NETWORK PROTOCOL DESIGN
[As per Choice Based Credit System (CBCS) scheme]
(Effective from the academic year 2016-2017)
SEMESTER – II

<table>
<thead>
<tr>
<th>Subject Code</th>
<th>16LNI21</th>
<th>IA Marks</th>
<th>20</th>
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</thead>
<tbody>
<tr>
<td>Number of Lecture Hours/Week</td>
<td>04</td>
<td>Exam Marks</td>
<td>80</td>
</tr>
<tr>
<td>Total Number of Lecture Hours</td>
<td>50</td>
<td>Exam Hours</td>
<td>03</td>
</tr>
</tbody>
</table>

CREDITS – 04

Course objectives: This course will enable students to

- Examine designing Network Protocols
- Define Abstract Protocol Notation
- Compare and contrast routing and congestion control protocols
- Analyze working in the Internet

Module -1

How to specify network protocols? Semantics of traditional protocol specifications, syntax of traditional protocol. Network processes constants, inputs, and variables. Specifications in new protocol, A vending machine protocol, a request/reply protocol, a Manchester encoding protocol. Current internet

Module -2


Module – 3


Module-4

Local and global topology information, maintaining local topology information, hierarchical topology information topology information in the internet, Abstraction of perfect channel in the internet, Hierarchical routing, random routing.

Module-5


Course outcomes:
The students should be able to:

- Evaluate networking protocols in AP notation
- Compare and contrast on routing, security and compression protocols
- Designing various error and congestion and multiplexing protocols

Question paper pattern:
The question paper will have ten questions.
There will be 2 questions from each module.
Each question will have questions covering all the topics under a module.
The students will have to answer 5 full questions, selecting one full question from each module.

Text Books:
**Reference Books:**

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### JAVA TECHNOLOGY

[As per Choice Based Credit System (CBCS) scheme]
(Effective from the academic year 2016 -2017)

**SEMESTER - II**

<table>
<thead>
<tr>
<th>Subject Code</th>
<th>16LNI22</th>
<th>IA Marks</th>
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<tr>
<td>Number of Lecture Hours/Week</td>
<td>04</td>
<td>Exam Marks</td>
<td>80</td>
</tr>
<tr>
<td>Total Number of Lecture Hours</td>
<td>50</td>
<td>Exam Hours</td>
<td>03</td>
</tr>
</tbody>
</table>

**CREDITS – 04**

Course objectives: This course will enable students to
- Developing Programs in Java
- Adopt concepts of inheritance and polymorphism
- Demonstration of generic programming and database programming
- Illustrate applets, Swings and XML parsing

---

**Module -1 Teaching Hours**

<table>
<thead>
<tr>
<th>Introduction to Java: Java and Java applications; Java Development Kit (JDK); Java is interpreted, Byte Code, JVM; Object-oriented programming; Simple Java programs. Data types and other tokens: Boolean variables, int, long, char, operators, arrays, white spaces, literals, assigning values; Creating and destroying objects; Access specifiers. Operators and Expressions:Type casting; Strings Control Statements: Selection statements, iteration statements, Jump Statements. Classes in Java; Declaring a class; Class name; Super classes; Constructors; Creating instances of class; Inner classes. Inheritance: Simple, multiple, and multilevel inheritance; Overriding, overloading</th>
<th>10 Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exception handling: Exception handling in Java. The Applet Class: Two types of Applets; Applet basics; Applet Architecture; An Applet skeleton; Simple Applet display methods; Requesting repainting; Using the Status Window; The HTML APPLET tag; Passing parameters to Applets; getDocumentbase() and getCodebase(); ApletContext and showDocument(); The AudioClip Interface; The Applet Stub Interface; Output to the Console</td>
<td>10 Hours</td>
</tr>
<tr>
<td>Multi Threaded Programming: What are threads? How to make the classes threadable; Extending threads; Implementing runnable; Synchronization; Changing state of the thread; Bounded buffer problems, read-write problem, producerconsumer problems. Event Handling: Two event handling mechanisms; The delegation event model; Event classes; Sources of events; Event listener interfaces; Using the delegation event model; Adapter classes; Inner classes</td>
<td>10 Hours</td>
</tr>
<tr>
<td>Introducing XML, Parsing an XML Document, Validating XML Documents, Locating Information with XPath, Using Namespaces, Streaming Parsers, Generating XML Documents, XSL Transformations, Connecting to a Server, Implementing Servers.</td>
<td>10 Hours</td>
</tr>
</tbody>
</table>
Course outcomes:
The students should be able to:
- Develop applications using Java
- Develop applets using Java
- Design User Interfaces using Java swings and XML parsing programs

Question paper pattern:
The question paper will have ten questions.
There will be 2 questions from each module.
Each question will have questions covering all the topics under a module.
The students will have to answer 5 full questions, selecting one full question from each module.

