PROGRAM EDUCATIONAL OBJECTIVES (PEOs):
1. To enable graduates to pursue research, or have a successful career in academia or industries associated with Computer Science and Networking, or as entrepreneurs.
2. To analyze and understand the foundations of networking and also advanced techniques and tools so as to build or improve current techniques to a higher standard to expand the horizons of easier computing.
3. To enhance the creativity and understanding of students through exposure of various Computer and analytical environments to enable them ethically to build innovative and research oriented systems or solutions of varying complexity.

PROGRAM SPECIFIC OBJECTIVES (PSOs)
1. To analyze, design and develop computing solutions by applying foundational concepts of computer science and engineering.
2. To understand the concepts and theories of networking and apply them to various situations for classifying networks, analyzing performance and implementing new technologies.
3. To adapt to emerging next generation of networking technologies to design, build and dream up the technology networks

PROGRAM OUTCOMES (POs)
Engineering Graduates will be able to:

A. Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

B. Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

C. Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for thepublic health and safety, and the cultural, societal, and environmental considerations.

D. Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of theinformation to provide valid conclusions.

E. Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

F. The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
G. **Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

H. **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

I. **Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

J. **Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

K. **Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one’s own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

L. **Life-long learning**: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

### MAPPING OF PROGRAMME EDUCATIONAL OBJECTIVES WITH PROGRAMME OUTCOMES

A broad relation between the programme objective and the outcomes is given in the following table:

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Contribution 1: Reasonable 2: Significant 3: Strong

### MAPPING OF PROGRAM SPECIFIC OBJECTIVES WITH PROGRAMME OUTCOMES

A broad relation between the Program Specific Objectives and the outcomes is given in the following table:

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ANNA UNIVERSITY, CHENNAI
AFFILIATED INSTITUTIONS
M.E. COMPUTER SCIENCE AND ENGINEERING
(With Specialization in Networks)
REGULATIONS – 2017
CHOICE BASED CREDIT SYSTEM
CURRICULA AND SYLLABI
# SEMESTER III

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<td>3.</td>
<td>CP5411</td>
<td>Project Work Phase – II</td>
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# PROFESSIONAL ELECTIVES (PE)

## SEMESTER II

### ELECTIVE I

<table>
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<th>SL. No</th>
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<td>1.</td>
<td>CP5072</td>
<td>Software Architectures and Design</td>
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<td>Cloud Computing Technologies</td>
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## SEMESTER II

### ELECTIVE II

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<td>1.</td>
<td>MU5251</td>
<td>Multimedia Communication Networks</td>
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<td>NE5001</td>
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<td>NE5002</td>
<td>High Speed Switching Architectures</td>
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## SEMESTER III

### ELECTIVE III

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<tr>
<td>1.</td>
<td>NE5071</td>
<td>Network Management</td>
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<td>Next Generation Networks</td>
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<td>NE5005</td>
<td>Software Defined Networks and Network Function Virtualization (SDN and NFV)</td>
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### SEMESTER III
#### ELECTIVE IV

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<tbody>
<tr>
<td>1.</td>
<td>CP5073</td>
<td>Embedded Software Development</td>
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<td>NE5006</td>
<td>Protocols and Architectures for Wireless Sensor Networks</td>
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<td>CP5076</td>
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### SEMESTER III
#### ELECTIVE V

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<tbody>
<tr>
<td>1.</td>
<td>CP5074</td>
<td>Social Network Analysis</td>
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<tr>
<td>2.</td>
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<td>Web Engineering</td>
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<td>Ethical Hacking</td>
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<td>4.</td>
<td>NE5008</td>
<td>Digital Forensics</td>
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</table>
OBJECTIVES:
This course is designed to provide the solid foundation on topics in applied probability and various statistical methods which form the basis for many other areas in the mathematical sciences including statistics, modern optimization methods and risk modeling. It is framed to address the issues and the principles of estimation theory, testing of hypothesis and multivariate analysis.

UNIT I PROBABILITY AND RANDOM VARIABLES 12

UNIT II TWO DIMENSIONAL RANDOM VARIABLES 12
Joint distributions – Marginal and conditional distributions – Functions of two dimensional random variables – Regression curve – Correlation.

UNIT III ESTIMATION THEORY 12

UNIT IV TESTING OF HYPOTHESIS 12
Sampling distributions – Type I and Type II errors – Small and large samples – Tests based on Normal, t, Chi square and F distributions for testing of mean, variance and proportions – Tests for independence of attributes and goodness of fit.

UNIT V MULTIVARIATE ANALYSIS 12
Random vectors and matrices – Mean vectors and covariance matrices – Multivariate normal density and its properties – Principal components - Population principal components – Principal components from standardized variables

TOTAL : 60 PERIODS

OUTCOMES:
After completing this course, students should demonstrate competency in the following topics:
- Basic probability axioms and rules and the moments of discrete and continuous random variables.
- Consistency, efficiency and unbiasedness of estimators, method of maximum likelihood estimation and Central Limit Theorem.
- Use statistical tests in testing hypotheses on data.
- Perform exploratory analysis of multivariate data, such as multivariate normal density, calculating descriptive statistics, testing for multivariate normality.

The students should have the ability to use the appropriate and relevant, fundamental and applied mathematical and statistical knowledge, methodologies and modern computational tools.
REFERENCES:


CP5151 ADVANCED DATA STRUCTURES AND ALGORITHMS

OBJECTIVES:

- To understand the usage of algorithms in computing.
- To learn and use hierarchical data structures and its operations
- To learn the usage of graphs and its applications.
- To select and design data structures and algorithms that is appropriate for problems.
- To study about NP Completeness of problems.

UNIT I ROLE OF ALGORITHMS IN COMPUTING


UNIT II HIERARCHICAL DATA STRUCTURES


UNIT III GRAPHS


UNIT IV ALGORITHM DESIGN TECHNIQUES


UNIT V NP COMPLETE AND NP HARD


TOTAL: 60 PERIODS
OUTCOMES:
Upon the completion of the course the student should be able to

- Design data structures and algorithms to solve computing problems.
- Design algorithms using graph structure and various string matching algorithms to solve real-life problems.
- Apply suitable design strategy for problem solving

REFERENCES:

CP5152 ADVANCED COMPUTER ARCHITECTURE

OBJECTIVES:

- To introduce the students to the recent trends in the field of Computer Architecture and identify performance related parameters.
- To learn the different multiprocessing issues.
- To expose the different types of multicore architectures.
- To understand the design of the memory hierarchy.

