स्वामी रामानंद तीर्थ मराठवाडा विद्यापीठ
नांदेड– ४३१६०६ (महाराष्ट्र)
SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY
NANDED-431606, MAHARASHTRA STATE, INDIA.
Established on 17th September 1994 - Recognized by the UGC U/s 2(f) and 12(B), NAAC Re-accredited with 'A' Grade

ACADEMIC (1-BOARD OF STUDIES) SECTION

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संलग्नित महाविद्यालयांतील विज्ञान व तंत्रज्ञान विद्याशाखेतील पदव्युत्तर स्तरावरील प्रथम वर्षाचे CBCS Pattern नुसारचे अभ्यासक्रम शैक्षणिक वर्ष २०१९–२० पासून लागू करण्याबाबत.

प रि प त्र क

(संदर्भ : शैक्षणिक–१/परिपत्रक/पदव्युत्तर–सीबीसीएस अभ्यासक्रम/२०१९–२०/४६४, दि. ११.०७.२०१९.)

या परिपत्रकान्वये सर्व संबंधितांना कळविण्यात येते की, **दिनांक ०८ जून २०१९ रोजी संपन्न झालेल्या ४४व्या मा. विद्या परिषद बैठकीतील ऐनवेळचा विषय क्र.११/४४–२०१९** च्या ठरावानुसार प्रस्तुत विद्यापीठाच्या **संलग्नित महाविद्यालयांतील विज्ञान व तंत्रज्ञान विद्याशाखेतील पदव्युत्तर स्तरावरील प्रथम वर्षाचे** खालील विषयांसह एकूण सतरा विषयांचे **C.B.C.S. (Choice Based Credit System) Pattern** नुसारचे अभ्यासक्रम संदर्भीय परिपत्रकान्वये शैक्षणिक वर्ष २०१९–२० पासून लागू करण्यात आले होते.

तथापि, त्यापैकी खालील पाच विषयांच्या अभ्यासक्रमांत काही सुधारणा करण्यात आल्या असून, त्या शैक्षणिक वर्ष २०१९–२० पासून लागू करण्यात येत आहेत.

1. Computer Management
2. Computer Science
3. Information Technology
4. Software Engineering
5. System Administration & Networking

सदरील परिपत्रक व अभ्यासक्रम प्रस्तुत विद्यापीठाच्या **www.srtmun.ac.in** या संकेतस्थळावर उपलब्ध आहेत. तरी सदरील बाब ही सर्व संबंधितांच्या निदर्शनास आणून द्यावी.

'ज्ञानतीर्थ' परिसर,
विष्णुपुरी, नांदेड – ४३१ ६०६.
जा.क्र.: शैक्षणिक–१/परिपत्रक/पदव्युत्तर–सीबीसीएस अभ्यासक्रम/२०१९–२०/**१८१०**
दिनांक : २६.१०.२०१९.

स्वाक्षरित/–
उपकुलसचिव
शैक्षणिक (१–अभ्यासमंडळ) विभाग

प्रत माहिती व पुढील कार्यवाहीस्तव :

१) मा. कुलसचिव यांचे कार्यालय, प्रस्तुत विद्यापीठ.
२) मा. संचालक, परीक्षा व मूल्यमापन मंडळ यांचे कार्यालय, प्रस्तुत विद्यापीठ.
३) प्राचार्य, सर्व संबंधित संलग्नित महाविद्यालये, प्रस्तुत विद्यापीठ.
४) साहाय्यक कुलसचिव, पदव्युत्तर विभाग, प्रस्तुत विद्यापीठ.
५) उपकुलसचिव, पात्रता विभाग, प्रस्तुत विद्यापीठ.
६) सीनिअर प्रोग्रामर, शैक्षणिक विभाग, प्रस्तुत विद्यापीठ.

Resolutions passed in the BoS in Computer Science and Application dated 16/09/2019

1. **Revised Credit arrangements for following programs - M.Sc. programs in Affiliated colleges including Computer Science, Software Engineering, System Administration and Networking, Computer Management, Information Technology**

New Resolution: There is no change in the total credits per semester or total credits per program. All above M.Sc. Degrees / programs in affiliated colleges would be of 100 Credits even now after changes. Total credits per semester are still 25. **However the credit pattern is changed in order to keep informality with other PG programs of other BoS in the faculty. These changes are as follows**

Earlier	**Revised and effective from 16-09-2019**
Each theory course has 04 credits which are split as 02 external credits and 02 internal credits. (50+ 50 pattern)	Each theory course has 04 credits which are split as 03 external credits and 01 internal credit. (75+25 pattern)
The university shall conduct the end semester examination for 02 external credits (50 marks).	The university shall conduct the end semester examination for 03 external credits (75 marks).
For theory internal credit, student has to appear for 02 class test (15 marks) and 01 assignment (20 marks).	For theory internal credit, student has to appear for 02 class test (10 marks each) and 01 assignment (05 marks).
Semester wise Practical / Lab examinations	**--- same --- no changes**
Every lab course has 02 credits which are split as 01 external credit and 01 internal credit.	**--- same --- no changes**
For lab internal credit, the student has to submit Laboratory Book (05 marks) and remaining 20 marks are for the Lab activities carried out by the student throughout the semester.	**--- same --- no changes**
For lab external credit, 20 marks are reserved for the examinational experiment and 05 marks are for the oral / viva examinations.	**--- same --- no changes**
For open elective **(also applicable to Open elective in professional UG programs also)**	The Open elective shall have 04 credits and its assessment shall be totally internally. Any University recognized MOOC courses can be availed for this. Such courses must be of minimum 16 weeks duration in order to claim 04 credits. The credit transfer policy shall be as per the rules and regulations of the University. The MOOC course coordinator of the college shall verify the contents, validity and time duration of the MOOC course chosen by the student and the semester duration. Failure of which, students must undergo in-house open elective. **More weightage for MOOC courses (above 08 credits) in campus and affiliated colleges is intentionally given by the BoS with a view that students will undergo skills based advanced courses in Computer science and allied subject discipline from reputed and recognized agencies. This will also help in wide range of elective subjects for students**
Credits for Major Project development activity in Last semester	Major Project development activity is one of the core subjects in fourth semester. There will be no theory examination conducted by the university for it. The external examiner shall conduct the examination for 04 credits. The 04 credits are together for actual project demonstration, project report and project viva

Resolutions passed in the BoS in Computer Science and Application dated 16/09/2019

Contd…

Resolutions:

2. The end semester examination duration of these M.Sc. programs in the affiliated colleges, namely, Computer Science, Software Engineering, System Administration and Networking, Computer Management, Information Technology, shall be of 03 hours and a common question paper pattern shall be followed for all these PG programs. This pattern is attached below.

3. For this academic year, AY 2019-2020, for PG programs, while setting theory question papers or conducting practical examinations, related to first year, the new question paper pattern has to be followed.

4. For setting theory question papers or conducting practical examinations, related to current second year (third and fourth semesters) belonging to old syllabi and for backlog students, belonging to PG programs, the previous concerned question paper pattern for corresponding syllabi must be followed .

5. For M.Sc. programs being offered by Campus School and Latur Sub centre (namely Computer Science, Computer Application and Computer Network), there is no change in the credit pattern, total credits per semester, total credits per program and the question paper pattern.

6. For MCA programs, being offered by Campus School and affiliated colleges, there is no change in the credit pattern, total credits per semester, total credits per program and the question paper pattern.

Revised Credit pattern for M.Sc. programs in affiliated colleges (Computer Science, Software

Sr. No	Course category	Course Code	Course Title	Internal credits	External credits	Total credits
First Semester to Third Semester						
1.	**Core Subjects**	Same	Same	1	3	4
2		Same	Same	1	3	4
3		Same	Same	1	3	4
Choose any one from below elective subjects						
4	**Elective Subject**	Same	Same	1	3	4
		Same	Same			
Practical /Lab						
5	**Lab / Practical**	Same	Lab	1	1	2
		Same	Lab	1	1	2
6	**Open Elective**	Same	Same	4	0	4
		Same	Same			
7	**Skill based Activity**	Same	same	1	0	1
	Total credits			**11**	**14**	**25**

Engineering, System Administration and Networking, Computer Management, Information Technology)

Sr. No	Course category	Course Code	Course Title	Internal credits	External credits	Total credits
Fourth Semester						
1.	Core Subjects			1	3	4
2				1	3	4
3			Major Project development Activity	0	4	4
Choose any one from below elective subjects						
4	Elective Subject			1	3	4
Practical /Lab						
5	Lab / Practical		Lab-7	1	1	2
			Lab-8	1	1	2
6	Open Elective	A	University recognized MOOC (NPTEL / SWAYAM / others) OR Intra / Inter Departmental OR Intra / Inter School OR	4	0	4
		B				
7	Skill based Activity		same	1	0	1
			Total credits	10	15	25

Common Question paper pattern for M.Sc. programs (Not for Campus)

Swami Ramanand Teerth Marathwada University, Nanded
Faculty of Science and Technology
Question Paper Pattern w.e.f Academic Year 2019-2020
M.Sc. (Computer Science /Computer Management/Information Technology/ Software Engineering/System Administration & Networking)
First Semester & Second Semester
(CBCS Pattern- Affiliated Colleges)

Time: 03 Hrs. **Max Marks = 75**

Note:

i) All questions are Compulsory
ii) Assume your own data if necessary
iii) Draw well labeled diagram wherever necessary to illustrate your answers.

Q1. Attempt the Following questions.

A. 15
OR
B. 7
C. 8

Q2. Attempt the Following Questions.

A. 15
OR
B. 7
C. 8

Q3. Attempt the Following Questions.

A. 15
OR
B. 7
C. 8

Q4. Attempt any one of the following

A. 15
OR
B. 7
C. 8

Q5. Write a Short note on following (any three) 15

A.
B.
C.
D.
E.

NOTE: The Questions are based on the all units in the syllabus

Swami Ramanand Teerth Marathwada University, Nanded

(NAAC Re-accredited with 'A' Grade)

Syllabus of

M.Sc. (System Administration and Networking) (2 years)

(Revised CBCS pattern)

Introduced from Academic Year 2019-2020

M.Sc. System Administration and Networking

M.Sc. System Administration and Networking (2years) program / degree is a specialized program in system administration and network related issues. It builds the student on higher studies and research awareness in system administration, maintenance and networking so as to become competent in the current race and development of new computational sciences. The duration of the study is of four semesters, which is normally completed in two years.

CBCS pattern

The M.Sc. System Administration and Networking program as per CBCS (Choice based credit system) pattern, in which choices are given to the students under open electives and subject electives. The students can choose open electives from the wide range of options to them.

Eligibility and Fees

The eligibility of a candidate to take admission to **M.Sc. System Administration and Networking** program is as per the eligibility criteria fixed by the University. More details on admission procedure and fee structure can be seen from the prospectus of the college / institution as well as on website of the University.

Credit Pattern

Every course has corresponding grades marked in the syllabus structure. There are 25 credits per semester. A total of 100 credits are essential to complete this program successfully. The Grading pattern to evaluate the performance of a student is as per the University rules.

Every semester has a combination of Theory (core or elective) courses and Lab courses. Each theory course has 04 credits which are split as 03external credits and 01 internal credit. The university shall conduct the end semester examination for 03 external credits. For theory internal credit, student has to appear for 02 class test (10 marks each) and 01 assignment (05 marks). Every lab course has 02 credits which are split as 01 external credit and 01 internal credit. For lab internal credit, the student has to submit Laboratory Book (05 marks) and remaining 20 marks are for the Lab activities carried out by the student throughout the semester. For lab external credit, 20 marks are reserved for the examinational experiment and 05 marks are for the oral / viva examinations. There is a special skill based activity of 01 internal credit per semester which shall inculcate awareness regarding the domain of computers, IT, and ICT.

The open elective has 04 credits which are purely internal. If students are opting for MOOCs as open elective, then, there must be a Faculty designed as MOOCs course coordinator who shall supervise learning through MOOCS. This is intentionally needed as the MOOCs course coordinator shall verify the MOOC details including its duration, staring date, ending date, syllabus contents, mode of conduction, infrastructure feasibility, and financial feasibility during start of each semester. This is precautionary as the offering of the MOOCs through online platforms are time specific and there must be proper synchronization of semester duration with the MOOCs duration. Students must opt for either institutional / college level open elective or a course from University recognized MOOCs platforms as open electives.

The number of hours needed for completion of theory and practical courses as well as the passing rules, grading patterns, question paper pattern, number of students in practical batches, etc shall be as per the recommendations, norms, guidelines and policies of the UGC, State Government and the SRTM University currently operational. The course structure is supplemented with split up in units and minimum numbers of hours needed for completion of the course, wherever possible.

Under the CBCS pattern, students would graduate **M.Sc. System Administration and Networking** with a minimum number of required credits which includes compulsory credits from core courses, open electives and program specific elective course. All students have to undergo lab / practical activities leading to specific credits and project development activity as a part of professional UG program.

1. **M.Sc. System Administration and Networking** Degree / program would be of 100 Credits. Total credits per semester= 25
2. Each semester shall consist of three core courses, one elective course, one open elective course and two practical courses. Four theory courses (core+elective) = 16 Credits. Two practical / Lab courses= 4 Credits in total (02 credits each) , One Open elective= 4 credit, One skill enhancement activity of 01 credits.
3. One Credit = 25 marks , Two Credits = 50 Marks, Four Credits = 100 Marks

PEO, PO and CO Mappings

1. **Program Name** : MSc.(SAN)

2. **Program Educational Objectives**: After completion of this program, the graduates / students would

PEO I :Technical Expertise	Implement fundamental domain knowledge of core courses for developing effective computing solutions by incorporating creativity and logical reasoning.
PEO II : Successful Career	Deliver professional services with updated technologies in System Administration and Networking based career.
PEO III :Hands on Technology and Professional experience	Develop leadership skills and incorporate ethics, team work with effective communication & time management in the profession.
PEO IV :Interdisciplinary and Life Long Learning	Undergo higher studies, certifications and research programs as per market needs.

3. **Program Outcome(s):** Students / graduates will be able to

PO1: Apply knowledge of mathematics, science and algorithm in solving Computer problems.
PO2: Generate solutions by understanding underlying computational environment for administration and maintenance
PO3: Design component, or processes to meet the needs within realistic constraints.
PO4: Identify, formulate, and solve problems using computational temperaments.
PO5: Comprehend professional and ethical responsibility in computing profession.
PO6: Express effective communication skills.
PO7: Recognize the need for interdisciplinary, and an ability to engage in life-long learning.
PO8: Actual hands on technology to understand it's working.
PO9: Knowledge of contemporary issues and emerging developments in computing profession.
PO10: Utilize the techniques, skills and modern tools, for actual development process
PO11: Function effectively as an individual and as a member or leader in diverse teams and in multidisciplinary settings in actual development work
PO12: Research insights and conduct research in computing environment.

4. **Course Outcome(s):** Every individual course under this program has course objectives and course outcomes (CO). The course objectives rationally match with program educational objectives. The mapping of PEO, PO and CO is as illustrated below

5. **Mapping of PEO& PO and CO**

Program Educational Objectives	Thrust Area	**Program Outcome**	Course Outcome
PEO I	Technical Expertise	PO1,PO2,PO3,PO6	All core courses
PEO II	Successful Career	PO4,PO5,PO11,	All discipline specific electives courses
PEO III	Hands on Technology and Professional experience	PO8,PO10	All Lab courses
PEO IV	Interdisciplinary and Life Long Learning	PO7,PO9,PO12	All open electives and discipline specific electives

Swami Ramanand Teerth Marathwada University, Nanded

CBCS Revised Syllabus w.e.f AY: 2019-2020

Program: M.Sc. (System Administration and Networking) – Affiliated Colleges

Sr. No	Course category	Course Code	Course Title	Internal credits	External credits	Total credits
First Semester						
1.	**Core Subjects**	SAN-101	Information Technology	1	3	4
2		SAN-102	Computer Network	1	3	4
3		SAN-103	Fundamental of Linux	1	3	4
Choose any one from below elective subjects						
4	**Elective Subject**	SAN-104 A	Internetworking Protocols using TCP/IP	1	3	4
		SAN-104 B	Cisco Certified Entry Networking Technician			
Practical /Lab						
5	**Lab / Practical**	SAN-105	Lab-1: Computer Network	1	1	2
		SAN-106	Lab-2: Linux	1	1	2
6	**Open Elective**	SAN-107A	University recognized MOOC (NPTEL / SWAYAM / others) OR Intra / Inter Departmental OR Intra / Inter School OR	4	0	4
		SAN-107 B	Communication Skills-1			
7	**Skill based Activity**	SAN-108	SK-01	1	0	1
	Total credits					**25**
Second Semester						
1.	**Core Subjects**	SAN-201	Operating System Concepts	1	3	4
2		SAN-202	Network Administration (Routing)	1	3	4
3		SAN-203	Linux Administration	1	3	4
Choose any one from below elective subjects						
4	**Elective Subject**	SAN-204 A	Introduction to Office Automation	1	3	4
		SAN-204 B	Ad hoc Sensor Network			
Practical /Lab						
5	**Lab / Practical**	SAN-205	Lab-3: Network Administration	1	1	2
		SAN-206	Lab-4: Linux Administration and Office Automation	1	1	2
6	**Open Elective**	SAN-207A	University recognized MOOC (NPTEL / SWAYAM / others) OR Intra / Inter Departmental OR Intra / Inter School OR	4	0	4
		SAN-207 B	Communication Skills-2			
7	**Skill based Activity**	SAN-208	SK-02	1	0	1
	Total credits					**25**

Code: SAN-101	First semester	**Information Technology**	Credits: 04

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: SAN-102	First semester	**Computer Network**	Credits: 04

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: SAN-103	First semester	**Fundamental of Linux**	Credits: 04

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: SAN-104 A Elective	First semester	**Internetworking Protocols using TCP/IP**	Credits: 04

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: SAN-104 B Elective	First semester	**Cisco Certified Entry Networking Technician**	Credits: 04

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: SAN-105	First semester	**Lab-1: Computer Network**	Credits: 02
	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: SAN-106	First semester	**Lab-2: Linux**	Credits: 02
	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: SAN-107 A	First semester	**Open Elective**	Credits: 04
Open Elective : University recognized MOOC (NPTEL / SWAYAM / others) OR Intra / Inter Departmental courses			

OR

Code: SAN-107 B	First semester	**Open Elective** **Communication Skills - 1**	Credits: 04

Course Objectives :

1. To make a comprehensive use of English in day-to-day life.
2. To help Students develop the ability to learn and contribute critically.
3. To develop the writing skills of the students.
4. To help the students to understand the basic usages of English.

Course Outcome :

By the end of this course students should be able to:

1. Understand and demonstrate Basic English usages for their different purposes.
2. Clear entrance examination and aptitude tests.
3. Write various letters, reports required for professional life.

Unit-1:	**Morphology**
Morphology: Free & Bound Morphemes, Word Formation Processes, Morphological Analysis of words	
Unit-2:	**Grammar in day-to-day use:**
Word Classes: Open and Closed Word Classes, Phrase: Types and functions of the phrases	
Unit-3:	**Auxiliary Verbs**
Verbs: Primary Auxiliary and Secondary Auxiliary, Usages and Functions of modal auxiliaries, Questions using Model Auxiliaries	
Unit-4:	**Transformation of Sentences**
Voice: Active & Passive, Speech: Direct & Indirect	
Unit-5:	**Error Detection**
Determiners: Article, Quantifiers and Demonstratives, Subject – Verb Agreement	
Unit-6:	**Tenses and their usages**
Simple Present, Simple Past, Simple Future	

Reference Books

1.	Modern English Grammar-L. S. Deshpande (creative Publication)
2.	A Practical English Grammar- A. J. Thomson. (Oxford University)
3.	Macmillan Foundation English. - R. K. Dwivedi & a. Kumar (Mammalian India Ltd)
4.	Writing English for You- G. Radhakrishna Pillai (Emerland Publication)
5.	High School English Grammar & Composition - Wren & Martin (S. Chand)
6.	Radiance Communication Skills- Editorial Board (SRTM University) Orient Black Swan.
7.	English Grammer and Composition – Rejendra Pal and Prem Lata Suri (Sultan Chand and Sons)

Code: SAN-108	First semester	**Skill based Activity** **SK01- PC Assembly and Maintenance**	Credits: 01

Scope : Practically understand the PC and surrounding peripherals. The student will assemble / setup and upgrade personal computer systems; install OS and other application software, diagnose and isolate faulty components; optimize system performance and install / connect peripherals.

Code: SAN-201	Second semester	**Operating System Concepts**	Credits: 04

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: SAN-202	Second semester	**Network Administration (Routing)**	Credits: 04

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: SAN-203	Second semester	**Linux Administration**	Credits: 04

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: SAN-204 A Elective	Second semester	**Introduction to Office Automation**	Credits: 04

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: SAN-204 B Elective	Second semester	**Ad hoc Sensor Network**	Credits: 04

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: SAN-205	Second semester	**Lab-3: Network Administration**	Credits: 02
	Practical List:		

1. Study of connected route.
2. Study of static route.
3. Study of default route.
4. Study of rip protocol configuration.
5. Study of ripv2 protocol configuration.
6. Study of OSPF protocol configuration.
7. Study of EIGRP protocol configuration.
8. Study of PPP protocol configuration.
9. Study of telnet password.
10. Study of router basic show commands.

Code: SAN-206	Second semester	**Lab-4: Linux Administration and Office Automation**	Credits: 02
	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: SAN-207 A	First semester	**Open Elective**	Credits: 04
Open Elective : University recognized MOOC (NPTEL / SWAYAM / others) OR Intra / Inter Departmental courses			

OR

Code: SAN-207 B	Second semester	**Communication Skills - 2**	Credits: 04

Course Objectives:

1. A comprehensive use of English in day-to-day life.
2. To help Students develop the ability to learn and contribute critically.
3. To develop the writing skills of the students.
4. To help the students to understand the basic usages of English.
5.

Course Outcome:

By the end of this course students should be able to:

1. Understand and demonstrate Basic English usages for their different purposes.
2. Clear entrance examination and aptitude tests.
3. Write various letters, reports required for professional life.

Unit-1:	**Business Correspondence**
E-mail Writing: Invitation, job, Essay Writing: Types, Structures etc., Resume, Bio-data, and CV.	
Unit-2:	**Reading Comprehension**
Basic Approaches for understanding English, Para Jumbles	
Unit-3:	**Practical Grammar**
Basic usages of Tenses, Auxiliaries (Modal and Primary), Phrasal Verbs	
Unit-4:	**Vocabulary**
One-word substitution, Idioms and Phrases, Synonyms and Antonyms, Spelling Mistakes	
Unit-5:	**Sentence Formation**
Sentence Completion/ Fillers, Paragraph Completion, Sentence Improvements, Cloze Test	
Unit-6:	**Day-to-Day-English**
Describing persons, objects or things, Narrating Pictures, Talking about places and recipes, Expression opinions	

Reference Books

1.	Modern English Grammar-L. S. Deshpande (creative Publication)
2.	A Practical English Grammar- A. J. Thomson. (Oxford University)
3.	Macmillan Foundation English. - R. K. Dwivedi & a. Kumar (Mammalian India Ltd)
4.	Writing English for You- G. Radhakrishna Pillai (Emerland Publication)
5.	High School English Grammar & Composition - Wren & Martin (S. Chand)
6.	Radiance Communication Skills- Editorial Board (SRTM University) Orient Black Swan.
7.	English Grammer and Composition – Rejendra Pal and Prem Lata Suri (Sultan Chand and Sons)

Code: SAN-208	Second semester	**Skill based Activity** **SK02- Networking Essentials**	Credits: 01

Scope : Networking Essentials deals with knowing what is a network, how to install, configure, and troubleshoot a computer network It includes knowledge of the fundamental building blocks that form a modern network, such as various cables, switches, routers, connectors, LAN-NIC cards and network operating systems. It then provides in-depth coverage of the most important concepts in contemporary networking like connecting computers/ peripherals, servers and clients, Wi-Fi connectivity, etc. Students are expected to have the skills to build a network / LAN from scratch and maintain, upgrade, and troubleshoot an existing network.

Common Question paper pattern for M.Sc. programs (Not for Campus)

Swami Ramanand Teerth Marathwada University, Nanded
Faculty of Science and Technology
Question Paper Pattern w.e.f Academic Year 2019-2020
M.Sc. (Computer Science /Computer Management/Information Technology/ Software Engineering/System Administration & Networking)
First Semester & Second Semester
(CBCS Pattern- Affiliated Colleges)

Time: 03 Hrs. **Max Marks = 75**

Note:

i) All questions are Compulsory
ii) Assume your own data if necessary
iii) Draw well labeled diagram wherever necessary to illustrate your answers.

Q1. Attempt the Following questions.

A. 15

OR

B. 7
C. 8

Q2. Attempt the Following Questions.

A. 15

OR

B. 7
C. 8

Q3. Attempt the Following Questions.

A. 15

OR

B. 7
C. 8

Q4. Attempt any one of the following

A. 15

OR

B. 7
C. 8

Q5. Write a Short note on following (any three) 15

A.
B.
C.
D.
E.

NOTE: The Questions are based on the all units in the syllabus