Text Books:

Reference Books:

MOBILE APPLICATION DEVELOPMENT
[As per Choice Based Credit System (CBCS) scheme]
(Effective from the academic year 2016 -2017)
SEMESTER – II

<table>
<thead>
<tr>
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<th>IA Marks</th>
<th>Exam Marks</th>
<th>Exam Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>16LNI23/ 16SCE23</td>
<td>20</td>
<td>80</td>
<td>03</td>
</tr>
<tr>
<td>16SCN254 / 16SIT23</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

CREDITS – 04

Course objectives: This course will enable students to
- Analyze system requirements for mobile applications.
- Apply of mobile development frameworks.
- Demonstrate mobile application design.
- Demonstrate and implement mobile application.

Module -1
Introduction to mobile communication and computing: Introduction to mobile computing, Novel applications, limitations and GSM architecture, Mobile services, System architecture, Radio interface, protocols, Handover and security. Smart phone operating systems and smart phones applications.

Module -2

Module -3

Module-4
Module-5

Displaying web pages and maps, communicating with SMS and emails. Creating and using content providers: Creating and consuming services, publishing android applications | 10 Hours

Course outcomes:
The students should be able to:
- Describe the requirements for mobile applications
- Explain the challenges in mobile application design and development
- Develop design for mobile applications for specific requirements
- Implement the design using Android SDK
- Implement the design using Objective C and iOS
- Deploy mobile applications in Android and iPhone marketplace for distribution

Question paper pattern:
The question paper will have ten questions.
There will be 2 questions from each module.
Each question will have questions covering all the topics under a module.
The students will have to answer 5 full questions, selecting one full question from each module.

Text Books:
1. Mobile Computing: (technologies and Applications-N. N. Jani Schand
2. B.M.Hirwani- Android programming Pearson publications-2013

PROTOCOL ENGINEERING
[As per Choice Based Credit System (CBCS) scheme]
(Effective from the academic year 2016 -2017)

Subject Code | 16LNI24 | IA Marks | 20
Number of Lecture Hours/Week | 04 | Exam Marks | 80
Total Number of Lecture Hours | 50 | Exam Hours | 03

CREDITS - 04

Course objectives: This course will enable students to
- Explain Protocol Engineering fundamentals
- Define SDL notations
- Demonstrate various protocol conformance testing schemes
- Explain Protocol Synthesis and Protocol Re-synthesis

Module -1

Module -2
SDL: Examples of SDL Based Protocol Specifications Introduction to Other Protocol Specification Languages. | 10 Hours

Module – 3
### Module-4

**Protocol Conformance Testing:**
- Conformance Testing
- Conformance Testing Methodology and Framework
- Conformance Test Architectures
- Test Sequence Generation Methods
- Distributed Architecture by Local Methods
- Conformance Testing with TTCN
- Conformance Testing in Systems with Semi-controllable Interfaces
- Conformance Testing of RIP, Multimedia Applications Testing
- SDL Based Tools for Conformance Testing
- SDL Based Conformance Testing of MPLS.

10 Hours

### Module-5

**Protocol Synthesis:**
- Protocol Synthesis
- Interactive Synthesis Algorithm
- Automatic Synthesis Algorithm
- Automatic Synthesis of SDL from MSC
- Protocol Re-synthesis

**Protocol Implementation:**
- Requirements of Protocol Implementation
- Object based approach to Protocol Implementation
- Protocol Compilers

10 Hours

### Course Outcomes:

The students should be able to:
- Describe the requirements for protocol engineering systems
- Explain the challenges in designing protocol engineering systems
- Implement the design using SDL

### Question paper pattern:

The question paper will have ten questions.
- There will be 2 questions from each module.
- Each question will have questions covering all the topics under a module.
- The students will have to answer 5 full questions, selecting one full question from each module.

