### Course Objectives:
This course will enable students to
- Explain the fundamentals of Semantic Web technologies.
- Implementation of semantic web applications and the architectures of social networking.
- Social network performance analysis.

### Module 1
**Teaching Hours:** 10 Hours


### Module 2
**Teaching Hours:** 10 Hours


### Module 3
**Teaching Hours:** 10 Hours


### Module 4
**Teaching Hours:** 10 Hours


### Module 5
**Teaching Hours:** 10 Hours

- Social Network Analysis and semantic web What is social Networks analysis, development of the social networks analysis, Electronic Sources for Network Analysis – Electronic Discussion networks, Blogs and Online Communities, Web Based Networks. Building Semantic Web Applications with social network features.

### Course Outcomes
The students should be able to:
- Demonstrate the semantic web technologies like RDF Ontology and others
- Learn the various semantic web applications
- Identify the architectures and challenges in building social networks
- Analyze the performance of social networks using electronic sources

### 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:

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

SEMESTER – I

<table>
<thead>
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CREDITS – 04

Course objectives: This course will enable students to
- Explain standard algorithms used to provide confidentiality, integrity and authenticity.
- Distinguish key distribution and management schemes.
- Deploy encryption techniques to secure data in transit across data networks
- Implement security applications in the field of Information technology

Module 1

Classical Encryption Techniques Symmetric Cipher Model, Cryptography, Cryptanalysis and Brute-Force Attack, Substitution Techniques, Caesar Cipher, Mono-alphabetic Cipher, Playfair Cipher, Hill Cipher, Poly alphabetic Cipher, One Time Pad. Block Ciphers and the data encryption standard: Traditional block Cipher structure, stream Ciphers and block Ciphers, Motivation for the feistel Cipher structure, the feistel Cipher, The data encryption standard, DES encryption, DES decryption, A DES example, results, the avalanche effect, the strength of DES, the use of 56-Bit Keys, the nature of the DES algorithm, timing attacks, Block cipher design principles, number of rounds, design of function F, key schedule algorithm

Module 2

Public-Key Cryptography and RSA: Principles of public-key cryptosystems. Public-key cryptosystems. Applications for public-key cryptosystems, requirements for public-key cryptosystems. Public-key cryptanalysis. The RSA algorithm, description of the algorithm, computational aspects, the security of RSA. Other Public-Key Cryptosystems: Diffie-hellman key exchange, The algorithm, key exchange protocols, man in the middle attack, Elgamal Cryptographic systems, Elliptic curve arithmetic, abelian groups, elliptic curves over real numbers, elliptic curves over Zp, elliptic curves overGF(2m), Elliptic curve cryptography, Analog of Diffie-hellman key exchange, Elliptic curve encryption/ decryption, security of Elliptic curve cryptography, Pseudorandom number generation based on an asymmetric cipher, PRNG based on RSA.

Module 3

Key Management and Distribution: Symmetric key distribution using Symmetric encryption, A key distribution scenario, Hierarchical key control, session key lifetime, a transparent key control scheme, Decentralized key control, controlling key usage, Symmetric key distribution using asymmetric encryption, simple secret key distribution, secret key distribution with confidentiality and authentication, A hybrid scheme, distribution of public keys, public announcement of public keys, publicly available directory, public key authority, public keys certificates, X-509 certificates. Certificates, X-509 version 3, public key infrastructure. User Authentication: Remote user Authentication principles, Mutual Authentication, one way Authentication, remote user Authentication using Symmetric encryption, Mutual Authentication, one way Authentication, Kerberos, Motivation , Kerberos version 4, Kerberos version 5, Remote user Authentication using Asymmetric encryption, Mutual Authentication, one way Authentication.
## Module 4


### 10 Hours

## Module 5


### 10 Hours

## Course Outcomes

The students should be able to:
- Analyze the vulnerabilities in any computing system and hence be able to design a security solution.
- Identify the security issues in the network and resolve it.
- Evaluate security mechanisms using rigorous approaches, including theoretical.