UNIT I FUNDAMENTALS OF COMPUTER DESIGN AND ILP

UNIT II MEMORY HIERARCHY DESIGN

UNIT III MULTIPROCESSOR ISSUES
- Introduction- Centralized, Symmetric and Distributed Shared Memory Architectures – Cache Coherence Issues – Performance Issues – Synchronization – Models of Memory Consistency – Case Study-Interconnection Networks – Buses, Crossbar and Multi-stage Interconnection Networks

UNIT IV MULTICORE ARCHITECTURES
OUTCOMES:
Upon completion of this course, the students should be able to:
- Identify the limitations of ILP.
- Discuss the issues related to multiprocessing and suggest solutions
- Point out the salient features of different multicore architectures and how they exploit parallelism.
- Discuss the various techniques used for optimising the cache performance
- Design hierarchal memory system
- Point out how data level parallelism is exploited in architectures

REFERENCES:

OBJECTIVES :
- To be able to read and understand sample open source programs and header files.
- To learn how the processes are implemented in linux.
- To understand the implementation of the Linux file system.
- To study Linux memory management data structures and algorithms.
- To acquire the knowledge in the implementation of interprocess communication.
- To understand how program execution happens in Linux.

UNIT I  INTRODUCTION
UNIT II     PROCESSES  

UNIT III     FILE SYSTEM  
The Virtual File System (VFS) - Role - File Model - System Calls - Data Structures - Super Block, Inode, File, dentry Objects - dentry Cache - Files Associated with a Process - Filesystem Types - Special File systems - File system Type Registration - File system Handling - Namespaces - Mounting - Unmounting - Implementation of VFS System Calls.

UNIT IV     MEMORY MANAGEMENT  
Page frame management - page descriptors - non-uniform memory access - memory zones - reserved page frames - zoned page frame allocator - kernel mappings - buddy system algorithm - page frame cache - zone allocator.

UNIT V     PROCESS COMMUNICATION AND PROGRAM EXECUTION  

TOTAL : 45 PERIODS

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

- To explain the functionality of a large software system by reading its source.
- To revise any algorithm present in a system.
- To design a new algorithm to replace an existing one.
- To appropriately modify and use the data structures of the linux kernel for a different software system.

REFERENCES:
OBJECTIVES:
- To understand Software Engineering Lifecycle Models
- To do project management and cost estimation
- To gain knowledge of the System Analysis and Design concepts.
- To understand software testing approaches
- To be familiar with DevOps practices

UNIT I  INTRODUCTION  9

UNIT II  SOFTWARE REQUIREMENT SPECIFICATION  9

UNIT III  ARCHITECTURE AND DESIGN  9

UNIT IV  TESTING  9
Testing – Unit testing – Black box testing– White box testing – Integration and System testing– Regression testing – Debugging - Program analysis – Symbolic execution – Model Checking

UNIT V  DEVOPS  9
DevOps:Motivation-Cloud as a platform-Operations- Deployment Pipeline:Overall Architecture- Building and Testing-Deployment- Case study: Migrating to Microservices

TOTAL: 45 PERIODS

OUTCOMES:
At the end of this course, the students will be able to:
- Understand the advantages of various Software Development Lifecycle Models
- Gain knowledge on project management approaches as well as cost and schedule estimation strategies
- Perform formal analysis on specifications
- Use UML diagrams for analysis and design
- Architect and design using architectural styles and design patterns
- Understand software testing approaches
- Understand the advantages of DevOps practices
REFERENCES:

CP5191 MACHINE LEARNING TECHNIQUES

OBJECTIVES:
- To introduce students to the basic concepts and techniques of Machine Learning.
- To have a thorough understanding of the Supervised and Unsupervised learning techniques.
- To study the various probability based learning techniques.
- To understand graphical models of machine learning algorithms.

UNIT I INTRODUCTION

UNIT II LINEAR MODELS

UNIT III TREE AND PROBABILISTIC MODELS

UNIT IV DIMENSIONALITY REDUCTION AND EVOLUTIONARY MODELS
UNIT V  GRAPHICAL MODELS

TOTAL: 45 PERIODS

OUTCOMES:
Upon completion of the course, the students will be able to:
- Distinguish between, supervised, unsupervised and semi-supervised learning
- Apply the apt machine learning strategy for any given problem
- Suggest supervised, unsupervised or semi-supervised learning algorithms for any given problem
- Design systems that uses the appropriate graph models of machine learning
- Modify existing machine learning algorithms to improve classification efficiency

REFERENCES:

CP5161  DATA STRUCTURES LABORATORY

OBJECTIVES:
- To acquire the knowledge of using advanced tree structures.
- To learn the usage of heap structures.
- To understand the usage of graph structures and spanning trees.

LIST OF EXPERIMENTS
Each student has to work individually on assigned lab exercises. Lab sessions could be scheduled as one contiguous four-hour session per week or two two-hour sessions per week. There will be about 15 exercises in a semester. It is recommended that all implementations are carried out in Java. If C or C++ has to be used, then the threads library will be required for concurrency. Exercises should be designed to cover the following topics:

EXPERIMENTS:
1. Implementation of Merge Sort and Quick Sort-Analysis
2. Implementation of a Binary Search Tree
3. Red-Black Tree Implementation
4. Heap Implementation
5. Fibonacci Heap Implementation
6. Graph Traversals
7. Spanning Tree Implementation
8. Shortest Path Algorithms (Dijkstra's algorithm, Bellmann Ford Algorithm)
9. Implementation of Matrix Chain Multiplication
10. Activity Selection and Huffman Coding Implementation.

TOTAL: 60 PERIODS
OUTCOMES:
Upon Completion of the course, the students will be able to:
- Design and implement basic and advanced data structures extensively.
- Design algorithms using graph structures
- Design and develop efficient algorithms with minimum complexity using design techniques.