### Text Books:


### Reference Books:


### Module - 2


### Module – 3


### Module-4


### Module-5


### Course outcomes:

The students shall able to:
- Design their own wireless network
- Evaluate the existing network and improve its quality of service
- Choose appropriate protocol for various applications
- Examine security measures present at different level
- Analyze energy consumption and management

### Question paper pattern:

The question paper will have ten questions. There will be 2 questions from each module. Each question will have questions covering all the topics under a module. The students will have to answer 5 full questions, selecting one full question from each module.

### Text Books:


### Reference Books:

[As per Choice Based Credit System (CBCS) scheme]  
(Effective from the academic year 2016 -2017)  

SEMIESTER – II  

<table>
<thead>
<tr>
<th>Subject Code</th>
<th>Subject Code</th>
<th>IA Marks</th>
<th>Exam Marks</th>
<th>Exam Hours</th>
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<tr>
<td>16SSE154</td>
<td>16LNI252</td>
<td>16SIT21</td>
<td>16SCS254</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>80</td>
<td>03</td>
</tr>
</tbody>
</table>

Number of Lecture Hours/Week: 03  
Total Number of Lecture Hours: 40  
CREDITS – 03

Course objectives: This course will enable students to

- Define and explain Web Services.
- Summarize WSDL Web Services.
- Analyze Web service Architecture.
- Explain Building Blocks of Web services.

<table>
<thead>
<tr>
<th>Module 1</th>
<th>Teaching Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Middleware: Understanding the middle ware, RPC and Related Middle ware, TP Monitors, Object Brokers, Message-Oriented Middleware.</td>
<td>8 Hours</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Module 2</th>
<th>8 Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Web Services: Web Services Technologies, Web Services Architecture.</td>
<td>8 Hours</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Module 3</th>
<th>8 Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>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.</td>
<td>8 Hours</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Module 4</th>
<th>8 Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Service Coordination Protocols: Infrastructure for Coordination Protocols, WS-Coordination, WS-Transaction, Rosetta Net and Other Standards Related to Coordination Protocols.</td>
<td>8 Hours</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Module 5</th>
<th>8 Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Service Composition: Basic of Service Composition, A New Chance of Success for Composition, Services Composition Models, Dependencies between Coordination and Composition, BPEL: Business Process Execution Language for Web Services, Outlook, Applicability of the Web Services, Web services as a Problem and a Solution : AN Example.</td>
<td>8 Hours</td>
</tr>
</tbody>
</table>

Course Outcomes

The students should be able to:

- Bind and unbind services in UDDI.
- Develop WSDL document
- Implement web service client to call public service.
- Implement a service and exposing it as public service.

Question paper pattern:

The question paper will have ten questions. There will be 2 questions from each module. Each question will have questions covering all the topics under a module. The students will have to answer 5 full questions, selecting one full question from each module.

Text Books:


Reference Books:

NIL

INTERNET OF THINGS
### Subject Code
16LNI253 /16SCE253 /16SCN151 /16SCS24 /16SIT251 /16SSE421

### Number of Lecture Hours/Week
03

### Total Number of Lecture Hours
40

### IA Marks
20

### Exam Marks
80

### Exam Hours
03

### CREDITS – 03

### Course objectives:
This course will enable students to
- Define and explain basic issues, policy and challenges in the IoT
- Illustrate Mechanism and Key Technologies in IoT
- Explain the Standard of the IoT
- Explain resources in the IoT and deploy of resources into business
- Demonstrate data analytics for IoT

### Module -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 ofThings 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. | 8 Hours |

### Module -2


### Module – 3

| Layer ½ Connectivity: Wireless Technologies for the IoT-WPAN Technologies for IoT/M2M, Cellular and Mobile Network Technologies for IoT/M2M,Layer 3 Connectivity :IPV6 Technologies for the IoT:Overview and Motivations.Address Capabilities,IPV6 Protocol Overview, IPV6 Tunneling, IPsec in IPV6,Header Compression Schemes,Quality of Service in IPV6, Migration Strategies to IPV6. | 8 Hours |

### Module-4

| Case Studies illustrating IoT Design-Introduction, Home Automation, Cities, Environment, Agriculture, Productivity Applications. | 8 Hours |

### Module-5

| Data Analytics for IoT – Introduction, Apache Hadoop, Using Hadoop MapReduce for Batch Data Analysis, Apache Oozie, Apache Spark, Apache Storm, Using Apache Storm for Real-time Data Analysis, Structural Health Monitoring Case Study. | 8 Hours |

### Course outcomes:
At the end of this course the students will be able to:
- Develop schemes for the applications of IOT in real time scenarios
- Manage the Internet resources
- Model the Internet of things to business
- Understand the practical knowledge through different case studies
- Understand data sets received through IoT devices and tools used for analysis

### Question paper pattern:
The question paper will have ten questions.
There will be 2 questions from each module.
Each question will have questions covering all the topics under a module.
The students will have to answer 5 full questions, selecting one full question from each module.

