SWAMI RAMANAND TEERTH

MARATHWADA UNIVERSITY, NANDED - 431 606

(Structure and Syllabus of Two Years PG Degree Program with Multiple Entry and Exit Option)

TWO YEAR MASTERS PROGRAMME IN SCIENCE

Subject System Administration and Networking

Under the Faculty of

Science and Technology

Effective from Academic year 2023 – 2024

(As per NEP-2020)

Swami Ramanand Teerth Marathwada University

Nanded

Affiliated Colleges

Faculty of Science and Technology

NEP-2020 Oriented Structure of Post Graduate Programs

(as per Govt of Maharashtra GR dated 16-05-2023)

M.Sc. System Administration and Networking (2 years full time PG Programs)

Introduced from Academic Year 2023-2024

Swami Ramanand Teerth Marathwada University, Nanded

Faculty of Science and Technology

NEP-2020 oriented Structure of Two years Post Graduate Program

Subject: M.Sc. System Administration and Networking

(2 years full time PG Programs in Affiliated Colleges)

Introduced from Academic Year 2023-2024 **(as per Govt of Maha GR dated 16-05-2023)**

Program Year and Sem	Level	Semester		Faculty			Other courses			Total Sem. credits	Cumu. Credits
First year common for all PG programs in the School			Major / Mandatory /		Electives/		RM	OJT/FP/	RP		
			Theory	Practical	Theory	Practical					
			(04 credits)	(01credits)	(04 credits) (03+01)		(03credits)	(03 Credits)	(04 Credits)		
			SCMP		SCMP						
M.Sc. SAN		First Semester	SSANC-401 SSANC-402 SSANC-403	SSANCP-401 SSANCP-402 SSANCP-403	SSANE-401	---------	SVECR-401 Research Methodology Compulsory	---------	---------	22	22
M.Sc. SAN	6.0	Second Semester	SSANC-451 SSANC-452 SSANC-453	SSANCP-451 SSANCP-452 SSANCP-453	SSANE -451	---------	---------	SCMPOJ-451	----------	22	44
PG Diploma			24credits + 06 Credits		06 credits +02 Credits		03credits	03credits	----------	**44 credits**	
Exit Option: After completion of First year as above with 44 credits, student will be awarded PG Diploma in System Administration and Networking ****** ****(for students who have done 03 years UG program)** ****(available from AY 2024-2025)**											

1. Abbreviations : **S- Science, SAN- SYSTEM ADMINISTRATION AND NETWORKING, D**iscipline **S**pecific **C**ore course (C- Core Course)
2. Abbreviations : **SSANE- D**iscipline supportive **E**lective **C**ourse   (E- Elective Course)
3. Abbreviations : SVECR: Research Methodology course
4. Abbreviations : SCMPOJ : On Job Training , Internship/ Apprenticeship or Field Project
5. Abbreviations : SCMPR : Research Project

Syllabus First Semester

Core Courses Code	Title	Remarks Credits
SSANC-401	Information Technology	04
SSANC-402	Computer Network	04
SSANC-403	Fundamental of Linux	04
SSANCP-401	Lab 1: Information Technology	01
SSANCP-402	Lab 2: Computer Network	01
SSANCP-403	Lab 3: Linux	01
SSANE-401	**Chose any one** A. Internetworking Protocols using TCP/IP B. Cisco Certified Entry Networking Technician C. Introduction to AI and ML	03 Theory and 01 Lab
SVECR-401	Research Methodology	03

Syllabus Second Semester

Core Courses Code	Title	Remarks Credits
SSANC-451	Operating System Concepts	04
SSANC-452	Network Administration (Routing)	04
SSANC-453	Linux Administration	04
SSANCP-451	Lab 4: Operating System	01
SSANCP-452	Lab 5: Network Administration	01
SSANCP-453	Lab 6: Linux Administration and Office Automation	01
SSANE-451	Chose any one A. Introduction to Office Automation B. Ad hoc Sensor Network C. VLSI Design	03 Theory and 01 Lab
SDSCOJ-451	On Job Training , Internship/ Apprenticeship or Field Project	03

Note $^{\$\$}$: Contents of the common courses in campus and affiliated colleges shall be different

M. Sc. SAN First Year, Semester I and II *(Level 6.0) : Teaching Scheme*

	Course Code	Course Name	Credits Assigned per course			Teaching Scheme (Hrs/ week) per course	
			Theory	Practical	Total	Theory	Practical
Major	SSANC-401 to SSANC-403 and SSANC-451 to SSANC-453	All Core Course	04	--	**04**	**04**	**--**
Elective	SSANE-401and SSANE-451	All Elective Courses	03	--	**03**	**03**	**--**
Special Courses	SVECR-401 and SCMPO-451	Research Methodology and On Job Training	03	--	**03**	**03**	
Major Practical	SSANCP-401 to SSANCP-403 and SSANCP-451 to SSANCP-453	All Core labs	--	01	**01**	**--**	**02**
Elective Practical	SSANEP-401 and SSANEP-451	Elective lab	--	01	**01**	**--**	**02**
Total Credits per semester			**18**	**04**	**22**	**18**	**04**
Total credits per year			**36**	**08**	**44**	**36**	**08**

