JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

M.Tech. (COMPUTER NETWORKS AND INFORMATION SECURITY)

COURSE STRUCTURE AND SYLLABUS

I Year – I Semester

	Course Title	Int. marks	Ext. marks	L	P	C
Core Course I	Data Structures and Algorithms	**25**	**75**	**4**	**--**	**4**
Core Course II	Computer Networking	25	75	4	--	4
Core Course III	Network Programming	25	75	4	--	4
Core Elective I	1. Database Internals 2. Software Defined Networks 3. TCP/IP Protocol Suite 4. Cloud Computing	25	75	4	--	4
Core Elective II	1. Internet of Things 2. Embedded Systems 3. Distributed Systems 4. Distributed Computing	25	75	4	--	4
Open Elective I	**Open Elective – 1**	25	75	4	--	4
Laboratory I	Network Programming Lab	25	75	--	4	2
Seminar I	Semina	50	--	--	4	2
Total Credits				**24**	**8**	**28**

I Year – II Semester

	Course Title	Int. marks	Ext. marks	L	P	C
Core Course IV	Network Security	**25**	**75**	**4**	**--**	**4**
Core Course V	Wireless Networks	**25**	**75**	**4**	**--**	**4**
Core Course VI	Network Security Standards and Applications	**25**	**75**	**4**	**--**	**4**
Core Elective III	1. Internet Technologies and Services 2. Digital Water Marking and Steganography 3. Security Threats 4. Network Management and Performance Evaluation	**25**	**75**	**4**	**--**	**4**
Core Elective IV	1. Storage Area Networks 2. Distributed Systems Security 3. Cyber Security 4. Information Systems control and Audit	**25**	**75**	**4**	**--**	**4**
Open Elective II	**Open Elective – 2**	**25**	**75**	**4**	**--**	**4**
Laboratory II	Network Security Lab	**25**	**75**	**--**	**4**	**2**
Seminar II	Semina	**50**	**--**	**--**	**4**	**2**
Total Credits			**24**	**8**	**28**	

II Year - I Semester

Course Title	Int. marks	Ext. marks	L	P	C
Comprehensive Viva-Voce	--	100	--	--	4
Project work Review I	50	--	--	24	12
Total Credits			--	24	**16**

II Year - II Semester

Course Title	Int. marks	Ext. marks	L	P	C
Project work Review II	50	--	--	8	4
Project Evaluation (Viva-Voce)	--	150	--	16	12
Total Credits			**--**	**24**	**16**

Open Electives

1. Basic Computer Programming skills are required for all open electives. Additionally, knowledge on the specified area mentioned in prerequisites is required for opting the open elective
2. Note: A student can register for any open elective subject provided that he has not already registered for the same subject

S.NO	Open Elective subject	Prerequisites
1.	"R" Programming	Maths, Statistics
2.	Android Application Development	Java
3.	Algorithmics	-------
4.	Big Data Analytics	Data Bases , Maths
5.	Bioinformatics	Data Structures
6.	Biometrics	----
7.	Computer Forensics	Maths, Data Structures
8.	Cyber Security	Internet Technologies
9.	Database Internals	---
10.	Distributed Systems Security	Information Security
11.	E-Commerce	Internet Technologies
12.	Embedded Systems	Digital logic
13.	Information Security and Audit	------
14.	Intellectual Property Rights	---
15.	Internet of Things	Java
16.	Internet Technologies and Services	Java
17.	Java Programming	---
18.	Linux Programming	---
19.	Mobile Computing	Java
20.	Mobile Application Security	Mobile Application Development
21.	OpenStack Cloud Computing	Linux Programming
22.	Operations Research	Maths, Data Structures
23.	Principles of Information Security	------
24.	Scripting Languages	---
25.	Social Media Intelligence	---
26.	Software Engineering	---
27.	Storage Area Networks	Computer Networks
28.	Web Usability	------

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

M.Tech- - I Year - I Sem. (CNIS)

DATA STRUCTURES AND ALGORITHMS

Objectives:

- The fundamental design, analysis, and implementation of basic data structures.
- Basic concepts in the specification and analysis of programs.
- Principles for good program design, especially the uses of data abstraction.
- Significance of algorithms in the computer field
- Various aspects of algorithm development
- Qualities of a good solution

UNIT I

Algorithms, Performance analysis- time complexity and space complexity, Asymptotic Notation-Big Oh, Omega and Theta notations, Complexity Analysis Examples. Data structures-Linear and non linear data structures, ADT concept, Linear List ADT, Array representation, Linked representation, Vector representation, singly linked lists -insertion, deletion, search operations, doubly linked lists-insertion, deletion operations, circular lists. Representation of single, two dimensional arrays, Sparse matrices and their representation.

UNIT II

Stack and Queue ADTs, array and linked list representations, infix to postfix conversion using stack, implementation of recursion, Circular queue-insertion and deletion, Dequeue ADT, array and linked list representations, Priority queue ADT, implementation using Heaps, Insertion into a Max Heap, Deletion from a Max Heap, java.util package-ArrayList, Linked List, Vector classes, Stacks and Queues in java.util, Iterators in java.util.