NE5291 NETWORK DESIGN AND PROGRAMMING

OBJECTIVES:
- To understand the basic networking principles
- To explore various networking devices and protocols required for network design and management
- To study two novel networking technologies: SDN and DTN
- To learn network programming in UNIX C

UNIT I NETWORKING PRINCIPLES

UNIT II PHYSICAL NETWORK DESIGN

UNIT III LOGICAL DESIGN AND MANAGEMENT

UNIT IV INNOVATIVE NETWORKS

UNIT V NETWORK PROGRAMMING IN UNIX C

TOTAL: 45 PERIODS
OUTCOMES:
After studying this course, the student should be able to:
- Apply the networking principles to design a network
- Apply SDN in computing paradigms like Cloud Computing and Internet of Things
- Configure the networking devices and protocols
- Develop network applications in various platforms

REFERENCES:

NE5201

NETWORK SECURITY

OBJECTIVES:
- To understand the fundamentals of network security
- To acquire knowledge on standard algorithms used to provide confidentiality, integrity and authenticity.
- To understand the various key distribution and management schemes.
- To understand how to deploy encryption techniques to secure data in transit across data networks
- To design security applications in the field of Information technology

UNIT I
INTRODUCTION

UNIT II
BLOCK CIPHERS & PUBLIC KEY ENCRYPTION

UNIT III
HASH FUNCTIONS AND DIGITAL SIGNATURES
UNIT IV E-MAIL, IP & WEB SECURITY

UNIT V SYSTEM SECURITY

TOTAL: 45 PERIODS

OUTCOMES:
• Compare various Security Techniques Design Secure applications Inject secure coding in the developed applications
• Implement basic security algorithms required by any computing system.
• Analyze the vulnerabilities in any computing system and hence be able to design a security solution.
• Analyze the possible security attacks in complex real time systems and their effective countermeasures
• Identify the security issues in the network and resolve it.
• Evaluate security mechanisms using rigorous approaches, including theoretical derivation, modeling, and simulations
• Formulate research problems in the computer security field

REFERENCES:

CP5292 INTERNET OF THINGS

OBJECTIVES:
• To understand the fundamentals of Internet of Things
• To learn about the basics of IOT protocols
• To build a small low cost embedded system using Raspberry Pi.
• To apply the concept of Internet of Things in the real world scenario.
UNIT I INTRODUCTION TO IoT
Internet of Things - Physical Design - Logical Design - IoT Enabling Technologies - IoT Levels & Deployment Templates - Domain Specific IoTs - IoT and M2M - IoT System Management with NETCONF-YANG - IoT Platforms Design Methodology

UNIT II IoT ARCHITECTURE
M2M high-level ETSI architecture - IETF architecture for IoT - OGC architecture - IoT reference model - Domain model - information model - functional model - communication model - IoT reference architecture

UNIT III IoT PROTOCOLS

UNIT IV BUILDING IoT WITH RASPBERRY PI & ARDUINO

UNIT V CASE STUDIES AND REAL-WORLD APPLICATIONS
Real world design constraints - Applications - Asset management, Industrial automation, smart grid, Commercial building automation, Smart cities - participatory sensing - Data Analytics for IoT – Software & Management Tools for IoT Cloud Storage Models & Communication APIs - Cloud for IoT - Amazon Web Services for IoT.

TOTAL : 45 PERIODS

OUTCOMES:
Upon completion of the course, the student should be able to:
- Analyze various protocols for IoT
- Develop web services to access/control IoT devices.
- Design a portable IoT using Raspberry Pi
- Deploy an IoT application and connect to the cloud.
- Analyze applications of IoT in real time scenario

REFERENCES:
OBJECTIVES:

- To understand the concepts of various wireless technologies
- To review the concepts of wireless networks
- To explore the emerging wireless technologies and their potential impact

UNIT I  WIRELESS LAN and PAN  9
Introduction, fundamentals of WLAN –technical issues, network architecture, IEEE 802.11-physical layer, Mac layer mechanism, CSMA/CA,RTS/CTS, Polling, Bluetooth- User scenarios, Architecture, Radio layer, Baseband layer, Link manager protocol, L2CAP, Security, SDP, IEEE 802.15.3. 19

UNIT II  WIRELESS INTERNET  9

UNIT III  AD-HOC SENSOR NETWORK  9

UNIT IV  3G NETWORKS  9

UNIT V  4G - LTE  9

TOTAL : 45 PERIODS

OUTCOMES:
Upon successful completion of this course, a student will be able to:

- To design the various wireless networks.
- To be able to design the 4G and LTE networks
- To design application sensor networks.
- To design Heterogeneous networks
REFERENCES:

NE5281 NETWORK DESIGN AND PROGRAMMING LABORATORY

OBJECTIVES:
- To practice LAN and WAN design
- To learn network programming in UNIX C and Python
- Establish a LAN with a switch/hub with 3 PCs and check the connectivity and configuration
- Establish a internetwork with 2 routers and two or more LANs using static routes and check the connectivity and configuration
- Establish a dynamic routing based internetwork with 2 routers and two or more LANs using RIP/OSPF and check the connectivity and configuration
- In the internetwork created in experiment number 4, analyze the performance of various TCP variants using an FTP application

NETWORK PROGRAMMING
- Develop a C program that demonstrates inter process communication
- Develop a TCP client/server application
- Develop a UDP client/server application
- Develop an Iterative UDP server with 2 or 3 clients
- Develop a concurrent TCP server with 2 or 3 clients
- Develop a multiprotocol server with TCP and UDP and 2 clients
- Develop simple Python programs that use frequently used syntactic constructs
- Develop a Socket based application in Python
- Build client applications for major APIs (Amazon S3, Twitter etc) in Python
- Develop an application that interacts with e-mail servers in python
- Develop applications that work with remote servers using SSH, FTP etc in Python

TOTAL: 60 PERIODS

OUTCOMES:
- After completing this course the student should be able to
- Design and implement LANs and internetworks
- Develop network based applications in UNIX C and Python
In this course, students will develop their scientific and technical reading and writing skills that they need to understand and construct research articles. A term paper requires a student to obtain information from a variety of sources (i.e., Journals, dictionaries, reference books) and then place it in logically developed ideas. The work involves the following steps:

1. Selecting a subject, narrowing the subject into a topic
2. Stating an objective.
3. Collecting the relevant bibliography (atleast 15 journal papers)
4. Preparing a working outline.
5. Studying the papers and understanding the authors contributions and critically analysing each paper.
6. Preparing a working outline
7. Linking the papers and preparing a draft of the paper.
8. Preparing conclusions based on the reading of all the papers.
9. Writing the Final Paper and giving final Presentation

Please keep a file where the work carried out by you is maintained.
Activities to be carried Out

