Course outcome

On successful completion of the course, students will be able to:

1. Interpret the scope and challenges of e-commerce in the Indian business context.
2. Analyze the various business models of e-commerce.
3. Comprehend the enabling technologies of WWW used to support various e-commerce applications.
4. Evaluate the different marketing methods used in e-commerce.
5. Evaluate the legal and regulatory framework involved in different E-payment systems.
6. Assess the various methods used to improve the effectiveness of e-commerce applications.

1. **E-commerce in Indian business context**: Definition of e-commerce, advantages and disadvantages of e-commerce, e-transition challenges for Indian corporate.
   
   **Self learning component**: e-commerce opportunities for industries

   
   **Self learning component**: Info-mediary model, community model

3. **Enabling Technologies of www**: Internet client-server applications, Networks and Internet protocols, IPV4, IPV6, Search Engines, software agents, Internet standards and specifications, Broadband technologies.
   
   **Self learning component**: types of broadband technology
4. **E-marketing**: Traditional marketing, identifying web-presence goods, Browsing behavior model, online marketing, e-advertising, e-branding, Marketing strategies.
   Self learning component:-

5. **E-payment Systems**: Main concerns in Internet banking, Digital payment, requirements, Digital token based e-payment systems, classification of new payment systems, Properties of e-cash, cheque payment on Internet, Risk of e-payment systems, Designing e-payment systems, digital signatures.
   Self learning component:-

   Self learning component:- seven dimensions of e-commerce strategy.

**Text Books**


Advanced Mathematics (4:0:0)

Sub Code : AMT0401
CIE : 50% Marks
Hrs/Week : 04
SEE : 50% Marks
SEE Hrs : 03
Max. : 100 Marks

Course Outcomes:

On successful completion of the course the students will be able to:

1. Construct the matrix, digraphs of relations and explain some results on different types of relations and solve problems associated with equivalence relations.

2. Identify different types of functions, compute composition and inverse of a function and solve problems using pigeon-hole principle.

3. Define and explain the basic concepts of graph theory and its applications to solve Konigsberg bridge problem, network flow problems and produce minimal spanning tree.

4. Solve problems associated with discrete & continuous probability distributions.

5. Construct confidence intervals, perform hypothesis tests and produce regression lines.

6. Solve problems on joint distribution, Markov chain using transition probability matrix and also problems on queuing theory.

Unit-I: Relations

Binary relations, Matrix and Digraph representation of a relation, Operations on binary relations, Composition of relations, Properties of relations, Equivalence relations.

Unit-II: Functions

Function, Types of functions, Composition of functions, Invertible functions, Recursive function, (Surjective function), The Pigeonhole-principle.

Unit-III: Graph Theory

Unit-IV : Probability
(SLE: Basic probability upto Baye’s Theorem) Random variables – Discrete and continuous random variables, Binomial, Poisson’s, Exponential and Normal Distributions.

Unit-V : Statistical Inference

Unit-VI : Joint Distribution and Markov Chains
Concept of joint probability: Joint probability distribution, (discrete) Independent random variables, Expectation, Covariance, Correlation Coefficient. (SLE: Continuous joint probability distributions) Probability vectors, Stochastic matrices, Regular stochastic matrices, Markov chains, Concept of a queue, the M/G/1 and M/M/1 queuing systems, analysis.

Books for Reference:

4. Probability and Statistics – Schaum Series (All latest editions)
6. Graph Theory with Applications to Engineering and Computer Science – Narsingh Deo, Prentice – Hall of India Pvt Ltd New Delhi, 1999
Data Warehousing and Data Mining (4:0:2)

Sub Code : MIT0504
Hrs/Week : 06
SEE Hours : 3 Hrs
Designation: CORE
Credits: 05

Course Outcomes:

On successful completion of the course the students will be able to

1. Understand the concepts of Data Warehousing, modeling and Online Analytical Processing (OLAP) and Data Mining
2. Identify the challenges, tasks, technologies and the kind of applications demanded by Data Mining
3. Decide about the data, data preprocessing and applications
4. Use the algorithms for association analysis and evaluate the association patterns
5. Understand and use the various data classification methods
6. Identify the various clustering methods to classify the data and perform analysis

1. Data Warehousing and OLAP
   Data Warehouse basic concepts, Data Warehouse Modeling, Data Cube.
   Self learning component:- OLAP

2. Data Mining
   Introduction, What is Data Mining, Motivating Challenges, Which technologies are used, kinds of applications are targeted by Data Mining
   Self learning component:- Data Mining Tasks

3. Data Mining-Which type of data
   Types of Data, Data Preprocessing, Measures of Similarity and Dissimilarity
   Self learning component:- Data Mining Applications

4. Association Analysis: Basic Concepts and Algorithms
   Frequent Itemset Generation, Rule Generation, Compact Representation of Frequent Itemsets, Alternative methods for generating Frequent Itemsets, FP Growth Algorithm,
   Self learning component:- Evaluation of Association Patterns
5. **Classification**
   Self learning component: Evaluation criteria for classification methods

6. **Clustering Techniques**
   Overview, Features of cluster analysis, Types of Data and Computing Distance, Types of Cluster Analysis Methods, Partitional Methods, Hierarchical Methods, Density Based Methods. Quality and Validity of Cluster Analysis. Outlier detection methods, Classification based approached
   Self learning component: Statistical Approaches, Clustering based applications

**Text Books:**


**Reference Books:**


2. Jiawei Han and Micheline Kamber: Data Mining - Concepts and Techniques, 2nd Edition, Morgan Kaufmann Publisher, 2006.

Cloud Computing (4:0:2)

Sub Code : MIT0505
Hrs/Week : 06
SEE Hours : 3 Hrs
Designation: CORE

Credits: 05

Course Outcomes

On successful completion of the course, the student will be able

1. Use Cloud Services.
2. Comprehend the concept of Virtualization
3. Comparatively evaluate task scheduling algorithms.
4. Apply Map-Reduce concept to applications.
5. Evaluate the needs for Private Cloud building.
6. Comprehend issues of resource virtualization and scheduling.

1. Introduction, Cloud Infrastructure

Cloud computing. Cloud computing delivery models and services, Ethical issues, Data vulnerabilities, Cloud computing at Amazon, Cloud computing the Google perspective, Microsoft Windows Azure and online services, Open-source software platforms for private clouds, Open data storage diversity and vendor lock-in, Energy use and ecological impact, Service level agreements

Exercises
Self learning component: User experience and software licensing.


Self learning component:- Digital content and cloud computing


Virtualization, Layering and virtualization, Virtual machine monitors, Virtual Machines, Performance and Security Isolation, Full virtualization and par avirtualization, Hardware support for virtualization.

Case Study: Xen a VMM based paravirtualization, Optimization of network virtualization, Cloud performance comparison of virtual machines, Exercises and problems.

Self learning component:-The dark side of virtualization
4. **Cloud Resource Management and Scheduling**

Policies and mechanisms for resource management, Application of control theory to task scheduling on a cloud, Stability of a two-level resource allocation architecture, Feedback control based on dynamic thresholds, Coordination of specialized autonomic performance managers, A utility-based model for cloud-based Web services, Resourcing bundling: Combinatorial auctions for cloud resources, Scheduling algorithms for computing clouds, Fair queuing, Start-time fair queuing, Borrowed virtual time, Cloud scheduling subject to deadlines, Scheduling Map Reduce applications subject to deadlines, Exercises and problems.

**Self learning component:** SLC: Resource management and dynamic scaling

5. **Cloud Security, Cloud Application Development**

Cloud security risks, Security: The top concern for cloud users, Privacy and privacy impact assessment, Trust, Operating system security, Virtual machine Security, Security of virtualization, Security risks posed by shared images, Security risks posed by a management OS, A trusted virtual machine monitor, Amazon web services: EC2 instances, Connecting clients to cloud instances through firewalls, Security rules for application and transport layer protocols in EC2, How to launch an EC2 Linux instance and connect to it SLC.

**Self learning component:** How to use S3 in java


**Self learning component:** Cloud based optimal FPGA synthesis SLC

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**Text Book:**


**REFERENCES:**


Advanced Database Management systems (4:0:0)

Sub Code : MIT0402
Hrs/Week : 04
SEE Hours : 3 Hrs
Designation: CORE
Credits: 04
CIE  : 50%
SEE  : 50%
Max Marks : 100

Course Outcome:

On successful completion of the course, student will be able to

1. Compare different file storage structures for DBMS.
2. Critically compare different types of indexing techniques.
3. Apply alternate query optimization techniques
4. Estimate the cost of a plan with effective data retrieval methods.
5. Design appropriate physical database to meet the application requirement.
6. Compare the advanced applications of the database.

1. **Over view of Storage and Indexing, Disks and Files**
   Data on external storage; File organizations and indexing; Index data structures; Comparison of file organizations; Indexes and performance tuning Memory hierarchy; RAID; Disk management; Buffermanager; Files of records;

   **Self learning component**: Page formats and record formats

2. **Tree Structured Indexing**
   Intuition for tree indexes; Indexes sequential access; B+ -trees, Search, Insert, Delete, Duplicates, B+ -trees in practice, Hash-Based Indexing, Static hashing, Extendible hashing.

   **Self learning component**: Linear hashing, comparisons

3. **Overview of Query Evaluation, External Sorting**
   The system catalog, Introduction to operator evaluation; Introduction to query optimizer; Alternative plans; A motivating example; what a typical optimizer does. When does a DBMS optimize? A simple two -way merge sort; External merge sort

   **Self learning component**: Algorithm for relational operations
4. **Typical Relational Query Optimizer**
   Translating SQL queries into Relational Algebra; Estimating the cost of a plan; Relational algebra equivalences; Enumeration of alternative plans; Nested sub-queries.
   
   **Self learning component:** other approaches to query optimization.

5. **Physical Database Design and Tuning**
   Introduction; Guidelines for index selection, examples; Clustering and indexing; Indexes that enable index-only plans, Tools to assist in index selection; Overview of database tuning; Choices in tuning the conceptual schema; Impact of concurrency; DBMS benchmarking.
   
   **Self learning component:** Choices in tuning queries and views

6. **More Recent Applications**
   Mobile databases; Multimedia databases; Geographical Information Systems;
   
   **Self learning component:** Genome data management.

**Text Books:**


**Reference Books:**

Sub Code : MIT0515
Hrs/Week : 06
SEE Hours : 3 Hrs

CIE : 50%
SEE : 50%
Max Marks : 100

Course Outcome

On successful completion of the course the students will be able to

1. Understand the basic concepts of .Net platform.
2. Use method to Define and deploy the different command line compiler options.
3. Apply different constructs to build the basic c# program.
4. Comprehend the basic of object oriented programming concepts and Exception Handling.
5. Use different system defined interfaces and collections.
6. Use the callback interfaces, delegates and advanced C# keywords.

1. The Philosophy of .NET
Understanding the Previous State of Affairs, The .NET Solution, The Building Block of the .NET Platform (CLR,CTS, and CLS), The Role of the .NET Base Class Libraries, What C# Brings to the Table, An Overview of .NET Binaries (aka Assemblies), the Role of the Common Intermediate Language, The Role of .NET Type Metadata, The Role of the Assembly Manifest, Compiling CIL to Platform-Specific Instructions; Understanding the Common Type System, Intrinsic CTS Data Types, Understanding the Common Languages Specification, Understanding the Common Language Runtime A tour of the .NET Namespaces,

Self study component:- Increasing Your Namespace Nomenclature, Deploying the .NET Runtime.

2. Building C# Applications
The Role of the Command Line Complier (csc.exe), Building C# Application using csc.exe Working with csc.exe Response Files, Generating Bug Reports, Remaining C# Compiler Options, Visual Studio .NET IDE, Other Key Aspects of the VS.NET IDE, C# “Preprocessor:” Directives, An Interesting Aside: The System. Environment Class,

Self study component:- The Command Line Debugger (cordbg.exe) Using the
3. C# Language Fundamentals.
The Anatomy of a Basic C# Class, Creating objects: Constructor Basics, The Composition of a C# Application, Default Assignment and Variable Scope, The C# Member Initialization Syntax, Basic Input and Output with the Console Class, Understanding Value Types and Reference Types, The Master Node: System, Object, The System Data Types (and C# Aliases), Converting Between Value Types and Reference Types: Boxing and Unboxing, Defining Program Constants, C# Iteration Constructs, C# Controls Flow Constructs, The Complete Set of C# Operators, Defining Custom Class Methods, Understanding Static Methods, Methods Parameter Modifies, Array Manipulation in C#, String Manipulation in C#, C# Enumerations,
Self study component:-Defining Structures in C#, Defining Custom Namespaces.

4. Object-Oriented Programming with C#
Forms Defining of the C# Class, Definition the “Default Public Interface” of a Type, Recapping the Pillars of OOP, The First Pillars: C#’s Encapsulation Services, Pseudo-Encapsulation: Creating Read-Only Fields The Second Pillar: C#’s Inheritance Supports, keeping Family Secrets: The “Protected” Keyword, Nested Type Definitions, The Third Pillar: C#’s Polymorphic Support, Casting Between .Exceptions and Object Lifetime. Ode to Errors, Bugs, and Exceptions, The Role of .NET Exception Handing, the System. Exception Base Class, Throwing a Generic Exception, Catching Exception, CLR System – Level Exception (System, System Exception), Custom Application-Level Exception (System. System Exception), Handling Multiple Exception, The Family Block, the Last Chance Exception Dynamically Identifying mApplication – and System Level Exception Debugging System Exception Using VS. NET, Understanding Object Lifetime, the CIT of “new”, The Basics of Garbage Collection,, Finalization a Type, The Finalization Process, Building an Ad Hoc Destruction Method.
Self study component:-Garbage Collection Optimizations, The System. GC Type.