UNIT III

Searching–Linear and binary search methods, Hashing-Hash functions, Collision Resolution methods-Open Addressing, Chaining, Hashing in java.util-HashMap, HashSet, Hashtable. Sorting –Bubble sort, Insertion sort, Quick sort, Merge sort, Heap sort, Radix sort, comparison of sorting methods.

UNIT IV

Trees- Ordinary and Binary trees terminology, Properties of Binary trees, Binary tree ADT, representations, recursive and non recursive traversals, Java code for traversals, Threaded binary trees. Graphs- Graphs terminology, Graph ADT, representations, graph traversals/search methods-dfs and bfs, Java code for graph traversals, Applications of Graphs-Minimum cost spanning tree using Kruskal's algorithm, Dijkstra's algorithm for Single Source Shortest Path Problem.

UNIT V

Search trees- Binary search tree-Binary search tree ADT, insertion, deletion and searching operations, Balanced search trees, AVL trees-Definition and examples only, Red Black trees –Definition and examples only, B-Trees-definition, insertion and searching operations, Trees in java.util- TreeSet, Tree Map Classes, Tries(examples only),Comparison of Search trees. Text compression-Huffman coding and decoding, Pattern matching-KMP algorithm.

TEXT BOOKS:

1. Data structures, Algorithms and Applications in Java, S.Sahni, Universities Press.
2. Data structures and Algorithms in Java, Adam Drozdek, 3rd edition, Cengage Learning.
3. Data structures and Algorithm Analysis in Java, M.A.Weiss, 2nd edition, Addison-Wesley (Pearson Education).

REFERENCE BOOKS:

1. Java for Programmers, Deitel and Deitel, Pearson education.
2. Data structures and Algorithms in Java, R.Lafore, Pearson education.
3. Java: The Complete Reference, 8th editon, Herbert Schildt, TMH.
4. Data structures and Algorithms in Java, M.T.Goodrich, R.Tomassia, 3rd edition, Wiley India Edition.
5. Data structures and the Java Collection Frame work,W.J.Collins, Mc Graw Hill.
6. Classic Data structures in Java, T.Budd, Addison-Wesley (Pearson Education).
7. Data structures with Java, Ford and Topp, Pearson Education.
8. Data structures using Java, D.S.Malik and P.S.Nair, Cengage learning.
9. Data structures with Java, J.R.Hubbard and A.Huray, PHI Pvt. Ltd.
10. Data structures and Software Development in an Object-Oriented Domain, J.P.Tremblay and G.A.Cheston, Java edition, Pearson Education.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

M.Tech- - I Year - I Sem. (CNIS)

COMPUTER NETWORKING

Objectives:

- To introduce the high speed networks that has spurred the development of new applications.
- To identify the design issues related to the Internet protocol (IP), entire TCP/IP protocol suite and network technologies dominating the high-speed scene.

UNIT –I

What Is the Internet?, The Network Edge , The Network Core , Delay, Loss, and Throughput in Packet-Switched Networks , Protocol Layers and Their Service Models, Networks Under Attack, History of Computer Networking and the Internet.

Application Layer: Principles of Network Applications, The Web and HTTP , File Transfer: FTP,Electronic Mail in the Internet, DNS–The Internet's Directory Service, Peer-to-Peer Applications, Socket Programming: Creating Network Applications.

UNIT – II

Transport Layer: Introduction and Transport-Layer Services, Multiplexing and Demultiplexing, Connectionless Transport: UDP, Principles of Reliable Data Transfer, Connection-Oriented Transport: TCP, Principles of Congestion Control, TCP Congestion Control.

UNIT-III

The Network Layer: Introduction, Virtual Circuit and Datagram Networks, What's Inside a Router?, The Internet Protocol (IP): Forwarding and Addressing in the Internet , Routing Algorithms, Routing in the Internet, Broadcast and Multicast Routing.

UNIT – IV

The Link Layer: Links, Access Networks, and LANs, Introduction to the Link Layer, Error-Detection and -Correction Techniques, Multiple Access Links and Protocols, Switched Local Area Networks, Link Virtualization: A Network as a Link Layer, Data Center Networking, Retrospective: A Day in the Life of a Web Page Request.

UNIT – V

Wireless and Mobile Networks: Introduction, Wireless Links and Network Characteristics, WiFi: 802.11 Wireless LANs, Cellular Internet Access, Mobility Management: Principles, Mobile IP, Managing Mobility in Cellular Networks, Wireless and Mobility: Impact on Higher-Layer Protocols.

TEXT BOOKS:

1. Computer Networking: A Top-Down Approach, 5/e, James F. Kurose and Keith W. Ross, Pearson Education, 2012.
2. Data Communications and Networking, *Behrouz A. Forouzan*, Fourth Edition, Tata McGraw Hill
3. High Speed Networks and Internets – Performance and Quality of Service, *William Stallings,* Second Edition, Pearson Education.
4. Top-Down Network Design, *Priscilla Oppenheimer,* Second Edition, Pearson Education (CISCO Press)

REFERENCE BOOKS:

1. Computer Networks by Mayank Dave, Cengage.
2. Guide to Networking Essentials, *Greg Tomsho, Ed Tittel, David Johnson,* Fifth Edition, Thomson.
3. Computer Networks, *Andrew S. Tanenbaum*, Fourth Edition, Prentice Hall.
4. An Engineering Approach to Computer Networking*, S.Keshav,* Pearson Education.
5. Campus Network Design Fundamentals, *Diane Teare, Catherine Paquet,* Pearson Education (CISCO Press)
6. Computer Communications Networks, Mir, Pearson Education.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

M.Tech- - I Year - I Sem. (CNIS)

NETWORK PROGRAMMING

Objectives:

- To understand to Linux utilities
- To understand file handling, signals
- To understand IPC, network programming in Java
- To understand processes to communicate with each other across a Computer Network.