**Text Books:**

**Reference Books:**
# ADVANCES IN STORAGE AREA NETWORKS

[As per Choice Based Credit System (CBCS) scheme]
(Effective from the academic year 2016-2017)

## SEMESTER – II

<table>
<thead>
<tr>
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<th>IA Marks</th>
<th>Exam Marks</th>
<th>Number of Lecture Hours</th>
<th>Total Number of Lecture Hours</th>
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<td>20</td>
<td>80</td>
<td>03</td>
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</table>

**Credits – 03**

### Course Objectives:
- Define and contrast storage centric and server centric systems
- Define metrics used for Designing storage area networks
- Illustrate RAID concepts
- Demonstrate, how data centers maintain the data with the concepts of backup mainly remote mirroring concepts for both simple and complex systems.

## Module 1: **Introduction**

8 Hours

Server Centric IT Architecture and its Limitations; Storage – Centric IT Architecture and its advantages. Case study: Replacing a server with Storage Networks The Data Storage and Data Access problem; The Battle for size and access. Intelligent Disk Subsystems: Architecture of Intelligent Disk Subsystems; Hard disks and Internal I/O Channels; JBOD, Storage virtualization using RAID and different RAID levels; Caching: Acceleration of Hard Disk Access; Intelligent disk subsystems, Availability of disk subsystems.

## Module 2: **I/O Techniques**

8 Hours

The Physical I/O path from the CPU to the Storage System; SCSI; Fibre Channel Protocol Stack; Fibre Channel SAN; IP Storage. Network Attached Storage: The NAS Architecture, The NAS hardware Architecture, The NAS Software Architecture, Network connectivity, NAS as a storage system. File System and NAS: Local File Systems; Network file Systems and file servers; Shared Disk file systems; Comparison of fibre Channel and NAS.

## Module 3: **Storage Virtualization**

8 Hours

Definition of Storage virtualization; Implementation Considerations; Storage virtualization on Block or file level; Storage virtualization on various levels of the storage Network; Symmetric and Asymmetric storage virtualization in the Network.

## Module 4: **SAN Architecture and Hardware devices**

8 Hours

Overview, Creating a Network for storage; SAN Hardware devices; The fibre channel switch; Host Bus Adaptors; Putting the storage in SAN; Fabric operation from a Hardware perspective. Software Components of SAN: The switch’s Operating system; Device Drivers; Supporting the switch’s components; Configuration options for SANs.

## Module 5: **Management of Storage Network**

8 Hours


### Course Outcomes

The students should be able to:
- Identify the need for performance evaluation and the metrics used for it
• Apply the techniques used for data maintenance.
• Realize strong virtualization concepts
• Develop techniques for evaluating policies for LUN masking, file systems

**Question paper pattern:**
The question paper will have ten questions.
There will be 2 questions from each module.
Each question will have questions covering all the topics under a module. The students will have to answer 5 full questions, selecting one full question from each module.

**Text Books:**
1. Ulf Troppens, Rainer Erkens and Wolfgang Muller: Storage Networks Explained, Wiley India, 2013.

**Reference Books:**

**MINIPROJECT**
[As per Choice Based Credit System (CBCS) scheme]
(Effective from the academic year 2016 -2017)

**SEMESTER – II**

<table>
<thead>
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<td>16LNI26/ 16SCE26/ 16SCN26/16SCS26/16SFC26/16SIT26/16SSE26</td>
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<table>
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<tbody>
<tr>
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<table>
<thead>
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<th>Total Number of Lecture Hours</th>
<th>Exam Hours</th>
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<tbody>
<tr>
<td>------</td>
<td>03</td>
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</tbody>
</table>

**CREDITS – 02**

**Course objectives:** This course will enable students to
- Enable the student to design, develop and analyze an application development

The student will carry out a mini project relevant to the course. The project must be development of an application (Hardware/Software). It is preferable if the project is based on mobile application development.