5. Interfaces and Collections
Defining Interfaces Using C# Invoking Interface Members at the object Level, Exercising the Shapes Hierarchy, Understanding Explicit Interface Implementation, Interfaces As Polymorphic Agents, Building Interface Hierarchies, Implementing, Implementation, Interfaces Using VS .NET, understanding the IConvertible Interface, Building a Custom Enumerator (IEnumerator and Enumerator), Building Cloneable objects (ICloneable), Building Comparable Objects (IComparable), Exploring the system. Collections Namespace,
Self study component:-Building a Custom Container (Retrofitting the Cars Type).

6. Callback Interfaces, Delegates, and Events, Advanced Techniques
Understanding Callback Interfaces, Understanding the .NET Delegate Type, Members of System. Multicast Delegate, The Simplest Possible Delegate Example, Building More a Elaborate Delegate Example, Understanding Asynchronous Delegates, Understanding (and Using) Events. The Advances Keywords of C#, A Catalog of C# Keywords Building a Custom Indexer, A Variation of the Cars Indexer Internal Representation of Type Indexer. Using C# Indexer from VB .NET. Overloading operators, The Internal Representation of Overloading

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Self study component: Understanding Delay Signing, Installing/Removing Shared Assembly, Using a Shared Assembly.

Text Books:


Reference Books:


Sub Code : MIT0518
Hrs/Week : 06
SEE Hours : 3 Hrs

CIE : 50%
SEE : 50%
Max Marks : 100

Course outcomes

On successful completion of the course students will be able to:

1. Discuss web services such as SOAP, RPC style SOAP, Document style SOAP, WSDL, REST services.
2. Illustrate usage of AJAX for development of Rich Internet Applications.
3. Explain details of XMLHttpRequest objects.
5. Explain UI components and techniques used in User Interface creation.
6. Design advanced web applications using AJAX, flex and mash up techniques.

1. Introduction, Web Services

What is Web 2.0?, Folksonomies and Web 2.0, Software As a Service (SaaS), Data and Web 2.0, Convergence, Iterative development, Rich User experience, Multiple Delivery Channels, Social Networking. Web Services: SOAP, RPC Style SOAP, Document style SOAP, WSDL, REST services, JSON format, What is JSON?, Array literals, Object literals, Mixing literals, JSON Syntax, JSON Encoding and Decoding.

Self study component:- JSON versus XML

2. Building Rich Internet Applications with AJAX

Building Rich Internet Applications with AJAX: Limitations of Classic Web application model, AJAX principles, Technologies behind AJAX, Examples of usage of AJAX, Dynamic web applications through Hidden frames for both GET and POST methods. IFrames, Asynchronous communication.

Self study component:- AJAX application model

3. XMLHttpRequest objects

XMLHttpRequest Object – properties and methods, handling different browser implementations of XMLHttpRequest, The same origin policy, Cache control, AJAX Patterns (Only algorithms – examples not required), Submission throttling pattern, Periodic refresh, Multi stage download, Fall back patterns.

Self study component:- Predictive fetch pattern

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4. **Building Rich Internet Applications with Flex 24 Hrs**

**Self study component:**-Managing layout, Flex layout overview

5. **Working with UI components**
   Working with UI components: Understanding UI Components, Creating component instances, Common UI Component properties, Handling events, Button, Value selectors, Text components, List based controls, Data models and Model View Controller, Creating collection objects, Setting the data provider, Using Data grids, Using Tree controls, Working with selected values and items, Pop up controls, Navigators, Control bars Working with data: Using data models, Using XML, Using Action script classes.

**Self study component:**-Data Binding

6. **Building Advanced Web 2.0 applications**
   Definition of mash up applications, Mash up Techniques, Building a simple mash up application with AJAX, Remote data communication, strategies for data communication, Simple HTTPServices, URLLoader in Flex, Web Services in Flex, Examples: Building an RSS reader with AJAX.

**Self study component:**-Building an RSS reader with Flex.
Text Books:


2. Chafic Kazoun: Programming Flex 2, O'Reilly publications, 2007. (Chapters 1, Chapters 3 to 7, Chapter 12, Chapter 16 pp380-403)

3. Francis Shanahan: Mashups, Wrox, 2007. (Chapters 1, 6)

Reference Books:


Sub Code : MIT0519
Hrs/Week : 06
SEE Hours : 3 Hrs

Course Outcomes:

1. Discuss the different generations of digital transport networks
2. Diagnose the timing and synchronization in digital networks
3. Describe architecture of Optical Transport Network (OTN)
4. Discuss Wavelength Division Multiplexing (WDM)
5. Analyze the concepts of label switching and its importance in Optical Transport Network (OTN)

1. **Introduction, Telecommunications Infrastructure, Characteristics of Optical Fiber:** Three generations of Digital Transport Networks; A brief introduction to WDM and TDM; The Optical Marketplace; Key Optical Nodes; Other Key Terms; Evolution of Optical Systems; Key attributes of Optical Fiber, The Local Connections; The Backbone Connections; The Digital Multiplexing Hierarchy; The Digital Signaling Hierarchies; T1 / DS1 and T3 / DS3; The Layered Protocol Model in the Transport Network; considerations for Interworking Layer1, Layer 2, and Layer 3 Networks, The Basics; The Wavelength; The Basic Components; Structure of the Fiber; Fiber Types; Key Performance Properties of Fiber; Attenuation; Amplifier Spontaneous Emission; Chromatic Dispersion;

**Self study component:** Wireless Optical Systems, Lasers

2. **Timing and Synchronization, SONET and SDH:** Timing and Synchronization in Digital Networks; Effect of a Timing error; The Clocking Signal; Types of Timing in Networks; Timing Variations; Methods of Clock Exchange; Distribution of Timing Using SONET and DS1; Timing Downstream Devices; Synchronization Status Messages and Timing Loops, The SONET Multiplexing Hierarchy; SONET and SDH Multiplexing Structure; The SONET / SDH Frame Structure; SONET and SDH Functional Components; SONET and SDH Problem Detection; Locating and Adjusting Payload with Pointers; Virtual Tributaries in more detail; Virtual Tributaries in Virtual Containers; The Overhead Bytes;

**Self study component:** Building Integrated Timing Supply, SONET and SDH Concatenation
3. **Architecture of Optical Transport Networks, WDM, Network Topologies and Protection**
   - Schemes: The Digital Wrapper; Control Planes; In-Band and Out-Band Control Signaling; Importance of Multiplexing and Multiplexing Hierarchies; Current Digital Transport Hierarchy; SONET Multiplexing Hierarchy; SDH Multiplexing Hierarchy; Key Indexes and Other Terms; The New Optical Transport and Digital Transport Hierarchy; The OTN Layered Model; Encapsulation and Decapsulation Operations.
   - **Self study component:** Generic Framing Procedure.

4. **The WDM Operation; DWDM, TDM and WDM Topologies; Relationship of WDM to SONET / SDH; EDF; WDM Amplifiers; Add-Drop Multiplexers; WDM Cross-Connects; Wavelength Continuity Property; Examples of DWDM Wavelength Plan; Higher Dispersion for DWDM; Tunable DWDM Lasers, The Non-Negotiable Requirement Robust Networks; Diversity in the Network; Line and Path Protection Switching; Types of Topologies; Working and Protection Fibers; Point-to-Point Topology; BLSR; Protection Switching on Four-Fiber BLSR; Meshed Topologies; PONs; Ethernet in the Wide Area Backbone.
   - **Self study component:** Metro Optical Networking.

5. **MPLS and Optical Networks, Architecture of IP and MPLS-Based OTNs:** Label Switching; FEC; Types of MPLS Nodes; Label Distribution and Binding; Label Switching and Traffic Forwarding; MPLS Support of VPNs; MPLS Traffic Engineering; Multiprotocol Lambda Switching; MPLS and Optical TE Similarities; Possibilities for the MPIS Network; Control and Data Planes Interworking, IP, MPLS, and Optical Control Planes; Interworking the three Control Planes; Management of the Planes; A Framework for the IP over Optical Networks; An Opposing View; Generalized MPLS use in Optical Networks; Bi-Directional LSPs in Optical Networks; GMPLS Extensions for G.709.
   - **Self study component:** GMPLS with SONET and SDH.

7. **The Link Management Protocol, Optical Routers:** Keep the Optical Link up and running; What is managed? Data-bearing Links; Clarification of terms; Basic functions of LMP; Control Channel Management; Link Property Correlation; Fault Management; Extending LMP operations for Optical Link Systems., Optical Switching; Implementation Preferences; Key Terms; Evolution of Switching Networks; Optical Router; Optical Switching Technologies; Optical Resources; Protecting the Label Switched Paths; Protection of the OSP; Wavelength OSP and MPLS LSP; Nesting the LSPs and OSPs; Topologies for a Node Failure; Plane Coupling and De-Coupling; Some End-to-End Wavelengths and Node-to-Node Wavelengths; Granularity of Labels versus Wavelength Support; Approach to the Problem of LSP and OSP Interworking.
   - **Self study component:** MEMS and Optical Switching; Thermo-Optic Switches.
TEXT BOOKS:


REFERENCE BOOKS:


III Semester

Course Code: MIT0201
Course: Seminar on Current Topic
On successful completion of the course, the students will be able to:

1. Identify current trends in a specific area of interest.
2. Identify real world issues by conducting literature survey of the area.
3. Understand and interpret the results of technical work as indicated by the literature.
4. Present a proper report, both orally and in writing on their seminar topic.

Course Code: MIT0401
Course: Industrial Training
On successful completion of the course, the students will be able to:

1. Get acquainted in the industrial environment and working procedures.
2. Familiarize with current technologies.
3. Correlate the gained knowledge to real life working environment.
4. Conclude by writing a brief report and presentation.

Course Code: MIT0801
Course: Project Phase-I
On successful completion of the course the students will be able to:

1. Identify a real world engineering problem and formulate it.
2. Outline a software project plan to check the feasibility of the solution in terms of both time and cost.
3. Describe the problem to identify both software and hardware requirement.
4. Carry out extensive literature survey to evaluate the available tools and adapt it to develop a suitable design.
Course Code: MIT2801

Course: Project Phase-II

On successful completion of the course the students will be able to

1. Construct the proposed design of Phase- I using appropriate tools and technology.
2. Implement the constructed design to get working results.
3. Verify and validate the obtained results
4. Prepare a detailed technical report of the project work carried out
5. Also suggest limitations and further extensions for the work.
Course outcomes

On successful completion of the course, students will be able to:

1. Understand the scope of e-commerce in the realm of modern business.
2. Know the various business models of e-commerce.
3. Find out the technologies used to develop e-commerce applications.
4. Familiar with marketing methods used in e-commerce.
5. Operate the legal and regulatory framework in e-commerce.
6. Keep track of the methods and metrics used to measure effectiveness of e-commerce activities

1. **E-commerce in Indian business context**: Definition of e-commerce advantages of e-commerce, disadvantages of e-commerce, e-transition challenges for Indian corporate.

   **Self learning component**: e-commerce opportunities for industries


   **Self learning component**: Info-mediary model, community model
3. **Enabling Technologies of www** : Internet client-server applications, Networks and Internet protocols, IPV4, IPV6, Search Engines, software agents, Internet standards and specifications, Broadband technologies.

   **Self learning component**:- – types of broadband technology

4. **E-marketing** : Traditional marketing, identifying web-presence goods, Browsing behavior, model, online marketing, e-advertising, e-branding, Marketing strategies.

   **Self learning component**:-

5. **E-payment Systems** : Main concerns in Internet banking, Digital payment, requirements, Digital token based e-payment systems, classification of new payment systems, Proprietary e-cash, cheque payment on Internet, Risk of e-payment systems, Designing e-payment systems, digital signatures.

   **Self learning component**:-

6. **Other issues** : E-CRM solutions; e-supply chain management – strategic advantage, components; Information and Strategy – The virtual value chain,

   **Self learning component**:- seven dimensions of e-commerce strategy.

**Text Books**


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**Advanced Mathematics (4:0:0)**

<table>
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<tr>
<th>Sub Code</th>
<th>MIT0401</th>
<th>CIE : 50%</th>
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<td>Hrs/Week</td>
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**Course outcomes**

On successful completion of the course, students will be able to:
1. Construct the matrix, digraphs of relations and prove some results on different types of relation and also obtain equivalence classes.
2. Identify different types of functions, find composition and inverse of a function and solve problems using pigeon-hole principle.
3. Apply the concepts of graph theory to solve some application problems.
4. Solve problems associated with basic probability, Baye’s rule, discrete & continuous probability distributions.
5. Evaluate estimators, construct confidence intervals, and perform hypothesis tests and obtain regression lines.
6. Solve problems of Joint Distribution, Markov chain using transition probability matrix and also the problems in queuing theory.

1. **Relations**

   Binary relations, Matrix and Digraph representation of a relation, Operations on binary relations, (SLE: Composition of relations), Properties of relations, Equivalence relations.

   - 9 Hrs

2. **Functions**

   Function, Types of functions, Composition of functions, Invertible functions, Recursive function, (SLE: Hash function), The Pigeonhole-principle.

   - 8 Hrs

3. **Graph Theory**


   - 9 Hrs

4. **Probability**

   (SLE: Basic probability upto Baye’s Theorem) Random variables – Discrete and continuous random variables, Binomial, Poisson’s, Exponential and Normal Distributions.

   - 9 Hrs

5. **Statistical Inference**

6. Joint Distribution and Markov Chains

Concept of joint probability: Joint probability distribution, (discrete) Independent random variables, Expectation, Covariance, Correlation Coefficient. (SLE: Continuous joint probability distributions) joint vectors, Stochastic matrices, Regular stochastic matrices, Markov chains, Concept of a queue, M/M/1 M/M/I queuing systems, analysis.