Unit-I

Introduction to Network Programming: OSI model, Unix standards, TCP and UDP & TCP connection establishment and Format, Buffer sizes and limitation, standard internet services, Protocol usage by common internet application.

Sockets : Address structures, value – result arguments, Byte ordering and manipulation function and related functions Elementary TCP sockets – Socket, connect, bind, listen, accept, fork and exec function, concurrent servers. Close function and related function.

Unit-II

TCP client server: Introduction, TCP Echo server functions, Normal startup, terminate and signal handling server process termination, Crashing and Rebooting of server host shutdown of server host.

Elementary UDP sockets: Introduction UDP Echo server function, lost datagram, summary of UDP example, Lack of flow control with UDP, determining outgoing interface with UDP.

I/O Multiplexing: I/O Models, select function, Batch input, shutdown function, poll function, TCP Echo server,

Unit-III

socket options: getsockopt and setsockopt functions. Socket states, Generic socket option IPV6 socket option ICMPV6 socket option IPV6 socket option and TCP socket options.

Advanced I/O Functions: Introduction, Socket Timeouts, recv and send Functions, readv and writev Functions, recvmsg and sendmsg Functions, Ancillary Data, How Much Data Is Queued? Sockets and Standard I/O, T/TCP: TCP for Transactions

Unit-IV

Elementary name and Address conversions: DNS, gethost by Name function, Resolver option, Function and IPV6 support, uname function, other networking information.

Daemon Processes and inetd **Superserver –** Introduction, syslogd Daemon, syslog Function, daemon_init Function, inetd Daemon, daemon_inetd Function

Broadcasting- Introduction, Broadcast Addresses, Unicast versus Broadcast, dg_cli Function Using Broadcasting, Race Conditions

Multicasting- Introduction, Multicast Addresses, Multicasting versus Broadcasting on A LAN, Multicasting on a WAN, Multicast Socket Options, mcast_join and Related Functions, dg_cli Function Using Multicasting, Receiving MBone Session Announcements, Sending and Receiving, SNTP: Simple Network Time Protocol, SNTP (Continued)

Unit-V

Raw Sockets-Introduction, Raw Socket Creation, Raw Socket Output, Raw Socket Input, Ping Program, Traceroute Program, An ICMP Message Daemon,

Datalink Access- *Introduction, BPF: BSD Packet Filter, DLPI: Data Link Provider Interface, Linux: SOCK_PACKET, libpcap: Packet Capture Library, Examining the UDP Checksum Field*

Remote Login: *Terminal line disciplines, Pseudo-Terminals, Terminal modes, Control Terminals, rlogin Overview, RPC Transparency Issues.*

Text Books:

1. UNIX Network Programming, by W. Richard Stevens, Bill Fenner, Andrew M. Rudoff, Pearson Education
2. UNIX Network Programming, 1st Edition, - W.Richard Stevens. PHI.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

M.Tech- - I Year - I Sem. (CNIS) (Core Elective-I)

DATABASE INTERNALS

Objectives:
By the end of the course, you will know:

- History and Structure of databases
- How to design a database
- How to convert the design into the appropriate tables
- Handling Keys appropriately
- Enforcing Integrity Constraints to keep the database consistent
- Normalizing the tables to eliminate redundancies
- Querying relational data
- and processing the queries
- Storage Optimizing Strategies for easy retrieval of data through index
- Triggers, Procedures and Cursors ,Transaction Management
- Distributed databases management system concepts and Implementation

UNIT I
Database System Applications, Purpose of Database Systems, View of Data – Data Abstraction, Instances and Schemas, Data Models – the ER Model, Relational Model, Other Models – Database Languages – DDL,DML, Database Access from Applications Programs, Transaction Management, Data Storage and Querying, Database Architecture, Database Users and Administrators, ER diagrams,. Relational Model: Introduction to the Relational Model – Integrity Constraints Over Relations, Enforcing Integrity constraints, Querying relational data, Logical data base Design, Introduction to Views –Altering Tables and Views, Relational Algebra, Basic SQL Queries, Nested Queries, Complex Integrity Constraints in SQL, Triggers

UNIT II
Introduction to Schema Refinement – Problems Caused by redundancy, Decompositions – Problem related to decomposition, Functional Dependencies - Reasoning about FDS, Normal Forms – FIRST, SECOND, THIRD Normal forms – BCNF –Properties of Decompositions- Loss less- join Decomposition, Dependency preserving Decomposition, Schema Refinement in Data base Design – Multi valued Dependencies – FOURTH Normal Form, Join Dependencies, FIFTH Normal form.