**Course outcomes:**
- Design, develop and to analyze an application development.
- Prepare report of the project.

**Conduction of Practical Examination:**
The student shall prepare the report by including:
1. Define project (Problem Definition)
2. Prepare requirements document
   a. Statement of work
   b. Functional requirements
   c. Software / Hardware requirements
3. Develop use cases
4. Research, analyze and evaluate existing learning materials on the application
5. Develop user interface and implement code
6. Prepare for final demo

**Evaluation:**
Evaluation shall be taken up at the end of the semester. Project work evaluation and viva-voce examination shall be conducted. Internal evaluation shall be carried by the Guide and Head of the department for 20 marks. Final examination which includes demonstration of the project and viva-voce shall be conducted for 80 Marks viz report + Outputs of the project + presentation = 30+30+20 = 80 marks.

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<tr>
<th>Subject Code</th>
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<td>Exam Marks</td>
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**SEMINAR**  
[As per Choice Based Credit System (CBCS) scheme]  
(Effective from the academic year 2016 -2017)  
**SEMESTER – II**

<table>
<thead>
<tr>
<th>Subject Code</th>
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</thead>
<tbody>
<tr>
<td>16SCE27 / 16SCN27 / 16LNI27 / 16SIT27 / 16SSE27 / 16SCS27 / 16SFC27</td>
<td>Exam Marks</td>
<td>-</td>
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</tbody>
</table>

**Course objectives:** This course will enable students to

- Motivate the students to read technical article
- Discover recent technology developments

**Descriptions**

The students should read a recent technical article (try to narrow down the topic as much as possible) from any of the leading reputed and refereed journals like:

1. IEEE Transactions, journals, magazines, etc.
2. ACM Transactions, journals, magazines, SIG series, etc.
3. Springer
4. Elsevier publications etc

In the area of (to name few and not limited to)

- Web Technology
- Cloud Computing
- Artificial Intelligent
- Networking
- Security
- Data mining

**Course Outcomes**

The students should be able to:

- Conduct survey on recent technologies
- Infer and interpret the information from the survey conducted
- Motivated towards research

**Conduction:**

The students have to present at least ONE technical seminar on the selected topic and submit a report for internal evaluation.

**Marks Distribution:** Literature Survey + Presentation (PPT) + Report + Question & Answer + Paper: 20 + 30 + 30 + 20 (100).
CLIENT SERVER PROGRAMMING
[As per Choice Based Credit System (CBCS) scheme]
(Effective from the academic year 2016 -2017)
SEMESTER – IV

Subject Code 16SIT151 / 16LNI41 / 16SCN41
IA Marks 20
Number of Lecture Hours/Week 04 Exam Marks 80
Total Number of Lecture Hours 50 Exam Hours 03
CREDITS – 04

Course objectives: This course will enable students to

- Define System Calls, Basic I/O Functions available in UNIX
- Illustrate socket interface, TCP, UDP in detail.
- Compare various client Software and various algorithms issue related to server software design.

Module 1


Module 2


Algorithms and Issues in Client Software Design: Introduction, Learning Algorithms instead of Details, Client Architecture, Identifying the Location of a Server, Parsing an Address Argument, Looking up a Domain Name, Looking up a well-known Port by Name, Port Numbers and Network Byte Order, Looking up a Protocol by Name, The TCP Client Algorithm, Allocating a Socket, Choosing a Local Protocol Port Number, A fundamental Problem in choosing a Local IP Address, Connecting a TCP Socket to a Server, Communicating with the Server using TCP, Reading a response from a TCP Connection, Closing a TCP Connection, Programming a UDP Client, Connected and Unconnected UDP Socket, Using Connect with UDP, Communicating with a Server using UDP, Closing a Socket that uses UDP, Partial Close for UDP, A Warning about UDP Unreliability.

Module 3


Module 4

Module 5


**Concurrent, Connection-Oriented Servers (TCP):** Introduction, Concurrent ECHO, Iterative Vs Concurrent Implementations, Process Structure, An example Concurrent ECHO Server, Cleaning up Errant Processes.