<table>
<thead>
<tr>
<th>Activity</th>
<th>Instructions</th>
<th>Submission week</th>
<th>Evaluation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Selection of area of interest and Topic</td>
<td>You are requested to select an area of interest, topic and state an objective</td>
<td>2nd week</td>
<td>3% Based on clarity of thought, current relevance and clarity in writing</td>
</tr>
<tr>
<td>Stating an Objective</td>
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</tr>
<tr>
<td>Collecting Information about your area &amp; topic</td>
<td>1. List 1 Special Interest Groups or professional society</td>
<td>3rd week</td>
<td>3% (the selected information must be area specific and of international and national standard)</td>
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<tr>
<td></td>
<td>2. List 2 journals</td>
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<td>3. List 2 conferences, symposia or workshops</td>
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<td>4. List 1 thesis title</td>
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<td>5. List 3 web presences (mailing lists, forums, news sites)</td>
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<tr>
<td></td>
<td>6. List 3 authors who publish regularly in your area</td>
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<td></td>
<td>7. Attach a call for papers (CFP) from your area</td>
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</tr>
<tr>
<td>Collection of Journal papers in the topic in the context of the objective – collect 20 &amp; then filter</td>
<td>• You have to provide a complete list of references you will be using- Based on your objective -Search various digital libraries and Google Scholar • When picking papers to read - try to: • Pick papers that are related to each other in some ways and/or that are in the same field so that you can write a meaningful survey out of them,</td>
<td>4th week</td>
<td>6% (the list of standard papers and reason for selection)</td>
</tr>
</tbody>
</table>
- Favour papers from well-known journals and conferences,
- Favour “first” or “foundational” papers in the field (as indicated in other people’s survey paper),
- Favour more recent papers,
- Pick a recent survey of the field so you can quickly gain an overview,
- Find relationships with respect to each other and to your topic area (classification scheme/categorization)
- Mark in the hard copy of papers whether complete work or section/sections of the paper are being considered

<table>
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<tr>
<th>Reading and notes for first 5 papers</th>
<th>Reading Paper Process</th>
<th>5th week</th>
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<tbody>
<tr>
<td>For each paper form a Table answering the following questions:</td>
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</tr>
<tr>
<td>What is the main topic of the article?</td>
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<tr>
<td>What was/were the main issue(s) the author said they want to discuss?</td>
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<tr>
<td>Why did the author claim it was important?</td>
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<tr>
<td>How does the work build on other’s work, in the author’s opinion?</td>
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<tr>
<td>What simplifying assumptions does the author claim to be making?</td>
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<tr>
<td>What did the author do?</td>
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<tr>
<td>How did the author claim they were going to evaluate their work and compare it to others?</td>
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<td>What did the author say were the limitations of their research?</td>
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<td>What did the author say were the important directions for future research?</td>
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<td>Conclude with limitations/issues not addressed by the paper (from the perspective of your survey)</td>
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<th>Reading and notes for next 5 papers</th>
<th>Repeat Reading Paper Process</th>
<th>6th week</th>
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( the table given should indicate your understanding of the paper and the evaluation is based on your conclusions about each paper)
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<th>Activity</th>
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<td>Reading and notes for final 5 papers</td>
<td>Repeat Reading Paper Process</td>
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<td>(the table given should indicate your understanding of the paper and the evaluation is based on your conclusions about each paper)</td>
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<td>Draft outline 1 and Linking papers</td>
<td>Prepare a draft Outline, your survey goals, along with a classification / categorization diagram</td>
<td>8th</td>
<td>8%</td>
<td>(this component will be evaluated based on the linking and classification among the papers)</td>
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<tr>
<td>Abstract</td>
<td>Prepare a draft abstract and give a presentation</td>
<td>9th</td>
<td>6%</td>
<td>(Clarity, purpose and conclusion) 6% Presentation &amp; Viva Voce</td>
</tr>
<tr>
<td>Introduction Background</td>
<td>Write an introduction and background sections</td>
<td>10th</td>
<td>5%</td>
<td>(clarity)</td>
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<td>Sections of the paper</td>
<td>Write the sections of your paper based on the classification / categorization diagram in keeping with the goals of your survey</td>
<td>11th</td>
<td>10%</td>
<td>(this component will be evaluated based on the linking and classification among the papers)</td>
</tr>
<tr>
<td>Your conclusions</td>
<td>Write your conclusions and future work</td>
<td>12th</td>
<td>5%</td>
<td>(conclusions – clarity and your ideas)</td>
</tr>
<tr>
<td>Final Draft</td>
<td>Complete the final draft of your paper</td>
<td>13th</td>
<td>10%</td>
<td>(formatting, English, Clarity and linking) 4% Plagiarism Check Report</td>
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<tr>
<td>Seminar</td>
<td>A brief 15 slides on your paper</td>
<td>14th &amp; 15th week</td>
<td>10%</td>
<td>(based on presentation and Viva-voce)</td>
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**TOTAL : 30 PERIODS**
OBJECTIVES:
- To understand the need, design approaches for software architecture to bridge the dynamic requirements and implementation.
- To learn the design principles and to apply for large scale systems.
- To design architectures for distributed heterogeneous systems, environment through brokerage interaction.
- To build design knowledge on service oriented and model driven architectures and the aspect oriented architecture.
- To develop appropriate architectures for various Case studies like semantic web services, supply chain cloud services.

UNIT I

UNIT II

UNIT III

UNIT IV

UNIT V

OUTCOMES:
- Understand the need of software architecture for sustainable dynamic systems.
- Sound knowledge on design principles and to apply for large scale systems.
- Ability to design architectures for distributed heterogeneous systems.
- Good knowledge on service oriented and model driven architectures and the aspect oriented architecture.
- Working knowledge to develop appropriate architectures through various case studies.
REFERENCES:
2. Software Architecture Design Illuminated, Kai Qian Jones and Bartlett Publishers Canada, 2010

CP5071 IMAGE PROCESSING AND ANALYSIS  
L T P C 3 0 0 3

OBJECTIVES:
- To understand the image processing concepts and analysis
- To understand the image processing techniques
- To familiarize the image processing environment and their applications,
- To appreciate the use of image processing in various applications

UNIT I IMAGE PROCESSING FUNDAMENTALS

UNIT II IMAGE ENHANCEMENT AND RESTORATION

UNIT III IMAGE SEGMENTATION AND MORPHOLOGY

UNIT IV IMAGE ANALYSIS AND CLASSIFICATION
Image segmentation- pixel based, edge based, region based segmentation. Active contour models and Level sets for medical image segmentation, Image representation and analysis, Feature extraction and representation, Statistical, Shape, Texture, feature and statistical image classification.

UNIT V IMAGE REGISTRATION AND VISUALIZATION
Rigid body visualization, Principal axis registration, Interactive principal axis registration, Feature based registration, Elastic deformation based registration, Image visualization – 2D display methods, 3D display methods, virtual reality based interactive visualization.