UNIT III
Transaction Management: The ACID Properties, Transactions and Schedules, Concurrent Execution of Transactions – Lock Based Concurrency Control, Deadlocks – Performance of Locking – Transaction Support in SQL.
Concurrency Control: Serializability, and recoverability – Introduction to Lock Management – Lock Conversions, Dealing with Deadlocks, Specialized Locking Techniques – Concurrency Control without Locking.
Crash recovery: Introduction to Crash recovery, Introduction to ARIES, the Log, and Other Recovery related Structures, the Write-Ahead Log Protocol, Check pointing, recovering from a System Crash, Media recovery

UNIT IV
Overview of Storage and Indexing: Data on External Storage, File Organization and Indexing – Clustered Indexes, Primary and Secondary Indexes, Index data Structures – Hash Based Indexing, Tree based Indexing
Storing data: Disks and Files: -The Memory Hierarchy – Redundant Arrays of Independent Disks.
Tree Structured Indexing: Intuitions for tree Indexes, Indexed Sequential Access Methods (ISAM)
B+ Trees: A Dynamic Index Structure, Search, Insert, Delete.
Hash Based Indexing: Static Hashing, Extendable hashing, Linear Hashing, Extendable Vs Linear Hashing.

UNIT V
Distributed databases: Introduction to distributed databases, Distributed DBMS architectures, Storing data in a distributed DBMS, Distributed catalog management, Distributed query processing Updating distributed data, Distributed transactions, Distributed concurrency control, Distributed recovery

TEXT BOOKS:

1. Data base Management Systems, Raghu Ramakrishnan, Johannes Gehrke, TMH, 3rd Edition, 2003.
2. Data base System Concepts, A.Silberschatz, H.F. Korth, S.Sudarshan, McGraw hill, VI edition, 2006.
3. Fundamentals of Database Systems 5th edition, Ramez Elmasri, Shamkant B.Navathe, Pearson Education, 2008.

REFERENCE BOOKS:

1. Introduction to Database Systems, C.J.Date, Pearson Education.
2. Database Management System Oracle SQL and PL/SQL, P.K.Das Gupta, PHI.
3. Database System Concepts, Peter Rob & Carlos Coronel, Cengage Learning, 2008.
4. Database Systems, A Practical approach to Design Implementation and Management Fourth edition, Thomas Connolly, Carolyn Begg, Pearson education.
5. Database-Principles, Programming, and Performance, P.O'Neil & E.O'Neil, 2nd ed, ELSEVIER
6. Fundamentals of Relational Database Management Systems, S.Sumathi, S.Esakkirajan, Springer.
7. Introduction to Database Management, M.L.Gillenson and others, Wiley Student Edition.
8. Database Development and Management, Lee Chao, Auerbach publications, Taylor & Francis Group.
9. Distributed Databases Principles & Systems, Stefano Ceri, Giuseppe Pelagatti, TMH.
10. Principles of Distributed Database Systems, M. Tamer Ozsu, Patrick Valduriez , Pearson Education, 2nd Edition.
11. Distributed Database Systems, Chhanda Ray, Pearson.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

M.Tech- - I Year - I Sem. (CNIS) (Core Elective-I)

SOFTWARE DEFINED NETWORKS

Objectives:

- This course provides a comprehensive introduction to Software Defined Networking (SDN) and presents SDN in context with more familiar network services and challenges
- It also offers a unique perspective of the business case and technology motivations for considering SDN solutions.
- It Identifies the impact of SDN on traffic management and the potential for network service growth
- Instills the knowledge needed to manage current and future demand and provisioning for SDN
- It provides students with the basic concepts and explains the importance of virtualization, particularly the impact of virtualization on servers and networks
- It also introduces students with the impact on service providers, legacy networks, and network vendors.

UNIT I

Introduction to Software Defined Networking: Virtualization, Virtual Memory, Virtual Memory Operation, Virtual and Physical Memory Mapping, Server Virtualization , Storage Virtualization, Software Defined Networking ,Network Limitations, Network Control Plane.

UNIT II

SDN Implementation: Introduction, SDN Implementation, SDN Design, Separation of the Control and Data Planes,Edge-Oriented Networking,SDN Operation, Service Providers and SDN

UNIT III

Openflow Introduction, Overview of the OpenFlow Switch Specification, OpenFlow Ports, OpenFlow Packet-Processing Pipeline, OpenFlow Channel, Message Handling, OpenFlow Channel Connections, Controller Modes, Auxiliary Connection Use for Performance and Reliability, Flow Table Synchronization, Bundle Messages, OpenFlow Configuration-and-Management Protocol, Remote Configuration and The OpenFlow Conformance Testing Program

UNIT IV

SDN Controllers,Network Programmability, The Management Interface ,The Application-Network Divide Modern Programmatic Interfaces,Virtualization and Data Plane I/O,Services Engineered Path, Service Locations and Chaining.

