।। सा विद्या या विमुक्तये ।।

स्वामी रामानंद तीर्थ मराठवाडा विद्यापीठ, नांदेड

"ज्ञानतीर्थ" परिसर, विष्णुपूरी, नांदेड - ४३१६०६ (महाराष्ट्र)

SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY NANDED

"Dnyanteerth", Vishnupuri, 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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प्रस्तुत विद्यापीठीय संकुलातील विज्ञान व तंत्रज्ञान विद्याशाखेतील पदव्युत्तर स्तरावरील द्वितीय वर्षाचे CBCS Pattern नुसारचे अभ्यासक्रम शैक्षणिक वर्ष २०२०—२१ पासून लागू करण्याबाबत.

प रि प त्र क

या परिपत्रकान्वये सर्व संबंधितांना कळविण्यात येते की, **दिनांक २० जून २०२० रोजी संपन्न झालेल्या ४७व्या मा. विद्या परिषद बैठकीतील विषय क्र.११/४७—२०२०** च्या ठरावानुसार **प्रस्तुत विद्यापीठीय संकुलातील विज्ञान व तंत्रज्ञान विद्याशाखेतील पदव्युत्तर स्तरावरील द्वितीय वर्षाचे** खालील विषयांचे **C.B.C.S. (Choice Based Credit System) Pattern** नुसारचे अभ्यासक्रम शैक्षणिक वर्ष २०२०—२१ पासून लागू करण्यात येत आहेत.

01. M.Sc.-II Year-Botany
02. M.Sc.-II Year-Analytical Chemistry
03. M.Sc.-II Year-Industrial Chemistry
04. M.Sc.-II Year-Medicinal Chemistry
05. M.Sc.-II Year-Organic Chemistry
06. M.Sc.-II Year-Physical Chemistry
07. M.Sc.-II Year-Polymer Chemistry
08. M.Sc.-II Year-Computer Application
09. M.Sc.-II Year-Computer Network
10. M.Sc.-II Year-Computer Science
11. M.C.A.-II Year (Master of Computer Applications)
12. M.Sc.-II Year-Environmental Science
13. M.A./M.Sc.-II Year-Geography
14. M.Sc.-II Year-Geophysics
15. M.Sc.-II Year-Geology
16. M.A./M.Sc.-II Year-Mathematics
17. M.Sc.-II Year-Microbiology
18. M.Sc.-II Year-Physics
19. M.Sc.-II Year-Zoology
20. M.Sc.-II Year-Biotechnology
21. M.A./M.Sc.-II Year-Statistics

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(संकुल)—सीबीसीएस अभ्यासक्रम/२०२०—२१/**५१३**

दिनांक : ०८.०८.२०२०.

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) मा. संचालक, सर्व संबंधित संकुले, प्रस्तुत विद्यापीठ.
४) साहाय्यक कुलसचिव, पदव्युत्तर विभाग, प्रस्तुत विद्यापीठ.
५) उपकुलसचिव, पात्रता विभाग, प्रस्तुत विद्यापीठ.
६) सिस्टम एक्सपर्ट, शैक्षणिक विभाग, प्रस्तुत विद्यापीठ.

Swami Ramanand Teerth Marathwada University, Nanded

(NAAC Re-accredited with 'A' Grade)

Syllabus of

Second Year M.Sc. (Computer Network) (Campus)*

(Revised CBCS pattern)

Introduced from Academic Year 2020-2021

Program code: SCS-S-MCN-PG (13-2-3-01)

*(BoS deserves the rights for minor corrections, typographical errors in this syllabus with due approval of Administrations)

M.Sc. Computer Network (Campus)

M.Sc. Computer Network (2years) program / degree is a specialized program in latest advances in computer networking issues. It builds the student on higher studies and research awareness in overall networking issues in IT and ICT fields 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. Computer Network 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. Computer Network** 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 02 external credits and 02 internal credits. The university shall conduct the end semester examination for 02 external credits. For theory internal credit, student has to appear for 02 class test (15 marks) and 01 assignment (20 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 credits 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. Computer Network** 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. Computer Network 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
3. enhancement activity of 01 credits.
4. One Credit = 25 marks , Two Credits = 50 Marks, Four Credits = 100 Marks

PEO, PO and CO Mappings

1. **Program Name** : M.Sc.(CN) Campus

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 computer netwrok by incorporating creativity and logical reasoning.
PEO II : Successful Career	Deliver professional services with updated technologies in computational science 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 computer network environment
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