Books for Reference:

4. Probability and Statistics – Schaum Series (All latest editions)

Data Warehousing and Data Mining (4:0:2)

Sub Code : MIT0504
Hrs/Week : 06
SEE Hours : 3 Hrs
Designation: CORE
Credits: 05

Course Outcomes:

On successful completion of the course the students will be able to

1. Understand the concepts of Data Warehousing, modeling and OnLine Analytical Processing (OLAP) and Data Mining.
2. Identify the challenges, tasks, technologies, and kind of applications demanded by the data mining industry.
3. Decide about the data, data preprocessing and applications.
4. Use the algorithms for association analysis and evaluate the association patterns.
5. Understand and use the various data classification methods.
6. Identify the various clustering methods to classify the data and perform analysis.
1. Data Warehousing and OLAP
Data Warehouse basic concepts, Data Warehouse Modeling, Data Cube.
Self learning component: OLAP

2. Data Mining
Introduction, What is Data Mining, Motivating Challenges, Which technologies are used, which kinds of applications are targeted by Data Mining
Self learning component: Data Mining Tasks

3. Data Mining-Which type of data
Types of Data, Data Preprocessing, Measures of Similarity and Dissimilarity,
Self learning component: Data Mining Applications

4. Association Analysis: Basic Concepts and Algorithms
Frequent Item set Generation, Rule Generation, Compact Representation of Frequent Itemsets, Alternative methods for generating Frequent Item sets, FP Growth Algorithm,
Self learning component: Evaluation of Association Patterns

5. Classification
Self learning component: Evaluation criteria for classification methods

6. Clustering Techniques
Overview, Features of cluster analysis, Types of Data and Computing Distance, Types of Cluster Analysis Methods, Partitional Methods, Hierarchical Methods, Density Based Methods. Quality and Validity of Cluster Analysis. Outlier detection methods, Classification based approached
Self learning component: Statistical Approaches, Clustering based applications

Text Books:

Reference Books:
2. Jiawei Han and Micheline Kamber: Data Mining - Concepts and Techniques, 2nd Edition, Morgan Kaufmann Publisher, 2006.
### CYBER SECURITY and CYBER LAW (4:2:0)

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<tr>
<td>SEE Hours</td>
<td>3 Hrs</td>
<td>Max Mark</td>
<td>100</td>
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#### Course outcomes

1. Introduce the student to the area of cybercrime and forensics.
2. Understand the motive and causes for cybercrime, detection and handling.
3. Areas affected by cybercrime and investigation.
4. Tools used in cyber forensic
5. have knowledge of Legal Perspectives in cyber security

#### Unit -1


#### Unit -2


#### Unit -3


#### Unit -4

**Understanding Computer Forensics:** Introduction, Historical Background of, Cyberforensics, Digital Forensics Science, The Need for Computer Forensics,, Cyberforensics and Digital Evidence.

NIE, Mysore-08

Unit-5


Unit-6


Text Books:

Reference Books:
Cloud Computing (4:0:2)

Sub Code : MIT0505
Hrs/Week : 06
SEE Hours : 3 Hrs
Designation: CORE

Credits: 05

Course Outcomes

On successful completion of the course, the student will be able

1. Use Cloud Services.
2. Comprehend the concept of Virtualization
3. Comparatively evaluate task scheduling algorithms.
4. Apply Map-Reduce concept to applications.
5. Evaluate the needs for Private Cloud building.
6. Comprehend issues of resource virtualization and scheduling.

1. Introduction, Cloud Infrastructure
   Cloud computing, Cloud computing delivery models and services, Ethical issues, Cloud vulnerabilities, Cloud computing at Amazon, Cloud computing the Google perspective, Microsoft Windows Azure and online services, Open-source software platforms for private clouds, Cloud storage diversity and vendor lock-in, Energy use and ecological impact, Service level agreements, Exercises
   Self learning component:- User experience and software licensing.

   Self learning component:- Digital content and cloud computing

   Self learning component:- The dark side of virtualization

   Policies and mechanisms for resource management, Application of control theory to task scheduling on a cloud, Stability of a two-level resource allocation architecture, Feedback control based on dynamic thresholds, Coordination of specialized autonomic performance managers, A utility-based model for cloud-

NIE, Mysore-08
based Web services, Resourcing bundling: Combinatorial auctions for cloud resources, Scheduling scheduling subject to deadlines, Scheduling Map Reduce applications subject to deadlines, Exercises and

Selflearning component: - SLC: Resource management and dynamic scaling

Cloud security risks, Security: The top concern for cloud users, Privacy and privacy impact assessment, Trust, Operating system security, Virtual machine Security, Security of virtualization, Security risks posed by shared images, Security risks posed by a management OS, A trusted virtual machine monitor, Amazon web services: EC2 instances, Connecting clients to cloud instances through firewalls, Security rules for application and transport layer protocols in EC2, How to launch an EC2 Linux instance and connect to it SLC.
Selflearning component: - How to use S3 in java

Selflearning component: - Cloud based optimal FPGA synthesis SLC

Text Book:


REFERENCES:


Advanced Database Management systems (4:0:0)

Sub Code : MIT0402
Hrs/Week : 04
SEE Hours : 3 Hrs
Designation: CORE
Credits: 04

CIE : 50%
SEE : 50%
Max Marks : 100

Course Outcome

On successful completion of the course the students will be able to

1. Compare the different file storage structures for DBMS
2. Describe the different types of Indexing Techniques
3. Understand the query evaluation and sorting Techniques
4. Estimate the cost of a plan and enumerate alternative plans
5. Understand the physical Database Design and Tuning
6. Discuss the database Applications

1. Over view of Storage and Indexing, Disks and Files
   Data on external storage; File organizations and indexing; Index data structures; Comparison of file organizations; Indexes and performance tuning Memory hierarchy; RAID; Disk space management; Buffermanager; Files of records;

   Self learning component: Page formats and record formats

2. **Tree Structured Indexing**
   Intuition for tree indexes ;Indexed sequential access method; B+ trees, Search, Insert, Delete, Duplicates, B+tress in practice, Hash-Based Indexing; Static hashing, Extendible hashing.

   Self learning component: Linear hashing, comparisons

3. Overview of Query Evaluation, External Sorting
   The system catalog, Introduction to operator evaluation; Introduction to query optimization; Alternative plans; A motivating example; what a typical optimizer does. When does a DBMS sort data? A simple two-way merge sort; External merge sort

   Self learning component: Algorithm for relational operations

4. **A Typical Relational Query Optimizer**
   Translating SQL queries in to Relational Algebra; Estimating the cost of a plan; Relational algebra equivalences; Enumeration of alternative plans; Nested sub-queries.

   Self learning component: other approaches to query optimization.

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5. **Physical Database Design and Tuning**
   Introduction; Guidelines for index selection, examples; Clustering and indexing;
   Indexerenable index-only plans, Tools to assist in index selection; Overview of database
   tuning; Choices in tuning the conceptual schema; Impact of concurrency; DBMS benchmarking.

   **Self learning component:** Choices in tuning queries and views

6. **More Recent Applications**
   Mobile databases; Multimedia databases; Geographical Information Systems;

   **Self learning component:** Genome data management.

**Text Books:**


**Reference Books:**

Sub Code: MIT0515
Hrs/Week: 06
SEE Hours: 3 Hrs

CIE: 50%
SEE: 50%
Max Marks: 100

Course Outcome

On successful completion of the course the students will be able to

1. Understand the basic concepts of .Net platform.
2. Use method to Define and deploy the different command line compiler options.
3. Apply different constructs to build the basic C# program.
4. Comprehend the basic of object oriented programming concepts and Exception Handling.
5. Use different system defined interfaces and collections.
6. Use the callback interfaces, delegates and advanced C# keywords.

1. The Philosophy of .NET
Understanding the Previous State of Affairs, The .NET Solution, The Building Block of the .NET Platform (CLR, CTS, and CLS), The Role of the .NET Base Class Libraries, What C# Brings to the Table, An Overview of .NET Binaries (aka Assemblies), the Role of the Common Intermediate Language, The Role of .NET Type Metadata, The Role of the Assembly Manifest, Compiling CIL to Platform—Specific Instructions, Understanding the Common Type System, Intrinsic CTS Data Types, Understanding the Common Languages Specification, Understanding the Common Language Runtime A tour of the .NET Namespaces,

Self study component:- Increasing Your Namespace Nomenclature, Deploying the .NET Runtime.

2. Building C# Applications

Self study component:-The Command Line Debugger (cordbg.exe) Using the
3. **C# Language Fundamentals.**
The Anatomy of a Basic C# Class, Creating objects: Constructor Basics, The Composition of a Basic Input and Output with the Console Class, Understanding Value Types and Reference Types, The Master Node: System, Object, The System Data Types (and C# Aliases), Converting Between Value Types and Reference Types: Boxing and Unboxing, Defining Program Constants, C# Iteration Constructs, C# Controls Flow Constructs, The Complete Set of C# Operators, Defining Custom Class Methods, Understating Static Methods, Methods Parameter Modifies, Array Manipulation in C#, String Manipulation in C#, C# Enumerations,
Self study component: Defining Structures in C#, Defining Custom Namespaces.

4. **Object-Oriented Programming with C#**
Forms Defining of the C# Class, Definition the “Default Public Interface” of a Type, Recapping the Pillars of OOP, The First Pillar: C#’s Encapsulation Services, Pseudo-Encapsulation: Creating Read-Only Fields The Second Pillar: C#’s Inheritance Supports, keeping Family Secrets: The “Protected” Keyword, Nested Type Definitions, The Third Pillar: C#’s Polymorphic Support, Casting Between .Exceptions and Object Lifetime. Ode to Errors, Bugs, and Exceptions, The Role of .NET Exception Handling, the System. Exception Base Class, Throwing a Generic Exception, Catching Exception, CLR System – Level Exception (System, System Exception), Custom Application-Level Exception (System, System Exception), Handling Multiple Exception, The Family Block, the Last Chance Exception Dynamically Identifying mApplication – and System Level Exception Debugging System Exception Using VS. NET, Understanding Object Lifetime, the CIT of “new”, The Basics of Garbage Collection, Finalization a Type, The Finalization Process, Building an Ad Hoc Destruction Method,
Self study component: Garbage Collection Optimizations, The System. GC Type.

5. **Interfaces and Collections**
Defining Interfaces Using C# Invoking Interface Members at the object Level, Exercising the Shapes Hierarchy, Understanding Explicit Interface Implementation, Interfaces As Polymorphic Agents, Building Interface Hierarchies, Implementing, Implementation, Interfaces Using VS .NET, understanding the IConvertible Interface, Building a Custom Enumerator (IEnumerator and Enumerator), Building Cloneable objects (ICloneable), Building Comparable Objects (IComparable), Exploring the system. Collections Namespace,
Self study component: Building a Custom Container (Retrofitting the Cars Type).

6. **Callback Interfaces, Delegates, and Events, Advanced Techniques**
Understanding Callback Interfaces, Understanding the .NET Delegate Type, Members of System. Multicast Delegate, The Simplest Possible Delegate Example, Building More a Elaborate Delegate Example, Understanding Asynchronous Delegates, Understanding (and Using)Events. The Advances Keywords of C#, A Catalog of C# Keywords Building a Custom Indexer, A Variation of the Cars Indexer Internal Representation of Type Indexer. Using C# Indexer, A Variation of the Cars Indexer Internal Representation of Type Indexer from VB .NET. Overloading operators, The Internal Representation of Overloading Indexer from VB .NET.
Course outcomes

On successful completion of the course students will be able to:

1. Discuss web services such as SOAP, RPC style SOAP, Document style SOAP, WSDL, REST services.
2. Illustrate usage of AJAX for development of Rich Internet Applications.
3. Explain details of XMLHTTP objects.
5. Explain UI components and techniques used in User Interface creation.
6. Design advanced web applications using AJAX, flex and mash up techniques.

1. Introduction, Web Services
   What is Web 2.0?, Folksonomies and Web 2.0, Software As a Service (SaaS), Data and Web 2.0, Convergence, Iterative development, Rich User experience, Multiple Delivery Channels, Social Networking. Web Services: SOAP, RPC Style SOAP, Document style SOAP, WSDL, REST services, JSON format, What is JSON?, Array literals, Object literals, Mixing literals, JSON Syntax, JSON Encoding and Decoding.
   Self study component:- JSON versus XML

2. Building Rich Internet Applications with AJAX
   Building Rich Internet Applications with AJAX: Limitations of Classic Web application model, AJAX principles, Technologies behind AJAX, Examples of usage of AJAX, Dynamic web applications through Hidden frames for both GET and POST methods. Iframes, Asynchronous communication.
   Self study component:- AJAX application model

3. XMLHTTP objects
   XMLHTTP Object – properties and methods, handling different browser implementations of XMLHTTP, The same origin policy, Cache control, AJAX Patterns (Only algorithms – examples not required), Submission throttling pattern, Periodic refresh, Multi stage download, Fall back patterns.
   Self study component:- Predictive fetch pattern
4. **Building Rich Internet Applications with Flex 24 Hrs**
   Flash player, Flex framework, MXML and Actionscript, Working with Data services, Understanding differences between HTML and Flex applications, Understanding how Flex applications work, Understanding Flex and Flash authoring, MXML language, a simple example, Using Actionscript, MXML and Actionscript correlations. Understanding Actionscript 3.0 language syntax: Language overview, Objects and Classes, Packages and namespaces, Variables & scope of variables, case sensitivity and general syntax rules, Operators, Conditional, Looping, Functions, Nested functions, Functions as Objects, Function scope, OO Programming in Actionscript: Classes, Interfaces, Inheritance, Working with String objects, Working with Arrays, Error handling in Actionscript: Try/Catch, Working with XML Framework fundamentals, Understanding application life cycle, Differentiating between Flash player and Framework, Bootstrapping Flex applications, Loading one flex application into another, Understanding application domains, Understanding the preloader, Working with children, Container types, Layout rules, Padding, Borders and gaps, Nesting containers, Making fluid interfaces.
   **Self study component:** Managing layout, Flex layout overview

5. **Working with UI components**
   Working with UI components: Understanding UI Components, Creating component instances, Common UI Component properties, Handling events, Button, Value selectors, Text components, List based controls, Data models and Model View Controller, Creating collection objects, Setting the data provider, Using Data grids, Using Tree controls, Working with selected values and items, Pop up controls, Navigators, Control bars Working with data: Using data models, Using XML, Using Action script classes.
   **Self study component:** Data Binding

