

Lecture Plan 1

SEMESTER: - VII

CLASS: - ECS

SUBJECT: -Data Warehousing and Data Mining UNIT: - I

COURSE CODE: - IT-401-F

S.No.	Topic Data warehousing Definition, usage and trends.	Time Allotted:-
1.	Introduction <p>A data warehouse is the main repository of the organization's historical data, its corporate memory There are many advantages to using a data warehouse, some of them are:</p> <ul style="list-style-type: none">• Enhances end-user access to a wide variety of data.• Business decision makers can obtain various kinds of trend reports e.g. the item with the most sales in a particular area / country for the last two years.• A data warehouse can be a significant enabler of commercial business applications, most notably customer relationship management (CRM).	05 35
2	Division of the Topic <ul style="list-style-type: none">• History of Data warehousing• Concept of Data warehousing• Features of Data warehousing• Benefits of Data warehousing• Applications of Data warehousing• Trends in Data warehousing	05
3.	Conclusion <p>Data Warehouses became a distinct type of computer database during the late 1980s and early 1990s. They were developed to meet a growing demand for management information and analysis that could not be met by operational systems</p>	05
4	Question / Answer – <ul style="list-style-type: none">• What is Data Warehousing• What are its advantages	05

- **Assignment to be given:** - What are different Application areas of Data warehousing?

Reference Readings:-

- Data Warehousing In the Real World; Sam Anahory & Dennis Murray; 1997, Pearson
- Data Warehousing, Data Mining and OLTP; Alex Berson, 1997, Mc Graw Hill.

Lecture Plan 2

SEMESTER: - VII

CLASS: - ECS

SUBJECT: - : Data Warehousing and Data Mining UNIT: - I

COURSE CODE: - IT-401-F

S. No.	Topic DBMS vs. data warehouse, Data marts, Metadata	Time Allotted:-
1.	Introduction A data mart (DM) is a specialized version of a data warehouse (DW). Like data warehouses, data marts contain a snapshot of operational data that helps business people to strategize based on analyses of past trends and experiences. The key difference is that the creation of a data mart is predicated on a specific, predefined need for a certain grouping and configuration of select data. A data mart configuration emphasizes easy access to relevant information.	05
2	Division of the Topic <ul style="list-style-type: none">• Comparison of Traditional Dbms and Data Warehouse• Data Marts• Types of Data Marts• Meta data•	35
3.	Conclusion Data Warehouses are larger than Dbms. The Data Warehouse functions as a Decision Support System (DSS) and an Executive Information System (EIS), meaning that it supports informational and analytical needs by providing integrated and transformed enterprise-wide historical data from which to do management analysis.	05
4	Question / Answer What are Data Marts? What is meta data?	05

Assignment to be given: - How Data warehouse is Different from Traditional databases?

Reference Readings: - Data Warehousing In the Real World; Sam Anahory & Dennis Murray; 1997, Pearson

- Data Mining- Concepts & Techniques; Jiawei Han & Micheline Kamber- 2001, Morgan Kaufmann.

Lecture Plan 3

SEMESTER: - VII

CLASS: - ECS

SUBJECT: - : Data Warehousing and Data Mining UNIT: - I

COURSE CODE: - IT-401-F

S. No.	Topic Multidimensional data model, Data cubes	Time Allotted:-
1.	Introduction Online Analytical Processing (OLAP) data is frequently organized in the form of multidimensional data cubes each of which is used to examine a set of data values, called measures, associated with multiple dimensions and their multiple levels.	05
2	Division of the Topic <ul style="list-style-type: none">• Representation of data warehouse• Multidimensional Data Model• Data Cubes• Operation on Data Cubes• Roll up• Drill down• Slice n dice• Pivot	35
3.	Conclusion Data cubes are better way to represent multidimensional data of warehouse. In data warehousing cubes are n-dimensional	05
4	Question / Answer What is Multidimensional Model? What are Data cubes?	05
		05

Assignment to be given: - Explain different operations on Data Cubes with example?