UNIT V

SDN Evolution Introduction, SDN and Enterprise Networks, SDN and Transport Networks, SDN and Optical Transport Networks, Increasing WAN Utilization with SDN,SDN Scalability Issues, Controller Designs for Scalability, Potential SDN Scalability Issues, Network Types, SDN Management, Load Adaptation, Google and SDN, Google's G-Scale Network, Google's G-Scale Network Hardware, Google SDN Deployment, Implementation Challenges

TEXT BOOKS:

1. Software Defined Networking: Design and Deployment, 1st Edition Patricia A. Morrealeand James M. Anderson, CRC press.
2. SDN: Software Defined Networks, Thomas D. Nadeau and Ken Gray, Orielly media

REFERENCE BOOKS:

1. Software Defined Networking with OpenFlow by Siamak Azodolmolky wiley Publications
2. Software Defined Networks: A Comprehensive Approach by Paul Goransson , Chuck BlackPublisher Morgan Kaufmann

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

M.Tech- - I Year - I Sem. (CNIS) (Core Elective-I)

TCP/IP PROTOCOL SUITE

Objectives:

- To Describe how the TCP/IP protocol suite works
- To Describe the functions of static and dynamic IP addresses
- To Explain the major functions of networks with the OSI seven-layer model
- To Describe the major functions of networks with the TCP/IP model

UNIT - I

Introduction to TCP/IP, The OSI Model and TCP/IP Protocol Suites, Underlying Technologies; IP Addressing, Sub netting and Super netting, CIDR, Delivery and Routing of IP Packets

UNIT - II

Internet Protocol (IP), ARP and RARP, Internet Control Message Protocol (ICMP), Internet Group Management Protocol (IGMP)

UNIT - III

User Datagram Protocol (UDP), Transmission Control Protocol (TCP) ; Routing Protocols (RIP, OSPF, HELLO and BGP)

UNIT - IV

Application Layer and Client-Server Model, BOOTP and DHCP; Domain Name System (DNS), Telnet and Rlogin

UNIT - V

File Transfer Protocol (FTP), Trivial File Transfer Protocol (SMTP), Simple Network Management Protocol (SNMP), Hyper Text Transfer Protocol (HTTP)

TEXT BOOKS:

1. “Internetworking with TCP/IP, Principles, Protocols and Architectures”, Vol. I, Douglas E.Comer, Fourth Edition, PHI.
2. “TCP/IP Protocol Suite”, Forouzan BA, TMH (2000)

REFERENCE BOOK:

TCP/IP Unleashed, Pearson Education.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

M.Tech- - I Year - I Sem. (CNIS) (Core Elective-I)

CLOUD COMPUTING

Objectives:

To learn the new computing model which enables shared resources on demand over the network.
To learn about the pay-per-use scenarios.
To learn about the new kind of service models and deployment models.
To learn about the virtualization technology.
To learn the python programming or various services and models.

UNIT-I

Principles of Parallel and Distributed Computing, Introduction to cloud computing, Cloud computing Architecture, cloud concepts and technologies, cloud services and platforms, Cloud models, cloud as a service, cloud solutions, cloud offerings, introduction to Hadoop and MapReduce.

UNIT –II

Cloud Platforms for Industry, Healthcare and education, Cloud Platforms in the Industry, cloud applications.
Virtualization, cloud virtualization technology, deep dive: cloud virtualization,
Migrating in to cloud computing, Virtual Machines Provisioning and Virtual Machine Migration Services, On the Management of Virtual Machines for cloud Infrastructure, Comet cloud, T-Systems,

UNIT-III

Cloud computing Applications: Industry, Health, Education, Scientific Applications, Business and Consumer Applications, Understanding Scientific Applications for Cloud Environments, Impact of Cloud computing on the role of corporate IT.
Enterprise cloud computing Paradigm, Federated cloud computing Architecture, SLA Management in Cloud Computing, Developing the cloud: cloud application Design.

UNIT-IV

Python Basics, Python for cloud, cloud application development in python, Cloud Application Development in Python.
Programming Google App Engine with Python: A first real cloud Application, Managing Data in the cloud, Google app engine Services for Login Authentication, Optimizing UI and Logic, Making the UI Pretty: Templates and CSS, Getting Interactive. Map Reduce Programming Model and Implementations.

UNIT-V

Cloud management, Organizational Readiness and change management in the cloud age ,Cloud Security ,Data security in the cloud, Legal Issues in the Cloud , Achieving Production Readiness for the cloud Services

TEXT BOOKS:

1. Cloud Computing : Raj Kumar Buyya , James Broberg, andrzej Goscinski, 2013 Wiley
2. Mastering Cloud Computing: Raj Kumar buyya, Christian Vecchiola,selvi-2013.
3. Cloud Computing: Arshdeep Bahga, Vijay Madisetti, 2014, University Press.
4. Cloud computing: Dr Kumar Saurab Wiley India 2011.

REFERENCES:

1. Code in the Cloud: Mark C.Chu-Carroll 2011, SPD.(Second part of IV UNIT)
2. Essentials of cloud computing : K Chandrasekharan CRC Press.
3. Cloud Computing: John W. Rittinghouse, James Ransome, CRC Press.
4. Cloud Security and Privacy: Mather, Kumaraswamy and Latif.2011. SPD, OREILLY.
5. Virtualization Security: Dave shackleford 2013. SYBEX a wiley Brand.
6. Cloud Computing Bible: Sosinsky 2012. Wiley India .
7. Cloud Computing: Dan C. Marinescu-2013, Morgan Kaufmann.
8. Distributed and Cloud Computing, Kai Hwang, Geoffery C.Fox, Jack J.Dongarra, Elsevier, 2012.
9. Fundamentals of Python Kenneth A.Lambert | B.L.Juneja