6. **Building Advanced Web 2.0 applications**
   Definition of mash up applications, Mash up Techniques, Building a simple mash up application with AJAX, Remote data communication, strategies for data communication, Simple HTTPServices, URLLoader in Flex, Web Services in Flex, Examples: Building an RSS reader with AJAX.
   **Self study component:** Building an RSS reader with Flex.
Optical Networks (4:0:2)

Sub Code : MIT0519  
Hrs/Week  : 06  
SEE Hours : 3 Hrs

CIE : 50%  
SEE : 50%  
Max Marks : 100

Course Outcomes:

1. Discuss the different generations of digital transport networks
2. Diagnose the timing and synchronization in digital networks
3. Describe architecture of Optical Transport Network (OTN)
4. Discuss Wavelength Division Multiplexing (WDM)
5. Analyze the concepts of label switching and its importance in Optical Transport Network (OTN)

1. **Introduction, Telecommunications Infrastructure, Characteristics of Optical Fiber**: Three generations of Digital Transport Networks; A brief introduction to WDM and TDM; The Optical Marketplace; Key Optical Nodes; Other Key Terms; Evolution of Optical Systems; Key attributes of Optical Fiber, The Local Connections; The Backbone Connections; The Digital Multiplexing Hierarchy; The Digital Signaling Hierarchies; T1 / DS1 and T3 / DS3; The Layered Protocol Model in the Transport Network; considerations for Interworking Layer1, Layer 2, and Layer 3 Networks, The Basics; The Wavelength; The Basic Components; Structure of the Fiber; Fiber Types; Key Performance Properties of Fiber; Attenuation; Amplifier Spontaneous Emission; Chromatic Dispersion;

**Self study component**: Wireless Optical Systems, Lasers

2. **Timing and Synchronization, SONET and SDH**: Timing and Synchronization in Digital Networks; Effect of a Timing error; The Clocking Signal; Types of Timing in Networks; Timing Variations; Methods of Clock Exchange; Distribution of Timing Using SONET and DS1; Timing Downstream Devices; Synchronization Status Messages and Timing Loops, The SONET Multiplexing Hierarchy; SONET and SDH Multiplexing Structure; The SONET / SDH Frame Structure; SONET and SDH Functional Components; SONET and SDH Problem Detection; Locating and Adjusting Payload with Pointers; Virtual Tributaries in more detail; Virtual Tributaries in Virtual Containers; The Overhead Bytes;

**Self study component**: Building Integrated Timing Supply, SONET and SDH Concatenation
3. **Architecture of Optical Transport Networks, WDM, Network Topologies and Protection Schemes**: The Digital Wrapper; Control Planes; In-Band and Out-Band Control Signaling; SONET Multiplexing Hierarchy; SDH Multiplexing Hierarchy; Key Indexes and Other Terms; The New Optical Transport and Digital Transport Hierarchy; The OTN Layered Model; Encapsulation and Decapsulation Operations; **Self study component**: Generic Framing Procedure.

4. **The WDM Operation; DWDM, TDM and WDM Topologies**: Relationship of WDM to SONET / SDH; EDF; WDM Amplifiers; Add-Drop Multiplexers; WDM Cross-Connects; Wavelength Continuity Property; Examples of DWDM Wavelength Plan; Higher Dispersion for DWDM; Tunable DWDM Lasers, The Non-Negotiable Requirement Robust Networks; Diversity in the Network; Line and Path Protection Switching; Types of Topologies; Working and Protection Fibers; Point-to-Point Topology; BLRS; Protection Switching on Four-Fiber BLRS; Meshed Topologies; PONs; Ethernet in the Wide Area Backbone; **Self study component**: Metro Optical Networking.

5. **MPLS and Optical Networks, Architecture of IP and MPLS-Based OTNs**: Label Switching; FEC; Types of MPLS Nodes; Label Distribution and Binding; Label Switching and Traffic Forwarding; MPLS Support of VPNs; MPLS Traffic Engineering; Multiprotocol Lambda Switching; MPLS and Optical TE Similarities; Possibilities for the MPLS Network; Control and Data Planes Interworking, IP, MPLS, and Optical Control Planes; Interworking the three Control Planes; Management of the Planes; A Framework for the IP over Optical Networks; An Opposing View; Generalized MPLS use in Optical Networks; Bi-Directional LSPs in Optical Networks; GMPLS Extensions for G.709; **Self study component**: GMPLS with SONET and SDH.

6. **The Link Management Protocol, Optical Routers**: Keep the Optical Link up and running; What is managed? Data-bearing Links; Clarification of terms; Basic functions of LMP; Control Channel Management; Link Property Correlation; Fault Management; Extending LMP operations for Optical Link Systems, Optical Switching; Implementation Preferences; Key Terms; Evolution of Switching Networks; Optical Router; Optical Switching Technologies; Optical Resources; Protecting the Label Switched Paths; Protection of the OSP; Wavelength OSP and MPLS LSP; Nesting the LSPs and OSPs; Topologies for a Node Failure; Plane Coupling and De-Coupling; Some End-to-End Wavelengths and Node-to-Node Wavelengths; Granularity of Labels versus Wavelength Support; Approach to the Problem of LSP and OSP Interworking; **Self study component**: MEMS and Optical Switching; Thermo-Optic Switches.
Complete Course

Python Applications Programming (4:2:0)

Sub Code: MIT05XX
Hrs/Week: 06
SEE Hours: 3 Hrs

Course outcomes

1. Learn Various Paradigms of Python Programming.
2. GUI Programming using Tkinter.
3. handle Files, Lists and Dictionaries in Python.
4. Learn How to combine data structures and functions available in Python to solve Problems.
5. Learning Python through Applications.

Unit -1
Introduction to Python: Basic features, creating Python programs, Functions, Strings, Lists, Tuples, and sets, Selections, Loops, Programming examples

Unit -2
Dictionaries, Files, Objects and classes, Object Oriented programming, Regular Expressions, text processing, Programming exercises

Unit - 3
Internet Programming, Multi threaded programming, Programming exercises

Unit-4
GUI Programming: Tkinter, Database Programming

Unit-5
Web Development: Web clients and servers, Web application Programming,

Unit-6
Case studies (A simple Blog, A wiki web, XML to read iTunes Database)

Text Books:
Reference Books:

4G TECHNOLOGIES(4:2:0)

Sub Code : MIT05XX
Hrs/Week : 06
SEE Hours : 3 Hrs

Course outcomes

1. Learn various generations of wireless and cellular networks
2. Study the fundamentals of 3G Services, its protocols and applications
3. Study how 4G Networks evolved, its architecture and applications
4. Study about WiMAX networks, protocol stack and standards
5. Gain knowledge about Spectrum characteristics & Performance evaluation

Unit - 1
INTRODUCTION: Introduction: History of mobile cellular systems, First Generation, Second Generation, Overview of 3G, 3GPP and 3GPP2 standards Overview of 4G

Unit - 2

Unit - 3
WIRELESS LOCAL AREA NETWORKS: WLAN Equipment WLAN Topologies, WLAN Technologies IR Technology UHF Narrowband Technology Spread Spectrum, Technology IEEE, 802.11, Bluetooth Piconet in the Presence of IEEE, Other WLAN Standards, IEEE 802.16, WiMAX.

Unit - 4
4G LTE NETWORKS: 4G Vision, 4G features and challenges, Applications of 4G, 4G Technologies – Multi carrier modulation, Smart Antenna Techniques, OFDMMIMO, Systems, Adaptive Modulation and Coding with Time-Slot Scheduler,
Unit-5

Unit-6

Text Books:
1. Introduction to 4G Mobile Communication, JuhaKorhonen, Artech House, (www.artechhouse.com),

Reference Books: NIL
INTERNET OF THINGS (4:2:0)

Sub Code : MIT05XX
Hrs/Week : 06
SEE Hours : 3 Hrs

CIE : 50%
SEE : 50%
Max Marks : 100

Course outcomes

1. Learn the basic issues, policy and challenges in the IoT
2. Understand the Mechanism and Key Technologies in IoT
3. Understand the Standard of the IoT
4. Learn to manage the resources in the IoT
5. Deploy the resources into business
6. Understand Data Analytics for IoT

Unit -1
What is The Internet of Things? Overview and Motivations, Examples of Applications, IPV6 Role., Areas of Development and Standardization, Scope of, the Present Investigation. Internet of Things Definitions and frameworks-IoT, Definitions, IoT Frameworks, Basic Nodal Capabilities, Internet of Things, Application Examples-Overview, Smart Metering/Advanced Metering, Infrastructure-Health/Body Area Networks, City Automation, Automotive, Applications, Home Automation, Smart Cards, Tracking, Over-The-Air-Passive, Surveillance/Ring of Steel, Control Application Examples, Myriad Other, Applications.

Unit -2

Unit - 3

Unit-4

Unit-5
Data Analytics for IoT – Introduction, Apache Hadoop, Using Hadoop, MapReduce for Batch Data Analysis

Unit-6
Apache Oozie, Apache Spark, Apache, Storm, Using Apache Storm for Real-time Data Analysis, Structural Health, Monitoring Case Study.

Text Books:
1. Daniel Minoli, ”Building the Internet of Things with IPv6 and MIPv6: The Evolving World of M2M Communications”, Wiley, 2013

Reference Books:
Sub Code : MIT0504  CIE : 50%
Hrs/Week : 06  SEE : 50%
SEE Hours : 3 Hrs  Max Marks : 100
Designation : CORE
Credits: 05

Course Outcomes:

On successful completion of the course the students will be able to

1. Understand the concepts of Data Warehousing, modeling and Online Analytical Processing
2. Identify the challenges, tasks, technologies and the kind of applications demanded by Data Mining
3. Decide about the data, data preprocessing and applications
4. Use the algorithms for association analysis and evaluate the association patterns
5. Understand and use the various data classification methods
6. Identify the various clustering methods to classify the data and perform analysis

1. Data Warehousing and OLAP
   Data Warehouse basic concepts, Data Warehouse Modeling, Data Cube.
   Self learning component:--OLAP

2. Data Mining
   Introduction, What is Data Mining, Motivating Challenges, Which technologies are used, which kinds of applications are targeted by Data Mining
   Self learning component:--Data Mining Tasks

3. Data Mining-Which type of data
   Types of Data, Data Preprocessing, Measures of Similarity and Dissimilarity
   Self learning component:-- Data Mining Applications

4. Association Analysis: Basic Concepts and Algorithms
   Frequent Itemset Generation, Rule Generation, Compact Representation of Frequent Itemsets, Alternative methods for generating Frequent Itemsets, FP Growth Algorithm,
   Self learning component:--Evaluation of Association Patterns
5. **Classification**

   **Self learning component:-** Evaluation criteria for classification methods

6. **Clustering Techniques**
   Overview, Features of cluster analysis, Types of Data and Computing Distance, Types of Cluster Analysis Methods, Partitional Methods, Hierarchical Methods, Density Based Methods. Quality and Validity of Cluster Analysis. Outlier detection methods, Classification based approached

   **Self learning component:-** Statistical Approaches, Clustering based applications

**Text Books:**


**Reference Books:**


2. Jiawei Han and Micheline Kamber: Data Mining - Concepts and Techniques, 2nd Edition, Morgan Kaufmann Publisher, 2006.

Sub Code : MIT0507
Hrs/Week : 06
SEE Hours : 3 Hrs

Course outcomes
1. Provide an in-depth knowledge of Web Services.
2. Understand the fundamental concepts of Web services.
3. Understand the fundamental concepts of WSDL Web Services.
5. Study Building Blocks of Web services.

Unit -1
Middleware: Understanding the middle ware, RPC and Related Middle ware, TP Monitors, Object Brokers, Message-Oriented Middleware.

Unit -2

Unit - 3
Basic Web Services Technology: WSDL Web Services Description Language, UDDI Universal Description Discovery and Integration, Web Services at work interactions between the Specifications, Related Standards.

Unit-4
(Service Coordination Protocols: Infrastructure for Coordination Protocols, WSCoordination, WS-Transaction, Rosetta Net and Other Standards Related to Coordination Protocols.

Unit-5
Service Composition: Basic of Service Composition, A New Chance of Success for Composition, Services Composition Models, Dependencies between Coordination and Composition,

Unit-6
BPEL: Business Process Execution Language for Web Services, Outlook, Applicability of the Web Services, Web services as a Problem and a Solution : AN Example.

Text Books:

Reference Books: NIL

NIE, Mysore-08

CIE : 50%
SEE : 50%
Max Marks : 100
Web Services (4:2:0)

Sub Code : MIT05XX  CIE : 50%
Hrs/Week : 06  SEE : 50%
SEE Hours : 3 Hrs  Max Marks : 100

Course outcomes
1. provide an in-depth knowledge of Web Services.
2. understand the fundamental concepts of Web services.
3. understand the fundamental concepts of WSDL Web Services.
4. design Web service Architecture.
5. Study Building Blocks of Web services.

Unit -1
Middleware: Understanding the middle ware, RPC and Related Middle ware, TP Monitors, Object Brokers, Message-Oriented Middleware.

Unit -2

Unit - 3
Basic Web Services Technology: WSDL Web Services Description Language, UDDI Universal Description Discovery and Integration, Web Services at work interactions between the Specifications, Related Standards.

Unit-4
Service Coordination Protocols: Infrastructure for Coordination Protocols, WSCoordination, WS-Transaction, Rosetta Net and Other Standards Related to Coordination Protocols.

Unit-5
Service Composition: Basic of Service Composition, A New Chance of Success for Composition, Services Composition Models, Dependencies between Coordination and Composition.

Unit-6
BPEL: Business Process Execution Language for Web Services, Outlook, Applicability of the Web Services, Web services as a Problem and a Solution: AN Example.
Department of CS&E

Text Books:

Reference Books: NIL
Advanced Mathematics (4:0:0)

Sub Code : MIT0402
Hrs/Week : 04
SEE Hours : 3 Hrs

CIE : 50%
SEE : 50%
Max Marks : 100

Course Outcomes:

On successful completion of the course the students will be able to:

1. Construct the matrix, digraphs of relations and explain some results on different types of relations and solve problems associated with equivalence relations.