M. Sc. SAN First Year , Semester I and II   (Level 6.0) :Examination Scheme

Course Code (2)	Course Name (3)	Theory				Practical		Total Col (6+7) / Col (8+9) (10)
		Continuous Assessment (CA)			ESA	CA (8)	ESA (9)	
		Test I (4)	Test II (5)	Avg of (T1+T2)/2 (6)	Total (7)			
SSANC401 to SSANC-403 and SSANC-451 to SSANC-453	All core courses	20	20	`20	80	--	--	100
SSANE-401 and SSANE-451	All elective courses	15	15	15	60	--	--	75
SVECR-401 and SCMPOJ-451	Research Methodology	15	15	15	60	--	--	75
SSANCP-401 to SSANCP-403 and SSANCP-451 to SSANCP-451	All Core Labs	--	--	--	--	05	20	25
SSANEP-401 and SSANEP-451	All Elective labs	--	--	--	--	05	20	25

Note : Teaching scheme and Examination scheme for Second year will be elaborated later, along with detailed syllabus of Second Year

Guidelines for Course Assessment:

A. **Continuous Assessment (CA) (20% of the Maximum Marks):** This will form 20% of the Maximum Marks and will be carried out throughout the semester. It may be done by conducting **Two Tests** (Test I on 40% curriculum) and **Test II** (remaining 40% syllabus). Average of the marks scored by a student in these two tests of the theory paper will make his **CA** score (col. 6).

B. **End Semester Assessment (80% of the Maximum Marks):** *(For illustration we have considered a paper of 04 credits, 100 marks and need to be modified depending upon credits of an individual paper)*
   1. **ESA Question paper will consists of 6 questions, each of 20 marks.**
   2. **Students are required to solve a total of 4 Questions.**
   3. **Question No.1 will be compulsory and shall be based on entire syllabus.**
   4. Students need to solve **ANY THREE** of the remaining Five Questions (Q.2 to Q.6) and shall be based on entire syllabus.

C. **Question paper for campus PG and PG in affiliated colleges will be different**

Note: **Number of lectures required to cover syllabus of a course depends on the number of credits assigned to a particular course. One credit of theory corresponds to 15 Hours lecturing and for practical course one credit corresponds to 30 Hours. For example, for a course of two credits 30 lectures of one hour duration are assigned, while that for a three credit course 45 lectures.**

%%%%%

Code: SSANC-401	First semester	**Information Technology**	Credits: 04 Marks:80 Hours-50

Course Objectives:
1. Study of motherboard components.
2. Basics knowledge of computer evolution.
3. Managing Hardware Devices.
4. Study of Computer Languages

Course Outcome:
1. Design, install, configure, troubleshoot and manage components of computer systems.
2. Apply basic knowledge of Hardware Devices.
3. Install, manage, and maintain Computer System.
4. Best Practices for Computer assembling.

Unit-1:	**Introduction**

Characters of computers, The Evolution of computer, generations of Computer, Classification of computers, Basic computer organization.

Unit-2:	**Hardware Component on Motherboard**

Mother Board and its types, Types of HDD, Types of RAM, Types of Chipsets, Microprocessor and its type, IDE and SATA cables, Other parts on motherboard.

Unit-3:	**Input Output Devices**

Input devices, Point-and-draw devices, Data scanning devices, Digitizer, Electronic card reader Output device, Monitors, Printers, Plotters, Screen image projector.

Unit-4:	**Processor & Memory**

Central processing unit, The control unit, Arithmetic logic unit ,Instruction sets , Registers, Processor speed ,Types of processors, The main memory ,Storage evaluation criteria ,Main memory organization

Unit-5:	**Secondary Storage Devices**

Sequential and Direct-Access Devices ,Magnetic tape ,Basic principles of operation Types of magnetic tapes ,Advantages & disadvantages of magnetic tapes , Uses of magnetic tapes ,Magnetic disks.

Unit-6:	**Computer Languages**

Machine Language, Advantages & Limitations of Machine Language, Assembly Language Assembler , Advantages & limitations of Assembly Language , Level Language Compiler, Linker, Interpreter, Advantages & limitations of high level language.