The detailed syllabus is as below,

CBCS Revised Syllabus w.e.f AY:2020-2021

Program: M.Sc.(Computer Network) – Campus School

Sr. No	Course category	Course Code	Course Title	Internal credits	External credits	Total credits
Third Semester						
1.	**Core Subjects**	NCN-301	Network Design and Analysis	2	2	4
2		NCN-302	Internetworking Protocols	2	2	4
3		NCN-303	Cloud Computing	2	2	4
Choose any one from below elective subjects						
4	**Elective Subject**	NCN-304 A	Switching and Routing	2	2	4
		NCN-304 B	Linux and Network Administration			
Practical /Lab						
5	**Lab / Practical**	NCN-305	Lab-5: Network Design and Analysis	1	1	2
		NCN-306	Lab-6: Linux Administration	1	1	2
6	**Open Elective**	NCN-307A	University recognized MOOC (NPTEL / SWAYAM / others) OR Intra / Inter Departmental OR Intra / Inter School OR	4	0	4
		NCN-307 B	Mobile Communications			
7	**Skill based Activity**	NCN-308	SK-03 : Seminar Presentation Activity	1	0	1
	Total credits					**25**

CBCS Revised Syllabus w.e.f AY:2020-2021
Program: M.Sc.(Computer Network) – Campus School

Sr. No	Course category	Course Code	Course Title	Internal credits	External credits	Total credits
Fourth Semester						
1.	**Core Subjects**	NCN-401	Mobile Application Development	2	2	4
2		NCN-402	Introduction to Web Technologies	2	2	4
3		NCN-403	Major Project development Activity	0	4	4
Choose any one from below elective subjects						
4	**Elective Subject**	NCN-404 A	Internet of Things (IoT)	2	2	4
		NCN-404 B	Advanced Operating Systems			
Practical /Lab						
5	**Lab / Practical**	NCN-405	Lab-7: Mobile Application Development	1	1	2
		NCN-406	Lab-8: Web Technology	1	1	2
6	**Open Elective**	NCN-407A	University recognized MOOC (NPTEL / SWAYAM / others) OR Intra / Inter Departmental OR Intra / Inter School OR	4	0	4
		NCN-407 B	Client and Server Technology			
7	**Skill based Activity**	NCN-408	SK-04	1	0	1
	Total credits					**25**

NCN-301: : Network Design and Analysis

Course Objectives

The primary objective of this course is to give students an understanding of how to design, manage and secure a computer network. It further examines how network managers and system admin can strategically use different techniques to capture and analyze network and system data to create a competitive advantage.

Course Outcomes

Completing this course student will understand Network design and implementation of Network operations and management, Network Monitoring and reporting, Traffic analysis and maintaining Security

Course Contents

Unit 1 – Introduction

This Unit introduces the course, Networking Basics, networking terminology, common physical and logical topologies, networking architectures and protocols, network connections, and the Open Systems Interconnection (OSI) model.

Unit 2 – Cables and Connectors

Twisted pair, coaxial and fibre optic cabling, standards, specifications, and components used for wiring implementation. Networking Devices, adapters, routers, firewalls, and layer3 switches.

Unit 3 – Ethernet

Ethernet architecture, specifications, network devices connection. Network Implementation, IP addressing, assigning IP addresses, mapping logical host names to IP addresses, routing, and accessing the Internet,.

Unit 4 – Wireless Networking

radio frequency wireless network, Networking architecture, infrastructure, and wireless standards (802.11, Infrared, and Bluetooth). Implement security on a wireless network; configure a wireless network, Wide Area Networks (WANs), (WAN) technologies, structure, and services.

Unit 5 – Network Security

Various network threats. firewall, a Virtual Private Network (VPN), and switch features to enhance security. Authentication and encryption for the network. An Intrusion Detection System (IDS) and network monitoring tools. Network Management, components of network management. SNMP, remote management, network monitoring tools, and elements to optimize the performance of the network.

Unit 6 – Troubleshooting

systematic methodology for troubleshooting, tools to troubleshoot network connectivity problems, and commands to gather network information and troubleshoot IP configuration problems. troubleshoot name resolution, switching and routing problems.

Text Books

1. Data Networks- D. Bertsekas and R. Gallager, Prentice-Hall,

2. Computer Networks: A Systems Approach- L. Peterson and B. Davies, McGraw Hill.

Reference Books

1. Computer Networks- A. S. Tanenbaum, 4th edition, Prentice Hall.

2. Introduction to Probability Models - S. Ross, 9th edition, Elsevier Press.

3. Queueing Systems Volume 1: Theory - L. Kleinrock, Wiley Publications.

NCN- 302 : Internetworking Protocols

UNIT – I : Network Models: Layered Tasks, The OSI Model, Layers in OSI Model, TCP/IP Protocol suite,
Addressing. Connecting devices: Passive Hubs, Repeaters, Active Hubs, Bridges, Two Layer Switches, Routers, Three Layer Switches, Gateway, Backbone Networks.