2. Identify different types of functions, compute composition and inverse of a function and solve problems using pigeon-hole principle.

3. Apply Euclidean algorithm, Chinese remainder, Fermat’s and Wilsons theorems to solve the problems in Number Theory.

4. Solve problems associated with discrete & continuous probability distributions.

5. Compute measures of central tendency, dispersion, skewness and kurtosis for a given statistical data.

6. Solve problems on joint distribution, Markov chain using transition probability matrix and also problems on queuing theory.

Unit-I: Relations

Binary relations, Matrix and Digraph representation of a relation, Operations on binary relations, (SLE: Composition of relations), Properties of relations, Equivalence relations.

- 9 Hrs

Unit-II: Functions

Function, Types of functions, Composition of functions, Invertible functions, Recursive function, (SLE: Hash function), The Pigeonhole-principle.

- 8 Hrs

Unit-III: Number Theory


- 9 Hrs
Unit-IV: Probability

(SLE: Basic probability upto Baye’s Theorem) Random variables—Discrete and continuous random variables, Binomial, Poisson’s, Exponential and Normal Distributions.

- 9 Hrs

Unit-V: Statistics

(SLE: Collection & classification of a given data and its graphical representation), Measures of central tendency- mean, median, mode, Measures of dispersion- Quartile deviation, Mean deviation and Standard deviation, Moments, Skewness, Kurtosis.

- 8 hrs

Unit-VI: Joint Distribution and Markov Chains

Concept of joint probability: Joint probability distribution, (discrete) Independent random variables, Expectation, Covariance, Correlation Coefficient.(SLE: Continuous joint probability distributions) Probability vectors, Stochastic matrices, Regular stochastic matrices, Markov chains, Concept of a queue, the M/G/1 and M/M/1 queuing systems, analysis.

- 9 Hrs

Books for Reference:

4. Probability and Statistics – Schaum Series (All latest editions)
CYBER SECURITY and CYBER LAW(4:2:0)

Sub Code : MIT0508
Hrs/Week : 06
SEE Hours : 3 Hrs

CIE : 50%
SEE : 50%
Max Marks : 100

Course outcomes

1. Introduce the student to the area of cybercrime and forensics.
2. Understand the motive and causes for cybercrime, detection and handling.
3. Areas affected by cybercrime and investigation.
4. Tools used in cyber forensic
5. Have knowledge of Legal Perspectives in cyber security
6. Basic knowledge on IPRs

Unit -1

SLE: Cloud Computing.

9 Hours

Unit -2

SLE:
Organizational Security Policies and Measures in Mobile Computing, Era, Laptops

9 Hours

Unit -3

SLE : SQL Injection

8 Hours

Unit-4
Approaching a Computer, Forensics Investigation, Setting up a Computer Forensics Laboratory: Understanding, the Requirements, Computer Forensics and Steganography, Relevance of the OSI 7, Layer Model to Computer Forensics, Forensics and Social Networking Sites: The Security/Privacy Threats,
Department of CS&E

Computer Forensics from Compliance Perspective, Challenges in Computer Forensics, Special Tools and Techniques, Forensics, Auditing.

SLE: Antiforensics.


SLE: Objective and Scope of the it Act 2000.


SLE: Software License.

Text Books:


Reference Books:

Cloud Computing (4+2)

Sub Code : MIT0505
Hrs/Week : 06
SEE Hours : 3 Hrs

CIE : 50%
SEE : 50%
Max Marks : 100

Course Outcomes

On successful completion of the course, the student will be able

1. Use Cloud Services.
2. Comprehend the concept of Virtualization
3. Comparatively evaluate task scheduling algorithms.
4. Apply Map-Reduce concept to applications.
5. Evaluate the needs for Private Cloud building.
6. Comprehend issues of resource virtualization and scheduling.

1. Introduction, Cloud Infrastructure
   Cloud computing, Cloud computing delivery models and services, Ethical issues, Cloud vulnerabilities, Cloud computing at Amazon, Cloud computing the Google perspective, Microsoft Windows Azure and online services, Open-source software platforms for private clouds, Cloud storage diversity and vendor lock-in, Energy use and ecological impact, Service level agreements, Exercises
   Self learning component:- User experience and software licensing.

   Self learning component:- Digital content and cloud computing

   Self learning component:- The dark side of virtualization

4. Cloud Resource Management and Scheduling
   Policies and mechanisms for resource management, Application of control theory to task scheduling on a cloud, Stability of a two-level resource allocation architecture, Feedback control based on dynamic thresholds, Coordination of specialized autonomic performance managers, A utility-based model for cloud-based Web services, Resourcing bundling: Combinatorial auctions for cloud resources, Scheduling algorithms for computing clouds, Fair queuing, Start-time fair queuing, Borrowed virtual time, Cloud
scheduling subject to deadlines, Scheduling Map Reduce applications subject to deadlines, Exercises and problems.

**Self learning component:-** SLC: Resource management and dynamic scaling

5. **Cloud Security, Cloud Application Development.**
Cloud security risks, Security: The top concern for cloud users, Privacy and privacy impact assessment, Security risks posed to Trust, Operating system security, Virtual machine Security, Security of virtualization, Security risks posed to Amazon by shared images, Security risks posed by a management OS, A trusted virtual machine monitor, Amazon web services: EC2 instances, Connecting clients to cloud instances through firewalls, Security rules for application and transport layer protocols in EC2, How to launch an EC2 Linux instance and connect to it SLC.

**Self learning component:-** How to use S3 in Java

6. **Cloud-based simulation of a distributed trust algorithm,** A trust management service, A cloud service for adaptive data streaming: Exercises and problems.

**Self learning component:-** Cloud based optimal FPGA synthesis SLC

**Text Book:**


**REFERENCES:**


Advanced Database Management systems (4:0:0)

Sub Code : MIT0402
Hrs/Week : 04
SEE Hours : 3 Hrs

CIE : 50%
SEE : 50%
Max Marks : 100

Course Outcome

On successful completion of the course the students will be able to

1. Compare the different file storage structures for DBMS
2. Describe the different types of Indexing Techniques
3. Understand the query evaluation and sorting Techniques
4. Estimate the cost of a plan and enumerate alternative plans
5. Understand the physical Database Design and Tuning
6. Discuss the database Applications

1. Over view of Storage and Indexing, Disks and Files
   Data on external storage; File organizations and indexing; Index data structures; Comparison of file organizations; Indexes and performance tuning Memory hierarchy; RAID; Disk space management; Buffermanager; Files of records;

   Self learning component:- Page formats and record formats

2. Tree Structured Indexing
   Intuition for tree indexes ; Indexed sequential access method; B+trees, Search, Insert, Delete, Duplicates, B+tress in practice, Hash-Based Indexing; Staticashing, Extensible hashing.

   Self learning component:- Linear hashing, comparisons

3. Overview of Query Evaluation, External Sorting
   The system catalog, Introduction to operator evaluation; Introduction to query optimization; Alternative plans; A motivating example; what a typical optimizer does. When does a DBMS sort data? A simple two-way merge sort; External merge sort

   Self learning component:- Algorithm for relational operations

4. A Typical Relational Query Optimizer
   Translating SQL queries in to Relational Algebra; Estimating the cost of a plan; Relational algebra equivalences; Enumeration of alternative plans; Nested sub-queries.
Self learning component:- other approaches to query optimization.

5. **Physical Database Design and Tuning**
   Introduction; Guidelines for index selection, examples; Clustering and indexing; Indexes that enable index-only plans, Tools to assist in index selection; Overview of database tuning; Choices in tuning the conceptual schema; Impact of concurrency; DBMS benchmarking.

   **Self learning component:** Choices in tuning queries and views

6. **More Recent Applications**
   Mobile databases; Multimedia databases; Geographical Information Systems;

   **Self learning component:** Genome data management.

**Text Books:**


**Reference Books:**

III Semester

Course Code : MIT0201

Course: Seminar on Current Topic

On successful completion of the course, the students will be able to:

1. Identify current trends in a specific area of interest.
2. Identify real world issues by conducting literature survey of the area.
3. Understand and interpret the results of technical work as indicated by the literature.
4. Present a proper report, both orally and in writing on their seminar topic.

Course code: MIT0401

Course: Industrial Training

On successful completion of the course, the students will be able to:

1. Get acquainted in the industrial environment and working procedures
2. Familiarize with current technologies
3. Correlate the gained knowledge to real life working environment.
4. Conclude by writing a brief report and presentation.

Course Code: MIT0801

Course: Project Phase-I

On successful completion of the course the students will be able to

1. Identify a real world engineering problem and formulate it.
2. Outline a software project plan to check the feasibility of the solution in terms of both time and cost.
3. Describe the problem to identify both software and hardware requirement.
4. Carry out extensive literature survey to evaluate the available tools and adapt it to develop a suitable design.
IV SEMESTER

Course Code: MIT2801

Course: Project Phase-II

On successful completion of the course the students will be able to

1. Construct the proposed design of Phase-I using appropriate tools and technology.
2. Implement the constructed design to get working results.
3. Verify and validate the obtained results
4. Prepare a detailed technical report of the project work carried out
5. Also suggest limitations and further extensions for the work.
Sub Code: MIT0515
Hrs/Week: 06
SEE Hours: 3 Hrs

CIE: 50%
SEE: 50%
Max Marks: 100

Course Outcome

On successful completion of the course the students will be able to:

1. Understand the basic concepts of .Net platform.
2. Use method to Define and deploy the different command line compiler options.
3. Apply different constructs to build the basic C# program.
4. Comprehend the basic of object oriented programming concepts and Exception Handling.
5. Use different system defined interfaces and collections.
6. Use the callback interfaces, delegates and advanced C# keywords.

1. The Philosophy of .NET
Understanding the Previous State of Affairs, The .NET Solution, The Building Block of the .NET Platform (CLR,CTS, and CLS), The Role of the .NET Base Class Libraries, What C# Brings to the Table, An Overview of .NET Binaries (aka Assemblies), the Role of the Common Intermediate Language, The Role of .NET Type Metadata, The Role of the Assembly Manifest, Compiling CIL to Platform –Specific Instructions, Understanding the Common Type System, Intrinsic CTS Data Types, Understanding the Common Languages Specification, Understanding the Common Language Runtime A tour of the .NET Namespaces,

Self study component:- Increasing Your Namespace Nomenclature, Deploying the .NET Runtime.

2. Building C# Applications

Self study component:-The Command Line Debugger (cordbg.exe) Using the
3. **C# Language Fundamentals.**

   The Anatomy of a Basic C# Class, Creating objects: Constructor Basics, The Composition of a Basic Input and Output with the Console Class, Understanding Value Types and Reference Types, The Master Node: System, Object, The System Data Types (and C# Aliases), Converting Between Value Types and Reference Types: Boxing and Unboxing, Defining Program Constants, C# Iteration Constructs, C# Controls Flow Constructs, The Complete Set of C# Operators, Defining Custom Class Methods, Understating Static Methods, Methods Parameter Modifies, Array Manipulation in C#, String Manipulation in C#, C# Enumerations,

   **Self study component:**-Defining Structures in C#, Defining Custom Namespaces.

4. **Object-Oriented Programming with C#**

   Forms Defining of the C# Class, Definition the “Default Public Interface” of a Type, Recapping the Pillars of OOP, The First Pillars: C#’s Encapsulation Services, Pseudo-Encapsulation: Creating Read-Only Fields The Second Pillar: C#’s Inheritance Supports, keeping Family Secrets: The “Protected” Keyword, Nested Type Definitions, The Third Pillar: C#’s Polymorphic Support, Casting Between Exceptions and Object Lifetime, Ode to Errors, Bugs, and Exceptions, The Role of .NET Exception Handling, the System. Exception Base Class, Throwing a Generic Exception, Catching Exception, CLR System – Level Exception (System, System Exception), Custom Application-Level Exception (System, System Exception), Handling Multiple Exception, The Family Block, the Last Chance Exception Dynamically Identifying mApplication – and System Level Exception Debugging System Exception Using VS. NET, Understanding Object Lifetime, the CIT of “new”, The Basics of Garbage Collection,, Finalization a Type, The Finalization Process, Building an Ad Hoc Destruction Method.