Reference Books	
1.	Fundamental of Computer –By Pradeep K.Sinha and Priti Sinha
2.	Fundamental of Computer System-Low price Edition.
3.	Computer Fundamental –By Rajaraman PHI publication

Code: SSANC- 402	First semester	**Computer Network**	Credits: 04 Marks:80 Hours-50

Course Objectives:
1. Study of Network Topology.
2. To introduce basic concepts and functions of modern network devices.
3. To understand various transmission media.
4. Study of multiplexing techniques.

Course Outcome:
1. Design, install, configure, troubleshoot and manage components of computer systems.
2. Apply basic knowledge of Network Devices.
3. Install, manage, and maintain LAN & WAN
4. Best Practices to design network setup.

Unit-1:	**Introduction**

Uses of computer Networks, Network Hardware- LAN, MAN, WAN, Wireless Networks, Network Software-Protocol Hierarchy

Unit-2:	**LAN Hardware**

Network Interface Card, Twisted Pair Cable, Coaxial Cable, Fiber optic cable, Network Topologies-Bus, Ring, Star, Tree and other Topologies, Networking Devices – Repeaters, Bridges, Routers, Gateways, Hub and Switch.

Unit-3:	**Multiplexing, Switching**

Multiplexing – Time division and Frequency division, Switching, Circuit Switching, Packet Switching, Message Switching

Unit-4:	**Network Standards and Network protocols**

OSI reference model, TCP/IP reference model, IP protocol, SMTP, PPP, FTP, HTTP, SNMP.IP-addresses, Concept of DNS.

Unit-5:	**Internet**

Definition, Internet verses Intranet, Internet Service Provider, E-mail–Architecture and Services, WWW-Client side and Server side, URL, Messenger, Search Engine.

Unit-6:	**LAN Software**

Client-Server Model, File Server, Database Server, Print Server, DHCP Server, DNS Server, Peer-TO-Peer Networks

Reference Books	
1.	Gerd E. Keiser", Local Area Networks", Tata McGraw Hill Edition, New Delhi.
2.	Andrew S. Tannenbaum,"Computer Networks", (Third Edition), Prentice-Hall of India Pvt. Ltd, New Delhi.

Code: SSANC- 403	First semester	**Fundamental of Linux**	Credits: 04 Marks:80 Hours-50

Course Objectives:
1. The main objective of Linux Operating system is to introduce students with basic concepts of Open source code operating system.
2. To family's students with file and directory structure of Linux with commands and utilities, their processes and resources with graphical and command line interface
3. To brief the student about software management and network interface in Linux OS

Course Outcome:
1. Appreciate the role of open source operating system as System software.
2. Learner will handle Linux OS for software development, web server and database administration for their carrier.

Unit-1:	**Introduction to Linux**

History of Linux, features of Linux, flavors of Linux, H/w and s/w requirements of Linux, installation of Linux, Linux kernel, Linux Boot loader

Unit-2:	**Working with Linux**

Logging into and working with Linux, Linux Shells, changing user information, Changing File permission, Working with editors, virtual Console, Backup strategies, Backup S/w and media, Backup H/w media

Unit-3:	**Linux Commands and Utilities**

cat touch vi ls mkdir cd mv grep cal date rm rmdir dd du fdisk mount umount at batch ps kill jobs alias chmod chown chsh useradd usermod userdel groupadd groupdel ifconfing ping netstat route write wall mail mesg preloginmesg motd lp lpr lpc lpq lpstat zip unzip tar cpio gzip gunzip

Unit-4:	**System Administration**

managing users and groups, system services and runlevels, managing s/w with RPM, controlling services with administrative tools, starting and stopping services manually

Unit-5:	**The X Window System**

Basic X Concepts, Using XFree86, Starting X, Selecting and Using X Window Managers.

Unit-6:	**Managing Services**

Fedora Core Linux Boot Process, System Services and Run levels, Controlling Services at Boot with Administrative Tools, Starting and Stopping Services Manually.

Reference Books	
1.	Red Hat Linux and Fedora Unleashed – By Bill Ball and Hoyt Duff.

Code: SSANE- 401 A Elective	First semester	**Internetworking Protocols using TCP/IP**	Credits: 03 Marks:80 Hours-50

Course Objectives:
1. Study of Internet Services.
2. Understanding of how connection oriented and connectionless network operate.
3. Understanding networking Protocols.
4. Study of Network technologies.

Course Outcome:
1. Design, install, configure, troubleshoot and manage components of Network.
2. Apply basic knowledge of TCP/IP protocols.
3. Install, manage, and maintain for Ethernet technology
4. Best Practices for IP Configuration Settings

Unit-1:	**Introduction**

The motivation for Internetworking, The TCP/IP Internet, Internet services, History and scope of the Internet, The Internet Architecture Board, Application level Interconnection, properties of the Internet, Network level Interconnection, Internet Architecture.

Unit-2:	**Reviews of Underlying Network Technologies**

Introduction, Connection oriented & connectionless Services, WAN, LAN, Ethernet Technology- 10 Base 5,10 Base 2, 10 Base T, Fiber Distributed Data Interconnection (FDDI).