TOTAL :45 PERIODS

OUTCOMES:
Upon successful completion of this course, a student will be able to:
- Design and implement algorithms for image processing applications that incorporates different concepts of medical Image Processing
- Familiar with the use of MATLAB and its equivalent open source tools
- Critically analyze different approaches to image processing applications
- Explore the possibility of applying Image processing concepts in various applications
REFERENCES:
1. Alasdair McAndrew, —Introduction to Digital Image Processing with Matlab‖, Cengage Learning 2011, India

CP5097 MOBILE APPLICATION DEVELOPMENT L T P C
3 0 0 3

OBJECTIVES:
- Understand system requirements for mobile applications.
- Generate suitable design using specific mobile development frameworks.
- Generate mobile application design.
- Implement the design using specific mobile development frameworks.
- Deploy the mobile applications in marketplace for distribution.

UNIT I INTRODUCTION
5 Introduction to mobile applications – Embedded systems - Market and business drivers for mobile applications – Publishing and delivery of mobile applications – Requirements gathering and validation for mobile applications.

UNIT II BASIC DESIGN
8 Introduction – Basics of embedded systems design – Embedded OS - Design constraints for mobile applications, both hardware and software related – Architecting mobile applications – User interfaces for mobile applications – touch events and gestures – Achieving quality constraints – performance, usability, security, availability and modifiability.

UNIT III ADVANCED DESIGN
8 Designing applications with multimedia and web access capabilities – Integration with GPS and social media networking applications – Accessing applications hosted in a cloud computing environment – Design patterns for mobile applications.

UNIT IV ANDROID

UNIT V IOS
12 Introduction to Objective C – iOS features – UI implementation – Touch frameworks – Data persistence using Core Data and SQLite – Location aware applications using Core Location and Map Kit – Integrating calendar and address book with social media application – Using Wifi - iPhone marketplace.

TOTAL :45 PERIODS
OUTCOMES:
- 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

REFERENCES:

CP5092 CLOUD COMPUTING TECHNOLOGIES L T P C
3 0 0 3

OBJECTIVES:
- To understand the concepts of virtualization and virtual machines
- To gain expertise in server, network and storage virtualization.
- To understand and deploy practical virtualization solutions and enterprise solutions
- To gain knowledge on the concept of virtualization that is fundamental to cloud computing
- To understand the various issues in cloud computing
- To be able to set up a private cloud
- To understand the security issues in the grid and the cloud environment

UNIT I VIRTUALIZATION 9

UNIT II VIRTUALIZATION INFRASTRUCTURE 9
UNIT III   CLOUD PLATFORM ARCHITECTURE

UNIT IV PROGRAMMING MODEL
Introduction to Hadoop Framework - Mapreduce, Input splitting, map and reduce functions, specifying input and output parameters, configuring and running a job –Developing Map Reduce Applications - Design of Hadoop file system –Setting up Hadoop Cluster - Cloud Software Environments - Eucalyptus, Open Nebula, Open Stack, Nimbus

UNIT V CLOUD SECURITY
Cloud Infrastructure security: network, host and application level – aspects of data security, provider data and its security, Identity and access management architecture, IAM practices in the cloud, SaaS, PaaS, IaaS availability in the cloud - Key privacy issues in the cloud –Cloud Security and Trust Management

TOTAL :45 PERIODS

OUTCOMES:
Upon Completion of the course, the students will be able to:
• Employ the concepts of storage virtualization, network virtualization and its management
• Apply the concept of virtualization in the cloud computing
• Identify the architecture, infrastructure and delivery models of cloud computing
• Develop services using Cloud computing
• Apply the security models in the cloud environment

REFERENCES:
OBJECTIVES:
- To understand the multimedia communication models
- To study the multimedia transport in wireless networks
- To explore real-time multimedia network applications

UNIT I  MULTIMEDIA COMMUNICATION MODELS  9
Common Multimedia applications - VoIP- Video Conferencing- Military Surveillance- Interactive TV-
Video on Demand- Smart Phone - Requirements and Design challenges of multimedia communications-Architecture of Internet Multimedia Communication- Protocol Stack-H.323.

UNIT II  BEST EFFORT AND GUARANTEED SERVICE MODEL  9

UNIT III  MULTIMEDIA ON IP NETWORKS  9
QoS aware routing-RSVP-Integrated and Differentiated services-MPLS-Multicasting-IGMP-
PIMDVMRP

UNIT IV  TRANSPORT LAYER SUPPORT FOR MULTIMEDIA  9
Multimedia over TCP-Significance of UDP-Multimedia Streaming- Audio and Video Streaming-Interactive and non Interactive Multimedia-RTP/RTCP-SIP-RTSP.

UNIT V  MULTIMEDIA QOS ON WIRELESS NETWORKS  9
IEEE 802.11e, IEEE 802.16, 3G networks-UMTS, 3GPP, 4G networks-LTE-IMS

TOTAL :  45  PERIODS

OUTCOMES:
Upon successful completion of this course, a student will be able to:
- To select suitable multimedia communication model for the required application
- Deploy the right Multimedia Communication models
- Apply QoS to multimedia network applications with efficient routing techniques
- Develop the real-time multimedia network applications

REFERENCES:
OBJECTIVES:
- To learn the basic architecture and concepts till Third Generation Communication systems.
- To understand the latest 4G Telecommunication System Principles.
- To introduce the broad perspective of pervasive concepts and management
- To Explore the HCI in Pervasive environment
- To Apply the pervasive concepts in mobile environment

UNIT I INTRODUCTION

UNIT II OVERVIEW OF A MODERN 4G TELECOMMUNICATIONS SYSTEM

UNIT III PERVERSIVE CONCEPTS AND ELEMENTS

UNIT IV HCI IN PERVERSIVE COMPUTING
Prototype for Application Migration - Prototype for Multimodalities - Human–Computer Interface in Pervasive Environments - HCI Service and Interaction Migration - Context-Driven HCI Service Selection - Interaction Service Selection Overview - User Devices - Service-Oriented Middleware Support - User History and Preference - Context Manager - Local Service Matching - Global Combination - Effective Region - User Active Scope - Service Combination Selection Algorithm

UNIT V PERVERSIVE MOBILE TRANSACTIONS

TOTAL: 45 PERIODS
OUTCOMES:
Upon completion of this course the students should be able to:
- Obtain a thorough understanding of Basic architecture and concepts of till Third Generation Communication systems.
- Explain the latest 4G Telecommunication System Principles.
- Incorporate the pervasive concepts.
- Implement the HCI in Pervasive environment.
- Work on the pervasive concepts in mobile environment.

REFERENCES:

NE5001 SIMULATION OF COMPUTER SYSTEMS AND NETWORKS L T P C
3 0 0 3

OBJECTIVES:
- To understand how simulators are built.
- To understand the statistical models used in simulations.
- To learn different ways of generating random numbers.
- To learn modeling of the data given as input to simulators.
- To understand how computer networks are simulated using case studies.