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

M.Tech- - I Year - I Sem. (CNIS) (Core Elective-II)

INTERNET OF THINGS

Objectives:

To introduce the terminology, technology and its applications
To introduce the concept of M2M (machine to machine) with necessary protocols
To introduce the Python Scripting Language which is used in many IoT devices
To introduce the Raspberry PI platform, that is widely used in IoT applications
To introduce the implementation of web based services on IoT devices

Unit I

Introduction to Internet of Things –Definition and Characteristics of IoT,
Physical Design of IoT – IoT Protocols, IoT communication models, Iot Communication APIs
IoT enabaled Technologies – Wireless Sensor Networks, Cloud Computing, Big data analytics, Communication protocols, Embedded Systems, IoT Levels and Templates
Domain Specific IoTs – Home, City, Environment, Energy, Retail, Logistics, Agriculture, Industry, health and Lifestyle

Unit II

IoT and M2M – Software defined networks, network function virtualization, difference between SDN and NFV for IoT
Basics of IoT System Management with NETCOZF, YANG- NETCONF, YANG, SNMP NETOPEER

Unit III

Introduction to Python - Language features of Python, Data types, data structures, Control of flow, functions, modules, packaging, file handling, data/time operations, classes, Exception handling
Python packages - JSON, XML, HTTPLib, URLLib, SMTPLib

Unit IV

IoT Physical Devices and Endpoints - Introduction to Raspberry PI-Interfaces (serial, SPI, I2C)
Programming – Python program with Raspberry PI with focus of interfacing external gadgets, controlling output, reading input from pins.

Unit V

IoT Physical Servers and Cloud Offerings – Introduction to Cloud Storage models and communication APIs
Webserver – Web server for IoT, Cloud for IoT, Python web application framework
Designing a RESTful web API

Text Book:

1. Internet of Things - A Hands-on Approach, Arshdeep Bahga and Vijay Madisetti, Universities Press, 2015, ISBN: 9788173719547
2. Getting Started with Raspberry Pi, Matt Richardson & Shawn Wallace, O'Reilly (SPD), 2014, ISBN: 9789350239759

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

M.Tech- - I Year - I Sem. (CNIS) (Core Elective-II)

EMBEDDED SYSTEMS

Objectives:

- To explain various embedded system applications and design requirements.
- To construct embedded system hardware.
- To develop software programs to control embedded system.
- To generate product specification for embedded system.

UNIT I

Introduction to Embedded Systems: Embedded Systems, Processor Embedded into a System, Embedded Hardware Units and Devices in a System, Embedded Software, Complex System Design, Design Process in Embedded System, Formalization of System Design, Classification of Embedded Systems

UNIT II

8051 and Advanced Processor Architecture: 8051 Architecture, 8051 Micro controller Hardware, Input/output Ports and Circuits, External Memory, Counter and Timers, Serial data Input/output, Interrupts, Introduction to Advanced Architectures, Real World Interfacing, Processor and Memory organization - **Devices and Communication Buses for Devices Network:** Serial and parallel Devices & ports, Wireless Devices, Timer and Counting Devices, Watchdog Timer, Real Time Clock, Networked Embedded Systems, Internet Enabled Systems, Wireless and Mobile System protocols

UNIT III

Embedded Programming Concepts: Software programming in Assembly language and High Level Language, Data types, Structures, Modifiers, Loops and Pointers, Macros and Functions, object oriented Programming, Embedded Programming in C++ & JAVA

UNIT IV

Real – Time Operating Systems: OS Services, Process and Memory Management, Real – Time Operating Systems, Basic Design Using an RTOS, Task Scheduling Models, Interrupt Latency, Response of Task as Performance Metrics - **RTOS Programming:** Basic functions and Types of RTOSES, RTOS VxWorks, Windows CE

UNIT V

Embedded Software Development Process and Tools: Introduction to Embedded Software Development Process and Tools, Host and Target Machines, Linking and Locating Software, Getting Embedded Software into the Target System, Issues in Hardware-Software Design and Co-Design - **Testing, Simulation and Debugging Techniques and Tools:** Testing on Host Machine, Simulators, Laboratory Tools

TEXT BOOK:

1. Embedded Systems, Raj Kamal, Second Edition TMH.

REFERENCE BOOKS:

1. Embedded/Real-Time Systems, Dr.K.V.K.K.Prasad, dreamTech press
2. The 8051 Microcontroller and Embedded Systems, Muhammad Ali Mazidi, Pearson.
3. The 8051 Microcontroller, Third Edition, Kenneth J.Ayala, Thomson.
4. An Embedded Software Primer, David E. Simon, Pearson Education.
5. Micro Controllers, Ajay V Deshmukhi, TMH.
6. Microcontrollers, Raj kamal, Pearson Education.
7. Introduction to Embedded Systems,Shibu K.V,TMH.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

M.Tech- - I Year - I Sem. (CNIS) (Core Elective-II)

DISTRIBUTED SYSTEMS

Objectives:

- To explain what a distributed system is, why you would design a system as a distributed system, and what the desired properties of such systems are;
- To list the principles underlying the functioning of distributed systems, describe the problems and challenges associated with these principles, and evaluate the effectiveness and shortcomings of their solutions;
- To recognize how the principles are applied in contemporary distributed systems, explain how they affect the software design, and be able to identify features and design decisions that may cause problems;
- To design a distributed system that fulfills requirements with regards to key distributed systems properties (such as scalability, transparency, etc.), be able to recognize when this is not possible, and explain why;
- To build distributed system software using basic OS mechanisms as well as higher-level middleware and languages.