Unit-3:	**Internet Protocol**

Introduction, Universal Identifiers, Three Primary classes of IP- addresses, The concept of Unreliable Delivery, Connectionless Delivery system, The purpose of the Internet Protocol, The Internet Datagram

Unit-4:	**Reliable Stream Transport Service (TCP)**

Introduction, the Need for Stream delivery, Properties of the reliable delivery service, providing reliability, The Idea behind Sliding Window, The Transmission Control Protocol, TCP Frame Format.

Unit-5:	**Internet Protocol - Connectionless Data gram Delivery**

Introduction. A Virtual Network, Internet Architecture and Philosophy, The concept of Unreliable Delivery, Connectionless Delivery system, The purpose of the Internet Protocol, The Internet Datagram

Unit-6:	**Internetworking Concepts and Architectural Model**

Introduction, Application level Interconnection, properties of the Internet, Network level Interconnection, Internet Architecture. ARP, RARP.

Reference Books	
1.	Internetworking with TCPIIP, PriDc, T, les, Protocols & Architecture - Douglas E. Comer

Code: SSANE-401 B Elective	First semester	**Cisco Certified Entry Networking Technician**	Credits: 03 Marks:80 Hours-50

Course Objectives:
1. Understand different types of networks, various topologies and application of networks.
2. Understand types of addresses, data communication
3. Understand the concept of networking models, protocols, functionality of each layer.

Course Outcome:
1. Learn basic networking hardware and tools.
2. Practice to design peer to peer network
3. Practice to design Client Server Network

Unit-1:	**Introduction**

Network Essentials, Network Definitions, Network Topologies, Network Categories, The OSI Reference Model, Functions and Advantages, The Layers, Network Components, Protocol Data Units

Unit-2:	**Ethernet Fundamentals**

Ethernet History, Ethernet Characteristics, Frame Types and Addressing, Media Access, Data Flow, Ethernet Standards, Peer to Peer Network, Client Server Model.

Unit-3:	**Switching**

Switch Fundamentals, Physical Features, Switch Initialization Functions, Duplex and Speed, Switch Modes, Switch Design Considerations, Switch Installation and Connections, Looping and STP,VLANs

Unit-4:	**Routing Essentials and IP Addressing**

Routing Fundamentals, Routing Logic and Data Flow, Routed and Routing Protocols, An Introduction to IP Addressing, IP Address Construction, IP Address Classes, IP Address Technologies

Unit-5:	**Branch design and WAN**

Basic terminology, Connection with IPsec, Connection with DSL, Connection with VPN, Multicast Mac & IP address, Multicast solution, version of IGMP, Implementing multicast, Multicast routing protocol

Unit-6:	**Network Media and Devices**

Network Media, Media Terminology, Copper Cabling, Fiber Cabling, Network Devices, NICs, Transceivers, Repeaters, and Hubs, Bridges and Switches, Routers, Security Devices

Reference Books	
1.	Cisco CCENT CCNA icnd1 100-101 Wendell odam

Code: SSANE- 401 C Elective	First semester	**Introduction to AI and ML**	Credits: 03 Marks:80 Hours-50

Course Objectives:
1) To learn the distinction between optimal reasoning Vs. human like reasoning.
2) To understand the concepts of state space representation, exhaustive search, heuristic
3) To understand the applications of AI, namely game playing, theorem proving, and machine

Course Outcome:
1) Learn the distinction between optimal reasoning Vs human like reasoning and formulate an efficient problem space for a problem expressed in natural language. Also select a search algorithm for a problem and estimate its time and space complexities.
2) Apply AI techniques to solve problems of game playing, theorem proving, and machine learning.

Unit-1:	**Introduction**

Definitions – Foundation and History of AI, Evolution of AI - Applications of AI, Classification of AI systems with respect to environment. Artificial Intelligence vs Machine learning.

Unit-2:	**Problem Solving**

Heuristic Search Techniques: Generate-and-Test; Hill Climbing; Properties of A* algorithm, Bestfirst Search; Problem Reduction. Constraint Satisfaction problem: Interference in CSPs; Back tracking search for CSPs; Local Search for CSPs; structure of CSP Problem. Beyond Classical

Unit-3:	**Knowledge and Reasoning**

Knowledge and Reasoning: Building a Knowledge Base: Propositional logic, first order Logic, situation calculus. Theorem Proving in First Order Logic, Planning, partial order planning. Uncertain Knowledge and Reasoning, Probabilities, Bayesian Networks.

Unit-4:	**Introduction to Machine Learning**

Introduction to Machine Learning, Examples of Machine Learning Applications, LearningTypes Supervised Learning -Learning a Class from Examples, Vapnik-Chervonenkis (VC) Dimension, Probably Approximately Correct (PAC) Learning, Noise, Learning Multiple

Classes, Regression, Model Selection and Generalization, Dimensions of a Supervised Machine Learning Algorithm

Unit-5:	**Linear Methods for Regression**	

Introduction, Linear Regression Models and Least Squares, Subset Selection, ShrinkageMethods-Ridge Regression, Lasso Regression, Least Angle Regression, Methods Using Derived Input Directions-Principal Components Regression, Partial Least Squares,

Unit-6:	**Support Vector Machines and Tree-Based Models**	

SVM-Introduction to SVM, The Support Vector Classifier, Support Vector Machines and Kernels- Computing the SVM for Classification, The SVM as a Penalization Method, FunctionEstimation and Reproducing Kernels, SVMs and the Curse of Dimensionality

Reference Books	
*.	1) Russell, S. and Norvig, P. 2015. Artificial Intelligence - A Modern Approach, 3rd edition, Prentice Hall 2) J. Gabriel, Artificial Intelligence: Artificial Intelligence for Humans (Artificial Intelligence, Machine Learning), Create Space Independent Publishing Platform, First edition , 2016 3) Introduction to Machine Learning Edition 2, by Ethem Alpaydin 4) The Elements of Statistical Learning. Trevor Hastie, Robert Tibshirani and Jerome Friedman. Second Edition. 2009. 5) Machine Learning. Tom Mitchell. First Edition, McGraw- Hill, 1997

Code: SSANCP -401	First semester	**Lab-1: Information Technology**	Credits: 01
	Practical List:		
	Note:- Conduct fifteen practical based on given syllabus		

Code: SSANCP -402	First semester	**Lab-2: Computer Network**	Credits: 01
	Practical List:		

1. Study of Hardware Component on Motherboard
2. Study of Assemble a Computer System.
3. Study of Installing Windows 7 OS
4. Study of Transmission Medias – Twisted Pair Cable, Co-ax Cable, Fiber-optic Cable.
5. Cable Coding (Straight Over, Crossover)
6. Study of Network Devices.
7. Study of Remote Desktop
8. Study of Assigning IP address
9. Creating a share Folder
10. Study of Network related command

Code: SSANCP -403	First semester	**Lab-3: Linux**	Credits: 01
	Practical List:		

1. Installation of Linux
2. Study of Linux Shells
3. Study of change user information.
4. Study of files and directory related commands
5. Study of process and resources related commands
6. Study of backup and recovery commands
7. Study of file system commands
8. Study of compression and decompression commands
9. Study of networking commands
10. Study of communication commands

Code: SVECR-401	First semester	**Research Methodology**	Credits: 03

Course Objectives:
4. Understand different types of networks, various topologies and application of networks.
5. Understand types of addresses, data communication
6. Understand the concept of networking models, protocols, functionality of each layer.

Course Outcome:
4. Learn basic networking hardware and tools.
5. Practice to design peer to peer network
6. Practice to design Client Server Network

Unit-1:	Introduction, the Purpose and Product of Research

What is research?, Evaluating Research, The 6Ps of research, Reasons for doing Research, possible products, Finding and choosing research topics, evaluating the purpose and product of research.

Unit-2:	Overview of the Research Process, Internet Research

A model of the research process, Alternative models of the research process, evaluating the research process, Background of the Internet and WWW, Internet research topics, The Internet and a literature review, The Internet and research strategies and methods, Internet research, the law and ethics.

Unit-3:	Reviewing the literature, Surveys and Design Creation

Purpose of literature review, literature resources, The Internet and literature reviews, conducting literature reviews, evaluating literature reviews, Define Surveys, Planning and Designing surveys, the internet and surveys, Example of Surveys, Defining design and creation, Planning and conducting design and creation research, Creative computing and digital art.

Unit-4:	Experiments, Case studies, Action Research

Defining experiments, Planning and conducting experiments, The internet and experiments, Defining case studies, Planning and conducting case studies, The internet case studies, Defining Action research, Planning and conducting Action research, The internet and Action research

Unit-5:	Interviews, Observations, Questionnaires

Defining Interviews, Planning and conducting Interviews, Group Interviews Internet based Interviews, Defining Observations, Planning and conducting systematic Observations, Planning and conducting participant Observations, The internet and Observations.

Unit-6:	Quantitative data analysis, Qualitative data analysis and Presentation of Research

Defining Quantitative data analysis, Types of Quantitative data analysis, Data coding, Visual aids for Quantitative data analysis, Using statistics for Quantitative data analysis, Qualitative data analysis-Introduction, Analysis textual data, Analysing non-textual qualitative data, Grounded theory, Presentation of Research- writing up the research, conference paper presentations, Posters and exhibitions, software demonstrations, Presenting yourself, PhD vivas, Research Ethics, Plagiarism, software to detect plagiarism	

Reference Books

1.	Researching Information System and Computing by Briony J Oates, SAGE Publications, ISBN 978-81-7829-759-0

Code: SSANC-451	Second semester	**Operating System Concepts**	Credits: 04 Marks:80 Hours-50

Course Objectives:
1. To introduce basic concepts and functions of modern operating systems.
2. To understand the concept of process and thread management.
3. To understand the scheduling of processes and threads.
4. To understand various Memory Management techniques.

Course Outcome:
1. Fundamental understanding of the role of Operating Systems.
2. To understand the various memory management techniques
3. To apply the cons of process/thread scheduling
4. To understand the concept of a process and thread.

Unit-1:	**Introduction**

What Operating System Do –User View, System View, Defining OS, Computer System Organization, Computer System Architecture, Single Processor System, Multiprocessor System,Extended Machine Concept, Operating System Structure, An Operating System Resource Manager

Unit-2:	**System Structure**

Operating System Services, User Operating System Interface –Command Interpreter, GUI, System Boot, System Calls, Types of System Calls, Process Control, File Management, Device Management, Information Maintenance, Communication, Protection

Unit-3:	**Processor Management**

Process Concept, The Process, Process States, Process Control Block, Process Scheduling, Scheduling Queues, Schedulers, Context Switching, Scheduling Algorithms, FCFS, SJF, Priority Scheduling, Round-Robin Scheduling.

Unit-4:	**Memory Management**

Introduction, Contiguous Memory Allocation, Memory Allocation, Fragmentation, Paging, Basic Method, Hardware Support, Segmentation, Basic Method, Hardware Support.

Unit-5:	**Multithreaded Programming**

Overview, Multithreading Models, Thread Libraries – pthreads.

Unit-6:	**File System**

File concept, Access Methods, Sequential, Direct, Directory and Disk Structure, Directory Overview, Single Level Directory, Two Level Directory, Tree Structure Directory, Allocation Methods, Contiguous Allocation, Linked Allocation, Indexed allocation, Free Space Management, Bit Vector, Linked List, Grouping, Counting.

Reference Books	
1.	Operating System - Achyut Godbole, Atul Kahate

Code: SSANC-452	Second semester	**Network Administration (Routing)**	Credits: 04 Marks:80 Hours-50

Course Objectives:
1. Describe the role of dynamic routing protocols and place these protocols in the context of modern network design
2. Understand N/W protocols like RIP, OSPF & EIGRP according to industry requirement
3. Study of reference models.

Course Outcome:
1. Practical hands-on will help to interconnect the N/W components & design industrial N/w
2. Best Practices for configuring dynamic routing protocols
3. Best Practices for network troubleshooting.

Unit-1:	**Network Fundamentals**

OSI Model, TCP/IP Model, Compare and contrast OSI and TCP/IP models, Data Encapsulation, Compare and contrast network topologies, cabling types, Configure, verify, and troubleshoot IPv4 addressing, Need for private IPv4 addressing

Unit-2:	**Routing Protocol Concepts**

Interior and Exterior Routing Protocols, Connected Routes, Static Routes, Extended ping Command, Default Routes, RIP Protocol, RIP-2 Basic Concepts, Comparing and Contrasting IP Routing Protocols.

Unit-3:	**OSPF**

Compare and contrast distance vector and link state routing protocols, OSPF Protocols and Operation, OSPF Neighbors, OSPF Topology Database Exchange, OSPF Configuration,

Unit-4:	**EIGRP**

EIGRP Concepts and Operation, Exchanging EIGRP Topology Information, EIGRP Configuring and Verification.

Unit-5:	**WAN Technologies**

PPP Concepts, PPP Protocol Field, PPP Link Control Protocol, PPP Configuration,

Unit-6:	**Troubleshooting IP Routing**

The Ping and trace route Commands, Internet Control Message Protocol, Troubleshooting the Packet Forwarding Process, Host Troubleshooting Tips Interface Status, Extended Ping.

Reference Books	
1.	CCENT/CCNA ICND1 (Second Edition) - Wendell Odom

Code: SSANC-453	Second semester	**Linux Administration**	Credits: 04 Marks:80 Hours-50

Course Objectives:
1. The main objective of Linux Operating system is to introduce students with basic concepts of Open source code operating system.
2. To family's students with file and directory structure of Linux with commands and utilities, their processes and resources with graphical and command line interface
3. To brief the student about software management and network interface in Linux OS

Course Outcome:
1. Appreciate the role of open source operating system as System software.
2. Learner will handle Linux OS for software development, web server and database administration for their carrier.

Unit-1:	**Managing Users**

User Accounts, Managing Groups, Managing Users, Managing Passwords, Getting System Administrator Privileges to Regular Users, The User Login Process, Disk Quotas.

Unit-2:	**Managing the File system**

The Fedora Core Linux File System Basics, working with ext3 File system, Other File System Available to Fedora Core Linux, creating a File system, Mounting File systems, Relocating a File system.

Unit-3:	**Backing Up, Restoring, and Recovery**

Choosing a Backup Strategy, choosing a Backup Hardware and Media, Using Backup Software Copying Files, Undeleting Files, System Rescue

Unit-4:	**Printing with Fedora**

Overview of Fedora Printing, Configuring and Managing Print Services, Creating and Configuring Local Printers, Creating Network Printers, Console Print Control, Using the Common UNIX Printing System (CUPS) GUI

Unit-5:	**Network Connectivity**

Networking with TCP/IP, Network Organization, Hardware Devices for Networking, Using Network Configuration Tools, Dynamic Host Configuration Protocol, Using the Network File System, Putting Samba to work

Unit-6:	**Internet Connectivity**

Common configuring information, Laying the foundation: the local host Interface Configuring dialup internet Access, Configuring Digital Subscriber Line Access Troubleshooting Connection Problems, Configuring a Dial –in PPP server

Reference Books	
1.	Red Hat Linux and Fedora Unleashed – By Bill Ball and Hoyt Duff.

Code: SSANE- 451 A Elective	Second semester	**Introduction to Office Automation**	Credits: 03 Marks:80 Hours-50

Course Objectives :

The main objective of Office Automation is to enhance and upgrade the existing system by increasing its efficiency and effectiveness. It will simplify the task and reduce the paper work means the software improves the working methods by replacing the existing manual system with the computer-based system.

Course Outcome:

After completion of this course student will be able to understand the computer software, hardware, made available to simplify and automate a variety of office operations such as data processing, data manipulating and data presentation with various application those are presents in Microsoft office tools packages.

Unit-1:	Introduction to MS-Word

Word 2010 Basics: - Opening screen of MS-word, uses of MS-word, Home menu- font tab, paragraph tab, styles tab, editing options in MS-Word, Header and Footer tool, custom dictionary, printing in MS-Word.

Unit-2:	Working with Tables and Columns

Creating table, entering text in a table using table tools, changing column's width with autofit, gridlines, merging cells, table formatting –sorting tables, copying tables and deleting tables, mail-merge.

Unit-3:	Working With MS-Excel

Introduction to MS-Excel, Working with spreadsheet, formatting spreadsheet, working with Formulas and Functions, Goal seek, data validation, Conditional Formatting.

Unit-4:	Creating and Formatting Charts

Introduction to charts, creating charts, Formatting charts, Exploring charts.

Unit-5:	Working with Microsoft power point

Opening Screen of MS PowerPoint, creating a new presentation based on template, design template and blank presentation, slide Transition, custom Animation effects, slide show, adding audio and video on slides.

Unit-6:	Introduction to MS-Access

Opening screen of MS-Access, performing Queries, Generating the report, creating the database in Access, creating forms and adding new records in MS-Access.

Reference Books	
1.	Microsoft Office 2010, PBP Publication by Prof. Satish Jain, M. Geetha, Kratika
2.	Microsoft office 2000 by Rebecca J. Fiala

3.	Working in Microsoft Office by TATA McGraw-Hill Edition.

Code: SSANE-452 B Elective	Second semester	**Ad hoc Sensor Network**	Credits: 04 Marks:80 Hours-50

Course Objectives:
1. To Comprehensive knowledge of various techniques in mobile networks/Ad-hoc networks and sensor based networks
2. Understanding of Infrastructure less networks and their importance in the future directions for wireless communications.

Course Outcome:
1. Describe the unique issues in ad-hoc sensor networks.
2. Describe current technology trends for the implementation and deployment of wireless ad-hoc/sensor networks
3. Discuss the challenges in designing MAC, routing and transport protocols for wireless ad-hoc/sensor networks.

Unit-1:	**Ad Hoc Wireless Networks**

Introduction, Issues in Designing a MAC Protocol for Ad Hoc Wireless Networks. Design Goals of a MAC Protocol for Ad Hoc Wireless Networks. Classifications of MAC Protocols. Contention-Based Protocols. Contention-Based Protocols with Reservation Mechanisms.

Unit-2:	**Routing Protocols for Ad Hoc Wireless Networks**

Introduction to Routing algorithm, Issues in Designing a Routing Protocol for Ad Hoc Wireless Networks. Classifications of Routing Protocols. Table-Driven Routing Protocols. On-Demand Routing Protocols. Hybrid Routing Protocols. Routing Protocols with Efficient Flooding Mechanisms

Unit-3:	**Transport Layer and Security Protocols**

Introduction. Issues in Designing a Transport Layer Protocol for Ad Hoc Wireless Networks. Design Goals of a Transport Layer Protocol for Ad Hoc Wireless Networks. Classification of Transport Layer Solutions.

Unit-4:	**Wireless Sensor Networks**

Introduction. Sensor Network Architecture. Data Dissemination. Data Gathering. MAC Protocols for Sensor Networks. Location Discovery. Quality of a Sensor Network. Evolving Standards. Other Issues

Unit-5:	**Hybrid wireless Networks**

Introduction. Next-Generation Hybrid Wireless Architectures. Routing in Hybrid Wireless Networks. Pricing in Multi-Hop Wireless Networks. Power Control Schemes in Hybrid Wireless Networks. Load Balancing in Hybrid Wireless Networks.

Unit-6:	**Wireless Geolocation Systems**

Introduction. What is wireless Geolocation? Wireless Geolocation System Architecture. Technologies for Wireless Geolocation. Geolocation Standards for E-911 Services. Performance Measures for Geolocation Systems. Questions. Problems	
Reference Books	
1.	Toh, C. K., Ad hoc Mobile Wireless Networks Protocols and Systems, Prentice Hall, PTR, (2001) 3rd Edition.

Code: SSANE- 451 C Elective	Second semester	**VLSI Design**	Credits: 03 Marks:80 Hours-50
Course Objectives: 1. To provide understanding of the entire logic design process with the analysis from combinational and sequential digital circuit design.				

Course Outcome:
    1. Understand the basic physics of semiconductor devices and the basics theory of PN junction.
    2. Understand the basic theory of MOS transistors.
    3. Understand the basic steps of fabrication.
    4. Learn the basics theory of Crystal Growth and Wafer Preparation.				

Unit-1:	**INTRODUCTION TO MOS TRANSISTOR**			
MOS Transistor, CMOS logic, Inverter, Pass Transistor, Transmission gate, Layout Design Rules, Gate Layouts, Stick Diagrams, Long-Channel I-V Charters tics, C-V Charters tics, Non ideal I-V Effects, DC Transfer characteristics, RC Delay Model, Elmore Delay, Linear Delay Model, Logical effort, Parasitic Delay, Delay in Logic Gate, Scaling.				
Unit-2:	**COMBINATIONAL MOS LOGIC CIRCUITS**			
Circuit Families: Static CMOS, Ratioed Circuits, Cascode Voltage Switch Logic, Dynamic Circuits, Pass Transistor Logic, Transmission Gates, Domino, Dual Rail Domino, CPL, DCVSPG, DPL, Circuit Pitfalls. Power: Dynamic Power, Static Power, Low Power Architecture.				
Unit-3:	**SEQUENTIAL CIRCUIT DESIGN**			
Static latches and Registers, Dynamic latches and Registers, Pulse Registers, Sense Amplifier Based Register, Pipelining, Schmitt Trigger, Monostable Sequential Circuits, Astable Sequential Circuits. Timing Issues : Timing Classification Of Digital System, Synchronous Design.				
Unit-4:	**DESIGN OF ARITHMETIC BUILDING BLOCKS AND SUBSYSTEM**			
Arithmetic Building Blocks: Data Paths, Adders, Multipliers, Shifters, ALUs, power and speed tradeoffs, Case Study: Design as a tradeoff. Designing Memory and Array structures: Memory Architectures and Building Blocks, Memory Core, Memory Peripheral Circuitry.				
Unit-5:	**IMPLEMENTATION STRATEGIES**			
FPGA Building Block Architectures, FPGA Interconnect Routing Procedures.				

Unit-6:	Design for Testability:
Design for Testability: Ad Hoc Testing, Scan Design, BIST, IDDQ Testing, Design for Manufacturability, Boundary Scan.	
Reference Books	
1.	VLSI DESIGN, 2ND EDN, by Debaprasad Das, Publisher : Oxford University Press; 2nd edition (13 April 2015),ISBN-10 : 9780198094869

Code: SSANCP - 451	Second semester	**Lab-4: Operating System**	Credits: 01
	Practical List:		
	Note:- Conduct fifteen practical based on given syllabus		

Code: SSANCP- 452	Second semester	**Lab-5: Network Administration**	Credits: 01
	Practical List:		
	Note:- Conduct fifteen practical based on given syllabus		

Code: SSANCP - 453	Second semester	**Lab-6: Linux Administration and Office Automation**	Credits: 01
	Practical List:		

1. Study of Mounting File systems
2. Study of network connectivity in Linux
3. Study of Creating and Configuring Local Printers.
4. Study of samba server.
5. Study of Backup Hardware and Media
6. Study of MS-Word
7. Study of MS-Excel
8. Study of Microsoft power point
9. Study of MS-Access
10. Study of Mail Merge.

Code: SDSCOJ-451	Second semester	On Job Traning, Internship/ Apprenticeship or field project	Credits: 03