<table>
<thead>
<tr>
<th>Course Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>The students should be able to:</td>
</tr>
<tr>
<td>- Explain Client-Server software, Context Switching and Protocol Software, I/O.</td>
</tr>
<tr>
<td>- Demonstrate programming System Calls, Basic I/O Functions available in UNIX</td>
</tr>
<tr>
<td>- Implement Socket interface, TCP, UDP in detail.</td>
</tr>
<tr>
<td>- Compare and contrast Client Software Various applications and their issues</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Question paper pattern:</th>
</tr>
</thead>
<tbody>
<tr>
<td>The question paper will have ten questions.</td>
</tr>
<tr>
<td>There will be 2 questions from each module.</td>
</tr>
<tr>
<td>Each question will have questions covering all the topics under a module. The students will have to answer 5 full questions, selecting one full question from each module.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Text Books:</th>
</tr>
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</table>

<table>
<thead>
<tr>
<th>Reference Books:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. NIL</td>
</tr>
</tbody>
</table>
Subject Code: 16LNI421 / 16SIT253 / 16SCE423

Number of Lecture Hours/Week: 03
Total Number of Lecture Hours: 40

Exam Marks: 80
Exam Hours: 03

CREDITS – 03

Course objectives: This course will enable students to
- Define the area of cybercrime and forensics.
- Explain the motive and causes for cybercrime, detection and handling.
- Investigate Areas affected by cybercrime.
- Illustrate tools used in cyber forensic
- Infer legal Perspectives in cyber security

Module -1

Module -2

Module – 3

Module-4

Module-5

<table>
<thead>
<tr>
<th>8 Hours</th>
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</thead>
</table>

**Course outcomes:**

By the end of this course the student acquire

- Define cyber security, cyber law and their roles
- Demonstrate cyber security cybercrime and forensics.
- Infer legal issues in cybercrime,
- Demonstrate tools and methods used in cybercrime and security.
- Illustrate evidence collection and legal challenges

**Question paper pattern:**

The question paper will have ten questions.

There will be 2 questions from each module.

Each question will have questions covering all the topics under a module.

The students will have to answer 5 full questions, selecting one full question from each module.

**Text Books:**


**Reference Books:**

MANAGING BIG DATA
[As per Choice Based Credit System (CBCS) scheme]
(Effective from the academic year 2016 -2017)
SEMESTER - IV

Subject Code | 16LNI422 / 16SCE21 / 16SCN24 / 16SCS21 / 16SIT41 / 16SSE422 | IA Marks | 20
Number of Lecture Hours/Week | 03 | Exam Marks | 80
Total Number of Lecture Hours | 40 | Exam Hours | 03

CREDITS – 03

Course objectives: This course will enable students to
- Define big data for business intelligence
- Analyze business case studies for big data analytics
- Explain managing of Big data Without SQL
- Develop map-reduce analytics using Hadoop and related tools

Module -1

Module -2

Module – 3

Module-4

Module-5

Course outcomes:
The students shall able to:
- Describe big data and use cases from selected business domains
- Explain NoSQL big data management
- Install, configure, and run Hadoop and HDFS
• Perform map-reduce analytics using Hadoop
• Use Hadoop related tools such as HBase, Cassandra, Pig, and Hive for big data Analytics

**Question paper pattern:**
The question paper will have ten questions.
There will be 2 questions from each module.
Each question will have questions covering all the topics under a module.
The students will have to answer 5 full questions, selecting one full question from each module.

**Text Books:**

**Reference Books:**

**SOFTWARE AGENTS**
[As per Choice Based Credit System (CBCS) scheme]
(Effective from the academic year 2016 -2017)
SEMESTER - IV

Subject Code 16LNI423 / 16SCE153
Number of Lecture Hours/Week 03
Exam Marks 80
Total Number of Lecture Hours 40
Exam Hours 03

**CREDITS – 03**

**Course objectives:** This course will enable students to
- Explain the principles and fundamentals of designing agents
- Define the architecture design of different agents.
- Demonstrate design of the agents
- Illustrate user interaction with agents
- Discover the role of agents in assisting the users in day to day activities