UNIT I STATISTICAL AND QUEUING MODELS

UNIT II RANDOM NUMBER AND RANDOM VARIATE GENERATION
Properties of random numbers – Generating uniform random numbers – Generating non-uniform random numbers - Tests for random numbers – Random-variante generation

UNIT III ANALYSIS OF SIMULATION DATA
Input modeling – Identifying the distribution – Parameter estimation – Goodness-of-fit tests – Multivariate and time-series input models – Verification and validation of simulation models

UNIT IV SIMULATION OF COMPUTER NETWORKS
UNIT V  CASE STUDIES OF NETWORK SIMULATORS  

TOTAL: 45 PERIODS

OUTCOMES:
• Understand the modeling and development of simulations and simulators
• Differentiate the different ways in which simulators are designed
• Analyse how computer networks are simulated
• Use simulators like ns-3
• Compare the features of different simulators

REFERENCES:

NE5002  HIGH SPEED SWITCHING ARCHITECTURES  
L T P C  
3 0 0 3

OBJECTIVES:
• To learn the basics of switching
• To explore the various space division switches
• To evaluate the performance of various switching architectures
• To study the architecture of IP routers
• To study about MPLS switches

UNIT I  SWITCHING BASICS  
Circuit switching, Message switching and Packet switching – Datagrams and Virtual circuits – Cell switching – Label switching – L2 switching Vs L3 switching – VLANs – Switching and Bridging – Loop resolution, Spanning tree algorithms – Cut through and Store and forward switches – Head of line blocking – Back pressure – Switch design goals

UNIT II  SWITCHING ARCHITECTURES  
UNIT III  PACKET QUEUES AND DELAY ANALYSIS  9
Littles theorem – Birth and death processes – Queuing disciplines – Markovian FIFO queuing – Non Markovian – Pollaczek-Khinchine formula – M/M/1, M/G/1 and M/D/1 models – Self similar models and Batch arrivals models – Network of queues – Burkes theorem and Jackson theorem.

UNIT IV  P ROUTER ARCHITECTURE  9
Bus based router architecture with single processor and multiple processors – Architecture with multiple parallel forwarding engines – Switch based router architecture with multiple processors – Switch based router architecture with multiple processors – Switch based architecture with fully distributed processors – Critical and non critical data path processing – fast and slow path.

UNIT V  MPLS ROUTERS  9

OUTCOMES
At the end of this course one should be able to:
- Apply switching concepts to build networks.
- Deploy the network with appropriate type of switches.
- Select and configure the appropriate type of IP router.
- Design and implement MPLS networks.

REFERENCES:

NE5071  NETWORK MANAGEMENT  L  T  P  C
3  0  0  3

OBJECTIVES:
- To appreciate the need for interoperable network management as a typical distributed application
- To familiarize concepts and terminology associated with SNMP
- To be aware of current trends in network management technologies

UNIT I  OSI NETWORK MANAGEMENT  8
OSI Network management model - Organizational model - Information model, Communication model. Abstract Syntax Notation - Encoding Structure, Macros Functional Model CMIP/CMIS.
UNIT II  BROADBAND NETWORK MANAGEMENT  9

UNIT III  SIMPLE NETWORK MANAGEMENT PROTOCOL  10

UNIT IV  NETWORK MANAGEMENT SYSTEMS  9

UNIT V  WEB-BASED MANAGEMENT  9

TOTAL: 45 PERIODS
OUTCOMES:
After the completion of this course, students will be able to
- Diagnose problems and make minor repairs to computer networks using appropriate diagnostics software
- Demonstrate how to correctly maintain LAN computer systems
- Maintain the network by performing routine maintenance tasks
- Apply network management tools

REFERENCES:
WEB REFERENCES:
2. ycchen.im.ncnu.edu.tw/nm/ch_5x.ppt
3. en.wikipedia.org/wiki/Systems_management

NE5003 NETWORK PERFORMANCE ANALYSIS

OBJECTIVES:
- To understand the mathematical basis for analyzing the performance of networks.
- To understand queuing theory and queuing models.
- To analytically model traffic control protocols, and error control protocols using these concepts.
- To model performance of wired and wireless MAC such as 802.3, 802.11 and 802.16.
- To model network traffic and study the performance of different packet scheduling algorithms.

UNIT I MARKOV CHAINS BASICS

UNIT II REDUCIBLE AND PERIODIC MARKOV CHAINS
Reducible Markov chain – Transition matrix, Reducible Composite Markov chain, Transient analysis, Steady state, Periodic Markov chain – Transition matrix, canonical form, Strongly and weakly periodic Markov chains, Queuing Analysis – M/M/1 queues, M/M/1/B queues, D/M/1/B queues, performance, communicating Markov chains

UNIT III TRAFFIC CONTROL, ERROR CONTROL AND MAC MODELING
Modeling traffic control protocols – Modeling leaky bucket and token bucket algorithms, Modeling Error control protocols - Stop and wait and GBN ARQ performance, Modeling media access control protocols – 802.1p, ALOHA, 802.3.

UNIT IV WIFI AND WIMAX PERFORMANCE
Modeling 802.11 protocol – Basic DCF modeling, RTS/CTS modeling, Modeling 802.11e Performance, 802.11e HCCA Performance. Modeling 802.16 protocol – system and user performance.

UNIT V NETWORK TRAFFIC AND SCHEDULING
Modeling network traffic – Flow traffic models – Continuous time modeling, Discrete time modeling, Pareto traffic distribution, Destination traffic. Scheduling algorithms – Analysis.

TOTAL 45 PERIODS

OUTCOMES:
On completing this course, the student will be able to:
- Apply markov chain models and analyse the behavior of network systems.
- Perform queuing theory based analysis of various L2 layer functions, such as flow control, error control, and MAC.
- Build network traffic models.
- Analyse QoS functions such as scheduling and traffic control.
REFERENCES:

NE5004 NEXT GENERATION NETWORKS L T P C 3 0 0 3

OBJECTIVES:
• To learn the technical, economic and service advantages of next generation networks.
• To learn the evolution of technologies of 4G and beyond.
• To learn Software defined Mobile Network issues and integrating challenges with LTE.
• To explore the NGN framework catering the services of end user with QoS provisioning.
• To learn about the NGM management and standards.

UNIT I INTRODUCTION 9

UNIT II 4G and BEYOND 9
Introduction to LTE-A –Requirements and Challenges, network architectures –EPC, E-UTRAN architecture-mobility management, resource management, services, channel -logical and transport channel mapping, downlink/uplink data transfer, MAC control element, PDU packet formats, scheduling services, random access procedure.