Unit-I

Characterization of Distributed Systems. Design Issues, User Requirement, Network Technologies and Protocols, IPC, Client-Server Communication, Group Communication, IPC in UNIX.
Remote Procedure Calling, Design issues, Implementation, Asynchronous RPC

Unit-II

Distributed OS, Its kernel, Processes and Threads, Naming and Protection, Communication and Invocation, Virtual Memory, File Service components, Design issues, Interfaces, implementation techniques, SUN network file systems

Unit-III

SNS – a name service model, its design issues, Synchronizing physical clocks, Logical time and logical clocks, Distributed coordination. Replication and its architectural model, Consistency and request ordering, Conversation between a client and a server, Transactions, Nested Transactions.

Unit-IV

Concurrency control Locks, Optimistic concurrency control, Timestamp ordering, Comparison of methods for concurrency control.
Distributed Transactions and Nested Transactions, Atomic commit protocols, Concurrency control in distributed transactions, distributed Deadlocks, Transactions with replicated data, Transaction recovery, Fault tolerance, Hierarchical and group masking of faults.

Unit-V

Cryptography, Authentication and key distribution, Logics of Authentication, Digital signatures.
Distributed shared memory, Design and Implementation issues, Sequential consistency and ivy, Release consistency and Munin, Overview of Distributed Operating systems Mach, Chorus.

TEXT BOOK:

1. G Coulouris, J Dollimore and T Kindberg - Distributed Systems Concepts and Design, Third Edition, Pearson Education.

REFERENCE BOOKS:

1. M Singhal, N G Shivarathri - Advanced Concepts in Operating Systems, Tata McGraw Hill Edition.
2. A.S. Tanenbaum and M.V. Steen - Distributed Systems – Principles and Paradigms, Pearson education.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

M.Tech- - I Year - I Sem. (CNIS) (Core Elective-II)

DISTRIBUTED COMPUTING

Objectives:

- Foundation of cooperative distributed systems engineering
- Supporting technologies with a special attention to agent-oriented paradigm
- Service-oriented computing and grid computing
- The implementation component includes a term-project

UNIT I

Introduction

The different forms of computing, The strengths and weaknesses of Distributed computing, Operating system concepts relevant to distributed computing, the architecture of distributed applications. Paradigms for Distributed Applications, choosing a Paradigm for an application (trade-offs).

UNIT II

Cluster Computing

Parallel computing overview, cluster computing – Introduction, Cluster Architecture, parallel programming models and Paradigms, Applications of Clusters.

UNIT III

Grid Computing

Introduction, Grid Computing Anatomy – Architecture, Architecture and relationship to other Distributed Technologies, Grid computing road map. Merging the Grid services Architecture with the Web Services Architecture.

UNIT IV

Open Grid Service Architecture – Introduction, Architecture and Goal, Sample Use cases: Commercial Data Center, National Fusion Collaboratory, Online Media and Entertainment. OGSA platform Components, Open Grid Services Infrastructure.

UNIT V

Globus GT 3 Toolkit – Architecture, Programming Model, A sample implementation, High Level services, OGSI.NET Middleware Solutions.

TEXT BOOKS:

1. Grid Computing, Joshy Joseph & Craig Fellenstein, Pearson education, 2004
2. Distributed Computing, Principles and Applications, M.L.Liu, Pearson Education, 2004
3. High Performance Cluster Computing, Rajkumar Buyya, Pearson education.

REFERENCE BOOKS:

1. Grid Computing – Making the global infrastructure a reality, Fran Berman, Geoffrey C Fox, Anthony J G Hey, Wiley India, 2010.
2. A Networking Approach to Grid Computing, D.Minoli, Wiley & sons, 2006.
3. Grid Computing: A Practical Guide to Technology and Applications, A.Abbas, Firewall Media, 2008.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

M.Tech- - I Year - I Sem. (CNIS)

NETWORK PROGRAMMING LAB

Objectives:

- To gain hands-on experiences in installing and administering computer systems and networks, in particular, the UNIX version.
- To implement networking and Internet protocols via programming and TCP/IP protocol architecture; user datagram protocol.
- TO implement shell script that accepts a list of files.

LIST OF SAMPLE PROBLEMS/EXPERIMENTS:

1. Write a shell script that accepts a file name, starting and ending line numbers as arguments and displays all the lines between the given line numbers.
2. Write a shell script that deletes all lines containing a specified word in one or more files supplied as arguments to it.
3. Write a shell script that displays a list of all the files in the current directory to which the user has read, write and execute permissions.
4. Write a shell script that receives any number of file names as arguments checks if every argument supplied is a file or a directory and reports accordingly. Whenever the argument is a file, the number of lines on it is also reported.
5. Write a shell script that accepts a list of file names as its arguments, counts and reports the occurrence of each word that is present in the first argument file on other argument files.
6. Write a shell script that accepts any number of arguments and prints them in the reverse order.
7. Write a shell script that determines the period for which a specified user is working on the system.
8. Write a shell script to list all of the directory files in a directory.
9. Write an interactive file-handling shell program- Let it offer the user the choice of copying, removing or linking files. Once the user has made a choice, have the program ask him for the necessary information such as the file name, new name and so on.
10. Write a shell script to find factorial of a given integer.
11. Write a shell script to find the G.C.D. of two integers.
12. Write a shell script to generate a multiplication table.
13. Write a shell script that copies multiple files to a directory.
14. Write a shell script that counts the number of lines and words present in a given file. *15. Write a shell script that displays the list of all files in the given directory.
15. Write a shell script (small calculator) that adds, subtracts, multiplies and divides the given two integers. There are two division options: one returns the quotient and the other returns reminder. The script requires 3 arguments: The operation to be used and two integer numbers. The options are add (-a), subtract (-s), multiply (-m), quotient (-c) and reminder (-r).
16. Write a shell script to reverse the rows and columns of a matrix.
17. Write a sed command that deletes the first character in each line in a file.
18. Write sed command that deletes the character before the last character in each line a file.
19. Write a sed command that swaps the first and second words in each line of a file.
20. Write an awk script that reads a file of which each line has 5 fields – ID, NAME, MARKS1, MARKS2, MARKS3 and finds out the average for each student. Print out the average marks with appropriate messages.
21. Write an awk script to find the factorial of a user supplied number.
22. ls –l command produces long listing of files.
23. Write an awk script 1) to print the selected fields (Ex: size and name of the files) from the file listing. 2) to print the size of all files and number of files.
24. Write an awk script to count the number of lines in a file that do not contain vowels.
25. Write an awk script to find the number of characters, words and lines in a file.
26. Write a c program that makes a copy of a file using
    a. Standard I/O b. System calls.
27. Write a C program that counts the number of blanks in a text file

a. Using standard I/O b. Using system calls

28. Implement in C the following UNIX commands using system calls

a. cat b. ls c. mv

29. Write a program that takes one or more file/directory names as command line input and reports the following information on the file.
    a. File type.
    b. Number of links.
    c. Time of last access.
    d. Read, Write and Execute permissions.
30. Write a c program to emulate the UNIX ls –l command.
31. Write a c program that creates a directory, puts a file into it, and then removes it.
32. Write a c program that searches for a file in a directory and reports whether the file is present in the directory or not.

33. Write a c program to list for every file in a directory, its inode number and file name.

34. Write a c program that creates a file containing hole which is occupying some space but having nothing.

35. Write a c program that demonstrates redirection of standard output to a file.

Ex: ls > f1.

36. Write a c program to create a child process and allow the parent to display "parent" and the child to display "child" on the screen.

37. Write a c program to create a Zombie process.

38. Write a c program that illustrates how an orphan is created.

39. Write a c program that creates a child process to execute a command. The command to be executed is passed on the command line.

40. Write a c program that accepts two small numbers as arguments and then sums the two numbers in a child process. The sum should be returned by child to the parent as its exit status and the parent should print the sum.

41. Write a c program that illustrates how to execute two commands concurrently with a command pipe. Ex:- ls –l | sort

42. Write c programs that illustrate communication between two unrelated processes using named pipe.

43. Write a c program in which a parent writes a message to a pipe and the child reads the message.

44. Write a c program that illustrates suspending and resuming processes using signals.

45. Write a c program that displays the real time of a day every 60 seconds, 10 times.

46. Write a c program that runs a command that is input by the user and prints the exit status if the command completes in 5 seconds. If it doesn't, then the parent uses kill to send a SIGTERM signal to kill the child process.

47. Write a C program that illustrates file-locking using semaphores.

48. Write a C program that implements a producer-consumer system with two processes. (Using semaphores).
49. Write client and server programs (using C) for
    a. Interaction between server and client processes using Unix Domain Sockets.
    b. Interaction between server and client processes using Internet Domain Sockets.
50. Write a C program (sender.c)

a. To create a message queue with read and write permissions.
b. To write 3 messages to it with different priority numbers.

51. Write a C program (receiver.c) that receives the messages (from the above message queue as specified in 63.a) and displays them.
52. Write C program that illustrates two processes communicating via shared memory.
53. Design TCP iterative Client and server application to reverse the given input sentence
54. Design TCP iterative Client and server application to reverse the given input sentence
55. Design TCP client and server application to transfer file
56. Design a TCP concurrent server to convert a given text into upper case using multiplexing system call "select"
57. Design a TCP concurrent server to echo given set of sentences using poll functions
58. Design UDP Client and server application to reverse the given input sentence
59. Design UDP Client server to transfer a file
60. Design using poll client server application to multiplex TCP and UDP requests for converting a given text into upper case.
61. Design a RPC application to add and subtract a given pair of integers

TEXT BOOKS:

1. Advance Unix Programming Richard Stevens, Second Edition Pearson Education
2. Advance UNIX Programming, N.B. Venkateswarlu, BS Publication.
3. UNIX and Shell programming, B.A.Forouzan and R.F.Gilberg, Thomson.
4. UNIX and Shell Programming, M.G. Venkatesh Murthy, Pearson Education.
5. UNIX Shells by Example, 4th Edition, Elllie Quigley, Pearson Education.