   **Self study component:**-Garbage Collection Optimizations, The System. GC Type.

5. **Interfaces and Collections**

   Defining Interfaces Using C# Invoking Interface Members at the object Level, Exercising the Shapes Hierarchy, Understanding Explicit Interface Implementation, Interfaces As Polymorphic Agents, Building Interface Hierarchies, Implementing, Implementation, Interfaces Using VS .NET, understanding the IConvertible Interface, Building a Custom Enumerator (IEnumerable and Enumerator), Building Cloneable objects (ICloneable), Building Comparable Objects (IComparable), Exploring the system. Collections Namespace,

   **Self study component:**-Building a Custom Container (Retrofitting the Cars Type).

6. **Callback Interfaces, Delegates, and Events, Advanced Techniques**

   Understanding Callback Interfaces, Understanding the .NET Delegate Type, Members of System. Multicast Delegate, The Simplest Possible Delegate Example, , Building More a Elaborate Delegate Example, Understanding Asynchronous Delegates, Understanding (and Delegate Example, Understanding Asynchronous (and Using)Events. The Advances Keywords of C#, A Catalog of C# Keywords Building a Custom Indexer, A Variation of the Cars Indexer Internal Representation of Type Indexer . Using C# Indexer, The Internal Representation of Overloading Indexer from VB .NET. Overloading operators, The Internal Representation of Overloading 55
Sub Code: MIT0518
Hrs/Week: 06
SEE Hours: 3 Hrs
CIE: 50%
SEE: 50%
Max Marks: 100

Course outcomes

On successful completion of the course students will be able to:

1. Discuss web services such as SOAP, RPC style SOAP, Document style SOAP, WSDL, REST services.
2. Illustrate usage of AJAX for development of Rich Internet Applications.
3. Explain details of XMLHTTP objects.
5. Explain UI components and techniques used in User Interface creation.
6. Design advanced web applications using AJAX, flex and mash up techniques

1. Introduction, Web Services
   What is Web 2.0?, Folksonomies and Web 2.0, Software As a Service (SaaS), Data and Web 2.0, Convergence, Iterative development, Rich User experience, Multiple Delivery Channels, Social Networking. Web Services: SOAP, RPC Style SOAP, Document style SOAP, WSDL, REST services, JSON format, What is JSON?, Array literals, Object literals, Mixing literals, JSON Syntax, JSON Encoding and Decoding.
   Self study component:- JSON versus XML

2. Building Rich Internet Applications with AJAX
   Building Rich Internet Applications with AJAX: Limitations of Classic Web application model, AJAX principles, Technologies behind AJAX, Examples of usage of AJAX, Dynamic web applications through Hidden frames for both GET and POST methods. IFrames, Asynchronous communication.
   Self study component:- AJAX application model

3. XMLHTTP objects
   XMLHttpRequest Object – properties and methods, handling different browser implementations of XMLHTTP, The same origin policy, Cache control, AJAX Patterns (Only algorithms – examples not required), Submission throttling pattern, Periodic refresh, Multi stage download, Fall back patterns.
   Self study component:- Predictive fetch pattern
4. **Building Rich Internet Applications with Flex 24 Hrs**

Flash player, Flex framework, MXML and Actionscript, Working with Data services, Understanding differences between HTML and Flex applications, Understanding how Flex applications work, Understanding Flex and Flash authoring, MXML language, a simple example, Using Actionscript, MXML and Actionscript correlations. Understanding Actionscript 3.0 language syntax: Language overview, Objects and Classes, Packages and namespaces, Variables & scope of variables, case sensitivity and general syntax rules, Operators, Conditional, Looping, Functions, Nested functions, Functions as Objects, Function scope, OO Programming in Actionscript: Classes, Interfaces, Inheritance, Working with String objects, Working with Arrays, Error handling in Actionscript: Try/Catch, Working with XML Framework fundamentals, Understanding application life cycle, Differentiating between Flash player and Framework, Bootstrapping Flex applications, Loading one flex application in to another, Understanding application domains, Understanding the preloader, Working with children, Container types, Layout rules, Padding, Borders and gaps, Nesting containers, Making fluid interfaces.

**Self study component:**-Managing layout, Flex layout overview

5. **Working with UI components**

Working with UI components: Understanding UI Components, Creating component instances, Common UI Component properties, Handling events, Button, Value selectors, Text components, List based controls, Data models and Model View Controller, Creating collection objects, Setting the data provider, Using Data grids, Using Tree controls, Working with selected values and items, Pop up controls, Navigators, Control bars Working with data: Using data models, Using XML, Using Action script classes.

**Self study component:**-Data Binding

6. **Building Advanced Web 2.0 applications**

Definition of mash up applications, Mash up Techniques, Building a simple mash up application with AJAX, Remote data communication, strategies for data communication, Simple HTTPServices, URLLoader in Flex, Web Services in Flex, Examples: Building an RSS reader with AJAX.

**Self study component:**-Building an RSS reader with Flex.
Optical Networks (4:0:2)

Sub Code : MIT0519
Hrs/Week : 06
SEE Hours : 3 Hrs

CIE : 50%
SEE : 50%
Max Marks : 100

Course Outcomes:

1. Discuss the different generations of digital transport networks
2. Diagnose the timing and synchronization in digital networks
3. Describe architecture of Optical Transport Network (OTN)
4. Discuss Wavelength Division Multiplexing (WDM)
5. Analyze the concepts of label switching and its importance in Optical Transport Network (OTN)

1. **Introduction, Telecommunications Infrastructure, Characteristics of Optical Fiber:** Three generations of Digital Transport Networks; A brief introduction to WDM and TDM; The Optical Marketplace; Key Optical Nodes; Other Key Terms; Evolution of Optical Systems; Key attributes of Optical Fiber, The Local Connections; The Backbone Connections; The Digital Multiplexing Hierarchy; The Digital Signaling Hierarchies; T1 / DS1 and T3 / DS3; The Layered Protocol Model in the Transport Network; considerations for Interworking Layer1, Layer 2, and Layer 3 Networks, The Basics; The Wavelength; The Basic Components; Structure of the Fiber; Fiber Types; Key Performance Properties of Fiber; Attenuation; Amplifier Spontaneous Emission; Chromatic Dispersion;

Self study component:- Wireless Optical Systems, Lasers

2. **Timing and Synchronization, SONET and SDH:** Timing and Synchronization in Digital Networks; Effect of a Timing error; The Clocking Signal; Types of Timing in Networks; Timing Variations; Methods of Clock Exchange; Distribution of Timing Using SONET and DS1; Timing Downstream Devices; Synchronization Status Messages and Timing Loops, The SONET Multiplexing Hierarchy; SONET and SDH Multiplexing Structure; The SONET / SDH Frame Structure; SONET and SDH Functional Components; SONET and SDH Problem Detection; Locating and Adjusting Payload with Pointers; Virtual Tributaries in more detail; Virtual Tributaries in Virtual Containers; The Overhead Bytes;

Self study component:- Building Integrated Timing Supply, SONET and SDH Concatenation
3. **Architecture of Optical Transport Networks, WDM, Network Topologies and Protection Schemes:** The Digital Wrapper; Control Planes; In-Band and Out-Band Control Signaling; SONET Multiplexing Hierarchy; SDH Multiplexing Hierarchy; Key Indexes and Other Terms; The New Optical Transport and Digital Transport Hierarchy; The OTN Layered Model; Encapsulation and Decapsulation Operations;
**Self study component:** Generic Framing Procedure,

4. **The WDM Operation; DWDM, TDM and WDM Topologies:** Relationship of WDM to SONET / SDH; EDF; WDM Amplifiers; Add-Drop Multiplexers; WDM Cross-Connects; Wavelength Continuity Property; Examples of DWDM Wavelength Plan; Higher Dispersion for DWDM; Tunable DWDM Lasers, The Non-Negotiable Requirement Robust Networks; Diversity in the Network; Line and Path Protection Switching; Types of Topologies; Working and Protection Fibers; Point-to-Point Topology; BLSR; Protection Switching on Four-Fiber BLsr; Meshed Topologies; PONs; Ethernet in the Wide Area Backbone,
**Self study component:** Metro Optical Networking.

5. **MPLS and Optical Networks, Architecture of IP and MPLS-Based OTNs:** Label Switching; FEC; Types of MPLS Nodes; Label Distribution and Binding; Label Switching and Traffic Forwarding; MPLS Support of VPNs; MPLS Traffic Engineering; Multiprotocol Lambda Switching; MPLS and Optical TE Similarities; Possibilities for the MPIS Network; Control and Data Planes Interworking, IP, MPLS, and Optical Control Planes; Interworking the three Control Planes; Management of the Planes; A Framework for the IP over Optical Networks; An Opposing View; Generalized MPLS use in Optical Networks; Bi-Directional LSPs in Optical Networks; GMPLS Extensions for G.709;
**Self study component:** GMPLS with SONET and SDH.

6. **The Link Management Protocol, Optical Routers:** Keep the Optical Link up and running; What is managed? Data-bearing Links; Clarification of terms; Basic functions of LMP; Control Channel Management; Link Property Correlation; Fault Management; Extending LMP operations for Optical Link Systems., Optical Switching; Implementation Preferences; Key Terms; Evolution of Switching Networks; Optical Router; Optical Switching Technologies; Optical Resources; Protecting the Label Switched Paths; Protection of the OSP; Wavelength OSP and MPLS LSP; Nesting the LSPs and OSPs; Topologies for a Node Failure; Plane Coupling and De-Coupling; Some End-to-End Wavelengths and Node-to-Node Wavelengths; Granularity of Labels versus Wavelength Support; Approach to the Problem of LSP and OSP Interworking;
**Self study component:** MEMS and Optical Switching; Thermo-Optic Switches.
**Course Code** : MIT05XX  
**Hrs/Week** : 06  
**SEE Hours** : 3 Hrs  

Course outcomes

1. Learn Various Paradigms of Python Programming.
2. GUI Programming using Tkinter.
3. handle Files, Lists and Dictionaries in Python.
4. Learn How to combine data structures and functions available in Python to solve Problems.
5. Learning Python through Applications.

**Unit -1**
Introduction to Python: Basic features, creating Python programs, Functions, Strings, Lists, Tuples, and sets, Selections, Loops, Programming examples

**Unit -2**
Dictionaries, Files, Objects and classes, Object Oriented programming, Regular Expressions, text processing, Programming exercises

**Unit -3**
Internet Programming, Multi threaded programming, Programming exercises

**Unit-4**
GUI Programming: Tkinter, Database Programming

**Unit-5**
Web Development: Web clients and servers, Web application Programming,

**Unit-6**
case studies (A simple Blog, A wiki web, XML to read iTunes Database)

**Text Books:**
Reference Books:

4G TECHNOLOGIES(4:2:0)

Sub Code :MIT05XX
Hrs/Week : 06
SEE Hours : 3 Hrs

CIE : 50%
SEE : 50%
Max Marks : 100

Course outcomes

1. Learn various generations of wireless and cellular networks
2. Study the fundamentals of 3G Services, its protocols and applications
3. Study how 4G Networks evolved, its architecture and applications
4. Study about WiMAX networks, protocol stack and standards
5. Gain knowledge about Spectrum characteristics & Performance evaluation

Unit -1
INTRODUCTION : Introduction: History of mobile cellular systems, First Generation, Second Generation, Overview of 3G, 3GPP and 3GPP2 standards Overview of 4G

Unit -2

Unit - 3
WIRELESS LOCAL AREA NETWORKS: WLAN Equipment WLAN Topologies, WLAN Technologies IR Technology UHF Narrowband Technology Spread Spectrum, Technology, IEEE, 802.11, Bluetooth Piconet in the Presence of IEEE, Other WLAN Standards, IEEE 802.16, WiMAX.

Unit-4
Unit-5

Unit-6

Text Books:
1. Introduction to 4G Mobile Communication, JuhaKorhonen, Artech House, (www.artechhouse.com),

Reference Books: NIL
INTERNET OF THINGS (4:2:0)

Sub Code : MIT05XX
Hrs/Week : 06
SEE Hours : 3 Hrs

Course outcomes

1. Learn the basic issues, policy and challenges in the IoT
2. Understand the Mechanism and Key Technologies in IoT
3. Understand the Standard of the IoT
4. Learn to manage the resources in the IoT
5. Deploy the resources into business
6. Understand Data Analytics for IoT

Unit -1

Unit -2

Unit - 3

Unit-4
Case Studies illustrating IoT Design-Introduction, Agriculture, Productivity Applications, Home Automation, Cities, Environment,

Unit-5
Data Analytics for IoT – Introduction, Apache Hadoop, Using Hadoop, MapReduce for Batch Data Analysis

Unit-6
Apache Oozie, Apache Spark, Apache, Storm, Using Apache Storm for Real-time Data Analysis, Structural Health, Monitoring Case Study.

Text Books:
1. Daniel Minoli, ”Building the Internet of Things with IPv6 and MIPv6:The Evolving World of M2M Communications”, Wiley, 2013

Reference Books:
Course Outcomes:

On successful completion of the course the students will be able to:

1. Understand the concepts of Data Warehousing, modeling, and Online Analytical Processing.
2. Identify the challenges, tasks, technologies, and the kind of applications demanded by Data Mining.
3. Decide about the data, data preprocessing, and applications.
4. Use the algorithms for association analysis and evaluate the association patterns.
5. Understand and use the various data classification methods.
6. Identify the various clustering methods to classify the data and perform analysis.

1. **Data Warehousing and OLAP**
   Data Warehouse basic concepts, Data Warehouse Modeling, Data Cube.
   Self learning component:- OLAP

2. **Data Mining**
   Introduction, What is Data Mining, Motivating Challenges, Which technologies are used, which kinds of applications are targeted by Data Mining.
   Self learning component:- Data Mining Tasks

3. **Data Mining-Which type of data**
   Types of Data, Data Preprocessing, Measures of Similarity and Dissimilarity.
   Self learning component:- Data Mining Applications

4. **Association Analysis: Basic Concepts and Algorithms**
   Frequent Itemset Generation, Rule Generation, Compact Representation of Frequent Itemsets, Alternative methods for generating Frequent Itemsets, FP Growth Algorithm.
   Self learning component:- Evaluation of Association Patterns
5. **Classification**
**Self learning component:** Evaluation criteria for classification methods

6. **Clustering Techniques**
Overview, Features of cluster analysis, Types of Data and Computing Distance, Types of Cluster Analysis Methods, Partitional Methods, Hierarchical Methods, Density Based Methods. Quality and Validity of Cluster Analysis. Outlier detection methods, Classification based approached
**Self learning component:** Statistical Approaches, Clustering based applications

**Text Books:**


**Reference Books:**
2. Jiawei Han and Micheline Kamber: Data Mining - Concepts and Techniques, 2nd Edition, Morgan Kaufmann Publisher, 2006.
Web-Commerce(4:0:2)

Sub Code : MIT0503  
CIE : 50%

Hrs/Week : 04  
SEE : 50%

SEE Hours : 3 Hrs  
Max Marks : 100

Course outcome

On successful completion of the course, students will be able to:

1. Understand the scope of e-commerce in the realm of modern business.
2. Know the various business models of e-commerce.
3. Find out the technologies used to develop e-commerce applications.
4. Familiar with marketing methods used in e-commerce.
5. Operate the legal and regulatory framework in e-commerce.
6. Keep track of the methods and metrics used to measure effectiveness of e-commerce activities.

Part-A

1. **E-commerce in Indian business context**: Definition of e-commerce advantages and disadvantages, e-commerce opportunities for industrial transition challenges for Indian corporates.


3. **Enabling Technologies of www**: Internet client-server applications, Networks and Internet protocols – IPV4, IPV6, Search Engines, software agents, Internet standards and specifications, Broadband technologies – types of broadband technology.
Part-B

4. **E-marketing**: Traditional marketing, identifying web-presence goods, Browsing behavior model, online marketing, e-advertising, e-branding, Marketing strategies.