UNIT III SDMN-LTE INTEGRATION 9

UNIT IV NGN ARCHITECTURE 9
Evolution towards NGN-Technology requirements, NGN functional architecture- Transport stratum, service stratum, service/ content layer and customer terminal equipment function. NGN entities, Network and Service evolution -fixed, mobile, cable and internet evolution towards NGN.

UNIT V NGN MANAGEMENT AND STANDARDIZATION 9
NGN requirements on Management-Customer, third party, Configuration, Accounting, performance, device and information management. Service and control management- End-to-End QoS and security. ITU and GSI-NGN releases, ETSI-NGN concept and releases, NGMN alliance and NGMN.

TOTAL: 45 PERIODS
OUTCOMES:
- To be able to understand the issues and challenges of wireless domain in future generation network design.
- To be able to explore the LTE concepts and technologies.
- To be able to understand the integration of SDN with LTE.
- To be able to understand the NGN management and standardizations.

REFERENCES:

NE5005 SOFTWARE DEFINED NETWORKS AND NETWORK FUNCTION VIRTUALIZATION (SDN AND NFV) L T P C 3 0 0 3

OBJECTIVES:
- To understand the concepts of software defined networks
- To learn the interface between networking devices and the software controlling them
- To learn network virtualization and tools
- To explore modern approaches like vmware, openflow, openstack

UNIT I SOFTWARE DEFINED NETWORK (SDN) 9

UNIT II VIRTUALIZATION BASICS 9
Primer on Virtualization, Benefits of virtual machines, Hypervisors, Managing Virtual resources, Virtualized cloud/data center

UNIT III NETWORK FUNCTIONS VIRTUALIZED 9
Virtualize a Network, virtualizing appliances, virtualizing core networking functions, scalability and performance

UNIT IV MODERN NETWORKING APPROACHES 9
Openflow, VMware NSX, OpenDayLight project-ODL architecture & controller platform, control network, Business case for SDN
UNIT V SECURITY & VISIBILITY
Security-Preventing Data leakage, Logging and auditing, Encryption in Virtual Networks
Visibility-Overlay networks, Network management tools, Monitoring Traffic

TOTAL : 45 PERIODS

OUTCOMES:
Upon successful completion of this course, a student will be able to:
- To identify/design software defined network for the required application/platform
- To deploy network virtualization tool & design
- To equip in various network security measures and tackle

REFERENCES:

CP5073 EMBEDDED SOFTWARE DEVELOPMENT

OBJECTIVES:
- To understand the architecture of embedded processor, microcontroller and peripheral devices.
- To interface memory and peripherals with embedded systems.
- To study the embedded network environment.
- To understand challenges in Real time operating systems.
- To study, analyze and design applications on embedded systems.

UNIT I EMBEDDED PROCESSORS

UNIT II EMBEDDED COMPUTING PLATFORM

UNIT III EMBEDDED NETWORK ENVIRONMENT
UNIT IV    REAL-TIME CHARACTERISTICS

UNIT V    SYSTEM DESIGN TECHNIQUES

TOTAL: 45 PERIODS

OUTCOME:
Upon completion of the course, the students will be able to
- Understand different architectures of embedded processor, microcontroller and peripheral devices. Interface memory and peripherals with embedded systems.
- Work with embedded network environment.
- Understand challenges in Real time operating systems.
- Design and analyze applications on embedded systems.

REFERENCES:

NE5006    PROTOCOLS AND ARCHITECTURES FOR WIRELESS SENSOR NETWORKS

OBJECTIVES:
- To understand the concepts of wireless sensor networks
- To understand the protocols for WSN
- To get exposure on WSN environment with TinyOS and like
- To understand the layered approach in sensor networks
- To design WSN and analyse performance
UNIT I  WIRELESS SENSOR NETWORK ARCHITECTURE  
Introduction to wireless sensor networks- Challenges, Comparison with ad hoc network, Node architecture and Network architecture, design principles, Service interfaces, Gateway, Short range radio communication standards-IEEE 802.15.4, Zigbee and Bluetooth. Physical layer and transceiver design considerations.

UNIT II  DATA LINK LAYER  
MAC protocols – fundamentals, low duty cycle protocols and wakeup concepts, contention-based protocols, Schedule-based protocols - SMAC, BMAC,TRAMA, Link Layer protocols – fundamentals task and requirements, error control, framing, link management, Naming and addressing – address assignment, unique, Content-based and geographical addressing.

UNIT III  NETWORK LAYER  

UNIT IV  TRANSPORT LAYER  

UNIT V  TOOLS FOR WSN  

TOTAL : 45 PERIODS

OUTCOMES:  
Upon successful completion of this course, a student will be able to:  
- To be able to design energy efficient WSNs.  
- To design and implement protocols in TinyOS and Contiki.  
- To design application dependent WSNs.

REFERENCES:  
OBJECTIVES:
- To understand the storage architecture and available technologies
- To learn to establish & manage datacenter
- To learn security aspects of storage & data center

UNIT I  STORAGE TECHNOLOGY  9
Review data creation and the amount of data being created and understand the value of data to a business, challenges in data storage and data management, Solutions available for data storage, Core elements of a data center infrastructure, role of each element in supporting business activities

UNIT II  STORAGE SYSTEMS ARCHITECTURE  9
Hardware and software components of the host environment, Key protocols and concepts used by each component, Physical and logical components of a connectivity environment, Major physical components of a disk drive and their function, logical constructs of a physical disk, access characteristics, and performance Implications, Concept of RAID and its components, Different RAID levels and their suitability for different application environments: RAID 0, RAID 1, RAID 3, RAID 4, RAID 5, RAID 0+1, RAID 1+0, RAID 6, Compare and contrast integrated and modular storage systems, lligh-level architecture and working of an intelligent storage system

UNIT III  INTRODUCTION TO NETWORKED STORAGE  9
Evolution of networked storage, Architecture, components, and topologies of FC-SAN, NAS, and IP-SAN, Benefits of the different networked storage options, understand the need for long-term archiving solutions and describe how CAS full fill the need, understand the appropriateness of the different networked storage options for different application environments

UNIT IV  INFORMATION AVAILABILITY, MONITORING & MANAGING DATACENTERS  9
List reasons for planned/unplanned outages and the impact of downtime, Impact of downtime -Business continuity (BC) and disaster recovery (DR) ,RTO and RPO, Identifysingle points of failure in a storage infrastructure and list solutions to mitigate these failures, architecture of backup/recovery and the different backup/ recovery topologies, replication technologies and their role in ensuring information availability and business continuity, Remote replication technologies and their role in providing disaster recovery and business continuity capabilities. Identify key areas to monitor in a data center, Industry standards for data center monitoring and management, Key metrics to monitor for different components in a storage infrastructure, Key management tasks in a data center

UNIT V  SECURING STORAGE AND STORAGE VIRTUALIZATION  9
Information security, Critical security attributes for information systems, Storage security domains, List and analyzes the common threats in each domain, Virtualization technologies, block-level and file-level virtualization technologies and processes.