**Module -1**

**Module -2**
Application and Agents in Oval, Conclusions: An Addendum: The Relationship between Oval and Objects Lens

<table>
<thead>
<tr>
<th>Module – 3</th>
<th>8 Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agents that Reduce Work and Information Overload Introduction, Approaches to Building Agents, Training a Personal Digital Assistant, Some Example of Existing Agents, Electronic Mail Agents, Meeting Scheduling Agent, News Filtering Agent, Entertainment Selection Agent, Discussion, Acknowledgements Software Agents for Cooperative Learning: Computer-Supported Cooperative Learning, Examples of Software Agents for Cooperative Learning, Examples of Software Agents for Cooperative Learning, Developing an Example, Discussion and Perspectives.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Module-4</th>
<th>8 Hours</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Module-5</th>
<th>8 Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agent for Information Gathering: Agent Organization, The Knowledge of an Agent, The Domain Model of an Agent, Modeling other Agent, communication language and protocol, query processing, an information goal, information source selection, generating a query access plan, interleaving planning and execution , semantic query optimization, learning, caching retrieved data, related work, discursion, acknowledgement. Mobile Agents: Enabling Mobile Agents, Programming Mobile Agents, Using Mobile Agents.</td>
<td></td>
</tr>
</tbody>
</table>

**Course outcomes:**

- Identify and explore the advantages of agents and design the architecture for an agent
- Analyze the agent in details in a view for the implementation
- Analyze communicative actions with agents.
- Analyze typical agents using a tool for different types of applications.

**Question paper pattern:**

The question paper will have ten questions. There will be 2 questions from each module. Each question will have questions covering all the topics under a module. The students will have to answer 5 full questions, selecting one full question from each module.

**Text Books:**


**Reference Books:**

# BIOINFORMATICS

[As per Choice Based Credit System (CBCS) scheme]

(Effective from the academic year 2016 -2017)

**SEMESTER – IV**

<table>
<thead>
<tr>
<th>Subject Code</th>
<th>16LNI424 / 16SIT254</th>
<th>IA Marks</th>
<th>20</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Lecture Hours/Week</td>
<td>03</td>
<td>Exam Marks</td>
<td>80</td>
</tr>
<tr>
<td>Total Number of Lecture Hours</td>
<td>40</td>
<td>Exam Hours</td>
<td>03</td>
</tr>
</tbody>
</table>

**CREDITS – 03**

**Course objectives:** This course will enable students to
- Explain domain of bioinformatics
- Illustrate role of data warehousing and data mining for bioinformatics
- Compare model bioinformatics based applications
- Demonstrate how to deploy the pattern matching and visualization techniques in bioinformatics
- Define the Microarray technologies for genome expression

<table>
<thead>
<tr>
<th>Module -1</th>
<th>Teaching Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>INTRODUCTION : Need for Bioinformatics technologies – Overview of Bioinformatics technologies – Structural bioinformatics – Data format and processing – secondary resources- Applications – Role of Structural bioinformatics - Biological Data Integration System.</td>
<td>8 Hours</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Module -2</th>
<th>Teaching Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>DATAWAREHOUSING AND DATAMINING IN BIOINFORMATICS: Bioinformatics data – Data warehousing architecture – data quality – Biomedical data analysis – DNA data analysis – Protein data analysis – Machine learning – Neural network architecture- Applications in bioinformatics.</td>
<td>8 Hours</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Module – 3</th>
<th>Teaching Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>MODELING FOR BIOINFORMATICS : Hidden markov modeling for biological data analysis Sequence identification – Sequence classification – multiple alignment generation – Comparative modeling – Protein modeling – genomic modeling – Probabilistic modeling – Bayesian networks – Boolean networks - Molecular modeling – Computer programs for molecular modeling.</td>
<td>8 Hours</td>
</tr>
</tbody>
</table>

<table>
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<tr>
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<th>Teaching Hours</th>
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</thead>
</table>

<table>
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<tr>
<th>Module-5</th>
<th>Teaching Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>MICROARRAY ANALYSIS: Microarray technology for genome expression study – image analysis for data extraction – preprocessing – segmentation – gridding, spot extraction, normalization, filtering – cluster analysis – gene network analysis</td>
<td>8 Hours</td>
</tr>
</tbody>
</table>

**Course outcomes:**
The students should be able to:
- Deploy the data warehousing and data mining techniques in Bioinformatics
- Model bioinformatics based applications
- Deploy the pattern matching and visualization techniques in bioinformatics
- Work on the protein sequences
- Use the Microarray technologies for genome expression.

**Question paper pattern:**
The question paper will have ten questions.
There will be 2 questions from each module.
Each question will have questions covering all the topics under a module.
The students will have to answer 5 full questions, selecting one full question from each module.

**Text Books:**

**Reference books :** NIL