5. **E-payment Systems**: Main concerns in Internet banking, Digital payment, requirements, Digital token based e-payment systems, classification of new payment systems, Properties of e-cash, cheque payment on Internet, Risk of e-payment systems, Designing e-payment systems, digital signatures.


**Text Books**


Advanced Mathematics (4:0:0)

Sub Code : MIT0401
Hrs/Week : 04
SEE Hours : 3 Hrs

CIE : 50%
SEE : 50%
Max Marks : 100

Course outcome

On successful completion of the course, the students will be able to,

1. Define relations, compute new relations, verify the properties of equivalence relations, partial ordering.

2. Recognise different types of functions, find composition and inverse of a function, apply pigeon-hole principle to solve problems.

3. Discuss different graph structures, their properties and algorithms which have applications in almost all the fields.

4. Demonstrate an understanding of basic principles of probability and Baye’s rule leading to discrete & continuous probability distributions. To represent a given Markov chain in terms of transition matrix and use various queuing models to solve some practical problems.

5. Evaluate estimators, construct confidence intervals, and perform hypothesis tests in the context of a single population sample and how to calculate basic two-variable statistics (covariance, correlation).

Part - A

1. Relations: Binary Relations, Matrix and Digraph representation of relations, Operations on relations, Composition of relations, Properties of relations, Equivalence relations.

2. Functions: Function, Types of functions, Composition of functions, Invertible function, Recursive function, Has function, The Pigeonhole principle

3. Graph Theory: Graphs and Multi graphs, Sub graphs, Isomorphic and Homeomorphic graphs, Paths, Cycles and Circuits in a graph, Connected graphs, Euler’s and Hamiltonian graphs, Konigsberg Bridge problem and Travelling salesman problem, Trees, Planar graphs, Graph coloring
Part-B

4. **Probability**: Axioms and Models, Conditional Probability, Baye’s rule, problems, random variables – discrete and continuous random variables, binomial distribution, Poisson's distribution, Exponential distribution, Normal distribution.

5. **Statistical Inference**: Random sampling, sampling distributions, parameter estimation, and hypothesis testing, regression, correlation, and analysis of variance examples.

6. **Joint distribution and Markov Chains**: Concept of joint probability, jointly distributed random variables (discrete), Independent random variables, Expectations, Covariance, Correlation Coefficient, Probability vectors, Stochastic matrices, Regular stochastic matrices, Markov chains, concept of a queue, the M/G/I and M/M/I queuing systems, analysis.

**Text Books:**

Data Warehousing and Data Mining (4:0:2)

Sub Code : MIT0504

Hrs/Week : 04

SEE Hours : 3 Hrs

Max Marks : 100

Course Outcome:

On successful completion of the course the students will be able to

1. Understand the concepts of Data Warehousing, modeling and OnLine Analytical Process Mining
2. Identify the challenges, tasks, technologies, and kind of applications demanded by Data Mining
3. Decide about the data, data preprocessing and applications
4. Use the algorithms for association analysis and evaluate the association patterns
5. Understand and use the various data classification methods
6. Identify the various clustering methods to classify the data and perform analysis

PART-A

1. Data Warehousing and OLAP
   Data Warehouse basic concepts, Data Warehouse Modeling, Data Cube and OLAP

2. Data Mining
   Introduction, What is Data Mining, Motivating Challenges, Data Mining Tasks, Which techniques are used, which kinds of applications are targeted by Data Mining

3. Data Mining - Which type of data
   Types of Data, Data Preprocessing, Measures of Similarity and Dissimilarity, Data Applications

PART-B

4. Association Analysis: Basic Concepts and Algorithms
   Frequent Item set Generation, Rule Generation, Compact Representation of Frequent Itemsets, Alternative methods for generating Frequent Item sets, FP Growth Algorithm, Evaluating Association Patterns
5. Classification

6. Clustering Techniques
Overview, Features of cluster analysis, Types of Data and Computing Distance, Types of Cluster Analysis Methods, Partitional Methods, Hierarchical Methods, Density Based Methods, Quality and Validity of Cluster Analysis

Outlier Analysis
Outlier detection methods, Statistical Approaches, Clustering based applications, Classification based approached

Text Books:

Reference Books:
2. Jiawei Han and Micheline Kamber: Data Mining - Concepts and Techniques, 2nd Edition, Morgan Kaufmann Publisher, 2006.
Cloud Computing (4:0:2)

Sub Code : MIT0505
Hrs/Week : 04
SEE Hours : 3 Hrs

CIE : 50%
SEE : 50%
Max Marks : 100

Course Outcome

On successful completion of the course, the student will be able to

1. Understand the basic cloud services, infrastructure and computing characteristics.
2. Thorough understanding of the various cloud models and their security constraints.
3. Choose between the various cloud solutions as a service.
4. Articulate issues like cloud management, provisioning, billing etc.
5. Articulate about the various cloud articulation technologies.
6. Map the cloud to Service Oriented Architecture (SOA)

Part-A

1. Introduction: Business and IT perspective, Cloud and virtualization, Cloud service requirements, cloud and dynamic infrastructure, cloud computing characteristics, cloud adoption

2. Cloud models: Cloud characteristics, Measured Service, Cloud models, security in a public cloud, public versus private clouds, cloud infrastructure self service.

3. Cloud at a service: Gamut of cloud solutions, principal technologies, cloud strategy, cloud design and implementation using SOA, Conceptual cloud model, cloud service demand. Cloud solutions: Cloud ecosystem, cloud business process management, cloud service management, cloud stack, computing on demand, cloud sourcing.

Part – B

5. **Cloud virtualization technology**: Virtualization defined virtualization benefits, server virtualization, virtualization for x86 architecture, Hypervisor management software, Logical partitioning, VIO server, Virtual infrastructure requirements. Storage virtualization, storage area networks, network attached storage, cloud server virtualization, virtualized data center.

6. **Cloud and SOA**: SOA journey to infrastructure, SOA and cloud, SOA defined, SOA defined, SOA and IAAS, SOA based cloud infrastructure steps, SOA business and IT services.

**Books:**

1. *Cloud Computing* by Dr. Kumar Saurabh, Wiley India, 2011.

**Reference Books**

1. Michael Miller, *Cloud Computing: Web based applications that change the way you work and collaborate online*, Que publishing, August 2009
Advanced Database Management systems (4:0:0)

Sub Code : MIT0402
Hrs/Week : 04
SEE Hours : 3 Hrs

CIE : 50%
SEE : 50%
Max Marks : 100

Course Outcome:

On successful completion of the course, student will be able to

1. Better understand essential techniques used in DBMS
2. Master in indexing and data organization for DBMS
3. Expertise in query processing and optimization
4. Compete with similarity-based querying
5. Familiar with new data management applications

Part – A

1. Over view of Storage and Indexing, Disks and Files

Data on external storage; File organizations and indexing; Index data structures; Concepts of file organizations; Indexes and performance tuning Memory hierarchy; RAID; Disk management; Buffer manager; Files of records; Page formats and record formats

2. Tree Structured Indexing

Intuition for tree indexes; Indexed sequential access; B+trees, Search, Insert, Delete, Duplicates, B+trees in practice, Hash-Based Indexing, hashing, Extendible hashing, Linear hashing, comparisons

3. Overview of Query Evaluation, External Sorting

The system catalog, Introduction to operator evaluation; Algorithm for relational op

Introduction to query optimization; Alternative plans; A motivating example; what optimizer does. When does a DBMS sort data? A simple two-way merge sort; External sort
Part – B

4. A Typical Relational Query Optimizer

Translating SQL queries in to Relational Algebra; Estimating the cost of a plan; Relational algebra equivalences; Enumeration of alternative plans; Nested sub-queries; other approaches to query optimization.

5. Physical Database Design and Tuning

Introduction; Guidelines for index selection, examples; Clustering and indexing; Indexes that enable index-only plans, Tools to assist in index selection; Overview of database tuning; Choices in tuning the conceptual schema; Choices in tuning queries and views; Impact of concurrency; DBMS benchmarking.

6. More Recent Applications

Mobile databases; Multimedia databases; Geographical Information Systems; Genome data management.

Text Books:


Reference Books:

### III Semester

<table>
<thead>
<tr>
<th>Sl.No</th>
<th>Subject Code</th>
<th>Subject</th>
<th>Teaching Hours/ Week</th>
<th>Credits</th>
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<tbody>
<tr>
<td>1</td>
<td>MIT0401</td>
<td>Industrial Training for 8 weeks duration (At the end of the training, students are required to submit a report and present a seminar)</td>
<td>- - -</td>
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<td>2</td>
<td>MIT0801</td>
<td>Project-work (preliminary)(Students have to initiate the project-work during III semester and are required to submit a report and present a seminar)</td>
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<td>3</td>
<td>MIT0201</td>
<td>Subject Seminar on current topic</td>
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### IV Semester

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<td>Project Work</td>
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<td>(Students have to submit the final project report at the end of the semester which will be evaluated followed by a seminar, presentation and viva voce examination)</td>
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Optical Networks (4/0:2)

Sub Code : MIT0519
Hrs/Week : 04
SEE Hours : 3 Hrs

Course Outcomes:

1. Discuss the different generations of digital transport networks also compare the WDM and TDM. Analyze the attributes of OFC
2. Discuss the different digital signaling hierarchies
3. Explain the different characteristics of Optical fiber
4. Diagnose the timing and synchronization in digital networks
5. Analyze the SONET and SDH networks
6. Determine the importance of multiplexing also classify the relationship of WDM to SONET

Part A

1. **Introduction**: Three generations of Digital Transport Networks; A brief introduction to WDM and TDM; The Optical Marketplace; Wireless Optical Systems; Key Optical Nodes; Other Key Terms; Evolution of Optical Systems; Key attributes of Optical Fiber.

2. **Telecommunications Infrastructure**: The Local Connections; The Backbone Connections; The Digital Multiplexing Hierarchy; The Digital Signaling Hierarchies; T1 / DS1 and T3 / DS3; The Layered Protocol Model in the Transport Network; considerations for Interworking Layer1, Layer 2, and Layer 3 Networks.

3. **Characteristics of Optical Fiber**: The Basics; The Wavelength; The Basic Components; Structure of the Fiber; Fiber Types; Key Performance Properties of Fiber; Attenuation; Amplifier Spontaneous Emission; Chromatic Dispersion; Lasers.

4. **Timing and Synchronization**: Timing and Synchronization in Digital Networks; Effect of a Timing error; The Clocking Signal; Types of Timing in Networks; Timing Variations; Methods of Clock Exchange; Distribution of Timing Using SONET and DS1; Timing Downstream Devices; Building Integrated Timing Supply; Synchronization Status Messages and Timing Loops.

5. **SONET and SDH**: Introduction; The SONET Multiplexing Hierarchy; SONET and SDH Multiplexing Structure; The SONET / SDH Frame Structure; SONET and SDH Functional Components; SONET and SDH Problem Detection; Locating and Adjusting Payload with Pointers;
Virtual Tributaries in more detail; Virtual Tributaries in Virtual Containers; The Overhead Bytes; SONET and SDH Concatenation.

6. Architecture of Optical Transport Networks, WDM: The Digital Wrapper; Control Planes; In-Band and Out-Band Control Signaling; Importance of Multiplexing and Multiplexing Hierarchies; Current Digital Transport Hierarchy; SONET Multiplexing Hierarchy; SDH Multiplexing Hierarchy; Key Indexes and Other Terms; The New Optical Transport and Digital Transport Hierarchy; The OTN Layered Model; Encapsulation and Decapsulation Operations; Generic Framing Procedure

The WDM Operation; DWDM, TDM and WDM Topologies; Relationship of WDM to SONET / SDH; EDF; WDM Amplifiers; Add-Drop Multiplexers; WDM Cross-Connects; Wavelength Continuity Property; Examples of DWDM Wavelength Plan; Higher Dispersion for DWDM; Tunable DWDM Lasers.

7. Network Topologies and Protection Schemes: The Non-Negotiable Requirement Robust Networks; Diversity in the Network; Line and Path Protection Switching; Types of Topologies; Working and Protection Fibers; Point-to-Point Topology; BLSR; Protection Switching on Four-Fiber BLSR; Meshed Topologies; PONs; Ethernet in the Wide Area Backbone? Metro Optical Networking

8. MPLS and Optical Networks: Label Switching; FEC; Types of MPLS Nodes; Label Distribution and Binding; Label Switching and Traffic Forwarding; MPLS Support of VPNs; MPLS Traffic Engineering; Multiprotocol Lambda Switching; MPLS and Optical TE Similarities; Possibilities for the MPIS Network; Control and Data Planes Interworking

9. Architecture of IP and MPLS-Based OTNs: IP, MPLS, and Optical Control Planes; Interworking the three Control Planes; Management of the Planes; A Framework for the IP over Optical Networks; An Opposing View; Generalized MPLS use in Optical Networks; Bi-Directional LSPs in Optical Networks; GMPLS Extensions for G.709; GMPLS with SONET and SDH.

10. The Link Management Protocol: Keep the Optical Link up and running; What is managed? Data-bearing Links; Clarification of terms; Basic functions of LMP; Control Channel Management; Link Property Correlation; Fault Management; Extending LMP operations for Optical Link Systems.

11. Optical Routers: Optical Switching; Implementation Preferences; Key Terms; Evolution of Switching Networks; Optical Router; Optical Switching Technologies; Optical Resources; Protecting Switching Networks; the Label Switched Paths; Protection of the OSP; Wavelength OSP and MPLS LSP; Nesting the LSPs and OSPs; Topologies for a Node Failure; Plane Coupling and De-Coupling; Some End-to-End Wavelengths and Node-to-Node Wavelengths; Granularity of Labels versus Wavelength Support;

53
Approach to the Problem of LSP and OSP Interworking; MEMS and Optical Switching; Thermo-Optic Switches.

12. **ASON Operation at the UNI and NNI, ATM versus IP in Optical Internets**: Objectives of ASON; UNI and NNI; Managing the Optical Bandwidth in the ASON; General approach to Optical Bandwidth Management; IETF Optical Carrier Framework for the UNI; Types of Connections; NNI; UNI and NNI Signaling Services.

   IP over ATM over SONET; The OSI and Internet Layered Models; ATM in the SONET / SDH Payload Envelope; PPP in the SONET Payload Envelope; Encapsulation / Framing Rules; The PPP Packet; The ATM versus IP; Overhead of IP and ATM; Three encapsulation methods

**TEXT BOOKS:**


**REFERENCE BOOKS:**

Web-Commerce(4:0:2)

Sub Code : MIT0503   CIE : 50%
Hrs/Week : 06         SEE : 50%
SEE Hours : 3 Hrs     Max Marks : 100
Designation: CORE

Credits: 05

Course outcomes

On successful completion of the course, students will be able to:

1. Understand the scope of e-commerce in the realm of modern business.
2. Know the various business models of e-commerce.
3. Find out the technologies used to develop e-commerce applications.
4. familiar with marketing methods used in e-commerce.
5. Operate the legal and regulatory framework in e-commerce.
6. Keep track of the methods and metrics used to measure effectiveness of e-commerce activities

1. **E-commerce in Indian business context**: Definition of e-commerce, advantages of e-commerce, disadvantages of e-commerce, e-transition challenges for Indian corporate.

   **Self learning component**: e-commerce opportunities for industries


   **Self learning component**: Info-mediary model, community model
3. **Enabling Technologies of www** : Internet client-server applications, Networks and Internets, IPV4, IPV6, Search Engines, software agents, Internet standards and specifications, Broadband technologies.

   **Self learning component:** – types of broadband technology

4. **E-marketing** : Traditional marketing, identifying web-presence goods, Browsing buyer model, online marketing, e-advertising, e-branding, Marketing strategies.

   **Self learning component:**

5. **E-payment Systems** : Main concerns in Internet banking, Digital payment, requirements, Digital token based e-payment systems, classification of new payment systems, Proprietary e-cash, cheque payment on Internet, Risk of e-payment systems, Designing e-payment systems, digital signatures.

   **Self learning component:**


   **Self learning component:** seven dimensions of e-commerce strategy.

**Text Books**


**Advanced Mathematics (4:0:0)**

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<tr>
<td>Designation</td>
<td>CORE</td>
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**Course outcomes**

On successful completion of the course, students will be able to:
1. Construct the matrix, digraphs of relations and prove some results on different types of relation and also obtain equivalence classes.
2. Identify different types of functions, find composition and inverse of a function and solve problems using pigeon-hole principle.
3. Apply the concepts of graph theory to solve some application problems.
4. Solve problems associated with basic probability, Baye’s rule, discrete & continuous probability distributions.
5. Evaluate estimators, construct confidence intervals, and perform hypothesis tests and obtain regression lines.
6. Solve problems of Joint Distribution, Markov chain using transition probability matrix and also the problems in queuing theory.

1. Relations

Binary relations, Matrix and Digraph representation of a relation, Operations on binary relations, (SLE: Composition of relations), Properties of relations, Equivalence relations.

- 9 Hrs

2. Functions

Function, Types of functions, Composition of functions, Invertible functions, Recursive function, (SLE: Hash function), The Pigeonhole-principle.

- 8 Hrs

3. Graph Theory


- 9 Hrs

4. Probability

(SLE: Basic probability upto Baye’s Theorem) Random variables – Discrete and continuous random variables, Binomial, Poisson’s, Exponential and Normal Distributions.

- 9 Hrs

5. Statistical Inference

6. Joint Distribution and Markov Chains

Concept of joint probability: Joint probability distribution, (discrete) Independent random variables, Expectation, Covariance, Correlation Coefficient. (SLE: Continuous joint probability distributions) Joint distribution of vectors, Stochastic matrices, Regular stochastic matrices, Markov chains, Concept of a queue, M/M/1 queuing systems, analysis.

Books for Reference:

3. Discrete and Combinatorial Mathematics – Ralph P. Grimaldi,
4. Probability and Statistics – Schaum Series (All latest editions)

Data Warehousing and Data Mining (4:0:2)

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Course Outcomes:

On successful completion of the course the students will be able to

1. Understand the concepts of Data Warehousing, modeling and Online Analytical Processing.
2. Identify the challenges, tasks, technologies, and kind of applications demanded for Data Mining.
3. Decide about the data, data preprocessing and applications.
4. Use the algorithms for association analysis and evaluate the association patterns.
5. Understand and use the various data classification methods.
6. Identify the various clustering methods to classify the data and perform analysis.
1. Data Warehousing and OLAP
Data Warehouse basic concepts, Data Warehouse Modeling, Data Cube.
Self learning component: OLAP

2. Data Mining
Introduction, What is Data Mining, Motivating Challenges, Which technologies are used, which kinds of applications are targeted by Data Mining
Self learning component: Data Mining Tasks

3. Data Mining - Which type of data
Types of Data, Data Preprocessing, Measures of Similarity and Dissimilarity,
Self learning component: Data Mining Applications

4. Association Analysis: Basic Concepts and Algorithms
Frequent Item set Generation, Rule Generation, Compact Representation of Frequent itemsets, Alternative methods for generating Frequent Item sets, FP Growth Algorithm,
Self learning component: Evaluation of Association Patterns

5. Classification
Self learning component: Evaluation criteria for classification methods

6. Clustering Techniques
Overview, Features of cluster analysis, Types of Data and Computing Distance, Types of Cluster Analysis Methods, Partitional Methods, Hierarchical Methods, Density Based Methods. Quality and Validity of Cluster Analysis. Outlier detection methods, Classification based approached
Self learning component: Statistical Approaches, Clustering based applications

Text Books:

Reference Books:
2. Jiawei Han and Micheline Kamber: Data Mining - Concepts and Techniques, 2nd Edition, Morgan Kaufmann Publisher, 2006.
Cloud Computing (4:0:2)

Sub Code : MIT0505
Hrs/Week : 06
SEE Hours : 3 Hrs
Designation: CORE
Credits: 05

CIE : 50%
SEE : 50%
Max Marks : 100

Course Outcomes

On successful completion of the course, the student will be able

1. To learn how to use Cloud Services.
2. To gain knowledge on Virtualization
3. To gain knowledge of Task Scheduling algorithms.
4. Apply Map-Reduce concept to applications.
5. To build Private Cloud.
6. To gain knowledge in cloud resource virtualization and scheduling.

1. Introduction, Cloud Infrastructure
Cloud computing, Cloud computing delivery models and services, Ethical issues, Cloud vulnerabilities, Cloud computing at Amazon, Cloud computing the Google perspective, Microsoft Windows Azure and online services, Open-source software platforms for private clouds, Cloud storage diversity and vendor lock-in, Energy use and ecological impact, Service level agreements, Exercises
Self learning component:- User experience and software licensing.

Self learning component:- Digital content and cloud computing

Self learning component:- The dark side of virtualization
Policies and mechanisms for resource management, Application of control theory to task scheduling on a cloud, Stability of a two-level resource allocation architecture, Feedback control based on dynamic thresholds, Coordination of specialized autonomic performance managers, A utility-based model for cloud-based Web services, Resourcing bundling: Combinatorial auctions for cloud resources, Scheduling algorithms for computing clouds, Fair queuing, Start-time fair queuing, Borrowed virtual time, Cloud scheduling subject to deadlines, Scheduling Map Reduce applications subject to deadlines, Exercises and problems.

Self learning component:- SLC: Resource management and dynamic scaling

Cloud security risks, Security: The top concern for cloud users, Privacy and privacy impact assessment, Trust, Operating system security, Virtual machine Security, Security of virtualization, Security risks posed by shared images, Security risks posed by a management OS, A trusted virtual machine monitor, Amazon web services: EC2 instances, Connecting clients to cloud instances through firewalls, Security rules for application and transport layer protocols in EC2, How to launch an EC2 Linux instance and connect to it SLC.

Self learning component:- How to use S3 in java


Self learning component:- Cloud based optimal FPGA synthesis SLC

Text Book:

REFERENCES:

Protocol Engineering (4:0:2)

Sub Code : MIT0506
Hrs/Week : 06
SEE Hours : 3 Hrs
Designation: CORE
Credits: 05

CIE : 50%
SEE : 50%
Max Marks : 100
Advanced Database Management systems (4:0:0)

Sub Code : MIT0402
Hrs/Week : 04
SEE Hours : 3 Hrs
Designation: CORE
Credits: 04

Course Outcomes:

On successful completion of the course, student will be able to

1. Understanding different file storage structures.
2. Compare different types of tree indexing
3. Understand the query evaluation and different types of sorting.
4. Familiar with the query optimizer.
5. Tuning of the database.
6. Compare the advanced applications of the database.

1. Overview of Storage and Indexing, Disks and Files

Data on external storage; File organizations and indexing; Index data structures; Comparison of file organizations; Indexes and performance tuning; Memory hierarchy; RAID; Disk space management; Buffer manager; Files of records;

Self learning component: Page formats and record formats

2. Tree Structured Indexing

Intuition for tree indexes; Indexed sequential access methods; B+trees, Search, Insert, Delete, Duplicates, B+tress in practice, Hash-Based Indexing; Statistical hashing, Extendible hashing.

Self learning component: Linear hashing, comparisons

3. Overview of Query Evaluation, External Sorting
The system catalog; Introduction to operator evaluation; Introduction to query optimization; Alternative plans; A motivating example; what a typical optimizer does. When does a DBMS sort data? A simple two-way merge sort; External merge sort

**Self learning component:** Algorithm for relational operations

4. A Typical Relational Query Optimizer

Translating SQL queries into Relational Algebra; Estimating the cost of a plan; Relational algebra equivalences; Enumeration of alternative plans; Nested sub-queries.

**Self learning component:** other approaches to query optimization.

5. Physical Database Design and Tuning

Introduction; Guidelines for index selection; examples; Clustering and indexing; Indexes that enable index-only plans; Tools to assist in index selection; Overview of database tuning; Choices in tuning the conceptual schema; Impact of concurrency; DBMS benchmarking.

**Self learning component:** Choices in tuning queries and views

6. More Recent Applications

Mobile databases; Multimedia databases; Geographical Information Systems;

**Self learning component:** Genome data management.

**Text Books:**


**Reference Books:**

### III Semester

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### IV Semester

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(Students have to submit the final project report at the end of the semester which will be evaluated followed by a seminar, presentation and viva voce examination)
Text Books:
2. Chafic Kazoun: Programming Flex 2, O’Reilly publications, 2007. (Chapters 1, Chapters 3 to 7, Chapter 12, Chapter 16 pp380-403)
3. Francis Shanahan: Mashups, Wrox, 2007. (Chapters 1, 6)

Reference Books:

Optical Networks (4:0:2)

Sub Code : MIT0519
Hrs/Week : 06
SEE Hours : 3 Hrs

CIE : 50%
SEE : 50%
Max Marks : 100

Course Outcomes:
1. Discuss the different generations of digital transport networks
2. Diagnose the timing and synchronization in digital networks
3. Describe architecture of OTN
4. Discuss WDM
5. Discuss the concept of label switching and its importance in OTN
6. Describe LMP and optical routers
Part-A

1. Introduction, Telecommunications Infrastructure, Characteristics of Optical Fiber: Three Marketplaces; Key Optical Nodes; Other Key Terms; Evolution of Optical Systems; Key attributes of Optical Fiber; The Local Connections; The Backbone Connections; The Digital Multiplexing Hierarchy; The Digital Signaling Hierarchies; T1 / DS1 and T3 / DS3; The Layered Protocol Model in the Transport Network; considerations for Interworking Layer1, Layer 2, and Layer 3 Networks, The Basics; The Wavelength; The Basic Components; Structure of the Fiber; Fiber Types; Key Performance Properties of Fiber; Attenuation; Amplifier Spontaneous Emission; Chromatic Dispersion.

Self study component:- Wireless Optical Systems, Lasers

2. Timing and Synchronization, SONET and SDH: Timing and Synchronization in Digital Networks; Effect of a Timing error; The Clocking Signal; Types of Timing in Networks; Timing Variations; Methods of Clock Exchange; Distribution of Timing Using SONET and DS1; Timing Downstream Devices; Synchronization Status Messages and Timing Loops, The SONET Multiplexing Hierarchy; SONET and SDH Multiplexing Structure; The SONET / SDH Frame Structure; SONET and SDH Functional Components; SONET and SDH Problem Detection; Locating and Adjusting Payload with Pointers; Virtual Tributaries in more detail; Virtual Tributaries in Virtual Containers; The Overhead Bytes;

Self study component:- Building Integrated Timing Supply, SONET and SDH Concatenation

3. Architecture of Optical Transport Networks, WDM, Network Topologies and Protection Schemes: The Digital Wrapper; Control Planes; In-Band and Out-Band Control Signaling; Importance of Multiplexing and Multiplexing Hierarchies; Current Digital Transport Hierarchy; SONET Multiplexing Hierarchy; SDH Multiplexing Hierarchy; Key Indexes and Other Terms; The New Optical Transport and Digital Transport Hierarchy; The OTN Layered Model; Encapsulation and Decapsulation Operations;

Self study component:- Generic Framing Procedure,

4. The WDM Operation; DWDM, TDM and WDM Topologies; Relationship of WDM to SONET / SDH; EDF; WDM Amplifiers; Add-Drop Multiplexers; WDM Cross-Connects; Wavelength Continuity Property; Examples of DWDM Wavelength Plan; Higher Dispersion for DWDM; Tunable and Path Protection Switching; Types of Topologies; Working and Protection Fibers; Point-to-Point and Path Protection Switching; Types of Topologies; Working and Protection Fibers; Point-to-Point and Path Protection Switching; Types of Topologies; Working and Protection Fibers; Point-to-Point and Path Protection Switching; Types of Topologies; Working and Protection Fibers; Point-to-Point and Path Protection Switching; Types of Topologies; Working and Protection Fibers; Point-to-Point and Path Protection Switching; Types of Topologies; Working and Protection Fibers; Point-to-Point