Reference Readings:-

- Data Mining- Concepts & Techniques; Jiawei Han & Micheline Kamber- 2001, Morgan Kaufmann.

Lecture Plan 4

SEMESTER: - VII

CLASS: - ECS

SUBJECT: - : Data Warehousing and Data Mining UNIT: - I

COURSE CODE: - IT-401-F

S. No.	Topic Schemas for Multidimensional Database: stars, snowflakes and fact constellations.	Time Allotted:-
1.	Introduction Multi-dimensional data structures can be implemented with multi-dimensional databases, or else they can also be implemented in a relational database management system using such techniques as the "star schema" and the "snowflake schema" (Weldon 1995).	05
2	Division of the Topic <ul style="list-style-type: none">• Need of Schemas• Types of schemas• Star schema• Snowflake schema• Fact constellation• Examples	30
3.	Conclusion The efficiency of schema version construction is significantly improved since no dynamic dimension instance conversion is required.	10
4	Question / Answer Name different Multidimensional schemas?	05

Assignment to be given: - Explain schemas with example?

Reference Readings:-

- Data Mining- Concepts & Techniques; Jiawei Han & Micheline Kamber- 2001, Morgan Kaufmann.

Lecture Plan 5

SEMESTER: - VII

CLASS: - ECS

SUBJECT: - : Data Warehousing and Data Mining UNIT: - I

COURSE CODE: - IT-401-F

S. No.	Topic	Time Allotted:-
Data warehouse process, Data warehouse Architecture		
1.	Introduction There are processes that constitute a data warehouse. These processes corresponds To the Data flows within a Data Warehouse	10
2	Division of the Topic <ul style="list-style-type: none"> • Process • Extract and load process • Clean and Transform data • Backup and archive Process • Query management Process • Mapping process to system • Load Manager • Warehouse manager • Query Manager • Detailed information • Summary information 	30
3.	Conclusion All these Processes play an important role to develop an architecture that can evolve as business requirement evolves	05
4	Question / Answer What are different Processes in data Warehouse?	

Assignment to be given: - How noisy data is cleaned in data warehouse?

Reference Readings:-

Data Warehousing In the Real World; Sam Anahory & Dennis Murray; 1997, Pearson

Lecture Plan 6

SEMESTER: - VII

CLASS: - ECS

SUBJECT: - : Data Warehousing and Data Mining UNIT: - I

COURSE CODE: - IT-401-F

S. No.	Topic	Time Allotted:-
1.	OLTP vs. OLAP, ROLAP vs. MOLAP, types of OLAP servers Introduction Data warehouse architecture is a description of the elements and services of the warehouse, with details showing how the components will fit together and how the system will grow over time. There is always architecture, either ad hoc or planned, but experience shows that planned architectures have a better chance of succeeding.	5
2	Division of the Topic <ul style="list-style-type: none">• OLTP• OLAP• Table of differences• ROLAP• MOLAP• HOLAP• Types of Servers	35
3.	Conclusion Data warehouses and their architectures vary depending upon the specifics of an organization's situation.	05
4	Question / Answer What are Different types of managers in Data warehouse Architecture?	05

Assignment to be given:-

How different architectures are implemented in organization give Example?

Reference Readings:-

Data Warehousing In the Real World; Sam Anahory & Dennis Murray; 1997, Pearson

Lecture Plan 7

SEMESTER: - VII

CLASS: - ECS

SUBJECT: - : Data Warehousing and Data Mining UNIT: - II

COURSE CODE: - IT-401-F

S. No.	Topic	Time Allotted:-
1.	3-Tier data warehouse architecture, distributed and virtual data warehouses, data warehouse manager.	
1.	Introduction Three tier data warehouse contains three tier such as bottom tier, middle tier and top tier. Bottom tier deals with retrieving related datas or information from various information repositories by using SQL. Middle tier contains two types of servers. 1. ROLAP server 2.MOLAP server Top tier deals with presentation or visualization of the results.	5
2	Division of the Topic <ul style="list-style-type: none">• 3 tier Warehouse Architecture• distributed data warehouses• virtual data warehouses• Data Warehouse Manager	35
3.	Conclusion distributed data warehouse would be where there are different physical databases that work together as a single physical database	05
4	Question / Answer What is advantage of 3 tier data warehouse architecture?	05

Assignment to be given: - Write short notes on Distributed warehouse and Virtual warehouse?

Reference Readings:-

- Data Mining- Concepts & Techniques; Jiawei Han & Micheline Kamber- 2001, Morgan Kaufmann.

Lecture Plan 8

SEMESTER: - VII

CLASS: - ECS

SUBJECT: - : Data Warehousing and Data Mining UNIT: - II

COURSE CODE: - IT-401-F

S. No.	Topic	Time Allotted:-
	Data warehouse implementation, computation of data cubes	
1.	Introduction Data warehouses are implemented by cuboids, As data warehouse contain large amount of data, OLAP servers demand that decision support queries be answered In order of seconds therefore computation of cuboids, access methods, query Processing techniques should be efficient.	05
2	Division of the Topic <ul style="list-style-type: none">• Efficient Computations of data cubes• Partial materialization• Multiway array aggregation in computation of data cubes• Indexing OLAP data• Efficient processing of OLAP queries	35
3.	Conclusion For efficient implementation of data warehouse above features must be efficient	
4	Question / Answer How Data warehouses are implemented?	5
		05

Assignment to be given: -Compute no. of cubes for $L=4$ $n=5$?

Reference Readings:-

- Data Mining- Concepts & Techniques; Jiawei Han & Micheline Kamber- 2001, Morgan Kaufmann.

Lecture Plan 9

SEMESTER: - VII

CLASS: - ECS

SUBJECT: - : Data Warehousing and Data Mining UNIT: - II

COURSE CODE: - IT-401-F

S. No.	Topic	Time Allotted:-
Data warehouse back end tools, complex aggregation at multiple granularities		
1.	<p>Introduction</p> <p>Data warehouse back end tools perform the extraction and transformation of data from the various source operational databases, and they transform it -- condition and denormalize it if necessary -- to put it into a usable form for the data warehouse. for c from the distributing source locations into the data warehouse.</p>	05
2	<p>Division of the Topic</p> <ul style="list-style-type: none"> • Data extraction tools • Data Cleaning Tools • Data Extraction Tools • Load • refresh 	35
3.	<p>Conclusion</p> <p>To date, only a small number of back-end tools is available. These include Passport, from Carleton Corp., Burlington, Mass.; the Extract Tool Suite, from Evolutionary Technologies; and Prism Warehouse Manager, from Prism Solutions Inc., Sunnyvale, Calif.</p>	05
4	<p>Question / Answer</p> <p>What tasks are performed by back end tools?</p>	

Assignment to be given:- Compare different data warehouse back end tools?

Reference Readings:-

- Data Mining- Concepts & Techniques; Jiawei Han & Micheline Kamber- 2001, Morgan Kaufmann.

Lecture Plan 10

SEMESTER: - VII

CLASS: - ECS

SUBJECT: - : Data Warehousing and Data Mining UNIT: - II

COURSE CODE: - IT-401-F

S. No.	Topic	Time Allotted:-
1.	Introduction To improve performance of data warehouse is known as Tuning. Performance can be accessed by <ul style="list-style-type: none">• Average query response times• Scan rates• I/O Throughput rates• Time used per query	10
2	Division of the Topic <ul style="list-style-type: none">• Assessing performance• Tuning the Data Load• Tuning Queries•	30
3.	Conclusion Tuning a data warehouse is difficult because of the adhoc and unpredictable nature of Load	05
4	Question / Answer What are different performance measures of Data Warehouse?	05

Assignment to be given:-How queries are tuned in data Warehouse?

Reference Readings:-

Data Warehousing In the Real World; Sam Anahory & Dennis Murray; 1997, Pearson

Lecture Plan 11

SEMESTER: - VII

CLASS: - ECS

SUBJECT: - : Data Warehousing and Data Mining UNIT: - III

COURSE CODE: - IT-401-F

S. No.	Topic	Time Allotted:-
	Data mining definition & task, KDD versus data mining	
1.	Introduction Data Mining , is the process of automatically searching large volumes of data for tools such as classification, association rule mining, clustering, etc. Data mining topic and has links with multiple core fields such as computer science and adds seminal computational techniques from statistics, information retrieval, machine pattern recognition.	10
2	Division of the Topic <ul style="list-style-type: none">• Data mining definition• Data mining tasks• Knowledge discovery in databases• Data mining architecture	30
3.	Conclusion Data mining, <i>the extraction of hidden predictive information from large databases</i> , is a powerful new technology with great potential to help companies focus on the most important information in their data warehouses	05
4	Question / Answer How is data mining beneficial?	05

Assignment to be given: - How is Data mining different from KDD?

- **Reference Readings:** - Data Mining- Concepts & Techniques; Jiawei Han & Micheline Kamber- 2001, Morgan Kaufmann.

Lecture Plan 12

SEMESTER: - VII

CLASS: - ECS

SUBJECT: - : Data Warehousing and Data Mining UNIT: - III

COURSE CODE: - IT-401-F

Sino.	Topic data mining techniques	Time Allotted:-
1.	Introduction there has been increased interest in developing new analytic techniques specifically designed to address the issues relevant to business <i>Data Mining</i>	05
2	Division of the Topic <ul style="list-style-type: none">• Association rules• Clustering techniques• Decision trees• Genetic Algorithm• Rough sets• Neural networks• Fuzzy sets	35
3.	Conclusion Many of these technologies have been in use for more than a decade in specialized analysis tools that work with relatively small volumes of data. These capabilities are now evolving to integrate directly with industry-standard data warehouse and OLAP platforms	05
4	Question / Answer – Explain different data mining techniques?	05

- **Assignment to be given:** Explain different data mining techniques?
- **Reference Readings:** - Data Mining- Concepts & Techniques; Jiawei Han & Micheline Kamber- 2001, Morgan Kaufmann.

Lecture Plan 13

SEMESTER: - VII

CLASS: - ECS

SUBJECT: - : Data Warehousing and Data Mining UNIT: - III

COURSE CODE: - IT-401-F

S. No.	Topic tools and applications	Time Allotted:-
1.	<p>Introduction</p> <p>A wide range of companies have deployed successful applications of data mining. While early adopters of this technology have tended to be in information-intensive industries such as financial services and direct mail marketing, the technology is applicable to any company looking to leverage a large data warehouse to better manage their customer relationships</p>	05
2	<p>Division of the Topic</p> <p>Data mining tools Application areas pharmaceutical company credit card company consumer package goods company</p>	35
3.	<p>Conclusion</p> <p>.</p> <p>A new technological leap is needed to structure and prioritize information for specific end-user problems. The data mining tools can make this leap. Quantifiable business benefits have been proven through the integration of data mining with current information systems, and new products are on the horizon that will bring this integration to an even wider audience of users.</p>	05
4	<p>Question / Answer</p> <p>What are different application areas of data mining?</p>	05

Assignment to be given: What are different application areas of data mining?

Reference Readings:-

- Data Mining- Concepts & Techniques; Jiawei Han & Micheline Kamber- 2001, Morgan Kaufmann.

Lecture Plan 14

SEMESTER: - VII CLASS: - ECS

SUBJECT: - : Data Warehousing and Data Mining UNIT: - III

COURSE CODE: - IT-401-F

S. No.	Topic Data mining query languages, data specification, specifying knowledge.	Time Allotted:-
1.	Introduction DMQL is a language for Data mining queries which is designed to support adhoc and interactive data mining in order to facilitate effective and flexible knowledge discovery	05
2	Division of the Topic <ul style="list-style-type: none">• Data mining query languages• data specification• Specifying knowledge.	35
3.	Conclusion Designing a comprehensive data mining language is challenging because data mining covers a wide spectrum of tasks.	
4	Question / Answer Write down DMQL query for Data specification?	05
		05

Assignment to be given: - Write down DMQL query for data specification?

Reference Readings:-

- Data Mining- Concepts & Techniques; Jiawei Han & Micheline Kamber- 2001, Morgan Kaufmann.

Lecture Plan 15

SEMESTER: - VII

CLASS: - ECS

SUBJECT: - : Data Warehousing and Data Mining UNIT: - III

COURSE CODE: - IT-401-F

S. No.	Topic hierarchy specification, pattern presentation & visualization specification	Time Allotted:-
1.	Introduction Concept Hierarchies allow the mining of knowledge at multiple levels of abstraction. Our data mining query languages needs syntax that allows users to specify the display of discovered patterns in one or more forms ,including rules,tables,crosstabs,pie or bar charts etc..	05
2	Division of the Topic <ul style="list-style-type: none">• hierarchy specification• pattern presentation• Visualization specification	30
3.	Conclusion Interactive mining should allow the discovered patterns to be viewed at different concept levels or from different angles	10
4	Question / Answer Write down DMQL query for pattern presentation	05

Assignment to be given: - Write down DMQL query for pattern presentation

Reference Readings:-

- Data Mining- Concepts & Techniques; Jiawei Han & Micheline Kamber- 2001, Morgan Kaufmann.

Lecture Plan 16

SEMESTER: - VII

CLASS: - ECS

SUBJECT: - : Data Warehousing and Data Mining UNIT: - III

COURSE CODE: - IT-401-F

S. No.	Topic	Time Allotted:-
	Data mining languages and standardization of data mining.	
1.	Introduction Besides DMQL ,there have been research efforts to standardize data Mining primitives and languages. some of these languages are MSQL, MINERULE,OLEDB DM,CRISP DM	10
2	Division of the Topic <ul style="list-style-type: none">• Other data mining languages• MSQL• MINERULE• OLEDB DM• Standardization of data mining	30
3.	Conclusion Having a standard Language will help to strengthen data mining industry by facilitating the development of data mining platforms and of data mining systems, and the sharing of data mining results	05
4	Question / Answer How data mining languages can be standardized	05

Assignment to be given: - Write short notes on data mining languages other than DMQL?

- **Reference Readings:** - Data Mining- Concepts & Techniques; Jiawei Han & Micheline Kamber- 2001, Morgan Kaufmann.

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Lecture Plan 17

SEMESTER: - VII

CLASS: - ECS

SUBJECT: - : Data Warehousing and Data Mining UNIT: - IV

COURSE CODE: - IT-401-F

S. No.	Topic	Time Allotted:-
1.	Data mining techniques: Association rules Introduction Association rules mining searches for interesting relationships among items in A given data set .Rule support and confidence are two measures of interestingness They respectively reflect the usefulness and certainty of discovered rules	10
2	Division of the Topic Market Basket Analysis Basic concepts Association rule mining a roadmap Apriory algorithm Generating association rules from frequent item sets	30
3.	Conclusion The discovery of association relationships among huge amounts of data is useful in selective marketing, decision analysis and business management	
4	Question / Answer What are association rules?	05
		05

Assignment to be given:-

Explain priory algorithm with example?

Reference Readings:-

- Data Mining- Concepts & Techniques; Jiawei Han & Micheline Kamber- 2001, Morgan Kaufmann.

Lecture Plan 18

SEMESTER: - VII

CLASS: - ECS

SUBJECT: - : Data Warehousing and Data Mining UNIT: - IV

COURSE CODE: - IT-401-F

S. No.	Topic Clustering techniques	Time Allotted:-
1.	Introduction Clustering is a process of grouping the data into classes or clusters so that objects within a cluster have high similarity in comparison to each other, but are dissimilar To objects in other clusters	05
2	Division of the Topic <ul style="list-style-type: none">• Cluster analysis• Hierarchical clustering• Density based methods• grid based clustering• Partitioning methods	35
3.	Conclusion Cluster Analysis has wide applications including market or customer segmentation, pattern recognition ,biological studies ,spatial data analysis et	
4	Question / Answer Explain different clustering techniques?	05
		05

Assignment to be given:-

Explain different clustering techniques?

Reference Readings:-

- Data Mining- Concepts & Techniques; Jiawei Han & Micheline Kamber- 2001, Morgan Kaufmann.

Lecture Plan 19

SEMESTER: - VII

CLASS: - ECS

SUBJECT: - : Data Warehousing and Data Mining UNIT: - IV

COURSE CODE: - IT-401-F

S. No.	Topic	Time Allotted:-
	Decision tree technique, knowledge discovery through Neural Networks	
1.	Introduction The Decision Tree is one of the most popular classification algorithms in current use in Data Mining. A decision tree is a flow chart like tree structure, where each node denotes a test on an attribute. Neural Networks can generate valid predictions but are not capable of identifying the specific nature of the interrelations between the variables on which the predictions are based.	5
2	Division of the Topic <ul style="list-style-type: none">• Decision Tree• Neural Network	35
3.	Conclusion Decision Tree algorithm helps solving the task of classifying cases into multiple categories. In many cases, this is the fastest, as well as easily interpreted machine learning algorithm	05
4	Question / Answer Explain Decision Tree Technique?	05

Assignment to be given: Explain neural networks with example?

Reference Readings:-

- Data Mining- Concepts & Techniques; Jiawei Han & Micheline Kamber- 2001, Morgan Kaufmann.

Lecture Plan 20

SEMESTER: - VII

CLASS: - ECS

SUBJECT: - : Data Warehousing and Data Mining UNIT: - IV

COURSE CODE: - IT-401-F

S. No.	Topic Genetic Algorithm, Rough Sets, Support Vector Machines and Fuzzy techniques.	Time Allotted:-
1.	Introduction Genetic algorithms (GAs) are search procedures that use the mechanics of natural selection and natural genetics. It uses evolutionary techniques, based on function optimization and artificial intelligence, to develop a solution. The rough set theory offers a viable approach for extraction of decision rules from data sets. The extracted rules can be used for making predictions in the semiconductor industry and other applications.	05
2	Division of the Topic <ul style="list-style-type: none">• Genetic Algorithm• Rough Sets• Support Vector Machines• Fuzzy techniques	30
3.	Conclusion One of the goals of data mining is to extract meaningful knowledge. The power, generality, accuracy, and longevity of decision rules can be increased by the application of concepts from systems engineering and evolutionary computation.	10
4	Question / Answer What is Genetic Algorithm? What are support Vector Machines	05

Assignment to be given: - Explain rough sets with example?

Reference Readings:-

- Data Mining- Concepts & Techniques; Jiawei Han & Micheline Kamber- 2001, Morgan Kaufmann.

Lecture Plan 21

SEMESTER: - VII

CLASS: - ECS

SUBJECT: - : Data Warehousing and Data Mining UNIT: - IV

COURSE CODE: - IT-401-F

S. No.	Topic	Time Allotted:-
	Mining complex data objects, Spatial databases	
1.	Introduction Spatial data mining is the process of discovering interesting and previously unknown, but potentially useful patterns from large spatial datasets. Extracting interesting and useful patterns from spatial datasets is more difficult than extracting the corresponding patterns from traditional numeric and categorical data due to the complexity of spatial data types, spatial relationships, and spatial autocorrelation. This tutorial will introduce spatial data mining in the following categories: location prediction, spatial outlier detection, and co-location mining.	05 35
2	Division of the Topic <ul style="list-style-type: none">• Mining complex data objects• Spatial databases	05
3.	Conclusion for many years, geographic information systems dominated this application area, the requirement for spatial data management emerges in more and more domains such as molecular biology, environmental protection, mechanical engineering, navigation, medical imaging, and data warehousing, among many others	05
4	Question / Answer Explain mining of spatial databases?	

Assignment to be given:-

How Complex data are mined?

Reference Readings:-

- Data Mining- Concepts & Techniques; Jiawei Han & Micheline Kamber- 2001, Morgan Kaufmann.

Lecture Plan 22

SEMESTER: - VII

CLASS: - ECS

SUBJECT: - : Data Warehousing and Data Mining UNIT: - IV

COURSE CODE: - IT-401-F

S. No.	Topic	Time Allotted:-
1.	Multimedia databases Introduction Capturing and organizing vast volumes of multimedia data, such as scientific and requires new information processing techniques in the context of pattern recognition mining. Despite the massive quantities of multimedia content available today progress have been made in building a systemized, operative, and accessible gathered data.	05
2	Division of the Topic <ul style="list-style-type: none">• Multimedia database mining	35
3.	Conclusion There are several inter-related issues in the management of such data, including feature extraction, similarity based search, high dimensional indexing, scalability to large data sets, and personalizing search and retrieval.	05
4	Question / Answer Explain mining of Multimedia databases?	05

Assignment to be given:-

How Multimedia databases are mined?

Reference Readings:-

- Data Mining- Concepts & Techniques; Jiawei Han & Micheline Kamber- 2001, Morgan Kaufmann.

Lecture Plan 23

SEMESTER: - VII

CLASS: - ECS

SUBJECT: - : Data Warehousing and Data Mining UNIT: - IV

COURSE CODE: - IT-401-F

S. No.	Topic	Time Allotted:-
1.	Time Series and Sequence databases Introduction In a temporal database, each tuple is given a start and an end time indicating the time interval during which the information recorded in the tuple is valid. With a temporal database, we can discover relationships between items which satisfy certain timing constraints	05
2	Division of the Topic <ul style="list-style-type: none">• Time Series and Sequence databases	35
3.	Conclusion Time series and sequence databases are related to time intervals their mining is important in stock markets etc where changes occur frequently	05
4	Question / Answer Explain mining of Time series and sequence databases?	05

Assignment to be given:-

How Time series and sequence data are mined?

Reference Readings:-

- Data Mining- Concepts & Techniques; Jiawei Han & Micheline Kamber- 2001, Morgan Kaufmann.

Lecture Plan 24

SEMESTER: - VII

CLASS: - ECS

SUBJECT: - : Data Warehousing and Data Mining UNIT: - IV

COURSE CODE: - IT-401-F

S. No.	Topic	Time Allotted:-
	Mining Text Databases, Mining Word Wide Web	
1.	Introduction Text Mining is the discovery by computer of new, previously unknown information, by automatically extracting information from different written resources. A key element is the linking together of the extracted information together to form new facts or new hypotheses to be explored further by more conventional means of experimentation. Web mining is the application of data mining techniques to discover patterns from the Web. According to analysis targets, web mining can be divided into three different types, which are Web usage mining , Web content mining and Web structure mining .	05
2	Division of the Topic <ul style="list-style-type: none">• Mining Text databases	35
3.	Conclusion In text mining, the goal is to discover heretofore unknown information, something that no one yet knows and so could not have yet written down.	05
4	Question / Answer Explain mining of Text databases?	05

Assignment to be given:-

How Text databases are mined?

Reference Readings:-

- Data Mining- Concepts & Techniques; Jiawei Han & Micheline Kamber- 2001, Morgan Kaufmann.