getting the high quality software and computer programs.
  - Minimum cost
  - On given time
  - Continuous production

We can judge the usefulness of the software Engineering with the importance of its attributes. Both are used for the same manner. The basic target of software Engineering is to provide the high quality software, which can be delivered.
  - On given time,
  - Within budget &
  - That fulfills the need.

Thus we can say that this is the best way or programs to get the following points:
  - To provide the best output of software system.
  - To make easy to use the software systems and develop them.
  - To improve the rate of production.
  - To maintain the budget for development of Software system.
  - Job satisfaction of software engineering.

- **What are the general topics or focus?**
  1. Processing Models, Life Cycle, Architecture, Testing, Maintenance, Evaluation, Documentation

- **How does it fit with other courses in the department or on campus?**
  1. Able to choose right processing model and design the model at the time of Mini project and External Projects.
  2. EPICS Course

- **Why would students want to take this course and learn this material?**
  - It will be helpful to manage and develop the effective software projects.
  - Score in Gate /SET/NET
  - Placement
  - Any Competitive exams
  - In Software Engineer Job Role

Methods of instruction
- Lecture
- Discussion
- Group work
- PPT
- LMS

Workload
- Estimated amount of time student needs to spend on course readings (per week):**01 hour**
- Estimate amount of time to student needs to spend on course assignments and projects (per week): **45 minutes per week**

Assessment

S. No	Assessments	Assessment Methodology	No of assessments	Weightage in marks	Marks scaled to
1	CIE	Quizzes	2	3	3
2		Class test	2	2	2
3		Assignment	3	3	3
4		Course Activity	4	2	2
5		Course Project	--	--	--
6		Internal exams	2	20	20
7	SEE	--	--	--	70

Note:
- Grades will be shared immediately .
- Absentees for class assessments: No Retest is conducted

Assessment
- Internal Exams-2
- Exams and quizzes:
  - Class Test ------2 (open book Test)
  - Quizzes----2 (multiple choice)[Kahoot]

Note:
- 1st class test and Quiz will be conducted before one week of 1st Mid Exam, Syllabus 1st mid portion.
- 2nd class test and Quiz will be conducted before one week of 2nd Mid Exam, Syllabus 2nd mid portion.

Assignments
- Which process model is suitable for the given application(**After 1st Unit)**
- Draw the UML models for the given Application (**After 3rd Unit)**
- Write the Test cases for the given Application(**After 4th Unit)**

Course Activity
Topic1:
- **Topic :** Effort Estimation and Risk Management
- **Activity : Group problem solving Activity**
- **schedule:** After completion of UNIT-I
- **Description of the Activity:**Individual project is given to each team. The team needs to calculate the effort estimation of the given project.

Topic2:
- **Topic :** Architecture Design
- **Activity: Think-Aloud Pair Problem**
- **schedule:** After completion of UNIT-II
- **Description of the Activity:**Each Team have to design the architecture for the given project

Topic3:
- **Topic:** OOAD Models
- **Activity: Team Based Learning Activity**
- **Schedule:** After completion of UNIT-III.
- **Description of the Activity:** Apply OOAD models for the given project

Topic4:
- **Topic:** Training, Documentation
- **Activity: Reciprocal Activity**
- **Schedule:** After completion of UNIT-IV.
- **Description of the Activity:** Demonstration of any automated testing tools.

Rubrics:

Metric	Problem solving skills(5Marks)	Participation(2.5 Marks)	Communication(2.5 Marks)
Very good	Innovative idea(5)	Very active(2.5)	Extreme(2.5)
Good	Suitable idea(4)	Active(2)	Active(2)
Poor	Partial solution(2)	Partial(1)	Partial(1)
Very Poor	No solution found(0)	No participation(0)	No communication(0)

Note: Assessments: Scaling column marks will considered as final marks

Key Concepts:
- Software Processing Models
- Software Architecture
- Design Tools, Software Life Cycle
- Software Project Testing
- Software Project Evaluation
  - Software Project management

LESSON PLAN

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	PSO1	PSO2
CO1	3	3	1	1	1	1	1	1	1	2	2	3	3	3
CO2	3	3	1	3	3	2	2	3	3	3	1	3	3	3
CO3	3	3	3	2	3	2	3	3	3	2	1	3	3	3
CO4	3	1	1	1	3	2	2	3	2	3	2	2	3	3
CO5	3	3	2	3	3	2	2	3	2	2	1	3	3	3

Course Syllabus

UNIT I
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?

Planning and Managing the Project: Tracking Progress, Project Personnel, Effort Estimation, Risk Management, The Project Plan

UNIT II
Modeling the Process and Life Cycle: The Meaning of Process, Software Processes: Models: Waterfall Model, Incremental Model and Spiral Model ,
Agile Software Development:
Agile Software Development: Coping with Change, The Agile Manifesto:Values and Principles. Agile methods: SCRUM and Extreme Programming. Plan-driven and agile development. Agile project management, Scaling agile methods
Tools and Techniques for Process Modeling

UNIT III
Capturing the Requirements: The Requirements Process, Requirements Elicitation, Types of Requirements, Characteristics of Requirements, Modeling Notations, Prototyping Requirements, Requirements Documentation, Validation and Verification,

UNIT IV
Designing the Architecture: The Design Process, Decomposition and Views, Modeling Architectures, Architectural Styles and Strategies, Achieving Quality Attributes, Documenting Software Architectures, Architecture Design Review
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.

UNIT V
Writing the Programs: Programming Standards and Procedures, Programming Guidelines, Documentation, the Programming Process.

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.

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.

UNIT VI
Delivering the System: Training, Documentation

Maintaining the System: The Changing System, The Nature of Maintenance, Maintenance Problems, Measuring Maintenance Characteristics, Maintenance Techniques and Tools, Software Rejuvenation.

Evaluating Products, Processes, and Resources: Approaches to Evaluation, Selecting an Evaluation Technique, Assessment vs. Prediction, Evaluating Products, Evaluating Processes, Evaluating Resources.

Lecture No.	Topic	Delivery Method/ Activity
UNIT I		
1	**Why Software Engineering?** What Is Software Engineering	Lecture
2	How Successful Have We ,Been, What Is Good Software	Discussion, PPT
3	Who Does Software Engineering, A Systems Approach	Group work, PPT
4	An Engineering Approach	Lecture

5	Members of the Development Team, How Has Software Engineering Changed?	PPT
6	**Planning and Managing the Project:**	PPT, Group work
7	Tracking Progress,	PPT
8	Project Personnel, Effort Estimation,	PPT
9	Risk Management, The Project Plan	**Group problem solving Activity**
UNIT II		
10	**Modeling the Process and Life Cycle:**	Lecture
12	The Meaning of Process, Software Processes:	PPT
13	Models: Waterfall Model, Incremental Model and Spiral Model ,	Lecture
14	**Agile Software Development:** Agile Software Development: Coping with Change	Lecture
15	The Agile Manifesto:Values and Principles.	Discussion
17	Agile methods: SCRUM and Extreme Programming. Plan-driven and agile development.	PPT
18	Agile project management,	**Think-Aloud Pair Problem Solving Activity**
20	Scaling agile methods	Lecture ,PPT
21	**Tools and Techniques for Process Modeling**	Lecture ,PPT
UNIT III		
23	**Capturing the Requirements:**	PPT
24	The Requirements Process,	PPT
26	Requirements Elicitation,	**Team Based Learning Activity**
1st Internal Exam		
28	Types of Requirements	Lecture ,PPT
30	Characteristics of Requirements	PPT
31	Modeling Notations	PPT
32	Prototyping Requirements,	Lecture ,PPT
33	Requirements Documentation,	PPT
34	Validation and Verification,	PPT
UNIT IV		
36	**Designing the Architecture:** The Design Process, Decomposition and Views	Lecture ,PPT

37	Modeling Architectures, Architectural Styles and Strategies	**Think-Aloud Pair Problem Solving Activity**
38	Achieving Quality Attributes, Documenting Software Architectures, Architecture Design Review	Discussion
39	**Designing the Modules:** Design Methodology, Design Principles, Object-Oriented Design	PPT
41	Representing Object-Oriented Designs in the UML	Lecture
43	Object-Oriented Design Patterns	Lecture
45	Other Design Considerations	PPT
46	Object-Oriented Measurement	PPT
47	Design Documentation	**Reciprocal Activity**
UNIT V		
48	**Writing the Programs:** Programming Standards and Procedures, Programming Guidelines	PPT
50	Documentation, the Programming Process	PPT
52	**Testing the Programs:** Software Faults and Failures, Testing Issues, Unit Testing, Integration	Lecture
54	Testing, Testing Object-Oriented Systems, Test Planning, Automated Testing Tools, When to Stop Testing.	PPT
56	**Testing the System:** Principles of System Testing, Function Testing, Performance Testing, Reliability, Availability, and Maintainability, Acceptance Testing, Installation Testing,	Group work
58	Automated System Testing, Test Documentation, Testing Safety-Critical Systems	Lecture
UNIT VI		
59	**Delivering the System:** Training, Documentation	**Reciprocal Activity**
60	**Maintaining the System:** The Changing System, The Nature of Maintenance, Maintenance Problems	PPT
61	Measuring Maintenance Characteristics, Maintenance	Lecture
62	Techniques and Tools, Software Rejuvenation.	PPT
63	**Evaluating Products, Processes, and Resources:** Approaches to Evaluation	Group work
64	Selecting an Evaluation Technique, Assessment vs. Prediction, Evaluating Products	Lecture
65	Evaluating Processes, Evaluating Resources	Lecture
2nd Internal Exam		

2nd Internal Exam

COMPILER DESIGN (18CS121)

III B.Tech: II Sem   **L:3   T:1   P: C:4**

Name of the Instructor(s): Md. Sallauddin, R. Ravi Kumar

No. of Hours/week: 4

Total number of hours planned: 58

Pre-requisite

- Knowledge of automata theory
- Context free languages
- Computer architecture
- Data structures and simple graph algorithms

Learning Resources

- Textbooks, Class Notes

Required Resourses:

Text Books:
1. Alfred V.Aho, Ravi Sethi and Jeffry D. Ullman "Compiler Principles, Techniques and Tools"16th Indian Reprint, Pearson Education Asia, ISBN No.81-7808-046-X.,2004.
2. D.M.Dhamdere "Compiler Construction", 2nd Edition " Mac Mellon India Ltd", ISBN No.0333 - 90406-0,1997

Reference Books:

1. Donovan,"Systems programming", Mc. Graw Hill.
2. Leland L. Beck, "System Software – An Introduction to Systems Programming" Addison Wesley.

Reading materials:
1. Online Video links

Additional Resources (links etc)

1. books.google.co.in Computers Programming General
2. www.amazon.com Books Computers and Technology
3. http://nptel.iitm.ac.in

How to Contact Instructor:

Sallauddin Mohmmad:
- In-person office hours: 9:30 AM to 5:00 PM – Room no.: 1311, except class timings
- Online office hours: 9:30 AM to 5:00 PM - Except class timings, a mail or message
    - Mail: sallauddin_md@srecwarangal.ac.in
    - Phone numbers: 9885502477
- Other than office hours: A message to the above number from 6PM to 9PM from Monday to Saturday and 8AM to 10 AM on Sunday
-

R. Ravi Kumar

In-person office hours: 9:30 AM to 5:00 PM – Room no.: 1311, except class timings
- Online office hours: 9:30 AM to 5:00 PM - Except class timings, a mail or message
    - Mail: **ravi_kumar_r@srecwarangal.ac.in**
    - Phone numbers: **+91 9989916656**
- Other than office hours: A message to the above number from 6PM to 9PM from Monday to Saturday and 8AM to 10 AM on Sunday

Technology Requirements:
- Laptops for class work and lab on required days
- LEX,C and YACC Compilers
- Learning management system (Google classroom)

Overview of Course:

- **What is the course about: its purpose?**

    Compiler design principles provide an in-depth view of translation and optimization process. **Compiler design** covers basic translation mechanism and error detection & recovery. It includes lexical, syntax, and semantic analysis as front end, and code generation and optimization as back-end.

- **What are the general topics or focus?**
    1. Phases of compiler
    2. Lexical Analysis
    3. Parsing Techniques
    4. Intermediate Code Generation
    5. Code Optimization
    6. Code Generation

- **How does it fit with other courses in the department or on campus?**

    Compilers have become part and parcel of today's computer systems. They are responsible for making the user's computing requirements, specified as a piece of program, understandable to the underlying machine. There tools work as interface between the entities of two different domains- the human being and the machine. This course is use full for all the programming languages.

- **Why would students want to take this course and learn this material?**
  1. Helps the student to improve problem solving skill
  2. Helps in learning further programming languages
  3. Helps to develop compiler
  4. As it a logical oriented, students will be able to improve logical thinking

Methods of instruction
- Lecture using PPTs in classroom
- Brainstorming and Discussion
- Group work as pair or sometimes as a group of 4 students
- Activities like Role plays, Think-Pair-Share
- Flipped classroom teaching
- Chalk and Talk while solving problems in some topics

Workload
- Estimated amount of time to spend on course readings
  Students are informed to spend half an hour per day (any four days of a week) or maximum of two hours per week on course readings
- Estimate amount of time to spend on course assignments and projects
  One assignment is given during the delivery of this course. Students will need to spend couple of hours per day for a maximum of three days or one hour per day for a maximum of six days to finish the assignment

Assessment

S. No	Assessments	Assessment Methodology	No of assessments	Weightage in marks	Marks scaled to
1	CIE	Quizzes	6	2.5	5
2		Class test	--	--	
3		Assignment	2	2.5	
4		Course Activity	--	--	--
5		Attendance	--	--	5
6		Internal exams	2	20	20
7	SEE	--	--	--	70

Note:
- Quiz – The marks allotted for quiz will be graded to assignment
- Since the assessment is through online the results will be displayed to the students immediately.

Topic	Activity	Rubrics			Unit	Schedule
Summary of questions will be framed for each unit	Online Quiz	10 Questions will be displayed one mark each (10)			All Units	After the completion of each unit
Recognition of tokens	Think-Pair-Share	Summary of the topic with Multiple Choice Questions (With wrong answers) and later with the discussion related to wrong answers			I	3rd Week
FIRST( ) and FOLLOW( )-LL Grammars	Role Play	Understanding of the problem(10)	Presentation(10)	Total(20)	II	6th Week
Error recovery in LR Parsing	Student-Team-Achievement-Divisions (STAD)	Level of Understanding(10)	Literature Review on the topic(10)	Total(20)	III	8th Week
Directed acyclic graph	Reciprocal Teaching	Explanation of the topic(10)	Interaction with other groups	Total(20)	V	10th Week
Data-flow analysis of flow graphs	Think-Pair-Share	Summary of the topic with Multiple Choice Questions (With wrong answers) and later with the discussion related to wrong answers			VI	11th Week
Average		Scaled to 5 Marks				

- If any student is absent for class assessments with prior permission, retest will be conducted on a later intimated date
- Any late submission of assignment, the student will be awarded zero marks
- Any student absent for online test will be awarded zero marks

Key concepts:

1. Compiler
2. Assembler, Translator
3. Lexical Analysis
4. Syntax Analysis
5. Semantic Analysis
6. Intermediate Code Generator
7. Code Optimizer
8. Code Generator

LESSON PLAN

Course Outcomes (COs):
At the end of the course the student should be able to:
1. Illustrate the different phases of a compiler, and implement practical aspects of automata theory
2. Apply the syntax and semantic rules to design an error free compiler.
3. Interpret storage organization and allocation strategies for dynamic storage system
4. Analyze the knowledge of different phases in designing a compiler
5. Apply code Generation and optimization techniques

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	PSO1	PSO2
Illustrate the different phases of a compiler, and implement practical aspects of automata theory	3	3	2									2	3	2
Apply the syntax and semantic rules to design an error free compiler.	3	3	3	1					3				2	3
Interpret storage organization and allocation strategies for dynamic storage system			3	2	2				2				2	2
Analyze the knowledge of different phases in designing a compiler			3						2				2	2
Apply code Generation and optimization techniques	2	3	3	2	2				2		2		3	2

Course Syllabus

UNIT I

Introduction to Compilers

Cousins of the compiler, Phases of a compiler, Analysis of the source program, grouping of phases, Compiler writing tools.

Lexical Analysis

Role of the lexical analyzer, Input Buffering, Specification of tokens, Recognition of tokens, A Language for specifying lexical Analyzers, Finite automata- Regular Expression to DFA, Optimization of DFA-based pattern matchers.

UNIT II

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, Backtracking, Recursive Descent parsing, FIRST and FOLLOW, LL(1) Grammar, Non-Recursive descent parsing, Error recovery in predictive parsing.

UNIT III

Bottom Up Parsing – Shift Reduce Parsing, Operator Precedence Parsing, LR Parsers – Model of an LR Parsers, SLR parsing, CLR parsing, LALR parsing, Error recovery in LR Parsing.

UNIT IV

Syntax Directed Translation

Syntax-directed definition, Syntax directed translation schema, S-attributed definitions, L-attributed definitions, Attribute grammar, S-attributed grammar, L-attributed grammar.

Semantic Analysis

Type Checking, Type systems, Equivalence of type expressions, Type Conversion.

UNIT V

Intermediate Code Generation

Construction of syntax trees, Directed acyclic graph, three address codes.

Runtime Environments

Storage organization, Storage-allocation strategies, Symbol tables, Activation record.

UNIT VI

Code Optimization

The principal sources of optimization, Basic blocks and Flow graphs, data-flow analysis of flow graphs.

Code Generation

Issues in the design of a code generator, Target machine, Next-use information, A simple code generator, Code-generation algorithm.

TEXT BOOKS:

1. Alfred V.Aho, Ravi Sethi and Jeffry D. Ullman "Compiler Principles, Techniques and Tools"16th Indian Reprint, Pearson Education Asia, ISBN No.81-7808-046-X.,2004.
2. D.M.Dhamdere "Compiler Construction", 2nd Edition " Mac Mellon India Ltd", ISBN No.0333 - 90406-0,1997

REFERENCE BOOKS:

1. Donovan,"Systems programming", Mc. Graw Hill.
2. Leland L. Beck, "System Software – An Introduction to Systems Programming" Addison Wesley.

WEB LINKS

1. books.google.co.in Computers Programming General
2. www.amazon.com Books Computers and Technology
3. http://nptel.iitm.ac.in

LESSON PLAN

Lecture No.	Topic	Delivery Method/ Activity
	UNIT-I	
1	**Introduction to Compiling**	Brainstorming
2	Cousins of the compiler	Chalk & Talk
3&4	The phases of a compiler	Chalk & Talk
5	Analysis of the source program	Chalk & Talk
6	grouping of phases	Chalk & Talk
	Compiler writing tools	Chalk & Talk
7	**Lexical Analysis:** The role of the lexical analyzer	Chalk & Talk
8	Specification of tokens	Chalk & Talk
9	Recognition of tokens	Chalk & Talk, Think-Pair-Share
10	A Language for specifying lexical Analyzers	Chalk & Talk
11 & 12	Finite automata	Chalk & Talk
13	Optimization of DFA-based pattern matchers	Chalk & Talk
Quiz will be conducted for UNIT I through Google classroom / Google forms		

	UNIT-II	
14	**Syntax Analysis:** The role of a parser	Chalk & Talk
15	Context-free grammars	Chalk & Talk
16	Writing a grammar	Chalk & Talk
	Parsing	Chalk & Talk
17 & 18	Ambiguous grammar, Elimination of Ambiguity	Brain storming
19	Classification of parsing techniques	Chalk & Talk
20	Top down parsing –Back Tracking	Chalk & Talk
21	Recursive Descent parsing	Chalk & Talk
22&23	FIRST( ) and FOLLOW( )- LL Grammars	Chalk & Talk ,Role Play
24	Non-Recursive descent parsing	Chalk & Talk
25	Error recovery in predictive parsing	Chalk & Talk
Quiz will be conducted for UNIT II through Google classroom / Google forms		
	UNIT-III	
26	**Bottom Up parsing-** SR parsing	Chalk & Talk
27	Operator Precedence Parsing	Chalk & Talk
28	LR grammars	Chalk & Talk
29	LR Parsers – Model of an LR Parsers	Chalk & Talk
30 & 31	SLR parsing	Chalk & Talk
32 &33	CLR parsing	Chalk & Talk
34	LALR parsing	Chalk & Talk
35	Error recovery in LR Parsing	Chalk & Talk, Student-Team-Achievement-Divisions (STAD)
Quiz will be conducted for UNIT III through Google classroom / Google forms		
I Mid Term Examinations		

	UNIT-IV	
36	**Syntax Directed Translation**	Chalk & Talk
37	Syntax-directed definition, Syntax directed translation schema	Chalk & Talk
38	S-attributed definitions, L-attributed definitions	Chalk & Talk
39	Attribute grammar	Chalk & Talk
40	S-attributed grammar, L-attributed grammar	Chalk & Talk
41	**Semantic Analysis:** Type Checking	Chalk & Talk
42	Type systems, Type expressions, Equivalence of type expressions	Chalk & Talk
Quiz will be conducted for UNIT IV through Google classroom / Google forms		
	UNIT-V	
43	**Intermediate Code Generation**	Chalk & Talk
44	Construction of syntax trees	Chalk & Talk
45	Directed acyclic graph	Chalk & Talk, Reciprocal Teaching
46	Three address codes	Chalk & Talk
47	**Runtime Environments,** Storage organization	Chalk & Talk,PPT
48	Storage-allocation strategies	Chalk & Talk,PPT
49	Symbol tables	Chalk & Talk
50	Activation records	Chalk & Talk,PPT
Quiz will be conducted for UNIT V through Google classroom / Google forms		
	UNIT-VI	
51 & 52	**Code Optimization:** The principal sources of optimization	Chalk & Talk
53	Basic blocks and Flow graphs	Chalk & Talk,PPT
54	Data-flow analysis of flow graphs	Chalk & Talk, Think-Pair-Share
55	**Code Generation:** Issues in the design of a code generator	Chalk & Talk
56	The target machine code	Chalk & Talk
57	Next-use information, A simple code generator	Chalk & Talk
58	Code-generation algorithm	PPT
Quiz will be conducted for UNIT V through Google classroom / Google forms		
II Mid Term Examinations		

CRYPTOGRAPHY AND NETWORK SECURITY (18CS119)

III B.Tech: II Sem   **L: 3   T: P: C: 3**

Name of the Instructor(s): **V.MANOJ KUMAR**

No. of Hours/week: 3

Total number of hours planned: 39

Pre-requisite
- Computer networks
- Basics of computer

Learning Resources
- Course notes, Text books, online courses.

Required Resources
Name of the Textbook:
- William Stallings, "Cryptography & Network Security", Pearson Education, 4th Edition, 2010.
- William Stallings and Lawrie Brown, "Computer Security: Principles and Practice", PHI, 2008

Reading materials:
- www.williamstallings.com/Security2e.html
- http://nptel.iitm.ac.in

Additional Resources (links etc):
- https://www.coursera.org/lecture/managing-network-cybersecurity/cryptography-and-network-security-w9SuJ.

How to Contact Instructor:
- In-person office hours: **9:30 to 4:00; Staff room no. 1308**
- Online office hours: **6:00 pm - 7:00 pm; through Canvas**
    - o Email address: **v.manojkumar@sru.edu.in**
    - o Phone numbers: **9908943941 only for text messages**
    - o LMS
- Optional: **4:00 pm - 5:00 pm**

Technology Requirements: (optional)
- Learning management system (Google classroom / Plickers / EDMODO etc.)

Overview of Course:

- **What is the course about: its purpose?**
  This course illustrates the cryptography techniques and modern technologies to deliver a sensitive data over a network securely.

- **What are the general topics or focus?**
  Cryptography basics
  Symmetric key cryptography
  Asymmetric key cryptography
  PGP,S/MIME
  SSL, IP security
  Viruses, Firewalls..etc

- **How does it fit with other courses in the department or on campus?**
  This subject is very useful to develop any software projects securely in programming courses like C, C++ and JAVA, .Net

- **Why would students want to take this course and learn this material?**
  In current scenario, this subject is very useful to learn the important courses like Ethical hacking, information security etc..

Methods of instruction:

- Lecture (chalk & talk / ICT)
- Collaborative Learning (Think pair share / Jigsaw etc.)

Workload:

- Estimated amount of time student needs to spend on course readings (per week): **(2 hours)**
- Estimate amount of time to student needs to spend on course assignments and projects (per week): **(1 hour)**

Assessment

S. No	Assessments	Assessment Methodology	No of assessments	Weightage in marks	Marks scaled to
1	CIE	Quizzes	2	5	5
2		Class test	--	--	--
3		Assignment	2	10	5
4		Course Activity	--	--	--
5		Course Project	--	--	--
6		Internal exams	2	20	20
7	SEE	--	--	--	70

Note:

- Grades (will be shared immediately if its online and within 3 days from the activity if it is offline)

Key concepts:
- Security attacks, services and mechanisms
- Classical encryption techniques
- Authentication functions
- Public key cryptography
- E-mail security
- IP security
- Web security
- Firewalls

LESSON PLAN

Course Outcomes (COs):

At the end of the course the student should be able to:
1. Identify the security issues in the network and resolve it.
2. Compare and contrast different IEEE standards and electronic mail security.
3. Explain the concept of digital signature and its applications.
4. Analyze and compare various cryptography techniques.
5. Design new startegies to secure data communication.

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	PSO1	PSO2
CO1	3	2	2	2	1							2	2	
CO2	2	2	3	2	2								2	2
CO3	2	3	2	2	2								2	
CO4	2	3	2	2	2								2	
CO5	2	2	3	2	2									2

Course Content (Syllabus)

Lecture No.	Topic	Delivery Method/ Activity
	UNIT - I	
1	**Introduction:** Security attacks, Security Services	Discussion, PPTs
2	Security Mechanisms, Model for internet security.	Chalk & talk/PPTs
3	Internet Standards and RFCs. **Finite Fields:** Groups	Chalk & talk/PPTs

4	Rings, Fields-Modular arithmetic	Chalk & talk/PPTs
5	Euclid's algorithm-Finite fields	Chalk & talk/PPTs
6	Polynomial arithmetic logarithms.	Chalk & talk/PPTs
7	Dos attacks.	Chalk & talk/PPTs
	UNIT - II	
8	**Conventional Encryption:** Principles, Conventional encryption algorithms: DES	Chalk & talk/PPTs
9	3-DES	Chalk & talk/PPTs
10, 11	AES	Chalk & talk/PPTs
12	Cipher block modes of operation	Chalk & talk/PPTs
13	Location of encryption devices	Chalk & talk/PPTs
14	Key distribution approaches of Message Authentication	Chalk & talk/PPTs
15	Secure Hash functions and HMAC.	Chalk & talk/PPTs
	Assignment-I for UNIT-I, II	
	UNIT - III	
16	**Number theory:** Prime numbers-Fermat's and Euler's theorem- Testing and Primality	Chalk & talk/PPTs
17	The Chinese remainder theorem-Discrete algorithms.	Chalk & talk/PPTs
18	**Public key cryptography:** principles, Public key cryptography algorithms: D-H	Chalk & talk/PPTs
19	RSA	Chalk & talk/PPTs
20	Digital signatures, Digital Certificates	Chalk & talk/PPTs
21	Certificate Authority and Key management	Chalk & talk/PPTs
22	Authentication applications – Kerberos	Chalk & talk/PPTs
23	X.509	Chalk & talk/PPTs
	Quiz-I Activity on III Unit	
	I- Mid Examination	
	UNIT - IV	
24, 25	**E-mail privacy:** Pretty Good Privacy (PGP)	Chalk & talk/PPTs
26	**E-mail privacy:** S/MIME.	Chalk & talk/PPTs

27	**IP security:** IP Security Overview, IP Security Architecture,	Chalk & talk/PPTs
28	Authentication Header, Encapsulating Security Payload.	Chalk & talk/PPTs
29	Combining Security Associations and Key Management	Chalk & talk/PPTs
	UNIT- V	
30	Web security: Web Security Requirements, Secure Socket Layer (SSL) , Secure Electronic Transaction (SET).	Chalk & talk/PPTs
31	Secure Socket Layer (SSL) and Transport Layer Security (TLS)	Chalk & talk/PPTs
32	Secure Electronic Transaction (SET).	Chalk & talk/PPTs
33	Basic concepts of SNMP, SNMPv1 community facility	Chalk & talk/PPTs
34	SNMPv3.	Chalk & talk/PPTs
	Assignment II on Unit IV and Unit V	
	UNIT – VI	
35	Intrusion detection system, password management	Chalk & talk/PPTs
36	Virus and related threats	Chalk & talk/PPTs
37	Virus Countermeasures	Chalk & talk/PPTs
38	Firewalls design principles	Chalk & talk/PPTs
39	Trusted systems	Chalk & talk/PPTs
	Quiz II Activity for VI Units	
	II- Mid Examination	

OBJECT ORIENTED PROGRAMMING CONCEPTSTHROUGH JAVA (18ES112)

III B.Tech/II Sem   **L: 3   T: P: C: 3**
Name of the Instructor(s):**K. Ravi Chythanya, K. Sudheer Kumar**

No. of Hours/week:3

Total number of hours planned:48

Pre-requisite
- Algorithms & Flowcharts
- Any Programming Language

Learning Resources:
1. Laptops within Class Work
2. Java Software
3. Mobiles with Internet Facility for successful completion of Online Quizzes.

Required Resources:
Text Books:
1. Java-The Complete Reference 9th Edition, Hebert Schlidt, McGraw Hill Education (India) Pvt. Ltd.
2. Understanding Object-Oriented Programming with Java, updated edition, T. Budd, Pearson Education.

Reference Books:
1. An Introduction to Programming and OO Design using Java, J. Nino and F.A. Hosch, John Wiley & Sons.
2. Introduction to Java Programming, Y. Daniel Liang, Pearson Education.
3. Object Oriented Programming through Java, P. Radha Krishna, University Press.
4. Programming in Java, S. Malhotra, S. Chudhary, 2nd Edition, Oxfoord Univ. Press.
5. Java Programming and Object-Oriented application development, R.A. Johnson, Cengage Learning.

Reading Resources:
1. Lecture Notes
2. PPTs

Additional Resources:
Web Links:
1. https://www.tutorialspoint.com › java
2. https://www.javatpoint.com › java-tutorial
3. https://www.geeksforgeeks.org › java

How to Contact Instructor:
- **In-person office hours**:
  1. K. Ravi Chythanya
     - Students can meet, whenever we have free schedule during the college hours.
  2. K. Sudheer Kumar
     - Students can meet, whenever we have free schedule during the college hours.
- **Online office hours: time and how to access**
  1. K. Ravi Chythanya
     - Email-ID: ravi.chythanya@sru.edu.in
     - Phone number: 9000188956
  2. K. Sudheer Kumar
     - Email-ID: k.sudheerkumar@sru.edu.in
     - Phone numbers: 9908291292

Technology Requirements:
- JDK 1.8
- Canvasand Kahoot

Overview of Course:
- **What is the course about: its purpose?**
  Java is a general-purpose programming language that is class-based, object-oriented, and designed to have as few implementation dependencies as possible. It is intended to let application developers write once, run anywhere (WORA), meaning that compiled Java code can run on all platforms that support Java without the need for recompilation.Java applications are typically compiled to bytecode that can run on any Java virtual machine (JVM) regardless of the underlying computer architecture. The syntax of Java is similar to C , but it has fewer low-level facilities than either of them. Java was one of the most popular programming languages in use according to GitHub, particularly for client-server web applications, with a reported 9 million developers.

- **What are the general topics or focus?**
  - OOP Concepts,
  - Handling errors –Exceptions,
  - Multi-Threaded Programs,
  - File Handling
  - GUI Development.

- **How does it fit with other courses in the department or on campus?**
  - Web Technologies,
  - Mobile Application Development,
  - Project Work

- **Why would students want to take this course and learn this material?**
  - Popularity and High Salary
  - Powerful Development Tools
  - Java has a Large Community
  - Java is Versatile
  - Multiple Open Source Libraries
  - Enhance their Programming Knowledge
  - Own Idea Implementation using GUI Applications(swings)

Methods of instruction
- Lecture (chalk & talk / ICT)
- Collaborative Learning (Role Play, Group Activity)

Workload
- Estimated amount of time student needs to spend on course readings (per week) -3
- Estimate amount of time to student needs to spend on course assignments and projects (per week) -6

Assessment

S. No	Assessments	Assessment Methodology	No of assessments	Weightage in marks	Marks scaled to
1	CIE	Quizzes	2	5	2.5
2		Class test	2	10	2.5
3		Assignment	2	5	5
4		Course Activity	--	--	--
5		Course Project	--	--	--
6		Internal exams	2	20	20
7	SEE	--	--	--	70

Class test/ Quiz:
Schedule:

Test-Type	Syllabus	Tentative Date&Time	Mode
Class Test-1	1st Unit	3rdWeek-Last Working Hour	Offline
Quiz-1	1st Unit and 2nd Unit	8th Week-Last Working Hour	Online
Quiz-2	3rd Unit and 4th Unit	14th Week-Last Working Hour	Online
Class Test-2	5th Unit and 6th Unit	16th Week-Last Working Hour	Offline

Activities:

Topic	Activity	Rubrics			Unit	Schedule
		Problem Stateme nt(5)	Design (5)	Total (10)		
Structured Programming Vs OOP Concepts	Group Discussion				I	4th Week
Inheritances and their Importance	Think Pair Share Activity	NIL			II	8thWeek
Error Handling and Types	Jigsaw	NIL			III	12th Week
Threads	Role Play	NIL			IV	16th Week

- Grades (will be shared immediately if its online and within 3 days from the activity if it is offline)

Grade	Marks Range
Grade 'A'	>=8
Grade 'B'	>=5 and <8
Grade 'C'	>=3 and <5
Grade 'D'	<3

- **Absentees for class assessments:**
  - With HOD permission Re-conduction of the Class Assessment will be done within next two working days from 4:00 PM to 5:00PM, Class Test/Quiz mark is evaluated for 75% of original marks.
  - Students who have taken prior permission from the HOD, re-conduction of the Class Assessment will be done within next two working days from 4:00 PM to 5:00PM Class Test/Quiz mark is evaluated for original marks.

Key concepts:
- OOP features and their implementations,
- Exception Handling,
- Multi-threading

Difficult Topics:
- I/O Streams,
- Collections Framework,
- GUI Programming.

LESSON PLAN

Course Outcomes (COs):

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

6. Identify classes, objects, members of a class and relationships among them needed for a specific problem.
7. Demonstrate the concept of polyorphism, inheritance and re-usability.
8. Illustrate Java Programs to implement error handling techniques using exception handling.
9. Compare Multithreaded programming with ordinary programming models, file handling techniques.
10. Build GUI interface using Collections.

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	PSO1	PSO2
CO1	2	3	2	2	3	1							2	2
CO2			3					1	2			2	1	2
CO3				3	2		2				2		2	3
CO4				3			1		1	2		2	1	3
CO5			3		2	3						2	2	3

Course Content (Syllabus)

UNIT I

Object-oriented thinking- A way of viewing world – Agents and Communities, messages and methods, Responsibilities, Classes and Instances, Class Hierarchies- Inheritance, Method binding, Overriding and Exceptions, Summary of Object-Oriented concepts. Java buzzwords, An Overview of Java, Data types, Variables and Arrays, operators, expressions, control statements, Introducing classes, Methods and Classes, String handling.

UNIT II

Inheritance– Inheritance concept, Inheritance basics, Member access, Constructors, Creating Multilevel hierarchy, super uses, using final with inheritance, Polymorphism-ad hoc polymorphism, pure polymorphism, method overriding, abstract classes, Object class, forms of inheritance- specialization, specification, construction, extension, limitation, combination, benefits of inheritance.

Packages- Defining a Package, CLASSPATH, Access protection, importing packages. Command Line Arguments.

UNIT III

Interfaces- defining an interface, implementing interfaces, Nested interfaces, applying interfaces, variables in interfaces and extending interfaces.

Exception handling - Fundamentals of exception handling, Exception types, Termination or resumptive models, Uncaught exceptions, using try and catch, multiple catch clauses, nested try statements, throw, throws and finally, built- in exceptions, creating own exception sub classes.

UNIT IV

Stream based I/O(java.io) – The Stream classes-Byte streams and Character streams, Reading console Input and Writing Console Output, File class, Reading and writing Files, Random access file operations, The Console class, Serialization, Enumerations, auto boxing, generics.

Multithreading- Differences between thread-based multitasking and process-based multitasking, Java thread model, creating threads, thread priorities, synchronizing threads, inter thread communication.

UNIT V

The Collections Framework (java.util)- Collections overview, Collection Interfaces, The Collection classes- Array List, Linked List, Hash Set, Tree Set, Priority Queue, Array Deque. Accessing a Collection via an Iterator, Using an Iterator, The For-Each alternative, Map Interfaces and Classes, Comparators, Collection algorithms, Arrays, The Legacy Classes and Interfaces- Dictionary, Hashtable,Properties, Stack, Vector More Utility classes, String Tokenizer, Bit Set, Date, Calendar, Random, Formatter, Scanner

UNIT VI

GUI Programming with Swing:

Event Handling- The Delegation event model- Events, Event sources, Event Listeners, Event classes, Handling mouse and keyboard events, Adapter classes, Inner classes, Anonymous Inner classes.

A Simple Swing Application, **Applets –** Applets and HTML, Security Issues, Applets and Applications, passing parameters to applets. Creating a Swing Applet, Painting in Swing, A Paint example, Exploring Swing Controls- JLabel and Image Icon, JText Field, The Swing Buttons- JButton, JToggle Button, JCheck Box, JRadio Button, JTabbed Pane, JScroll Pane, JList, JCombo Box, Swing Menus, Dialogs. Layout Mangers.

LESSON PLAN

Lecture No.	Topic	Delivery Method/ Activity
UNIT – I		
L1	**Object- oriented Thinking-**A way of viewing world- Agents and Communities, messages and methods, Responsibilities	Chalk& Talk/ PPT
L2	Classes and Instances	Chalk & Talk/ PPT
L3	Class Hierarchies- Inheritance, Method binding	Chalk & Talk/PPT
L4	Over riding and Exceptions, Summary of Object-Oriented Concepts	Chalk & Talk/PPT
L5	Java Buzz Words, An Overview of Java, Data Types, Variables and Arrays	Chalk & Talk/PPT
L6	Operators, expressions, control Statements	Chalk & Talk/PPT
L7	Introducing classes, Methods and classes	Chalk & Talk/PPT
L8	String handling, Structured Programming Vs OOP Concepts	Chalk& Talk, **Activity:** Group Discussion
UNIT – II		
L9	**Inheritance-** Inheritance Concept, Inheritance Basics, Member access, Constructors	Chalk & Talk/PPT
L10	Creating Multi level hierarchy, super use, using final with inheritance.	Chalk & Talk/PPT
L11	Polymorphism- adhoc polymorphism, pure polymorphism, method overriding.	Chalk & Talk/PPT
L12	Abstract Classes, Object Class, Inheritance and their Importance	PPT, **Activity:** Think-Pair-Share
L13	Forms of inheritance- specialization, specification, construction, extension	Chalk & Talk/PPT
L14	Limitation, combination, benefits of inheritance. **Packages-**Defining a package.	Chalk & Talk/PPT
L15	Class Path, Access Protection, importing packages, Command Line arguments.	Chalk & Talk/PPT
UNIT – III		
L16	**Interfaces-** Defining Interface, implementing interfaces	Chalk & Talk/PPT
L17	Nested Interfaces, applying interfaces, variables in interfaces and extending interfaces	Chalk & Talk/PPT
L18	**Exception Handling-**Fundamentals of exception handling, Exception types, Termination of presumptive models,	Chalk & Talk/PPT

	Uncaught Exceptions	
L19	Using try and catch, multiple catch clauses	Chalk & Talk/PPT
L20	Nested try statements, throw, throws and finally, Error Handling and Types	PPT, **Activity:** Jigsaw
L21	Built-in exceptions, creating own exception sub classes	Chalk & Talk/PPT
UNIT – IV		
L22	**Stream Based I/O (java. io)-** The Stream classes- Byte Streams and character streams	Chalk & Talk/PPT
L23	Reading console Input and Writing Console Output, File class	Chalk & Talk/PPT
L24, L25	Reading and Writing Files, Random access file operations	Chalk & Talk/PPT
L26	The Console class, Serialization	Chalk & Talk/PPT
L27	Enumerations, auto boxing, generics	Chalk & Talk/PPT
L28	**Mutli- Threading-** Differences between thread-based multitasking and process based multi tasking , Java Thread Model	Chalk & Talk/PPT
L29	Creating Threads, Thread Priorities	Chalk & Talk/PPT
L30	Synchronizing Threads	Chalk & Talk/PPT
L31	Inter Thread Communication, Threads & Streams	Chalk & Talk/PPT, **Activity:** Flipped Class Room
UNIT – V		
L32	**The Collection Frame work (java.util)-** Collections overview, Collections Interfaces	Chalk & Talk/PPT
L33,L34	The Collections Classes- Array List, Linked List, Hash Set, Tree Set, Priority Queue, Array DeQue, Accessing collection via Iterator, For-each Alternative,	Chalk & Talk/PPT
L35	Map Interfaces and Classes, Comparators	Chalk & Talk/PPT
L36	Collection Algorithms- Arrays, The Legacy classes and Interface- Dictionary, Properties	Chalk & Talk/PPT
L37	Stack, Vector More Utility Classes, String Tokenizer	Chalk & Talk/PPT
L38	Bit Set, Date, Calendar	Chalk & Talk/PPT
L39	Random, Formatter, Scanner	Chalk & Talk/PPT
UNIT- VI		
L40	**Event Handling-** Delegation event model, Events, Event sources, Event classes, Event Listeners.	PPT

L41	Handling mouse and keyboard events	PPT
L42	Adapter classes, inner classes, Anonymous Inner Classes	PPT
L43, L44	**A Simple Swing Application, Applets-** Applets and HTML, Security Issues, Applets and Applications, Passing Parameters to Applet	PPT
L45	Exploring Swing Controls- JLabel and Image Icon, JText Field	PPT
L46	The Swing Buttons- JButton, JToggle Button, JCheck Box, JRadio Button, JTabbed Pane, JSrcoll Pane	PPT
L47	Jlist, JCombo Box	PPT
L48	Swing Menus, Dialogs, Layout Managers	PPT

DATA MINING (18CS116)

III B.Tech: II Sem   **L: 3   T: 0   P: 0   C: 3**

Name of the Instructor(s): **Syed Nawaz Pasha, P.Anil Kishan**

No. of Hours/week: 3

Total number of hours planned: 48

Pre-requisite
- Database Management Systems
- Distributed Systems

Learning Resources
Course Notes,PPT,Web Links

Required Resources
1. Shawkat Ali A B M, Saleh A. Wasimi, "Data Mining: Methods and Techniques", Third Indian Reprint, Cengage Learning, 2010.
2. Soman K. P., Shyam Diwakar, Ajay V. "Insight into Data Mining Theory and Practice", Fifth Printing, PHI Learning, 2011.

How to Contact Instructor:
Syed Nawaz Pasha:
- In-person office hours: 9:30 AM to 5:00 PM – Room no.: 1311, except class timings
- Online office hours: 9:30 AM to 5:00 PM - Except class timings, a mail or message
    - Mail: sd.nawazpasha@sru.edu.in
    - Phone numbers: 9959054349
- Other than office hours: A message to the above number from 6PM to 9PM from Monday to Saturday and 8AM to 10 AM on Sunday

P. Anil Kishan:
- In-person office hours: 9:30 AM to 5:00 PM – Room no.: 1311, except class hours
- Online office hours: 9:30 AM to 5:00 PM - Except class timings, a mail or message
    - Mail: p.anilkishan@sru.edu.in
    - Phone numbers: 9390832446

  Other than office hours: A message to the above number from 6PM to 9PM from Monday to Saturday

Technology Requirements: (optional)
- Laptops for class work
- Google Classroom
- WEKA

Overview of Course:
- What is the course about: its purpose?

This course Data Mining is essential for computer science and engineering students. Here the students learn deriving insights from data which is very much essential in performing data analysis and data visualization. The students learn various techniques like data preprocessing, feature extraction, building models and then predicting the outcome. This course will lay a foundation for the students to explore areas such as data analytics, machine learning and deep learning.

- What are the general topics or focus?

Data preprocessing, model creation, testing the models, classification, prediction, clustering and accuracy estimation.

- How does it fit with other courses in the department or on campus?

This course is a part of data analytics stream. In order to perform data analysis the students has to have knowledge of courses like DBMS, distributed systems, data mining ,big data analytics and machine learning. For the students explore about big data analytics and machine learning he has to have knowledge of data mining and different data mining algorithms.

- Why would students want to take this course and learn this material?
1. It is very essential for the students to learning data mining to have a carrier in the field of data analytics and business intelligence.
2. It is also essential for students to explore their research in the field of machine learning and artificial intelligence.

Methods of instruction
- Lecture (chalk & talk / ICT)
- PPT
- Video Lecture presentation
- WEKA

Workload
- Estimated amount of time to spend on course readings
  Students are informed to spend half an hour per day (any four days of a week) or maximum of two hours per week on course readings
- Estimate amount of time to student needs to spend on course assignments and projects (per week)
  One assignments is given during the delivery of this course. Students will need to spend couple of hours per day for a maximum of three days or one hour per day for a maximum of six days to finish the assignment

Assessment

S. No	Assessments	Assessment Methodology	No of assessments	Weightage in marks	Marks scaled to
1	CIE	Quizzes	--	--	--
2		Class test	4	10	2.5
3		Assignment	2	10	7.5
4		Course Activity	--	--	--
5		Course Project	--	--	--
6		Internal exams	2	20	20
7	SEE	--	--	--	70

Note:
- Class test:
  The class test will be scheduled after completion of each unit with prior intimation to students and the grades will be announced 3 days after the completion of test.
- Two assignments will be given each of 10 marks and scaled to total of 10.The students need to submit the assignment in time.
- Absentees for class assessments.
  The absentees for class assessment will be awarded zero marks unless the reason for absent is prior and a genuine one. In case of genuine reason and have permission from concerned authority, a retest will be conducted with a new set of assessment questions.
  In case of assignment full marks will be awarded for those who submit proper assignment in time, late assignments will be marked as zero.

Key concepts
1. Data Preprocessing
2. Classification
3. Prediction
4. Clustering
5. Frequent pattern mining
6. Text mining

LESSON PLAN

Course Outcomes (COs):

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

11. Acquire the concepts of data processing.
12. Understand the different data mining techniques
13. Perform data mining tasks with relevant tools
14. Apply statistical tools to analyze data and understand their physical meanings and implications
15. Analyze the ethical issues in data mining

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	PSO1	PSO2
CO1	3	3												
CO2	3	3		3	3									
CO3		2			3									
CO4	2	2			3									
CO5		2						3						

Course Content (Syllabus)

UNIT I
Fundamentals Data Mining, Data Processing And Data Warehouses Data Mining – History – Strategies– Techniques–Applications–Challenges–Future-Types of Data–Data Warehouses – Data Processing - Quality Measure – OLAP – Sampling.

UNIT II
Data types, input and output of data mining algorithms - different Types of features – Concept Learning – Output of Data Mining Algorithms.
Pre processing In Data Mining– Steps – Discretization – Feature Extraction,
Selection and construction – Missing Data and Techniques for dealing it.

UNIT III
Introduction – Installation- Visualisation – filtering- selecting attributes- other popular packages. CLASSIFICATION TASK:Introduction – Decision trees – Naïve Bayes' classification- Artificial Neural Networks and Support Vector Machines.

UNIT IV
Model Evaluation Techniques
Accuracy Estimation- ROC-Lift Charts- Cost –Bagging and Boosting- Model Ranking Approach. ASSOCIATION RULE MINING:Concepts, Relevance, Functions of Association rule Mining – Apriori Algorithm- Strengths and Weaknesses of ARM- Applications.

UNIT V

Clustering and Estimation

Clustering Task: Introduction- Distance Measure – Types – KNN for clustering – validation - Strengths and Weaknesses of Algorithms – Applications.

Estimation Task: Scatter Plots and Correlation – Linear regression Models – Logistic regression – Regression Analysis - Strengths and Weaknesses of Estimation- Applications.

UNIT VI

Mining of Time Series

Fundamentals – Time series Models – Regression, Periodic Models - Strengths and Weaknesses of Time series Analysis – Applications. Text and Web Mining – Privacy, security and Ethical Issues in Data Mining.

Lecture No.	Topic	Delivery Method/ Activity
	UNIT I	
1	Fundamentals Data Mining, Data Processing	Chalk and Talk
2	Data Warehouses Data Mining – History – Strategies	Chalk and Talk
3	Techniques, Applications	Chalk and Talk
4	Challenges–Future-Types of Data	Chalk and Talk
5	Data Warehouses	Chalk and Talk
6	Data Processing	Chalk and Talk
7	Quality Measure	Chalk and Talk
8	OLAP	PPT
9	Sampling	Chalk and Talk
10	Data types	Chalk and Talk
	UNIT II	
11	input and output of data mining algorithms	PPT
12	different Types of features – Concept Learning	PPT
13	Output of Data Mining Algorithms.	Chalk and Talk
14	Preprocessing In Data Mining– Steps	Chalk and Talk
15	Discretization	Chalk and Talk
16	Feature Extraction	Chalk and Talk
17	Selection and construction	Chalk and Talk
18	Missing Data and Techniques for dealing it	Chalk and Talk

	UNIT III	
19	Introduction – Installation	PPT
20	Visualization – filtering- selecting attributes	PPT
21	CLASSIFICATION TASK:Introduction – Decision trees	PPT
22	Naïve Bayes' classification	PPT
23	Artificial Neural Networks	PPT
24	Support Vector Machines	Chalk and Talk
	UNIT IV	
25	**Model Evaluation Techniques** Accuracy Estimation- ROC-Lift Charts	PPT
26	Cost –Bagging and Boosting	PPT
27	Model Ranking Approach	PPT
28	ASSOCIATION RULE MINING:Concepts, Relevance	Chalk and Talk
29	Functions of Association rule Mining	Chalk and Talk
30	Apriori Algorithm	Chalk and Talk
31	Strengths and Weaknesses of ARM	Chalk and Talk
32	Applications	Chalk and Talk
	UNIT V	
33	**Clustering and Estimation** **Clustering Task**: Introduction- Distance Measure– Types	Chalk and Talk
34	KNN for clustering – validation - Strengths and Weaknesses of Algorithms – Applications	Chalk and Talk
35	**Estimation Task**: Scatter Plots and Correlation	PPT
36	Linear regression Models	Chalk and Talk
37	Logistic regression	Chalk and Talk
38	Regression Analysis - Strengths and Weaknesses of Estimation	Chalk and Talk
39	Applications	Chalk and Talk
	UNIT VI	
40	**Mining of Time Series** Fundamentals – Time series Models	Chalk and Talk
41	Regression	Chalk and Talk

42	Periodic Models Analysis	PPT
43	Strengths and Weaknesses of Time series	Chalk and Talk
44	Applications	Chalk and Talk
45	Text Mining	Text Mining
46	Privacy	Text Mining
47	securityWeb	Text Mining
48	Ethical Issues in Data Mining	Text Mining