

MULTIMEDIA COMMUNICATIONS [As per Choice Based Credit System (CBCS) scheme] (Effective from the academic year 2016 -2017) SEMESTER – II			
Subject Code	16SCN21/16LNI152	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			
<ul style="list-style-type: none"> • 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			Teaching Hours
Introduction, multimedia information representation, multimedia networks, multimedia applications, Application and networking terminology, network QoS and application QoS, Digitization principles,. Text, images, audio and video.			10 Hours
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			10 Hours
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.			10 Hours
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.			10 Hours
Module 5			
Notion of synchronization, presentation requirements, reference model for synchronization, Introduction to SMIL, Multimedia operating systems, Resource management, process management techniques.			10 Hours
Course Outcomes			
The students should be able to:			
<ul style="list-style-type: none"> • 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:			
<ol style="list-style-type: none"> 1. Fred Halsall, “Multimedia Communications”, Pearson education, 2001. 2. Raif Steinmetz, Klara Nahrstedt, “Multimedia: Computing, Communications and Applications”, Pearson education, 2002. 			

Reference Books:

1. K. R. Rao, Zoran S. Bojkovic, Dragorad A. Milovanovic, "Multimedia Communication Systems", Pearson education, 2004.
2. John Billamil, Louis Molina, "Multimedia : An Introduction", PHI, 2002.

CLOUD COMPUTING [As per Choice Based Credit System (CBCS) scheme] (Effective from the academic year 2016 -2017) SEMESTER – II			
Subject Code	16SCS12/16SCE12 16SIT22/16SSE254 16SCN22/16LNI151	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			
<ul style="list-style-type: none"> • Define and Cloud, models and Services. • Compare and contrast programming for cloud and their applications • Explain virtualization, Task Scheduling algorithms. • Apply ZooKeeper, Map-Reduce concept to applications. 			
Module 1			Teaching Hours
Introduction, Cloud Infrastructure: Cloud computing, Cloud computing delivery models and services, Ethical issues, Cloud vulnerabilities, Cloud computing at Amazon, Cloud computing the Google perspective, Microsoft Windows Azure and online services, Open-source software platforms for private clouds, Cloud storage diversity and vendor lock-in, Energy use and ecological impact, Service level agreements, User experience and software licensing. Exercises and problems.			10 Hours
Module 2			
Cloud Computing: Application Paradigms: Challenges of cloud computing, Architectural styles of cloud computing, Workflows: Coordination of multiple activities, Coordination based on a state machine model: The Zookeeper, The Map Reduce programming model, A case study: The Gre The Web application, Cloud for science and engineering, High-performance computing on a cloud, Cloud computing for Biology research, Social computing, digital content and cloud computing.			10 Hours
Module 3			
Cloud Resource Virtualization: Virtualization, Layering and virtualization, Virtual machine monitors, Virtual Machines, Performance and Security Isolation, Full virtualization and paravirtualization, Hardware support for virtualization, Case Study: Xen a VMM based paravirtualization, Optimization of network virtualization, vBlades, Performance comparison of virtual machines, The dark side of virtualization, Exercises and problems			10 Hours
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.			10 Hours
Module 5			
Cloud Security, Cloud Application Development: Cloud security risks, Security: The top concern for cloud users, Privacy and privacy impact assessment, Trust, Operating system security, Virtual machine Security, Security of virtualization, Security risks posed by shared images, Security risks posed by a management OS, A trusted virtual machine			10 Hours

<p>monitor, Amazon web services: EC2 instances, Connecting clients to cloud instances through firewalls, Security rules for application and transport layer protocols in EC2, How to launch an EC2 Linux instance and connect to it, How to use S3 in java, Cloud-based simulation of a distributed trust algorithm, A trust management service, A cloud service for adaptive data streaming, Cloud based optimal FPGA synthesis .Exercises and problems.</p>	
<p>Course Outcomes</p>	
<p>The students should be able to:</p> <ul style="list-style-type: none"> • 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 	
<p>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.</p>	
<p>Text Books: 1. Dan C Marinescu: Cloud Computing Theory and Practice. Elsevier(MK) 2013.</p>	
<p>Reference Books: 1. Rajkumar Buyya , James Broberg, Andrzej Goscinski: Cloud Computing Principles and Paradigms, Willey 2014. 2. John W Rittinghouse, James F Ransome:Cloud Computing Implementation, Management and Security, CRC Press 2013.</p>	

NETWORK MANAGEMENT [As per Choice Based Credit System (CBCS) scheme] (Effective from the academic year 2016 -2017) SEMESTER – II			
Subject Code	16LNI154 / 16SCN23	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			
<ul style="list-style-type: none"> • 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			Teaching Hours
Introduction: Analogy of Telephone Network Management, Data and Telecommunication Network Distributed computing Environments, TCP/IP-Based Networks: The Internet and Intranets, Communications Protocols and Standards-Communication Architectures, Protocol Layers and Services; Case Histories of Networking and Management – The Importance of topology , Filtering Does Not Reduce Load on Node, Some Common Network Problems; Challenges of Information Technology Managers, Network Management: Goals, Organization, and Functions-Goal of Network Management, Network Provisioning, Network Operations and the NOC, Network Installation and Maintenance; Network and System Management, Network Management System platform, Current Status and Future of Network Management.			10 Hours
Module 2			10 Hours
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.			10 Hours
Module 3			10 Hours
SNMPv1 Network Management: Managed Network: The History of SNMP Management, Internet Organizations and standards, Internet Documents, The SNMP Model, The Organization Model, System Overview. The Information Model – Introduction, The Structure of Management Information, Managed Objects, Management Information Base. The SNMP Communication Model – The SNMP Architecture, Administrative Model, SNMP Specifications, SNMP Operations, SNMP MIB Group, Functional Model SNMP Management – RMON: Remote Monitoring, RMON SMI and MIB, RMON1- RMON1 Textual Conventions, RMON1 Groups and Functions, Relationship Between Control and Data Tables, RMON1 Common and Ethernet Groups, RMON Token Ring Extension Groups, RMON2 – The RMON2 Management Information Base, RMON2 Conformance Specifications.			10 Hours
Module 4			10 Hours
Broadband Network Management: Broadband Access Networks and Technologies: Broadband Access Networks, Broadband Access Technology; HFCT Technology: The Broadband LAN, The Cable Modem, The Cable Modem Termination System, The HFC Plant, The RF Spectrum for Cable Modem; Data Over Cable, Reference Architecture; HFC Management – Cable Modem and CMTS Management, HFC Link Management, RF Spectrum Management, DSL Technology; Asymmetric Digital Subscriber Line Technology – Role of the ADSL Access Network in an Overall Network, ADSL			10 Hours

Architecture, ADSL Channeling Schemes, ADSL Encoding Schemes; ADSL Management – ADSL Network Management Elements, ADSL Configuration Management, ADSL Fault Management, ADSL Performance Management, SNMP-Based ADSL Line MIB, MIB Integration with Interfaces Groups in MIB-2, ADSL Configuration Profiles	
Module 5	
Network Management Applications: Configuration Management- Network Provisioning, Inventory Management, Network Topology, Fault Management- Fault Detection, Fault Location and Isolation 24 Techniques, Performance Management – Performance Metrics, Data Monitoring, Problem Isolation, Performance Statistics; Event Correlation Techniques – Rule-Based Reasoning, Model-Based Reasoning, Case Based Reasoning, Codebook correlation Model, State Transition Graph Model, Finite State Machine Model, Security Management – Policies and Procedures, Security Breaches and the Resources Needed to Prevent Them, Firewalls, Cryptography, Authentication and Authorization, Client/Server Authentication Systems, Messages Transfer Security, Protection of Networks from Virus Attacks, Accounting Management, Report Management, Policy- Based Management, Service Level Management.	10 Hours
Course Outcomes	
<p>The students should be able to:</p> <ul style="list-style-type: none"> • 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 	
<p>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.</p>	
<p>Text Books: 1. Mani Subramanian: Network Management- Principles and Practice, 2nd Pearson Education, 2010.</p>	
<p>Reference Books: 1. J. Richard Burke: Network management Concepts and Practices: a Hands-On Approach, PHI, 2008.</p>	

MANAGING BIG DATA [As per Choice Based Credit System (CBCS) scheme] (Effective from the academic year 2016 -2017) SEMESTER – II			
Subject Code	16LNI422 / 16SCE21 / 16SCN24 / 16SCS21 / 16SIT41 / 16SSE422	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 <ul style="list-style-type: none"> • 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			Teaching Hours
UNDERSTANDING BIG DATA: What is big data – why big data –.Data!, Data Storage and Analysis, Comparison with Other Systems, Rational Database Management System , Grid Computing, Volunteer Computing, convergence of key trends – unstructured data – industry examples of big data – web analytics – big data and marketing – fraud and big data – risk and big data – credit risk management – big data and algorithmic trading – big data and healthcare – big data in medicine – advertising and big data – big data technologies – introduction to Hadoop – open source technologies – cloud and big data – mobile business intelligence – Crowd sourcing analytics – inter and trans firewall analytics.			10Hours
Module -2			
NOSQL DATA MANAGEMENT: Introduction to NoSQL – aggregate data models – aggregates – key-value and document data models – relationships – graph databases – schema less databases – materialized views – distribution models – shading — version – map reduce – partitioning and combining – composing map-reduce calculations.			10 Hours
Module – 3			
BASICS OF HADOOP: Data format – analyzing data with Hadoop – scaling out – Hadoop streaming – Hadoop pipes – design of Hadoop distributed file system (HDFS) – HDFS concepts – Java interface – data flow – Hadoop I/O – data integrity – compression – serialization – Avro – file-based data structures.			10 Hours
Module-4			
MAPREDUCE APPLICATIONS: MapReduce workflows – unit tests with MRUnit – test data and local tests – anatomy of MapReduce job run – classic Map-reduce – YARN – failures in classic Map-reduce and YARN – job scheduling – shuffle and sort – task execution – MapReduce types – input formats – output formats			10 Hours
Module-5			
HADOOP RELATED TOOLS: Hbase – data model and implementations – Hbase clients – Hbase examples –praxis. Cassandra – Cassandra data model – Cassandra examples – Cassandra clients –Hadoop integration. Pig – Grunt – pig data model – Pig Latin – developing and testing Pig Latin scripts. Hive – data types and file formats – HiveQL data definition – HiveQL data manipulation – HiveQL queries.			10 Hours
Course outcomes:			
The students shall able to: <ul style="list-style-type: none"> • 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:

1. Tom White, "Hadoop: The Definitive Guide", Third Edition, O'Reilley, 2012.
2. Eric Sammer, "Hadoop Operations", O'Reilley, 2012.

Reference Books:

1. Vignesh Prajapati, Big data analytics with R and Hadoop, SPD 2013.
2. E. Capriolo, D. Wampler, and J. Rutherglen, "Programming Hive", O'Reilley, 2012.
3. Lars George, "HBase: The Definitive Guide", O'Reilley, 2011.
4. Alan Gates, "Programming Pig", O'Reilley, 2011

SWITCHING & STATISTICAL MULTIPLEXING IN TELECOMMUNICATIONS [As per Choice Based Credit System (CBCS) scheme] (Effective from the academic year 2016 -2017) SEMESTER – II			
Subject Code	16SCN251	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 <ul style="list-style-type: none"> • Explain switching and multiplexing. • Analyze the transmission technology. And transmission control. • Demonstrate basic knowledge on telecommunication 			
Module -1			Teaching Hours
Introduction: Evolution of Telecommunication, Simple Telephone Communication, Basics of a Switching System, Manual Switching System, Major Telecommunication Networks. Why Digital: Advantages of Digital Voice Networks, Digital Signal Processing, Disadvantages of Digital Voice Networks			8 Hours
Module -2			
Switching: Crossbar Switching, Principles of Common Control, Touch Tone Dial Telephone, Principles of Crossbar Switching, Crossbar Switch Configurations, Crosspoint Technology, Crossbar Exchange Organization			8 Hours
Module – 3			
Electronic Space Division Switching: Stored Program Control, Centralized SPC, Distributed SPC, Software Architecture, Application Software, Enhanced Services, Two-stage, Three-stage and n-stage Networks. Digital Transmission and Multiplexing: Sampling, Quantization and Binary Coding, Quantization Noise, Companding, Differential Coding, Vocoders, Pulse Transmission, Line Coding, Time Division Multiplexing			8 Hours
Module-4			
Time Division Switching: Basic Division Space and Time Switching, Time Multiplexed Space and Time Switching, Combination Switching, Three-stage and n-stage Combination Switching			8 Hours
Module-5			
Traffic Engineering: Network Traffic Load and Parameters, Grade of Service and Blocking Probability, Modeling Switching Systems, Incoming Traffic and Service Time Characterization, Blocking Models and Loss Estimates, Delay Systems			8 Hours
Course outcomes:			
The student will be able to: <ul style="list-style-type: none"> • Explain basics of telecommunications and digital form • Elaborate switching and multiplexing, telecommunication. • Illustrate transmission control in telecommunication • Design and develop switching, multiplexing and traffic control. 			
Question paper pattern: <ul style="list-style-type: none"> • 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. Thiagarajan Viswanathan: Telecommunication Switching Systems and Networks, PHI, 1992.
2. John.C.Bellamy: Digital Telephony, 3rd Edition, John Wiley and Sons Inc., 2002.

Reference Books:

WIRELESS SENSOR NETWORKS [As per Choice Based Credit System (CBCS) scheme] (Effective from the academic year 2016 -2017) SEMESTER – II			
Subject Code	16SCN252	IA Marks	20
Number of Lecture Hours/Week	03	Exam Marks	80
Total Number of Lecture Hours	40	Exam Hours	03
CREDITS – 03			
<p>Course objectives: This course will enable students to</p> <ul style="list-style-type: none"> • Explain sensor networks for various application setups. • Demonstrate the design space and conduct trade-off analysis between performance and resources. • Assess coverage and conduct node deployment planning. • Devise appropriate data dissemination protocols and model links cost. • Determine suitable medium access protocols and radio hardware. • Illustrate sensor networks using commercial components. • Discuss quality of service, fault-tolerance, security and other dependability requirements while coping with resource constraints. 			
Module -1			Teaching Hours
Introduction, Overview and Applications of Wireless Sensor Networks Introduction, Basic overview of the Technology, Applications of Wireless Sensor Networks: Introduction, Background, Range of Applications, Examples of Category 2 WSN Applications, Examples of Category 1 WSN Applications, Another Taxonomy of WSN Technology. (Chapter 1: 1.1, 1.2, Chapter2: 2.1-2.6)			8 Hours
Module -2			Teaching Hours
Basic Wireless Sensor Technology and Systems: Introduction, Sensor Node Technology, Sensor Taxonomy, WN Operating Environment, WN Trends, Wireless Transmission Technology and Systems: Introduction, Radio Technology Primer, Available Wireless Technologies (Chapter3: 3.1-3.5, Chapter 4: 4.1-4.3)			8 Hours
Module – 3			Teaching Hours
MAC and Routing Protocols for Wireless Sensor Networks: Introduction, Background, Fundamentals of MAC Protocols, MAC Protocols for WSNs, Sensor-MAC case Study, IEEE 802.15.4 LR-WPANs Standard Case Study. Routing Protocols for Wireless Sensor Networks: Introduction, Background, Data Dissemination and Gathering, Routing Challenges and Design Issues in WSNs, Routing Strategies in WSNs. (Chapter 5: 5.1-5.6, Chapter 6: 6.1-6.5)			8 Hours
Module-4			Teaching Hours
Transport Control and Middleware for Wireless Sensor Networks: Traditional Transport Control Protocols, Transport Protocol Design Issues, Examples of Existing Transport Control Protocols, Performance of Transport Control Protocols. Middleware for Wireless Sensor Networks: Introduction, WSN Middleware Principles, Middleware Architecture, Existing Middleware. (Chapter 7: 7.1-7.4, Chap. 8: 8.1-8.4)			8 Hours
Module-5			Teaching Hours
Network Management and Operating System for Wireless Sensor Networks: Introduction, Network Management Requirements, Traditional Network Management Models, Network Management Design Issues. Operating Systems for Wireless Sensor Networks: Introduction, Operating System Design Issues, Examples of Operating Systems. (Chapter 9: 9.1-9.5, Chapter 10: 10.1-10.3)			8 Hours
Course outcomes:			

The students shall able to:

- Explain existing applications of wireless sensor actuator networks
- Apply in the context of wireless sensor networks and explain elements of distributed computing and network protocol design
- Contrast Various hardware, software platforms that exist for sensor networks
- Summarize various network level protocols for MAC, routing, time synchronization, aggregation, consensus and distributed tracking

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. KAZEM SOHRABY, DANIEL MINOLI, TAIEB ZNATI, "Wireless Sensor Networks: Technology, Protocols and Applications:", WILEY , Second Edition (Indian) , 2014

Reference Books:

1. Ian F. Akyildiz, Mehmet Can Vuran "Wireless Sensor Networks", Wiley 2010
2. Feng Zhao & Leonidas J. Guibas, "Wireless Sensor Networks- An Information Processing Approach", Elsevier, 2007.

OPTICAL NETWORKS [As per Choice Based Credit System (CBCS) scheme] (Effective from the academic year 2016 -2017) SEMESTER – II			
Subject Code	16SCN253	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 <ul style="list-style-type: none"> • Define basic elements of optical fiber transmission link, fiber modes configurations and structures • Compare different kind of losses, signal distortion in optical wave guides and other signal degradation factors • List and explain various optical source materials, LED structures, quantum efficiency, and Laser diodes • Demonstrate fiber optical receivers such as PIN APD diodes, noise performance in photo detector, receiver operation and configuration and also fiber optical network components, variety of networking aspects, FDDI, SONET/SDH and operational principles WDM 			
Module -1			Teaching Hours
Client Layers of the Optical Layer: SONET/SDH: Multiplexing, CAT and LCAS, Sonnet/SDH Layers, SONET Frame Structure, SONET/SDH Physical Layer , Elements of a SONET/SDH Infrastructure, Optical Transport Network: Hierarchy, Frame Structure, Multiplexing, Generic Framing Procedure Ethernet: Frame Structure, Switches, Ethernet Physical Layer, Carrier Transport IP: Routing and Forwarding, Quality of Service Multiprotocol Label Switching: Labels and Forwarding, Quality of Service, Signaling and Routing, Carrier Transport, Resilient Packet Ring: Quality of Service, Node Structure, Fairness Storage-Area Networks: Fiber Channel.			8 Hours
Module -2			
WDM Network Elements: Optical Line Terminals, Optical Line Amplifiers, Optical Add/Drop Multiplexers: OADM Architectures, Reconfigurable OADMs Optical Cross connects: All-Optical OXC Configurations.			8 Hours
Module – 3			
Control and Management: Network Management Functions: Management Framework, Information Model, Management Protocols. Optical Layer Services and Interfacing, Layers within the Optical Layer, Multivendor Interoperability, Performance and Fault Management: The Impact of Transparency, BER Measurement, Optical Trace, Alarm Management, Data Communication Network (DCN) and Signaling, Policing, Optical Layer Overhead, Client Layers. Configuration Management: Equipment Management, Connection Management, Adaptation Management. Optical Safety: Open Fiber Control Protocol			8 Hours
Module-4			

<p>Basic Concepts: Protection in SONET/SDH: Point-to-Point Links, Self-Healing Rings, Unidirectional Line-Switched Rings, Bidirectional Line-Switched Rings, Ring Interconnection and Dual Homing. Protection in the Client Layer: Protection in Resilient Packet Rings, Protection in Ethernet, Protection in IP, Protection in MPLS, Why Optical Layer Protection: Service Classes Based on Protection. Optical Layer Protection Schemes: 1+1 OMS Protection, 1:1 OMS Protection, OMS-DPRing, OMS-SPRing, 1:N Transponder Protection, 1+1 OCh Dedicated Protection, OCh-SPRing, OCh-Mesh Protection, GMPLS Protection, Interworking between Layers.</p>	<p>8 Hours</p>
<p>Module-5</p>	
<p>WDM Network Design: Cost Trade-OFFS: A Detailed Ring Network Example LTD and RWA Problems, Light path Topology Design, Routing and Wavelength Assignment, Wavelength Conversion. Dimensioning Wavelength-Routing Networks, Statistical Dimensioning Models: First-Passage Model, Blocking Model, Maximum Load Dimensioning Models: Offline Light path Requests, Online RWA in Rings</p>	<p>8 Hours</p>
<p>Course outcomes:</p>	
<p>The students shall able to:</p> <ul style="list-style-type: none"> • Explain fundamentals of optical network. • Analyze optical network architectures ranging from optical access networks to backbone optical transport networks. • Choose approaches and methodologies of optical network for design effective optimization; • Apply Techniques of optical network survivability. • Demonstrate problem solving skills and critical thinking in the discipline of optical networks. 	
<p>Question paper pattern:</p> <p>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.</p>	
<p>Text Books:</p> <p>1. Optical Networks by Rajeev Ramaswamy, Kumar N Sivarajan, Galen H Sasaki, Elsevier Publication 3rd Edition, 2009.</p>	
<p>Reference Books:</p> <p>1. Uyles Black, Optical Networks-Third generation transport system: Pearson 2013.</p>	

MOBILE APPLICATION DEVELOPMENT [As per Choice Based Credit System (CBCS) scheme] (Effective from the academic year 2016 -2017) SEMESTER – II			
Subject Code	16LNI23/ 16SCE23 16SCN254 / 16SIT23	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 <ul style="list-style-type: none"> • Analyze system requirements for mobile applications. • Apply of mobile development frameworks. • Demonstrate mobile application design. • Demonstrate and implement mobile application. 			
Module -1			Teaching Hours
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.			8 Hours
Module -2			
Fundamentals of Android Development: Introduction to Android., The Android 4.1 Jelly Bean SDK, Understanding the Android Software Stack, Installing the Android SDK, Creating Android Virtual Devices, Creating the First Android Project, Using the Text View Control, Using the Android Emulator.			8 Hours
Module – 3			
The Intent of Android Development, Four kinds of Android Components: Activity, Service, Broadcast Receiver and Content Provider. Building Blocks for Android Application Design, Laying Out Controls in Containers. Graphics and Animation: Drawing graphics in Android, Creating Animation with Android’s Graphics API.			8 Hours
Module-4			
Creating the Activity, Working with views: Exploring common views, using a list view, creating custom views, understanding layout. Using Selection Widgets and Debugging Displaying and Fetching Information Using Dialogs and Fragments. Multimedia: Playing Audio, Playing Video and Capturing Media. Advanced Android Programming: Internet, Entertainment, and Services.			8 Hours
Module-5			
Displaying web pages and maps, communicating with SMS and emails. Creating and using content providers: Creating and consuming services, publishing android applications			8 Hours
Course outcomes:			
The students should be able to: <ul style="list-style-type: none"> • 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 iPone 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 S chand
2. B.M.Hirwani- Android programming Pearson publications-2013
3. W. Frank Ableson, Robi Sen and C. E. Ortiz - **Android in Action**, Third Edition-2012 DreamTech Publisher

MINIPROJECT [As per Choice Based Credit System (CBCS) scheme] (Effective from the academic year 2016 -2017) SEMESTER – II			
Laboratory Code	16LNI26/ 16SCE26 / 16SCN26 /16SCS26 /16SFC26 / 16SIT26 / 16SSE26	IA Marks	20
Number of Lecture Hours/Week	03 hours of lab	Exam Marks	80
Total Number of Lecture Hours	-----	Exam Hours	03
CREDITS – 02			
<p>Course objectives: This course will enable students to</p> <ul style="list-style-type: none"> • Enable the student to design, develop and analyze an application development 			
<p>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.</p>			
<p>Course outcomes:</p> <ul style="list-style-type: none"> • Design, develop and to analyze an application development. • Prepare report of the project. 			
<p>Conduction of Practical Examination:</p> <p>The student shall prepare the report by including:</p> <ol style="list-style-type: none"> 1. Define project (Problem Definition) 2. Prepare requirements document <ol style="list-style-type: none"> 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 			
<p>Evaluation:</p> <p>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</p>			

= 80 marks.

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

SEMESTER – II

Subject Code	16SCE27 / 16SCN27 / 16LNI27 / 16SIT27 / 16SSE27 / 16SCS27 / 16SFC27	IA Marks	100
Number of Lecture Hours/Week	----	Exam Marks	-
Total Number of Lecture Hours	----	Exam Hours	-

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:

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			
<ul style="list-style-type: none"> • Explain Client-Server software, Context Switching and Protocol Software, I/o. • 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			Teaching Hours
The Client Server Model and Software Design: Introduction, Motivation, Terminology and Concepts. Concurrent Processing in Client-Server software: Introduction, Concurrency in Networks, Concurrency in Servers, Terminology and Concepts, An example of Concurrent Process Creation, Executing New Code, Context Switching and Protocol Software Design, Concurrency and Asynchronous I/O. Program Interface to Protocols: Introduction, Loosely Specified Protocol Software Interface, Interface Functionality, Conceptual Interface Specification, System Calls, Two Basic Approaches to Network Communication, The Basic I/O Functions available in UNIX, Using UNIX I/O with TCP/IP.			10 Hours
Module 2			
The Socket Interface: Introduction, Berkley Sockets, Specifying a Protocol Interface, The Socket Abstraction, Specifying an End Point Address, A Generic Address Structure, Major System Calls used with Sockets, Utility Routines for Integer Conversion, Using Socket Calls in a Program, Symbolic Constants for Socket Call Parameters. 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.			10 Hours
Module 3			
Example Client Software: Introduction, The Importance of Small Examples, Hiding Details, An Example Procedure Library for Client Programs, Implementation of Connect TCP, Implementation of Connect UDP, A Procedure that Forms Connections, Using the Example Library, The DAYTIME Service, Implementation of a TCP Client for DAYTIME, Reading from a TCP Connection, The Time Service, Accessing the TIME Service, Accurate Times and Network Delays, A UDP Client for the TIME Service, The ECHO Service, A TCP Client for the ECHO Service, A UDP Client for the ECHO Service.			10 Hours
Module 4			
Algorithms and Issues in Server Software Design: Introduction, The Conceptual Server Algorithm, Concurrent Vs Iterative Servers, Connection-Oriented Vs			10 Hours

<p>Connectionless Access, Connection-Oriented Servers, Connectionless Servers, Failure, Reliability and Statelessness, Optimizing Stateless Servers, Four Basic Types of Servers, Request Processing Time, Iterative Server Algorithms, An Iterative Connection-Oriented Server Algorithm, Binding to a Well Known Address using INADDR_ANY, Placing the Socket in Passive Mode, Accepting Connections and using them. An Iterative Connectionless Server Algorithm, Forming a Reply Address in a Connectionless Server, Concurrent Server Algorithms, Master and Slave Processes, A Concurrent Connectionless Server Algorithm, A concurrent Connection-Oriented Server Algorithm, Using separate Programs as Slaves, Apparent Concurrency using a Single Process, When to use each Server Types, The Important Problem of Server Deadlock, Alternative Implementations.</p>	
<p>Module 5</p>	
<p>Iterative, Connectionless Servers (UDP): Introduction, Creating a Passive Socket, Process Structure, An example TIME Server. Iterative, Connection-Oriented Servers (TCP): Introduction, Allocating a Passive TCP Socket, A Server for the DAYTIME Service, Process Structure, An Example DAYTIME Server, Closing Connections, Connection Termination and Server Vulnerability. Concurrent, Connection-Oriented Servers (TCP): Introduction, Concurrent ECHO, Iterative Vs Concurrent Implementations, Process Structure, An example Concurrent ECHO Server, Cleaning up Errant Processes.</p>	<p>10 Hours</p>
<p>Course Outcomes</p>	
<p>The students should be able to:</p> <ul style="list-style-type: none"> • Explain Client-Server software, Context Switching and Protocol Software, I/O. • Demonstrate programming System Calls, Basic I/O Functions available in UNIX • Implement Socket interface, TCP, UDP in detail. • Compare and contrast Client Software Various applications and their issues 	
<p>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.</p>	
<p>Text Books:</p> <ol style="list-style-type: none"> 1. Douglas E.Comer, David L. Stevens: Internetworking with TCP/IP – Vol. 3, Client-Server Programming and Applications, BSD Socket Version with ANSI C, 2nd Edition, Pearson, 2001. 	
<p>Reference Books:</p> <ol style="list-style-type: none"> 1. NIL 	

SERVICE ORIENTED ARCHITECTURE [As per Choice Based Credit System (CBCS) scheme] (Effective from the academic year 2016 -2017) SEMESTER – IV			
Subject Code	16SSE13 /16SIT153 / 16SCN421	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			
<ul style="list-style-type: none"> • Interpret various architecture for application development • Demonstrate the importance of SOA in Application Integration • To learn web service and SOA related tools • To Learn implementation details of SOA • To understand various case studies 			
Module 1			Teaching Hours
SOA BASICS :Software Architecture – Types of IT Architecture – SOA – Evolution – Key components – perspective of SOA – Enterprise-wide SOA – Architecture – Enterprise Applications – Solution Architecture for enterprise application – Software platforms for enterprise Applications – Patterns for SOA – SOA programming models.			8 Hours
Module 2			
SOA ANALYSIS AND DESIGN: Service-oriented Analysis and Design – Design of Activity, Data, Client and business process services – Technologies of SOA – SOAP – WSDL – JAX – WS – XML WS for .NET – Service integration with ESB – Scenario – Business case for SOA – stakeholder OBJECTIVES – benefits of SPA – Cost Savings.			8 Hours
Module 3			
SOA GOVERNANCE: SOA implementation and Governance – strategy – SOA development – SOA governance – trends in SOA – event-driven architecture – software as a service – SOA technologies – proof-of-concept – process orchestration – SOA best practices.			8 Hours
Module 4			
SOA IMPLEMENTATION: SOA based integration – integrating existing application – development of web services – Integration - SOA using REST – RESTful services – RESTful services with and without JWS – Role of WSDL,SOAP and Java/XML mapping in SOA – JAXB Data binding.			8 Hours
Module 5			
APPLICATION INTEGRATION: JAX –WS 2.0 client side/server side development – Packaging and Deployment of SOA component – SOA shopper case study –WSDL centric java WS with SOA-J – related software – integration through service composition (BPEL) – case study - current trends.			8 Hours
Course Outcomes			
The students should be able to:			
<ul style="list-style-type: none"> • Compare different IT architecture • Analyze and design of SOA based applications • Implement web service and realize of SOA • Implement REST full services • Design and implement of SOA based Application Integration using BPEL 			
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. Shankar Kambhampaly, "Service-Oriented Architecture for Enterprise Applications", Wiley 2008.

Reference Books:

1. Mark D. Hansen, "SOA using Java Web Services", Practice Hall, 2007.
2. Waseem Roshen, "SOA-Based Enterprise Integration", Tata McGraw-HILL, 2009.

ANALYSIS OF COMPUTER NETWORKS [As per Choice Based Credit System (CBCS) scheme] (Effective from the academic year 2016 -2017) SEMESTER - IV			
Subject Code	16SCN422	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 <ul style="list-style-type: none"> • Explain with the concepts of computer networks • What is a computer network and what are the fundamental protocols. • Analyze network architectures in stochastic and deterministic way. • Illustrate RSVP, Principles of TCP • Discover more on different network protocols. • Explain multiplexing, streaming sessions in computer network. 			
Module -1			Teaching Hours
Introduction: Two examples of analysis: Efficient transport of packet voice calls, Achievable throughput in an input-queuing packet switch; the importance of quantitative modeling in the Engineering of Telecommunication Networks.			8 Hours
Module -2			
Multiplexing: Network performance and source characterization; Stream sessions in a packet network: Delay guarantees; Elastic transfers in a packet network; Packet multiplexing over Wireless networks.			8 Hours
Module – 3			
Stream Sessions: Deterministic Network Analysis: Events and processes in packet multiplexer models: Universal concepts; Deterministic traffic models and Network Calculus; Scheduling; Application to a packet voice example; Connection setup: The RSVP approach; Scheduling (continued).			8 Hours
Module-4			
Stream Sessions: Stochastic Analysis: Deterministic analysis can yield loose bounds; Stochastic traffic models; Additional notation; Performance measures; Little’s theorem, Brumelle’s theorem, and applications; Multiplexer analysis with stationary and ergodic traffic; The effective bandwidth approach for admission control; Application to the packet voice example; Stochastic analysis with shaped traffic; Multihop networks; Long-Range-Dependent traffic			8 Hours
Module-5			
Adaptive Bandwidth Sharing for Elastic Traffic: Elastic transfers in a Network; Network parameters and performance objectives; sharing a single link; Rate-Based Control; Window-Based Control: General Principles; TCP: The Internet’s Adaptive			8 Hours

Window Protocol; Bandwidth sharing in a Network.	
Course outcomes:	
On completion, student will be able to:	
<ul style="list-style-type: none"> List and classify network services, protocols and architectures, explain why they are layered. Implement key Internet applications and their protocols, and will apply to develop their own applications (e.g. Client Server applications, Web Services) using the sockets API. 	
Question paper pattern:	
<p>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.</p>	
Text Books:	
1. Anurag Kumar, D. Manjunath, Joy Kuri: Communication Networking An Analytical Approach, Elsevier, 2004.	
Reference Books:	
1. M. Schwartz: Broadband Integrated Networks, Prentice Hall PTR, 1996.	
2. J. Walrand, P. Varaiya: High Performance Communication Networks, 2nd Edition, Morgan Kaufmann, 1999	

NETWORK ROUTING ALGORITHMS [As per Choice Based Credit System (CBCS) scheme] (Effective from the academic year 2016 -2017) SEMESTER - IV			
Subject Code	16SCN423	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			
<ul style="list-style-type: none"> Discuss layered architecture for communication networks and the specific functionality of the network layer. Explain the basic principles of routing and the manner, this is implemented in conventional networks and the evolving routing algorithms based on Internetworking requirements, optical backbone and the wireless access part of the network. Compare and contrast different routing algorithms existing and their performance characteristics. 			

Module -1	Teaching Hours
<p>NETWORK ROUTING: BASICS AND FOUNDATIONS: Networking and Network Routing: An Introduction: Addressing and Internet Service: An Overview, Network Routing: An Overview, IP Addressing, On Architectures, Service Architecture, Protocol Stack Architecture, Router Architecture, Network Topology Architecture, Network Management Architecture, Public Switched Telephone Network, Communication Technologies, Standards Committees, Last Two Bits.</p> <p>Routing Algorithms: Shortest Path and Widest Path: Bellman–Ford Algorithm and the Distance Vector Approach, Dijkstra’s Algorithm, Comparison of the Bellman–Ford Algorithm and Dijkstra’s Algorithm, Shortest Path Computation with Candidate Path Caching, Widest Path Computation with Candidate Path Caching, Widest Path Algorithm, k-Shortest Paths Algorithm</p> <p>Routing Protocols: Framework and Principles: Routing Protocol, Routing Algorithm, and Routing Table, Routing Information Representation and Protocol Messages, Distance Vector Routing Protocol, Link State Routing Protocol, Path Vector Routing Protocol, Link Cost</p>	8 Hours
Module -2	
<p>ROUTING IN IP NETWORKS: IP Routing and Distance Vector Protocol Family : Routers, Networks, and Routing Information: Some Basics, Static Routes, Routing Information Protocol, Version 1 (RIPv1), Routing Information Protocol, Version 2 (RIPv2), Interior Gateway Routing Protocol (IGRP), Enhanced Interior Gateway Routing Protocol (EIGRP), Route Redistribution</p> <p>OSPF and Integrated IS-IS :From a Protocol Family to an Instance of a Protocol, OSPF: Protocol Features, OSPF Packet Format, Examples of Router LSAs and Network LSAs, Integrated IS-IS, Similarities and Differences Between IS-IS and OSPF</p> <p>Internet Routing Architectures: Internet Routing Evolution, Addressing and Routing: Illustrations, Current Architectural View of the Internet, Allocation of IP Prefixes and AS Number, Policy-Based Routing, Point of Presence, Traffic Engineering Implications, Internet Routing Instability</p>	8 Hours
Module – 3	
<p>Router Architectures: Functions of a Router, Types of Routers, Elements of a Router, Packet Flow, Packet Processing: Fast Path versus Slow Path, Router Architectures. IP Address Lookup Algorithms: Impact of Addressing on Lookup, Longest Prefix Matching, Naïve Algorithms, Binary Tries, Multibit Tries, Compressing Multibit Tries, Search by Length Algorithms, Search by Value Approaches, Hardware Algorithms, Comparing Different Approaches. IP Packet Filtering and Classification: Importance of Packet Classification, Packet Classification Problem, Packet Classification Algorithms, Naïve Solutions, Two-Dimensional Solutions, Approaches for Dimensions, Extending Two-Dimensional Solutions, Divide and Conquer Approaches, Tuple Space Approaches, Decision Tree Approaches, Hardware-Based Solutions.</p>	8 Hours
Module-4	
<p>ADVANCED ROUTING PROTOCOLS FOR WIRELESS NETWORKS: Wireless networking basic aspects, Basic routing concepts, Ad hoc routing, Mesh routing, Vehicular routing, Sensor routing</p>	8 Hours
Module-5	

<p>TOWARD NEXT GENERATION ROUTING: Quality of Service Routing: QoS Attributes, Adapting Shortest Path and Widest Path Routing: A Basic Framework, Update Frequency, Information Inaccuracy, and Impact on Routing, Lessons from Dynamic Call Routing in the Telephone Network, Heterogeneous Service, Single-Link Case, A General Framework for Source-Based QoS Routing with Path Caching, Routing Protocols for QoS Routing</p> <p>MPLS and GMPLS: Traffic Engineering Extension to Routing Protocols, Multiprotocol Label Switching, Generalized MPLS, MPLS Virtual Private Networks. Routing and Traffic Engineering with MPLS: Traffic Engineering of IP/MPLS Networks, VPN Traffic Engineering, Routing/Traffic Engineering for Voice Over MPLS. VoIP Routing: Interoperability through IP and PSTN : PSTN Call Routing Using the Internet, PSTN Call Routing: Managed IP Approach, IP-PSTN Interworking for VoIP, IP Multimedia Subsystem, Multiple Heterogeneous Providers Environment and All-IP Environment of VoIP Services.</p>	<p>8 Hours</p>
<p>Course outcomes:</p>	
<ul style="list-style-type: none"> • Given the network and user requirements and the type of channel over which the network has to operate, the student would be in a position to apply his knowledge for identifying a suitable routing algorithm, implementing it and analyzing its performance. • The student would also be able to design a new algorithm or modify an existing algorithm to satisfy the evolving demands in the network and by the user applications. 	
<p>Question paper pattern:</p> <p>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.</p>	
<p>Text Books:</p> <ol style="list-style-type: none"> 1. Deepankar Medhi and Karthikeyan Ramasamy, “Network Routing: Algorithms, Protocols, and Architectures”, (The Morgan Kaufmann Series in Networking), Elsevier Inc 2007 2. Miguel Elias M. Campista and Marcelo G. Rubinstein, “Advanced Routing Protocols for Wireless Networks”, John Wiley & Sons, Inc, © ISTE Ltd 2014 	
<p>Reference Books:</p> <ol style="list-style-type: none"> 1. William Stallings, “High speed networks and Internets Performance and Quality of Service”, 2nd Edition, Pearson Education Asia. Reprint India 2002. 2. M. Steen Strub, “Routing in Communication network,” Prentice –Hall International, Newyork, 1995. 3. James D. McCabe, “Network Analysis, Architecture, and Design”, 3rd Edition, 2007 Elsevier Inc. 	

WEB MINING [As per Choice Based Credit System (CBCS) scheme] (Effective from the academic year 2016 -2017) SEMESTER - IV			
Subject Code	16SCN424	IA Marks	20
Number of Lecture Hours/Week	03	Exam Marks	80
Total Number of Lecture Hours	40	Exam Hours	03
CREDITS – 03			
<p>Course objectives: This course will enable students to</p> <ul style="list-style-type: none"> • Compare and contrast different knowledge discovery issues in Web mining. • Analyze the different algorithms commonly used by Web application. • Apply the role played by Web mining in Information retrieval and extraction • Demonstrate the documents structures and grouping, • Use the probabilistic model for web mining • Illustrate applications using Web mining 			
Module -1			Teaching Hours
<p>INTRODUCTION: Crawling and Indexing, Topic Directories, Clustering and Classification, Hyperlink Analysis, Resource Discovery and VerticalPortals, Structured vs. Unstructured DataMining . INFRASTRUCTURE and WEB SEARCH -- Crawling the web – HTML and HTTP Basics – Crawling Basics – Engineering Large ScaleCrawlers- Putting together a Crawler- Boolean Queries and the Inverted Index – RelevanceRanking – Similarity Search.</p>			8 Hours
Module -2			
<p>INFORMATION RETRIEVAL: Information Retrieval and Text Mining - Keyword Search - Nearest-Neighbor Methods -Measuring Similarity - Web-Based Document Search - Document–Matching - Inverted Lists -Evaluation of Performance - Structure in a Document Collection - Clustering Documents by Similarity- Evaluation of Performance - Information Extraction - Patterns and Entities from Text- Co reference and Relationship Extraction - Template Filling and Database Construction</p>			8 Hours
Module – 3			
<p>LEARNING I: Similarity and Clustering – Formulations and approaches- Bottom up and Top down Partitioning Paradigms – Clustering and Visualization via Embedding’s – Probabilistic Approaches to clustering – Collaborative Filtering, SUPERVISED LEARNING: The Supervised Learning Scenario, Overview of Classification Strategies, Evaluating Text Classifiers, Nearest Neighbor Learners, Feature Selection.</p>			8 Hours
Module-4			

<p>LEARNING II : SUPERVISED LEARNING – Bayesian Learners, Exploiting Hierarchy among Topics, Maximum Entropy Learners, Discriminative Classification, Hypertext Classification, SEMI SUPERVISED LEARNING-- Expectation Maximization, Labeling Hypertext Graphs and Co- training.</p>	<p>8 Hours</p>
<p>Module-5</p>	
<p>APPLICATIONS: Social Network Analysis- Social Sciences and Bibliometry – Page Rank and HITS – Shortcomings of coarse Grained Graph model- Enhanced Models and Techniques- Evaluation of Topic Distillation- Measuring and Modeling the Web – Resource Discovery – Collecting Important Pages Preferentially – Similarity Search Using Link Topology – Topical Locality and Focused Crawling – Discovering Communities- The Future of Web Mining.</p>	<p>8 Hours</p>
<p>Course outcomes:</p>	
<p>At the end of the course the student should be able to:</p> <ul style="list-style-type: none"> • Identify the application areas for web content mining, web structure mining and webusage mining. • Design to retrieval the web data • Develop schemes to crawl the web data, organize and index • Cluster the documents for fast access • Develop algorithms used by web mining applications. • Select between different approaches and techniques of web mining 	
<p>Question paper pattern:</p> <p>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.</p>	
<p>Text Books:</p> <ol style="list-style-type: none"> 1. Sholom Weiss, “Text Mining: Predictive Methods for Analyzing Unstructured Information”, Springer, 2005 2. Soumen Chakrabarti, “Mining the Web: Discovery Knowledge from Hypertext Data,” Elsevier Science 2003 	
<p>Reference Books:</p> <ol style="list-style-type: none"> 1. Min Song, Yi-fang Brok Wu, “Handbook of Research on Text and Web Mining Technologies”, Vol I & II, Information Science Reference (IGI), 2009 2. K.P.Soman, ShyamDiwakar, V.Ajay, “Insight into Data Mining Theory and Practice ,” Prentice Hall of India Private Ltd 2006 3. Anthony Scime, “Web Mining Applications and Techniques”, Idea Group Publishing,2005 4. Margret H.Dunham “DATA MINING - Introductory and Advanced Concepts”, PearsonEducation,2003. 	