## 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:
# NETWORK PROGRAMMING

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

## SEMESTER – 1

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**CREDITS – 04**

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

- Define Network Programming.
- Demonstrate programming with TCP and SCTP.
- Explain key management and routing sockets.
- Evaluate advanced Socket Programming APIs.

### Module 1

Introduction to network application, client/server communication, OSI Model, BSD Networking history, Test Networks and Hosts, Unix Standards, 64-bit architectures, Transport Layer: TCP, UDP and SCTP.

**Teaching Hours:** 10

### Module 2

Sockets Introduction – socket address structures, value-result arguments, byte ordering and manipulation functions, address conversion functions, Elementary TCP Sockets – socket, connect, bind, listen, accept, fork and concurrent server design, getssockopt and getpeername functions and TCP Client/Server Example - client/server programming through TCP sockets, Normal startup, termination, POSIX signal handling, Signal handling in server, Crashing, rebooting of server host, shutdown

**Teaching Hours:** 10

### Module 3

I/O Multiplexing and Socket Options, Elementary SCTP Sockets - Interface Models, sctp_xx functions, shutdown function, Notifications, SCTP Client/Server Examples – One-to-Many, Head-of-Line Blocking, Controlling number of streams and Termination, IPv4 and IPv6 Interoperability – different interoperability scenarios.

**Teaching Hours:** 10

### Module 4

Daemon Processes, syslogd, daemonizing functions and the inetd super server, Advanced I/O functions- readv, writev, sendmsg and recvmsg, Ancillary data, Advanced polling, Unix domain protocols- socket address structure, functions and communication scenarios, Nonblocking I/O – connect and accept examples.

**Teaching Hours:** 10

### Module 5

ioctl operations- socket, file, interface configuration information, ARP cache and routing table operations, Routing sockets- data link socket address structure, reading and writing, sysctl operations, interface name and index functions, Key Management functions – reading, writing, SADB, SA, Dynamically Maintaining SA’s, Out-of-Band data, Threads- basic thread functions, TCP echo server using threads, Mutexes and Conditional variables.

**Teaching Hours:** 10

**Course Outcomes**

The students should be able to:

- Develop applications that communicate with each other using TCP and SCTP.
- Identify the IPv4 and IPv6 compatibility.
- Evaluate socket programming APIs.

**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:**

<table>
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**CREDITS – 04**

<table>
<thead>
<tr>
<th>Course objectives: This course will enable students to</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Develop analytical capability and to impart knowledge of Probability, Statistics and Queuing.</td>
</tr>
<tr>
<td>- Apply above concepts in Engineering and Technology.</td>
</tr>
<tr>
<td>- Acquire knowledge of Hypothesis testing and Queuing methods and their applications so as to enable them to apply them for solving real world problems</td>
</tr>
</tbody>
</table>

**Module 1**

- Axioms of probability, Conditional probability, Total probability, Baye’s theorem, Discrete Random variable, Probability mass function, Continuous Random variable, Probability density function, Cumulative Distribution Function, and its properties, Two-dimensional Random variables, Joint pdf / cdf and their properties |

10 Hours

**Module 2**


10 Hours

**Module 3**


10 Hours

**Module 4**

- Testing Hypothesis: Testing of Hypothesis: Formulation of Null hypothesis, critical region, level of significance, errors in testing, Tests of significance for Large and Small Samples, t-distribution, its properties and uses, F-distribution, its properties and uses, Chi-square distribution, its properties and uses, $\chi^2$ – test for goodness of fit, $\chi^2$ test for Independence |

10 Hours

**Module 5**

- Symbolic Representation of a Queuing Model, Poisson Queue system, Little Law, Types |

10 Hours

**Course Outcomes**

The students should be able to:

- Demonstrate use of probability and characterize probability models using probability mass (density) functions & cumulative distribution functions.
- Explain the techniques of developing discrete & continuous probability distributions and its applications.
- Describe a random process in terms of its mean and correlation functions.
- Outline methods of Hypothesis testing for goodness of fit.
- Define the terminology & nomenclature appropriate queuing theory and also distinguish various queuing models.

**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

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

### Module 5


### Course Outcomes

The students should be able to:

- Compare the strengths and limitations of cloud computing
- Identify the architecture, infrastructure and delivery models of cloud computing
- Apply suitable virtualization concept.
- Choose the appropriate cloud player
- Address the core issues of cloud computing such as security, privacy and interoperability
- Design Cloud Services
- Set a private cloud

### 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:

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

SEMESTER – I

<table>
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CREDITS – 03

Course objectives: This course will enable students to
- Define the Multimedia Communication Models
- Explain Multimedia Transport in Wireless Networks
- Solve the Security issues in multimedia networks
- Illustrate real-time multimedia network applications.
- Explain different network layer based application.

Module 1
Introduction, multimedia information representation, multimedia networks, multimedia applications, Application and networking terminology, network QoS and application QoS, Digitization principles, Text, images, audio and video.

Module 2
Text and image compression, compression principles, text compression- Runlength, Huffman, LZW, Document Image compression using T2 and T3 coding, image compression- GIF, TIFF and JPEG

Module 3
Audio and video compression, audio compression – principles, DPCM, ADPCM, Adaptive and Linear predictive coding, Code-Excited LPC, Perceptual coding, MPEG and Dolby coders video compression, video compression principles.

Module 4
Video compression standards: H.261, H.263, MPEG, MPEG 1, MPEG 2, MPEG-4 and Reversible VLCs, MPEG 7 standardization process of multimedia content description, MPEG 21 multimedia framework.

Module 5
Notion of synchronization, presentation requirements, reference model for synchronization, Introduction to SMIL, Multimedia operating systems, Resource management, process management techniques.

Course Outcomes
The students should be able to:
- Deploy the right multimedia communication models.
- Apply QoS to multimedia network applications with efficient routing techniques.
- Solve the security threats in the multimedia networks.
- Develop the real-time multimedia network 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:

**ETHERNET TECHNOLOGY**  
[As per Choice Based Credit System (CBCS) scheme]  
(Effective from the academic year 2016 -2017)  
**SEMESTER – I**

<table>
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**CREDITS – 03**

**Course objectives:** This course will enable students to
- Define with the basics of Ethernet
- Explain concepts of different types of Ethernet
- Analyze building an Ethernet system
- Acquire knowledge of hubs and repeaters

**Module 1**

<table>
<thead>
<tr>
<th>Module 2</th>
<th>Ethernet Media Systems: Ethernet Media Fundamentals Twisted-Pair Media System(10Base-T) Fiber Optic Media System(10Base-F) Fast Ethernet Twisted-Pair Media System(100Base-TX)</th>
<th>8 Hours</th>
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<table>
<thead>
<tr>
<th>Module 3</th>
<th>Fast Ethernet Fiber Optic Media System(100Base-FX) Gigabit Ethernet Twisted-Pair Media System(1000Base-T) Gigabit Ethernet Fiber Optic Media System (1000Base-X)</th>
<th>8 Hours</th>
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<table>
<thead>
<tr>
<th>Module 4</th>
<th>Multi-Segment Configuration Guidelines Building Your Ethernet System: structured Cabling Twisted-Pair Cables and Connectors Fiber Optic Cables and Connectors</th>
<th>8 Hours</th>
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<table>
<thead>
<tr>
<th>Module 5</th>
<th>Ethernet Repeater Hubs Ethernet Switching Hubs Performance and troubleshooting: Ethernet Performance Troubleshooting.</th>
<th>8 Hours</th>
</tr>
</thead>
</table>

**Course Outcomes**
The students should be able to:
- Classify different types of Ethernet systems
- Contrast Ethernet Media systems
- Evaluate a complete Ethernet system

**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:

| NETWORK MANAGEMENT  
[As per Choice Based Credit System (CBCS) scheme]  
(Effective from the academic year 2016 -2017)  
SEMESTER – I  

<table>
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<td>03</td>
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CREDITS – 03

Course objectives: This course will enable students to
- Evaluate need for interoperable network management.
- Explain the concepts and architecture behind standards based network management.
- Illustrate the concepts and terminology associated with SNMP and TMN.
- Demonstrate network management as a typical distributed application.

Module 1
Introduction:

8 Hours

Module 2
Basic Foundations: Standards, Models, and Language: Network Management Standards, Network Management Model, Organization Model, Information Model – Management Information Trees, Managed Object Perspectives, Communication Model; ASN.1- Terminology, Symbols, and Conventions, Objects and Data Types, Object Names, An Example of ASN.1 from ISO 8824; Encoding Structure; Macros, Functional Model.

8 Hours

Module 3

8 Hours

Module 4
Broadband Network Management: Broadband Access Networks and Technologies: Broadband Access Networks, Broadband Access Technology; HFCT Technology: The

Module 5


**Course Outcomes**

The students should be able to:

- Analyze the issues and challenges pertaining to management of emerging network technologies such as wired/wireless networks and high-speed internets.
- Apply network management standards to manage practical networks
- Formulate possible approaches for managing OSI network model.
- Use on SNMP for managing the network
- Use RMON for monitoring the behavior of the network
- Identify the various components of network and formulate the scheme for the managing them

**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:**


**INFORMATION NETWORK SECURITY AND NETWORK PROGRAMMING LAB**

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

(Effective from the academic year 2016 -2017)

**SEMESTER – I**

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</table>

**CREDITS – 02**

Course objectives: This course will enable students to
- Evaluate of Cryptography through practical implementation.
- To implement standard algorithms used to provide confidentiality, integrity and authenticity.
- To implement the various key distribution and management schemes.
- How to use cutting edge simulation tools
- Design security applications in the field of Information technology

**PART – A INFORMATION AND NETWORK SECURITY LABORATORY WORK:**
1. Consider a file with composite data, substitute the content and transpose the ciphers.
2. Apply the RSA algorithm on a text file to produce cipher text file.
3. Develop a mechanism to setup a security channel using Diffie-Hellman Key Exchange between client and server.
5. Implement secure hash algorithm for Data Integrity. Implement MD5 and SHA-1 algorithm, which accepts a string input, and produce a fixed size number - 128 bits for MD5; 160 bits for SHA-1, this number is a hash of the input. Show that a small change in the input results in a substantial change in the output.

**PART – B NETWORK PROGRAMMING LABORATORY WORK:**
1. Write a C program to implement daytime client/server program using TCP sockets.
2. Write a TCP client/server program in which client sends three numbers to the server in a single message. Server returns sum, difference and product as a result single message. Client program should print the results appropriately.
3. Write a C program that prints the IP layer and TCP layer socket options in a separate file.

**Course Outcomes**
The students should be able to:
- Implement various encryption techniques
- Generate and test message digest
- Perform interprocess communication between two machines in a network.

**Conduction of Practical Examination:**
All laboratory experiments (nos) are to be included for practical examination. Students are allowed to pick one experiment from each part and execute both. Strictly follow the instructions as printed on the cover page of answer script for breakup of marks.

**PART –A**: Procedure + Conduction + Viva: 10 + 20 +10 (40)
**PART –B**: Procedure + Conduction + Viva: 10 + 20 +10 (40)

Change of experiment is allowed only once and marks allotted to the procedure part to be made zero.

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

**SEMESTER – I**

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<td>Exam Hours</td>
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</tbody>
</table>

**CREDITS – 01**

**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:
- IEEE Transactions, journals, magazines, etc.
- ACM Transactions, journals, magazines, SIG series, etc.
- Springer
- Elsevier publications etc

In the area of (to name few and not limited to)
- Web Technology
- Cloud Computing
- Artificial Intelligent
- Networking
- Security
- Data mining

<table>
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<tr>
<th>Course Outcomes</th>
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</thead>
<tbody>
<tr>
<td>The students should be able to:</td>
</tr>
<tr>
<td>• Conduct survey on recent technologies</td>
</tr>
<tr>
<td>• Infer and interpret the information from the survey conducted</td>
</tr>
<tr>
<td>• Motivated towards research</td>
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</tbody>
</table>

**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).