TOTAL : 45 PERIODS
OUTCOMES:
Upon successful completion of this course, a student will be able to:

- To select from various storage technologies to suit for required application
- To apply security measures to safeguard storage & farm
- Analyse QoS on Storage

REFERENCES:

CP5293 BIG DATA ANALYTICS L T P C
3 0 0 3

OBJECTIVES:

- To understand the competitive advantages of big data analytics
- To understand the big data frameworks
- To learn data analysis methods
- To learn stream computing
- To gain knowledge on Hadoop related tools such as HBase, Cassandra, Pig, and Hive for big data analytics

UNIT I INTRODUCTION TO BIG DATA

UNIT II HADOOP FRAMEWORK
Distributed File Systems - Large-Scale File System Organization – HDFS concepts - MapReduce Execution, Algorithms using MapReduce, Matrix-Vector Multiplication – Hadoop YARN

UNIT III DATA ANALYSIS
Statistical Methods: Regression modelling, Multivariate Analysis - Classification: SVM & Kernel Methods - Rule Mining - Cluster Analysis, Types of Data in Cluster Analysis, Partitioning Methods, Hierarchical Methods, Density Based Methods, Grid Based Methods, Model Based Clustering Methods, Clustering High Dimensional Data - Predictive Analytics – Data analysis using R.

UNIT IV MINING DATA STREAMS
UNIT V  BIG DATA FRAMEWORKS

OUTCOMES:
At the end of this course, the students will be able to:
- Understand how to leverage the insights from big data analytics
- Analyze data by utilizing various statistical and data mining approaches
- Perform analytics on real-time streaming data
- Understand the various NoSql alternative database models

REFERENCES:
2. David Loshin, "Big Data Analytics: From Strategic Planning to Enterprise Integration with Tools, Techniques, NoSQL, and Graph", 2013.

CP5074  SOCIAL NETWORK ANALYSIS  L  T  P  C
3  0  0  3

OBJECTIVES:
- To understand the components of the social network
- To model and visualize the social network
- To mine the users in the social network
- To understand the evolution of the social network
- To know the applications in real time systems

UNIT I  INTRODUCTION

UNIT II  MODELING AND VISUALIZATION
UNIT III MINING COMMUNITIES
Aggregating and reasoning with social network data, Advanced Representations – Extracting evolution of Web Community from a Series of Web Archive - Detecting Communities in Social Networks - Evaluating Communities – Core Methods for Community Detection & Mining - Applications of Community Mining Algorithms - Node Classification in Social Networks.

UNIT IV EVOLUTION

UNIT V APPLICATIONS
A Learning Based Approach for Real Time Emotion Classification of Tweets, A New Linguistic Approach to Assess the Opinion of Users in Social Network Environments, Explaining Scientific and Technical Emergence Forecasting, Social Network Analysis for Biometric Template Protection

OUTCOMES:
Upon Completion of the course, the students will be able to
- Work on the internals components of the social network
- Model and visualize the social network
- Mine the behaviour of the users in the social network
- Predict the possible next outcome of the social network
- Apply social network in real time applications

REFERENCES:
OBJECTIVES:
- Understand the characteristics of web applications
- Learn to Model web applications
- Be aware of Systematic design methods
- Be familiar with the testing techniques for web applications

UNIT I  INTRODUCTION TO WEB ENGINEERING  9

UNIT II WEB APPLICATION ARCHITECTURES & MODELLING WEB APPLICATIONS  9

UNIT III WEB APPLICATION DESIGN  9

UNIT IV TESTING WEB APPLICATIONS  9

UNIT V PROMOTING WEB APPLICATIONS AND WEB PROJECT MANAGEMENT  9

TOTAL : 45  PERIODS
OUTCOMES:
Upon completion of the course, the student should be able to:

- Explain the characteristics of web applications.
- Model web applications.
- Design web applications.
- Test web applications.

REFERENCES:

NE5007 ETHICAL HACKING

OBJECTIVES:
- To understand and analyse Information security threats & counter measures
- To perform security auditing & testing
- To understand issues relating to ethical hacking
- To study & employ network defense measures
- To understand penetration and security testing issues

UNIT I ETHICAL HACKING OVERVIEW

UNIT II SCANNING AND ENUMERATION

UNIT III SYSTEM HACKING

UNIT IV PROGRAMMING FOR SECURITY PROFESSIONALS
UNIT V  PENETRATION TESTING

TOTAL: 45 PERIODS

OUTCOMES:
Upon successful completion of this course, a student will be able to:
• Understand vulnerabilities, mechanisms to identify vulnerabilities/threats/attacks
• Perform penetration & security testing
• Become a professional ethical hacker

REFERENCES:

NE5008  DIGITAL FORENSICS  L  T  P  C
3  0  0  3

OBJECTIVES:
• Have an understanding of the fundamental concepts of forensic science.
• Have a basic understanding of the application of forensic science principles to digital evidence examinations.
• Be able to articulate the steps of the forensic process as applied to digital evidence.
• Be able to draft a Standard Operating Procedure.
• Conduct rudimentary digital forensic examinations.

UNIT I  INTRODUCTION

UNIT II  EVIDENCE AND INVESTIGATIONS
UNIT III  OPEN SOURCE EXAMINATION PLATFORM  9
Open Source Examination Platform - Using Linux and Windows as the Host, Disk and File System Analysis, Media Analysis Concepts, Sleuth Kit, Partitioning and Disk Layouts, Special Containers, Hashing

UNIT IV  DISK AND FILE SYSTEM ANALYSIS  9

UNIT V  LAWS AND ACTS  9
Laws and Ethics, Digital Evidence Controls, Evidence Handling Procedures, Basics of Indian Evidence ACT IPC and CrPC, Electronic Communication Privacy ACT, Legal Policies.

TOTAL : 45 PERIODS

OUTCOMES:
At the end of the course the students should be able to
- Have an idea regarding the fundamental concepts of forensic science.
- Can apply the concepts and will be able to collect digital evidence.
- Able to Implement the forensic concepts in open platform.
- Able to apply the Standard Operating Procedure.
- Present the forensic evidence in terms of Legal procedure.

REFERENCES: