



NEW HORIZON COLLEGE OF ENGINEERING



Approved by AICTE & ISO 9001:2008 certified

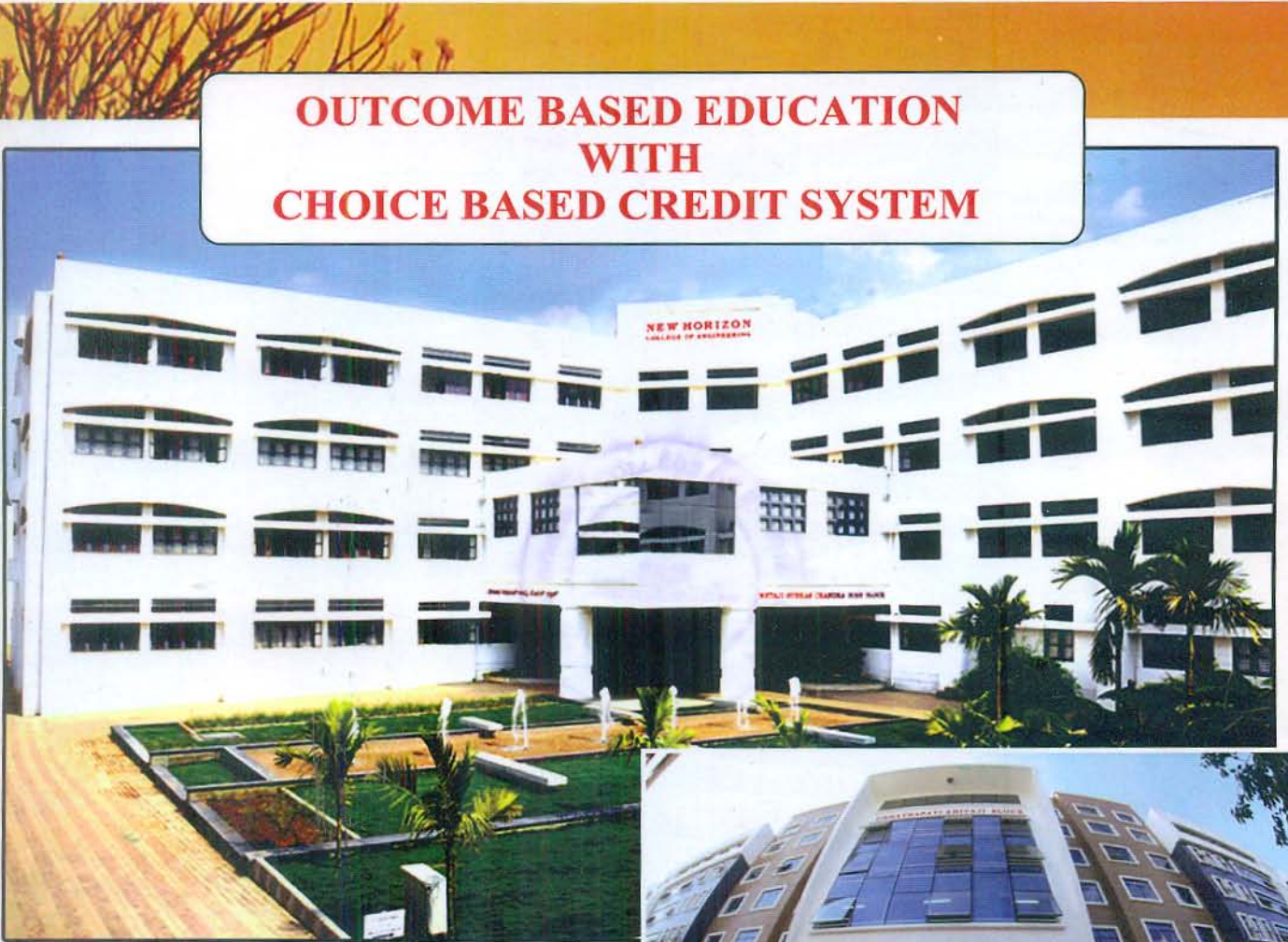
The Trust is a Recipient of Prestigious Rajyotsava State Award 2012 Conferred by the Govt. of Karnataka

Awarded Outstanding Technical Education Institute in Karnataka- 2014

Ring Road, Bellandur Post, Near Marathahalli, Bangalore-560103, India

(An Autonomous Institution Affiliated to VTU)

**OUTCOME BASED EDUCATION
WITH
CHOICE BASED CREDIT SYSTEM**



**M.Tech in Computer Network Engineering (CNE)
M.Tech in Computer Science and Engineering (CSE)
M.Tech in Software Engineering (SEE)**

**First and Second Semesters
Scheme and Syllabus**



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W.E.F Academic Year 2015-16

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VISION

To achieve total quality in education and knowledge management through specific, measurable, attainable, relevant, time bound goals and continuous improvement methods.

MISSION

To mould our students into holistic personalities who are accomplished in emotional, moral, intellectual, social and mental capabilities besides inculcating a capacity for critical and lateral thinking

GOAL

To adhere to the reputation of being able to channel our human resources and guide the transformation process of every individual's dream into a reality.

QUALITY POLICY

To provide education services of the highest quality both curricular and co-curricular so that our students can integrate skills and serve industry and society equally well at the Global level.

PREFACE

New Horizon College of Engineering was recently granted the autonomous status effective academic year 2015-16. The college offers B.E program in eight branches, M.B.A, M.C.A and M.Tech program in eight specializations. We look forward to implementing the prestigious autonomous status with utmost commitment and enthusiasm-true to our institution motto "In Pursuit of Excellence."

India has recently become a Permanent Member by signing the Washington Accord. The accord was signed by the National Board of Accreditation (NBA) on behalf of India on 13th June 2014. It enables not only the mobility of our degrees globally but also establishes equivalence to our degrees with those of the member nations such as Taiwan, Hong Kong, Ireland, Korea, Malaysia, New Zealand, Russia, Singapore, South Africa, Turkey, Australia, Canada and Japan. Among other signatories to the international agreement are the US and the UK. Implementation of Outcome Based Education (OBE) has been the core issue for enabling the equivalence and of Indian degrees and their mobility across the countries.

New Horizon College of Engineering has adopted the Choice Based Credit System (CBCS) semester structure with OBE scheme and grading system. The credit based OBE semester system provides flexibility in designing curriculum and assigning credits based on the course content and hours of teaching. OBE emphasizes setting clear standards for observable, measurable outcomes of programs in stages. Outcome Based Education is a method or means which begins with the end in mind and constantly emphasizes continuous improvement. Choice Based Credit System (CBCS) provides choice for students to select from the prescribed courses (core, Foundation, Foundation Elective, elective, open elective and minor or soft skill courses). The CBCS provides a 'cafeteria' type approach in which the students can choose electives from a wide range of courses of their choice, learn at their own pace, undergo additional courses and acquire more than the required credits, adopt an interdisciplinary approach to learning which enables integration of concepts, theories, techniques, and, perspectives from two or more disciplines to advance fundamental understanding or to solve problems whose solutions are beyond the scope of a single discipline.

Outcome Base Education and CBCS greatly enhance the overall skills and employability of students. In order to increase the Industry readiness, many Soft Skills and Personality Development modules have been added to the existing curriculum. Industry Interactions have been made compulsory to enhance the dle experience. In order to enhance creativity and innovation Mini Project and Industrial visit & Interaction are included in all undergraduate programs.

Dr. Manjunatha
Principal-NHCE

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**CREDIT SCHEME FOR FIRST SEMESTER M.TECH COMPUTER NETWORK
ENGINEERING**

S.No	Course Code	Course	BoS	Credit Distribution				Overall Credits	Marks		
				L	P	T	S		CIE	SEE	Total
1	15SCN11	Network Programming	CSE	4	1	0	0	5	75	75	150
2	15SCN12	Cyber Security & Forensics	CSE	4	0	0	0	4	50	50	100
3	15SCN13	Advanced Computer Networks	CSE	4	0	0	0	4	50	50	100
4	15SCN14x	Specialization Elective-1	CSE	4	0	0	1	5	50	50	100
5	15NHG15x	Global Elective-1*	CSE	3	0	0	1	4	50	50	100
6	15SCN16	Mini Project I - ACN	CSE					3	50	50	100
Total								25	325	325	650

Specialization Electives-1	
Course Code	Course
15SCN141	Protocol Engineering
15SCN142	Real Time systems
15SCN143	Switching & Statistical Multiplexing
15SCN144	Business Intelligence

**CREDIT SCHEME FOR SECOND SEMESTER M.TECH COMPUTER
NETWORK ENGINEERING**

S.No	Course Code	Course	BoS	Credit Distribution				Overall Credits	Marks		
				L	P	T	S		CIE	SEE	Total
1	15SCN21	Cellular Networks	CSE	4	1	0	0	5	75	75	150
2	15SCN22	Information & Network Security	CSE	4	0	0	0	4	50	50	100
3	15SCN23	Storage Area Networks	CSE	4	0	0	0	4	50	50	100
4	15SCN24x	Specialization Elective-2	CSE	4	0	0	1	5	50	50	100
5	15NHG25x	Global Elective-2 (TBA)	CSE	3	0	0	1	4	50	50	100
6	15SCN26	Mini Project 2 - Storage Area Networks	CSE	-				3	50	50	100
Total								25	325	325	650

Specialization Electives-2	
Course Code	Course
15SCN241	Human Computer Interaction
15SCN242	Service Oriented Architecture
15SCN243	Grid Computing
15SCN244	Semantic Web

M.TECH-COMPUTER NETWORK AND ENGINEERING

NETWORK PROGRAMMING

Course Code : 15SCN11
L:P:T:S : 4:1:0:0
Exam Hours : 03

Credits : 05
CIE Marks : 50+25
SEE Marks : 50+25

Course Objectives:

- 1) To learn the basics of socket programming using TCP Sockets.
- 2) To learn basics of TFTP protocol.
- 3) To develop knowledge of execution of remote commands
- 4) To learn about remote login.
- 5) To understand Java network programming

Module 1

Review of Basic Concepts: Layering, OSI model, Processes, A simplified model, Client-Server model, A history of Unix Networking; Review of TCP/IP **9 Hrs**

Module 2

Sockets: Introduction, Unix domain protocols, socket addresses, elementary socket systemcalls, advanced socket system calls, reserved ports, stream pipes, passing file descriptions, socket options, asynchronous I/O, Input/Output Multiplexing, Out-of-Band data, sockets and signals, Internet superservers, socket implementation.

9 Hrs

Module 3

TFTP Protocol: Introduction, protocol, security, data formats, connections, client userinterface, UDP implementation, TCP implementation.

9 Hrs

Module 4

Remote Command Execution: Introduction, Security issues, rcmd function and rshd server, rexec function and rexecd server.

9 Hrs

Module 5

Remote Login: Introduction, Terminal line disciplines, pseudo terminal, terminal modes, control terminals rlogin overview, rlogin client, rlogin server.

JAVA Network Programming: Introduction, Client-Server Computing, The InetAddress class, Serving multiple clients, Applet clients, Sending and receiving objects, Retrieving objects from Web servers, Datagram Sockets **8 Hrs**

NETWORK PROGRAMMING LAB

- 1) Design, develop, and execute a program in C under UNIX / LINUX environment to implement a simple echo server and demonstrate its working. Both the server and client are to be connection- oriented and use TCP. The system works as follows: Client reads a line from the standard input and writes the line to the server; the server reads a line from its network input and echoes the line back to the client; the client reads the echoed line and prints it on its standard output.
- 2) Repeat the above experiment using UDP instead of TCP.
- 3) Repeat the Experiment 1 using JAVA network programming facilities.
- 4) Modify the above program such that the client sends an integer value supposed to represent the radius of a circle and the server is to compute and return the corresponding area.
- 5) Extend the above program such that the server responds to multiple clients.

Text Books:

- 1) UNIX Network Programming, W. Richard Stevens, PRENTICE-HALL INDIA, 2001.
- 2) Introduction to JAVA Programming, 6th Edition, Y. Daniel Liang, Pearson, 2007.

Reference Books:

- 1) TCP/IP Illustrated, Volumes 1 - 3, W. Richard Stevens, Pearson, 2000
- 2) William Stallings, "SNMP, SNMPv2, SNMPv3 and RMON 1 and 2", Third Edition, Addison Wesley, 1999.
- 3) D.E. Comer, "Inter Networking with TCP/IP Vol- III", (BSD Sockets Version), second Edition, PHI, 2003.

Expected Course Outcome:

At the end of the course graduate will be able to:

- 1) Implement the network algorithm and study its performance
- 2) Use Network simulation package or programming language to develop network programs
- 3) Understanding the working principle of Socket programming
- 4) Familiarization with the OPNET toolkit
- 5) To expand knowledge of threads for developing high performance scalable applications.

Assessment Method:

CIE:

1. Three internal tests of 30 marks each will be conducted and the average of the top two test marks will be considered.
2. Assignment - 10 marks
3. Quiz test / Seminar - 10 marks

SEE:

1. SEE will be conducted for 100 marks and shall be for a duration of 3 hours
2. Two Questions will be set from each module carrying 20 Marks each.
3. Students have to answer 5 questions selecting one full question from each module.

CIE (Lab):

1. Day-to-day completion of experiment and submission – 10 marks, Internal test – 15 marks

SEE (Lab):

1. One experiment to be performed for 25 marks

CYBER SECURITY AND FORENSICS

Course Code : 15SCN12

L:P:T:S : 4:0:0:0

Exam Hours : 03

Credits : 04

CIE Marks : 50

SEE Marks : 50

Course Objectives:

- To identify about Cyber Security and Crime
- To recognize the categories of cyber crime
- To understand the Digital laws and legislation
- To realize the system Vulnerability Scanning
- To appreciate the network defense tools
- To value the Web Application Tools
- To identify with the Digital Forensics

Module 1

Overview of Cyber Security & Crime, Nature and Scope of Cyber Crime, Types of Cyber Crime, Social Engineering, Categories of Cyber Crime, Property Cyber Crime. Unauthorized Access to Computers, Computer Intrusions, White collar Crimes, Viruses and Malicious Code, Internet Hacking and Cracking, Virus Attacks, Pornography, Software Piracy, Intellectual Property, Mail Bombs, Exploitation, Stalking and Obscenity in Internet, Digital laws and legislation, Law Enforcement Roles and Responses.

9 Hrs

Module 2

Systems Vulnerability Scanning: Overview of vulnerability scanning, Open Port / Service Identification, Banner Version Check, Traffic Probe, Vulnerability Probe, Vulnerability Examples, OpenVAS, Metasploit. Networks Vulnerability Scanning - Netcat, Socat, understanding Port and Services tools - Datapipe, Fpipe, WinRelay, Network Reconnaissance – Nmap, THC-Amap and System tools. Network Sniffers and Injection tools – Tcpdump and Windump, Wireshark, Ettercap, Hping Kismet.

9 Hrs

Module 3

Network Defense tools: Firewalls and Packet Filters: Firewall Basics, Packet Filter Vs.Firewall, How a Firewall Protects a Network, Packet Characteristic to Filter, Stateless VsStateful Firewalls, Network Address Translation (NAT) and Port Forwarding, the basic of Virtual Private Networks, Linux Firewall, Windows Firewall, Snort: Introduction Detection System.

9 Hrs

Module 4

Web Application Tools: Scanning for web vulnerabilities tools: Nikto, W3af, HTTP utilities - Curl, OpenSSL and Stunnel, Application Inspection tools – Zed Attack Proxy, Sqlmap. DVWA, Webgoat, Password Cracking and Brute-Force Tools – John the Ripper, L0htcrack, Pwdump, HTC-Hydra**9 Hrs**

Module 5

Digital Forensics, Forensic Software and Hardware, Analysis and Advanced Tools, Forensic Technology and Practices, Forensic Ballistics and Photography, Face, Iris and Fingerprint Recognition, Audio Video Analysis, Windows System Forensics, Linux System Forensics, Network Forensics.

8 Hrs

Text Book:

- 1) Kevin Mandia, Chris Prosise, Matt Pepe, "Incident Response and Computer Forensics", Tata McGraw -Hill, New Delhi, 2006.
- 2) Robert M Slade, "Software Forensics", Tata McGraw - Hill, New Delhi, 2005.
- 3) Cyber Security Understanding Cyber Crimes, Computer Forensics and Legal Perspectives by Nina Godbole and SunitBelpure, Publication Wiley
- 4) Bernadette H Schell, Clemens Martin, "Cybercrime", ABC – CLIO Inc, California, 2004.
- 5) Nelson Phillips and EnfingerSteuart, "Computer Forensics and Investigations", Cengage Learning, New Delhi, 2009.
- 6) Anti-Hacker Tool Kit (Indian Edition) by Mike Shema, Publication McGraw Hill.

Reference Books:

- 1) Donn Parkers, " Fighting Computer Crime: A New Framework for Protecting Information", John Wiley&Sons, 2003
- 2) Micki Krause, Harold F.Tripton, "Information Security Management Handbook",Auerbach Publications, 2012.
- 3) Mark Talabis, "Information Security Risk Assessment Toolkit: Practical Assessments through Data Collection and Data Analysis", Kindle Edition. ISBN: 978-1-59749-735-0.
- 4) David L. Cannon, "CISA Certified Information Systems Auditor Study Guide", SYBEX Publication. ISBN: 978-0-470-23152-4.
- 5) "Understanding Forensics in IT ", NIIT Ltd, 2005.

Expected Course Outcome:

At the end of the course graduate will be able to:

- To understand the Virus Attacks, Pornography, Software Piracy, Intellectual Property, Mail Bombs.
- To apply the Digital laws and Enforcement of Roles and Responses.
- To apply vulnerability scanning
- To apply Networks Vulnerability Scanning
- To understand Port and Services tools - Datapipe, Fpipe, WinRelay.
- To apply Firewalls and Packet Filters.
- To apply Detection System & Scanning for web vulnerabilities tools
- To effectively utilize Forensic Software and Hardware
- To implement Forensic Technology and Practices.

Assessment Method:

CIE:

1. Three internal tests of 30 marks each will be conducted and the average of the top two test marks will be considered.
2. Assignment - 10 marks
3. Quiz test / Seminar - 10 marks

SEE:

1. SEE will be conducted for 100 marks and shall be for a duration of 3 hours
2. Two Questions will be set from each module carrying 20 Marks each.
3. Students have to answer 5 questions selecting one full question from each module.

ADVANCED COMPUTER NETWORKS

Course Code : 15SCN13
L:P:T:S : 4:0:0:0
Exam Hours : 03

Credits : 04
CIE Marks : 50
SEE Marks : 50

Course Objectives:

- 1) To become familiar with the Networks requirements.
- 2) To learn Network architectures.
- 3) To learn Concepts of fundamental protocols.
- 4) To gain the knowledge of internetworking concepts.
- 5) To understand the knowledge of internetworking concepts in various applications.
- 6) To acquire knowledge of implementation concepts in congestion control and error detections.

Module 1

Foundation: Building a Network, Requirements, Perspectives, Scalable Connectivity, Cost-Effective Resource sharing, Support for Common Services, Manageability, Protocol layering, Performance, Bandwidth and Latency, Delay X Bandwidth Product, Perspectives on Connecting, Classes of Links, Reliable Transmission, Stop-and-Wait , Sliding Window,

Module 2

Internetworking- I: Switching and Bridging, Datagram's, Virtual Circuit Switching, Source Routing, Bridges and LAN Switches, Basic Internetworking (IP), What is an Internetwork ?, Service Model, Global Addresses, Datagram Forwarding in IP, sub netting and classless addressing, Address Translation(ARP), Host Configuration(DHCP), Error Reporting(ICMP), Virtual Networks and Tunnels.

9 Hrs

Module 3

Internetworking- II: Network as a Graph, Distance Vector(RIP), Link State(OSPF), Metrics,The Global Internet, Routing Areas, Routing among Autonomous systems(BGP), IP Version 6(IPv6), Mobility and Mobile IP

9 Hrs

Module 4

End-to-End Protocols: Simple Demultiplexer (UDP), Reliable Byte Stream(TCP), End-to-End Issues, Segment Format, Connecting Establishment and Termination, Sliding Window Revisited, Triggering Transmission, Adaptive Retransmission, Record Boundaries, TCP Extensions, Queuing Disciplines, FIFO, Fair Queuing, TCP Congestion Control, Additive Increase/ Multiplicative Decrease, Slow Start, Fast Retransmit and Fast Recovery.

9 Hrs

Module 5

Congestion Control and Resource Allocation: Congestion-Avoidance Mechanisms, DEC bit, Random Early Detection (RED), Source-Based Congestion Avoidance. The Domain Name System (DNS), Electronic Mail (SMTP, POP, IMAP, MIME), World Wide Web (HTTP), Network Management(SNMP).

8 Hrs

Text Books:

- 1) Larry Peterson and Bruce S Davis "Computer Networks :A System Approach" 5th Edition , Elsevier -2014
- 2) Douglas E Comer, "Internetworking with TCP/IP, Principles, Protocols and Architecture" 6th Edition, PHI - 2014

Reference Books:

- 1) Uyles Black "Computer Networks, Protocols , Standards and Interfaces" 2nd Edition - PHI
- 2) Behrouz A Forouzan "TCP/IP Protocol Suite" 4th Edition - Tata McGraw-Hill

Expected Course Outcome:

At the end of the course graduate will be able to:

- 1) List and classify network services, protocols and architectures, explain why they are layered.
- 2) Choose key Internet applications and their protocols, and apply to develop their own applications (e.g. Client Server applications, Web Services) using the sockets API.
- 3) Explain develop effective communication mechanisms using techniques like connection establishment, queuing theory, recovery Etc.
- 4) Explain various congestion control techniques.

Assessment Method:

CIE:

1. Three internals tests of 30 marks each will be conducted and the average of the top two test marks will be considered.
2. Assignment - 10 marks
3. Quiz test / Seminar - 10 marks

SEE:

1. SEE will be conducted for 100 marks and shall be for a duration of 3 hours
2. Two Questions will be set from each module carrying 20 Marks each.
3. Students have to answer 5 questions selecting one full question from each module.

PROTOCOL ENGINEERING

Course Code : 15SCN141

L:P:T:S : 4:0:0:1

Exam Hours : 03

Credits : 05

CIE Marks : 50

SEE Marks : 50

Course Objectives:

- 1) To become familiar with communication system in protocols
- 2) Understand various specifications related to protocols
- 3) To become familiar with different validation approaches
- 4) Understand various testing methods
- 5) Get insight of algorithms for implementation.

Module 1

Introduction: Communication model, Communication Software, Communication Subsystems, Communication Protocol Definition/Representation, Formal and Informal Protocol Development Methods, Protocol Engineering Phases; Architecture, Network Services and

Module 2

Protocol Specification: Protocol Functions: Encapsulation, Segmentation, Reassembly, Multiplexing, Addressing Components of specification, Service specification, Communication Service Specification Protocol entity specification: Sender, Receiver and Channel specification, Interface specifications, Interactions, Multimedia specifications, Alternating Bit Protocol Specification, RSVP specification. **9 Hrs**

Module 3

Protocol Specification Language (SDL): Salient Features. Communication System Description Using SDL, Structure of SDL. Data types and communication paths, Examples of SDL based Protocol Specifications: Question and answer protocol, X-on-X-off protocol, Alternating bit protocol, Sliding window protocol specification, TCP protocol specification, SDL based platform for network, OSPF, BGP Multi-Protocol Label Switching SDL components. Protocol Verification / Validation: Protocol Verification using FSM, ABP Verification, Protocol Design Errors, Deadlocks, Unspecified Reception, Non-executable Interactions, State Ambiguities, Protocol Validation Approaches: Perturbation Technique, Reachability Analysis, Fair Reachability Graphs, Process Algebra based Validation, SDL Based Protocol Verification: ABP Verification, Liveness Properties, SDL Based Protocol Validation: ABP Validation. **9 Hrs**

Module 4

Protocol Conformance and Performance Testing: Conformance Testing Methodology and Framework, Local and Distributed Conformance Test Architectures, Test Sequence Generation Methods: T, U, D and W methods, Distributed Architecture by Local Methods, Synchronizable Test Sequence, Conformance testing with Tree and Tabular Combined Notation (TTCN), Testing Multimedia Systems, quality of service test architecture (QoS), Performance Test methods, Interoperability testing, Scalability testing **9 Hrs**

Module 5

Protocol Synthesis & Implementation: Synthesis methods, Interactive Synthesis Algorithm, Automatic Synthesis Algorithm, Automatic Synthesis of SDL from MSC, Protocol Re-synthesis, Requirements of Protocol Implementation, Objects Based Approach To Protocol implementation, Protocol Compilers, Code generation from Estelle, LOTOS, SDL and CVOPS. Case Studies: Example (Simple) protocols to be chosen to give equivalent FSM specification & develop SDL charts and perform verification and validation for the same. **8 Hrs**

Text Book:

- 1) Communication Protocol Engineering, Pallapa Venkataram and Sunilkumar S. Manvi, PRENTICE-HALL INDIA, 2004.

Reference Books:

- 1) Elements of Protocol Design, Mohammed G. Gouda, Wiley Student Edition, 2004.

Expected Course Outcome:

At the end of the course graduate will be able to:

- 1) Familiar with the concept of protocols and their representation and discuss the phases of protocol engineering
- 2) Identify the components of protocol to be specified and to create formal specification of protocol using communicating finite state machine
- 3) Design and develop SDL based specification of a protocol
- 4) Apply different types of protocol verification techniques and tools
- 5) Identify a generally applicable and efficient procedure for generating a conformance test suite for a given protocol implementation, to compare different types of protocol testing methods, to familiarize concepts of performance, interoperability and scalability testing of protocol
- 6) Discuss methods for interactively build correct protocol specification and its implementation issues

Assessment Method:

CIE:

1. Three internal tests of 30 marks each will be conducted and the average of the top two test marks will be considered.
2. Assignment - 10 marks
3. Quiz test / Seminar - 10 marks

SEE:

1. SEE will be conducted for 100 marks and shall be for a duration of 3 hours
2. Two Questions will be set from each module carrying 20 Marks each.
3. Students have to answer 5 questions selecting one full question from each module.

REAL TIME SYSTEMS

Course Code : 15SCN142
L:P:T:S : 4:0:0:1
Exam Hours : 03

Credits : 05
CIE Marks : 50
SEE Marks : 50

Course Objectives:

- 1) To study issues related to the design and analysis of systems with real-time constraints.
- 2) To learn the features of Real time OS.
- 3) To study the various Uni-processor and Multiprocessor scheduling mechanisms.
- 4) To learn about various real time communication protocols.
- 5) To study the difference between traditional and real time databases

Module 1

Introduction to real time computing - Concepts; Example of real-time applications - Structure of real time system - Characterization of real time systems and tasks - Hard and Soft timing constraints - Design Challenges - Performance metrics - Prediction of Execution Time : Source code analysis, Micro-architecture level analysis, Cache and pipeline issues- Programming Languages for Real-Time Systems **9 Hrs**

Module 2

Real time OS - Threads and Tasks - Structure of Microkernel - Time services - Scheduling Mechanisms Communication and Synchronization - Event Notification and Software interrupt. **9 Hrs**

Module 3

Task assignment and Scheduling - Task allocation algorithms - Single-processor and Multiprocessor task scheduling - Clock-driven and priority-based scheduling algorithms- Fault tolerant scheduling **9 Hrs**

Module 4

Real Time Communication -Network topologies and architecture issues - protocols - contention based, token based, polled bus, deadline based protocol, Fault tolerant routing. RTP and RTCP. **9 Hrs**

Module 5

Real time Databases - Transaction priorities - Concurrency control issues - Disk scheduling algorithms - Two phase approach to improve predictability **8Hrs**

Text Book:

- 1) C.M. Krishna, Kang G. Shin - " Real Time Systems", International Edition, McGraw Hill Companies, Inc., New York, 1997

Reference Books:

- 1) Jane W.S. Liu, Real-Time Systems, Pearson Education India, 2000.
- 2) Philip A. Laplante and Seppo J. Ovaska, "Real-Time Systems Design and Analysis: Tools for the Practitioner" IV Edition IEEE Press, Wiley. 2011

Expected Course Outcome:

At the end of the course graduate will be able to:

- Gain Knowledge about Schedulability analysis.
- Ability to learn Real-time programming environments.
- Knowledge about real time communication and databases.
- Ability to develop real time systems.

Assessment Method:

CIE:

1. Three internal tests of 30 marks each will be conducted and the average of the top two test marks will be considered.
2. Assignment - 10 marks
3. Quiz test / Seminar - 10 marks

SEE:

1. SEE will be conducted for 100 marks and shall be for a duration of 3 hours
2. Two Questions will be set from each module carrying 20 Marks each.
3. Students have to answer 5 questions selecting one full question from each module.

SWITCHING & STATISTICAL MULTIPLEXING

Course Code : 15SCN143

L:P:T:S : 4:0:0:1

Exam Hours : 03

Credits : 05

CIE Marks : 50

SEE Marks : 50

Course Objectives:

- 1) To understand Switching and multiplexing.
- 2) To understand the transmission technology.
- 3) To understand the transmission control.
- 4) To understand basic knowledge on telecommunication

Module 1

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.

9Hrs

Module 2

Switching: Crossbar Switching, Principles of Common Control, Touch Tone Dial Telephone, Principles of Crossbar Switching, Crossbar Switch Configurations, Cross point Technology, Crossbar Exchange Organization.

9Hrs

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.

9Hrs

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.

9Hrs

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 Hrs

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:

- 1) A.Kumar, D. Manjunath, J. Kuri, Communication Networking: An Analytical Approach, Morgan Kaufman Publishers.
- 2) Hui, J.Y., Switching and Traffic Theory for Integrated Broadband Networks, Kluwer

Expected Course Outcome:

At the end of the course graduate will be able to:

- Gain the knowledge about switching and multiplexing
- Gain the knowledge about telecommunication.
- Learn transmission control in telecommunication.

Assessment Method:

CIE:

1. Three internal tests of 30 marks each will be conducted and the average of the top two test marks will be considered.
2. Assignment - 10 marks
3. Quiz test / Seminar - 10 marks

SEE:

1. SEE will be conducted for 100 marks and shall be for a duration of 3 hours
2. Two Questions will be set from each module carrying 20 Marks each.

3. Students have to answer 5 questions selecting one full question from each module.

BUSINESS INTELLIGENCE

Course Code : 15SCN144
L:P:T:S : 4:0:0:1
Exam Hours : 03

Credits : 05
CIE Marks : 50
SEE Marks : 50

Course Objectives:

- 1) To Implement the key elements of a successful business intelligence (BI) program
- 2) To Apply a BI meta model that turns outcomes into actions
- 3) To Extract and transform data from an operational data to a data business data
- 4) To Exploit business analytics and performance measurement tools

Module 1

Development Steps, BI Definitions, BI Decision Support Initiatives, Development Approaches, Parallel Development Tracks, BI Project Team Structure, Business Justification, Business Divers, Business Analysis Issues, Cost – Benefit Analysis, Risk Assessment, Business Case Assessment Activities, Roles Involved In These Activities, Risks Of Not Performing Step, Hardware, Middleware, DBMS Platform, Non-Technical Infrastructure Evaluation **9 Hrs**

Module 2

Managing The BI Project, Defining And Planning The BI Project, Project Planning Activities, Roles And Risks Involved In These Activities, General Business Requirement, Project Specific Requirements, Interviewing Process. **9 Hrs**

Module 3

Differences in Database Design Philosophies, Logical Database Design, Physical Database Design, Activities, Roles And Risks Involved In These Activities, Incremental Rollout, Security Management, Database Backup And Recovery. **9 Hrs**

Module 4

Growth Management, Application Release Concept, Post Implementation Reviews, Release Evaluation Activities, The Information Asset and Data Valuation, Actionable Knowledge – ROI, BI Applications, The Intelligence Dashboard. **9Hrs**

Module 5

Business View of Information technology Applications: Business Enterprise excellence, Key purpose of using IT, Type of digital data, basics of enterprise reporting, BI road ahead. **8 Hrs**

Text Books:

- 1) Larissa T Moss and ShakuAtre – Business Intelligence Roadmap : The Complete Project Lifecycle for Decision Support Applications, Addison Wesley Information Technology Series, 2003.
- 2) R N Prasad, SeemaAcharya – Fundamentals of Business Analytics , Wiley India, 2011.

Reference Books:

- 1) David Loshin - Business Intelligence: The Savvy Manager's Guide, Publisher: Morgan Kaufmann, ISBN 1- 55860-196-4.
- 2) Brian Larson - Delivering Business Intelligence with Microsoft SQL Server 2005, McGraw Hill, 2006.
- 3) Lynn Langit - Foundations of SQL Server 2008 Business Intelligence –Apress, ISBN13: 978-1-4302-3324-4, 2011

Expected Course Outcome:**At the end of the course graduate will be able to:**

- know the complete life cycle of BI/Analytical development
- Understand the technology and processes associated with Business Intelligence framework
- Given a business scenario, identify the metrics, indicators and make recommendations to achieve the business goal.

Assessment Method:**CIE:**

1. Three internal tests of 30 marks each will be conducted and the average of the top two test marks will be considered.
2. Assignment - 10 marks
3. Quiz test / Seminar - 10 marks

SEE:

1. SEE will be conducted for 100 marks and shall be for a duration of 3 hours
2. Two Questions will be set from each module carrying 20 Marks each.
3. Students have to answer 5 questions selecting one full question from each module.

MINI PROJECT I - ADVANCED COMPUTER NETWORKS

Course Code : 15SCN16
L:P:T:S : 0:3:0:0
Exam Hours : 03

Credits : 03
CIE Marks : 50
SEE Marks : 50

Students are expected to independently identify a problem related to the field of Advanced Computer Networks and carry out a mini project on the problem defined. Projects should be coded (or programmed) individually and independently. The code developed towards the project will be reviewed by a panel of examiners at multiples levels. Plagiarized projects will automatically get an **"F" GRADE** and the student will be liable for further disciplinary action. At the completion of a project, the student is to submit a project report and make a presentation, which will be evaluated (end semester assessment) by duly appointed examiner(s).

CELLULAR NETWORKS

Course Code : 15SCN21
L:P:T:S : 4:1:0:0
Exam Hours : 03

Credits : 05
CIE Marks : 50+25
SEE Marks : 50+25

Course Objectives:

- 1) To understand the basics of Mobile Computing and Cellular Networks
- 2) To understand the context of modulation techniques
- 3) To understand multiple access techniques in case of wireless communications.
- 4) To understand the basics of wireless networking

Module 1

Introduction to Wireless Communication Systems: Evolution of Mobile Radio Communications Mobil Radio Systems around the world examples of Wireless Communication Systems, Paging System, Cordless Telephone System. Cellular Telephone Systems, Comparison of Common Wireless Communications Systems Modern Wireless Communications Systems: Second generation (2G), Cellular Networks, evolution of 2.5G, TDMA Standards, Third Generation (3G) Wireless Networks, Wireless Local Loop (WLL) and LMDS, Wireless Local Area Networks (WLANs), Bluetooth and Personal Area Networks (PANS)

9 Hrs

Module 2

The Cellular Concept: System Design Fundamentals, Introduction, Frequency reuse, channel assignment strategies, handoff strategies - prioritizing handoffs, Practical Handoff

considerations, Interference and system capacity, co-channel interference and system capacity, channel planning for wireless systems, adjacent channel interference, power control for reducing interference Mobile Radio Propagation: Introduction to radio wave propagation, Free space propagation model, Relating power to electric field, Reflection, Diffraction, Scattering.

9Hrs

Module 3

Modulation Techniques for Mobile Radio: Frequency modulation Vs. amplitude modulation, Amplitude modulation, Angle modulation, Digital Modulation, Linear Modulation techniques – Binary phases shift keying (BPSK), Differential Phase Shift Keying (DPSK), Quadrature Phase Shift Keying (QPSK), Constant envelope modulation – Binary Frequency Shift Keying, Minimum Shift Keying (MSK), Gaussian Minimum Shift Keying (GMSK).

9 Hrs

Module 4

Multiple Access Techniques for Wireless Communications: Introduction to Multiple access, Frequency Division Multiple Access (FDMA), Time Division Multiple Access (TDMA), Spread Spectrum Multiple Access, Space Division Multiple Access (SDMA), Packet Radio. Protocols, Reservation Protocols – Reservation ALOHA, Packet Reservation Multiple Access (PRMA), Capacity of cellular systems.

9 Hrs

Module 5

Wireless Networking: Introduction, Difference between Wireless and Fixed Telephone Networks, Development of Wireless Networks, First generation, second generation, third generation.

8 Hrs

CELLULAR NETWORKS LAB

- 1) Using any package like MATLAB or using any programming language of your choice, implement the BPSK algorithm and study its performance.
- 2) Repeat the above experiment for QPSK algorithm and compare its performance with that of BPSK.
- 3) Using any Network simulation package or using any programming language of your choice, implement and study the performance of PRMA.

Text Book:

- 1) Wireless Communications, Principles and Practice, 2nd Edition, Theodore S Rappaport, Pearson Education Asia, 2002.

Reference Books:

- 1) Mobile Communications Engineering Theory and Applications, 2nd Edition, William C Y Lee, McGraw Hill Telecommunications 1998.

- 2) Wireless Communications and Networks, William Stallings, Pearson Education Asia, 2002

Expected Course Outcome:

At the end of the course graduate will be able to:

- Work on state of art techniques in wireless communication.
- Explore CDMA, GSM, Mobile IP, WiMax
- Work on Different Mobile OS
- Develop program for CLDC, MIDP let model and security concerns

Assessment Method:

CIE:

1. Three internals tests of 30 marks each will be conducted and the average of the top two test marks will be considered.
2. Assignment - 10 marks
3. Quiz test / Seminar - 10 marks

SEE:

1. SEE will be conducted for 100 marks and shall be for a duration of 3 hours
2. Two Questions will be set from each module carrying 20 Marks each.
3. Students have to answer 5 questions selecting one full question from each module.

CIE (Lab):

1. Day-to-day completion of experiment and submission – 10 marks, Internal test – 15 marks

SEE (Lab):

1. One experiment to be performed for 25 marks

INFORMATION and NETWORK SECURITY

Course Code : 15SCN22

L:P:T:S : 4:0:0:0

Exam Hours : 03

Credits : 04

CIE Marks : 50

SEE Marks : 50

Course Objectives:

- 1) To understand the fundamentals of Cryptography
- 2) To acquire knowledge on standard algorithms used to provide confidentiality, integrity and authenticity.

- 3) To understand the various key distribution and management schemes.
- 4) To understand how to deploy encryption techniques to secure data in transit across data networks
- 5) To design 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, Monoalphabetic Cipher, Playfair Cipher, Hill Cipher, Polyalphabetic 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, these 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. **9Hrs**

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, keyexchange protocols, man in the middle attack, Elgamal Cryptographic systems, Elliptic curve arithmetic, abelian groups, elliptic curves over real numbers, elliptic curves over Z_p , elliptic curves over $GF(2^m)$, 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.

9 Hrs

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, federated identity management, identity management, identity

Module 4

Wireless network security: Wireless security, Wireless network threats, Wireless network measures, mobile device security, security threats, mobile device security strategy, IEEE 802.11 Wireless LAN overview, the Wi-Fi alliance, IEEE 802 protocol architecture. Security, IEEE 802.11i services, IEEE 802.11i phases of operation, discovery phase, Authentication phase, key management phase, protected data transfer phase, the IEEE 802.11i pseudorandom function.

Web Security Considerations: Web Security Threats, Web Traffic Security Approaches.

Secure Sockets Layer : SSL Architecture, SSL Record Protocol, Change Cipher Spec Protocol, Alert Protocol, and shake Protocol, Cryptographic Computations.

Transport Layer Security: Version Number, Message Authentication Code, Pseudorandom Functions, Alert Codes, Cipher Suites, Client Certificate Types, Certificate Verify and Finished Messages, Cryptographic Computations, and Padding. **HTTPS** Connection Initiation, Connection Closure.

Secure Shell (SSH) Transport Layer Protocol, User Authentication Protocol, Connection Protocol.

9 Hrs

Module 5

Electronic Mail Security: Pretty good privacy, notation, operational; description, S/MIME, RFC 5322, Multipurpose internet mail extensions, S/MIME functionality, S/MIME messages, S/MIME certificate processing, enhanced security services, Domain keys identified mail, internet mail architecture, E-Mail threats, DKIM strategy, DKIM functional flow.

IP Security: IP Security overview, applications of IPsec, benefits of IPsec, Routing applications, IPsec documents, IPsec services, transport and tunnel modes, IP Security policy, Security associations, Security associations database, Security policy database, IP traffic processing, Encapsulating Security payload, ESP format, encryption and authentication algorithms, Padding, Anti replay service, transport and tunnel modes, combining security associations, authentication plus confidentiality, basic combinations of security associations, internet key exchange, key determinations protocol, header and payload formats, cryptographic suits.

8Hrs

Text Book:

- 1) William Stallings: Cryptography and Network Security, Pearson 6th edition.

Reference Book:

- 1) V KPachghare: Cryptography and Information Security. PHI Learning. ISBN 978-81-203-3521-9

Expected Course Outcome:

At the end of the course graduate will be able to:

1. Analyze the vulnerabilities in any computing system and hence be able to design a security solution.
2. Identify the security issues in the network and resolve it.
3. Evaluate security mechanisms using rigorous approaches, including theoretical.

Assessment Method:

CIE:

1. Three internal tests of 30 marks each will be conducted and the average of the top two test marks will be considered.
2. Assignment - 10 marks
3. Quiz test / Seminar - 10 marks

SEE:

1. SEE will be conducted for 100 marks and shall be for a duration of 3 hours
2. Two Questions will be set from each module carrying 20 Marks each.
3. Students have to answer 5 questions selecting one full question from each module.

STORAGE AREA NETWORKS

Course Code : 15SCN23

L:P:T:S : 4:0:0:0

Exam Hours : 03

Credits : 04

CIE Marks : 50

SEE Marks : 50

Course Objectives:

- 1) To understand the fundamentals of storage centric and server centric systems
- 2) To understand the metrics used for Designing storage area networks
- 3) To understand the RAID concepts
- 4) To enable the students to understand how data center's maintain the data with the concepts of backup mainly remote mirroring concepts for both simple and complex systems

Module 1

Introduction: Server Centric IT Architecture and its Limitations; Storage-Centric IT Architecture and its advantages. Case study: Replacing a server with Storage Networks The Data Storage and Data Access problem; The Battle for size and access. **9 Hrs**

Module 2

Intelligent Disk Subsystems: Architecture of Intelligent Disk Subsystems; Hard disks and Internal I/O Channels; JBOD, Storage virtualization using RAID and different RAID levels; Caching: Acceleration of Hard Disk Access; Intelligent disk Sub systems, Availability of disk subsystems. **9 Hrs**

Module 3

I/O Techniques: The Physical I/O path from the CPU to the Storage System; SCSI; FibreChannel Protocol Stack; Fibre Channel SAN; IP Storage.

Network Attached Storage: The NAS Architecture, The NAS hardware Architecture, TheNAS Software Architecture, Network connectivity, NAS as a storage system.

9 Hrs

Module 4

File System and NAS: Local File Systems; Network file Systems and file servers; Shared Diskfile systems; Comparison of fibre Channel and NAS.

Storage Virtualization: Definition of Storage virtualization; Implementation Considerations; Storage virtualization on Block or file level; Storage virtualization on various levels of the storage Network; Symmetric and Asymmetric storage virtualization in the Network. **9 Hrs**

Module 5

SAN Architecture and Hardware devices: Overview, Creating a Network for storage; SAN Hardware devices; The fibre channel switch; Host Bus Adaptors; Putting the storage in SAN, Fabric operation from a Hardware perspective.

Software Components of SAN: The switch's Operating system; Device Drivers; Supporting the switch's components; Configuration options for SANs.

8 Hrs

Text Book:

- 1) Ulf Troppens, Rainer Erkens and Wolfgang Muller: Storage Networks Explained, Wiley India, 2007

Reference Books:

- 1) Richard Barker and Paul Massiglia: Storage Area Network Essentials A Complete Guide to understanding and Implementing SANs, John Wiley India, 2002.
- 2) G. Somasundaram, Alok Shrivastava (Editors): Information Storage and Management, EMC Education Services, Wiley- India, 2009.
- 3) Robert Spalding: Storage Networks The Complete Reference, Tata McGraw-Hill, 2003.
- 4) Marc Farley: Storage Networking Fundamentals – An Introduction to Storage Devices, Subsystems, Applications, Management, and File Systems, Cisco Press, 2005.

Expected Course Outcome:

At the end of the course graduate will be able to:

- Identify the need for performance evaluation and the metrics used for it
- Apply the techniques used for data maintenance.
- Realize storage virtualization concept,
- Develop techniques for evaluating policies for LUN masking, file systems.

Assessment Method:

CIE:

1. Three internal tests of 30 marks each will be conducted and the average of the top two test marks will be considered.
2. Assignment - 10 marks
3. Quiz test / Seminar - 10 marks

SEE:

1. SEE will be conducted for 100 marks and shall be for a duration of 3 hours
2. Two Questions will be set from each module carrying 20 Marks each.
3. Students have to answer 5 questions selecting one full question from each module.

HUMAN COMPUTER INTERACTION

Course Code : 15SCN241

L:P:T:S : 4:0:0:1

Exam Hours : 03

Credits : 05

CIE Marks : 50

SEE Marks : 50

Course Objectives:

- 1) Determine the need for computers and evaluate the use of computers
- 2) identify the stages in software engineering that need to be modified for effectiveness of interacting with computers
- 3) discover the various models that can be used for designing systems
- 4) evaluate the design techniques by applying the apt statistical approach
- 5) design dialogue for representation to computers

Module 1

DESIGN PROCESS: Humans-Information process-Computer-Information Process- Differences and Similarities between them - Need for Interaction - Models - Ergonomics - Style - Context - Paradigms - Designing of Interactive systems - Usability - Paradigm shift - Interaction design basics - Design Process - Scenarios - Users need - Complexity of design. **9 Hrs**

Module 2

DESIGN AND EVALUATION OF INTERACTIVE SYSTEMS: Software Process- Usabilityengineering - Issue based Information systems - Iterative design practices - Design rules - maximum usability - Principles - Standards and guidelines - design patterns - Programming Tools - Windowing systems - Interaction tool kit - User Interface management system - Evaluation techniques - evaluation design - Evaluating implementations - Observational Methods **9 Hrs**

Module 3

MODELS: Universal design principles-Multimodal systems-User Support-Presentation andImplementation Issues - types - requirements - approaches - Cognitive model - Hierarchical model - Linguistic model - physical and device models - Socio-technical models - Communication and Collaboration models - Task models - Task analysis and design. **9 Hrs**

Module 4

EXPERIMENTAL DESIGN AND STATISTICAL ANALYSIS OF HCI: Basic Design structure- Single independent variable - multiple independent variable - factorial design - split-plot design - random errors - experimental procedure - Statistical analysis - T tests - Analysis of Variance test - Regression - Chi-Square test - Survey - Probabilistic sampling - Non-probabilistic sampling - developing survey questions. **9 Hrs**

Module 5

THEORIES: Dialogue notations and design-Dialogue need-dialogue design notations- Graphical - Textual - representing dialogue - formal descriptions - Dialogue analysis - System models - Interaction models - relationship with dialogue - Formalisms - Formal notations - Interstitial behavior - Virtual reality - Modeling rich interaction - Status Event analysis - Properties - Rich contexts - Sensor-based systems - Groupware - Applications - Ubiquitous computing - Virtual reality. **8 Hrs**

Text Books:

- 1) Alan Dix, Janet Finlay, Gregory Abowd, Russell Beale Human Computer Interaction, 3rd Edition Prentice Hall, 2004.
- 2) Jonathan Lazar Jinjuan Heidi Feng, Harry Hochheiser, Research Methods in Human-Computer Interaction, Wiley, 2010.

Reference Books:

- 1) Ben Shneiderman and Catherine Plaisant Designing the User Interface: Strategies for Effective Human-Computer Interaction (5th Edition, pp. 672, ISBN 0-321-53735-1, March 2009), Reading, MA: Addison-Wesley Publishing Co.

Expected Course Outcome:

At the end of the course graduate will be able to:

- explain why it is important to design interactive products that are usable
- define key terms used in interaction design
- explain key theories used in the design of interactive products
- explain the importance of iteration, evaluation and prototyping in interaction design

Assessment Method:

CIE:

1. Three internal tests of 30 marks each will be conducted and the average of the top two test marks will be considered.
2. Assignment - 10 marks
3. Quiz test / Seminar - 10 marks

SEE:

1. SEE will be conducted for 100 marks and shall be for a duration of 3 hours
2. Two Questions will be set from each module carrying 20 Marks each.
3. Students have to answer 5 questions selecting one full question from each module.

SERVICE ORIENTED ARCHITECTURE

Course Code : 15SCN242

L:P:T:S : 4:0:0:1

Exam Hours : 03

Credits : 05

CIE Marks : 50

SEE Marks : 50

Course Objectives:

- 1) To understand various architecture for application development
- 2) To understand the importance of SOA in Application Integration
- 3) To learn web service and SOA related tools
- 4) To Learn implementation details of SOA
- 5) To understand various case studies

Module 1

SOA BASICS: Software Architecture-Types of IT Architecture-SOA-Evolution-Keycomponents

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.

9 Hrs

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. **9 Hrs**

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. **9 Hrs**

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. **9 Hrs**

Module 5

APPLICATION INTEGRATION:JAX-WS 2.0 client side/server side development-Packagingand 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.

8Hrs

Text Book:

- 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) WaseemRoshen, "SOA-Based Enterprise Integration", Tata McGraw-HILL, 2009.

Expected Course Outcome:

After studying the course you will be able to:

- Comparison of different IT architecture
- Analysis and design of SOA based applications
- Implementation of web service and realization of SOA
- Implementation of RESTful services
- Design and implementation of SOA based Application Integration using BPEL

Assessment Method:

CIE:

1. Three internal tests of 30 marks each will be conducted and the average of the top two test marks will be considered.
2. Assignment - 10 marks
3. Quiz test / Seminar - 10 marks

SEE:

1. SEE will be conducted for 100 marks and shall be for a duration of 3 hours
2. Two Questions will be set from each module carrying 20 Marks each.
3. Students have to answer 5 questions selecting one full question from each module.

GRID COMPUTING

Course Code : 15SCN243
L:P:T:S : 4:0:0:1
Exam Hours : 03

Credits :05
CIE Marks : 50
SEE Marks : 50

Course Objectives:

- 1) To understand the genesis of grid computing
- 2) To know the application of grid computing
- 3) To understand the technology and tool kits for facilitating grid computing

Module 1

INTRODUCTION AND OVERVIEW OF GRID COMPUTING: Early Grid Activities-Current GridActivities-An Overview of Grid Business Areas-Grid Applications-Grid Infrastructure 9 Hrs

Module 2

WEB SERVICES AND RELATED TECHNOLOGIES: Service-Oriented Architecture-WebService Architecture-XML, Related Technologies, and Their Relevance to Web services-XML Messages and Enveloping-Service Message Description Mechanisms-Relationship between Web Service and Grid Service - Web Service Interoperability and the Role of the

WS-IOrganization
9 Hrs

Module 3

DISTRIBUTED OBJECT TECHNOLOGY FOR GRID COMPUTING (OGSA): Introduction to Open Grid Services Architecture(OGSA)- Commercial Data Center-National Fusion Collaboratory- The OGSA Platform Components **9 Hrs**

Module 4

OPEN GRID SERVICES INFRASTRUCTURE (OGSI): Introduction-Grid Services-A High-Level Introduction to OGSI – Introduction to Service Data Concepts – Grid Service: Naming and Change Management Recommendations. **9 Hrs**

Module 5

OGSA BASIC SERVICES AND THE GRID COMPUTING TOOLKITS: Common Management Model(CMM)-Security Architecture- GLOBUS GT3 Toolkit: Architecture-GLOBUS GT3 Toolkit: - Architecture, Programming model, High level services .
9Hrs

Text Book:

- 1) Joshy Joseph & Craig Fellenstein, "Grid Computing", Pearson/PHI PTR- 2003.
- 2) Ahmar Abbas, "Grid Computing: A Practical Guide to technology and Applications", Charles River media – 2003.

Reference Books:

1. Introduction to GRID COMPUTING by Luis Ferreira, Viktors Berstis, et al , REDBOOKS by IBM
2. Grid Computing - Towards a global Interconnected Infrastructure by Nikolaos Preve, SPRINGER
3. Grid & Cloud Computing - A business perspective on Technology & Applications by Katarina Stanoevska-Slabeva, Thomas Woznaik and Santi Ristol, Springer

Expected Course Outcome:

At the end of the course graduate will be able to:

- Design and implement Grid computing applications using Globus or similar toolkits
- Justify the applicability, or non-applicability, of Grid technologies for a specific application

Assessment Method:

CIE:

1. Three internal tests of 30 marks each will be conducted and the average of the top two test marks will be considered.
2. Assignment - 10 marks
3. Quiz test / Seminar - 10 marks

SEE:

1. SEE will be conducted for 100 marks and shall be for a duration of 3 hours
2. Two Questions will be set from each module carrying 20 Marks each.
3. Students have to answer 5 questions selecting one full question from each module.

SEMANTIC WEB**Course Code : 15SCN244****L:P:T:S : 4:0:0:1****Exam Hours : 03****Credits : 05****CIE Marks : 50****SEE Marks : 50****Course Objectives:**

- 1) To understand the concepts of Semantic Web.
- 2) To realize the characteristics of the agents.
- 3) To understand design and implementation of Agents.
- 4) To understand the implementation described in the architecture level.

Module 1

Introduction to Semantic Web: Web, Web 2.0, Syntactic Web, Web 3.0 and Semantic Web; why Semantic Web; Impact of Semantic Web; Myths about Semantic Web; Semantic Modeling. Overview of Web and XML technologies

9 Hrs**Module 2**

Resource Description Framework (RDF): Introduction to Knowledge Representation (KR) formalisms; meta-data and KR for the Web; the Layer Cake; Attribute Languages, Description Logic and Inference; RDF statements, triples and graphs; RDF/XML; RDF stores and databases; RDF parsers; inference in RDF.

9 Hrs**Module 3**

Ontologies: Introduction to Classification Theory; Vocabulary, Thesauri, Taxonomy and Ontology; types of ontologies; ontology exemplars; introduction to ontological engineering.

9Hrs

Module 4

RDF Schema and OWL: Defining hierarchies in RDFS; RDFS modeling; RDFS-Plus; Microformats, RDFa, SKOS; FOAF; Basic OWL; Class, Properties and Constraints; Individuals; XSD Data types; Class Axioms; ontology development methodology; ontology tools; SPARQL

9 Hrs

Module 5

Applications and Trends: Applications of Semantic Web; Software Agents; Semantic Search; Knowledge Management; Semantic Desktop; Semantic Web Services; semantics in Social 17 Networking; Geospatial Semantic Web; Rule Languages, RIF and business systems; RSS, MOM, EAI, SOA, EII, and ETL; the Future of the Net.

8Hrs

Text Books:

- 1) Semantic Web: Concepts, Technologies and Applications, Karin K. Breitman, Marco Antonio Casanova and Walter Truszkowski, Springer International Edition, 2007.
- 2) Semantic Web for the Working Ontologist: Effective Modeling in RDFS and OWL, Dean Allemang and James Hendler, Morgan Kaufmann Publishers, 2008 (2nd edition 2011).

Reference Books:

- 1) Semantic Web for Dummies, Jeffrey T. Pollock, John Wiley, 2009.
- 2) Ontological Engineering, Asuncion Gomez-Perez, Mariano Fernandez-Lopez and Oscar Corcho, Springer International Edition, 2004.
- 3) Semantic Web Programming, John Hebel, Matthew Fisher, Ryan Blace and Andrew Perez-Lopez, Wiley India, 2009.
- 4) Liyang Yu, "Introduction to the Semantic Web and Semantic web services" Chapman & Hall/CRC, Taylor & Francis group, 2007.
- 5) Johan Hjelm, "Creating the Semantic Web with RDF", Wiley, 2001
- 6) Grigoris Antoniou and Frank van Harmelen, "A Semantic Web Primer", MIT Press, 2012.

Expected Course Outcome:

At the end of the course graduate will be able to:

1. To apply the concepts of Semantic Web.
2. To realize the characteristics of the agents.
3. To appreciate design and implementation of Agents.
4. To value the implementation described in the architecture level.
5. To implement the ontology engineering- tools and methods.
6. To implement the Applications and trends of Semantic web.

Assessment Method:

CIE:

1. Three internal tests of 30 marks each will be conducted and the average of the top two test marks will be considered.
2. Assignment - 10 marks
3. Quiz test / Seminar - 10 marks

SEE:

1. SEE will be conducted for 100 marks and shall be for a duration of 3 hours
2. Two Questions will be set from each module carrying 20 Marks each.
3. Students have to answer 5 questions selecting one full question from each module.

MINI PROJECT II – STORAGE AREA NETWORKS

Course Code : 15SCN26

Credits : 03

L:P:T:S : 0:3:0:0

CIE Marks : 50

Exam Hours : 03

SEE Marks : 50

Students are expected to independently identify a problem related to the field of Storage Area Networks and carry out a mini project on the problem defined. Projects should be coded (or programmed) individually and independently. The code developed towards the project will be reviewed by a panel of examiners at multiple levels. Plagiarized projects will automatically get an **"F" GRADE** and the student will be liable for further disciplinary action. At the completion of a project, the student is to submit a project report and make a presentation, which will be evaluated (end semester assessment) by duly appointed examiner(s).