UNIT – II : Internetworking Concepts: Principles of Internetworking, Connectionless Interconnection, Application Level Interconnection, Network Level Interconnection, Properties of the Internet, Internet Architecture, Interconnection through IP Routers TCP, UDP & IP: TCP Services, TCP Features, Segment, A TCP Connection, Flow Control, Error Control, Congestion Control, Process to Process Communication, User Datagram, Checksum, UDP Operation, IP Datagram, Fragmentation, Options, IP Addressing: Classful Addressing, IPV6.

UNIT – III : Congestion and Quality of Service: Data Traffic, Congestion, Congestion Control, Congestion Control in TCP, Congestion Control in Frame Relay, Source Based Congestion Avoidance, DEC Bit Scheme, Quality of Service, Techniques to Improve QOS: Scheduling, Traffic Shaping, Admission Control, Resource Reservation, Integrated Services and Differentiated Services.

UNIT – IV : Queue Management: Concepts of Buffer Management, Drop Tail, Drop Front, Random Drop, Passive Buffer Management Schemes, Drawbacks of PQM, Active Queue Management: Early Random Drop, RED Algorithm.

UNIT – V : Stream Control Transmission Protocol: SCTP Services, SCTP Features, Packet Format, Flow
Control, Error Control, Congestion Control. Mobile Network Layer: Entities and Terminology, IP Packet Delivery, Agents, Addressing, Agent Discovery, Registration, Tunneling and Encapsulating, Inefficiency in Mobile IP. Mobile Transport Layer : Classical TCP Improvements, Indirect TCP, Snooping TCP, Mobile TCP, Fast Retransmit/Fast \ Recovery, Transmission, Timeout Freezing, Selective Retransmission, Transaction Oriented TCP.

TEXT BOOKS:

- Behrouz A Forouzan, “TCP/IP Protocol Suite”, TMH, 3rd Edition
- B.A. Forouzan, “Data communication & Networking”, TMH, 4th Edition.

NCN-303: Cloud Computing

Course Objectives

This course is to know the emerging trends in Cloud Computing. To have thorough knowledge of Virtualization Technologies and Cloud architecture. To integrate security in cloud applications. To have systematic knowledge of Ubiquitous Computing.

Course Outcomes

Student will Understand and Familiar with the basic concepts of cloud computing. Student will understand how to build large scale distributed systems and cloud applications. Comprehend the importance of cloud security. Understand Ubiquitous Computing and applications.

Course Contents

Unit –1

Defining Cloud computing, essential characteristics of Cloud computing, Cloud deployment model, Cloud service models, Multi-tenancy, Cloud cube model, Cloud economics and benefits, Cloud types and service scalability over the cloud, challenges in cloud NIST guidelines.

Unit - 2

Virtualization concepts, types, Server virtualization, Storage virtualization, Storage services, Network virtualization, Service virtualization, Virtualization management, Virtualization technologies and architectures, Internals of virtual machine, Measurement and profiling of virtualized applications. Hypervisors: KVM, Xen, HyperV Different hypervisors and features.

Unit - 3

Architecture for federated cloud computing, SLA management in cloud computing: Service provider‟s perspective, performance prediction for HPC on Clouds, Monitoring Tools.

Unit - 4

Cloud Security risks, Security, Privacy, Trust, Operating system security, Security of virtualization, Security risks posed by shared images, Security risk posed by a management OS, Trusted virtual machine monitor.

Unit - 5

Cloud Platforms: Amazon EC2 and S3, Cloudstack, Intercloud, Google App Engine, Open Source cloud Eucalyptus, Open stack, Open Nebulla, etc., Applications.

Unit - 6

Basics and Vision, Applications and Requirements, Smart Devices and Services, Human Computer Interaction, Tagging, Sensing and controlling, Context-Aware Systems, Ubiquitous Communication, Management of Smart Devices, Ubiquitous System Challenge and outlook.

Text Books

1. Cloud Computing Principles and Paradigms- RajkumarBuyya, J.Broberg, A. Goscinski, Wiley Publishing.

2. Cloud Security: Comprehensive guide to Secure Cloud Computing- Ronald Krutz, Wiley Publishing.

Reference Books

1. Cloud Computing: Practical Approach- Anthony T. Velte, McGraw Hill.

2. Cloud Security and Privacy- Tim Mather, O‟REILLY Publication.

NCN-304 A: Switching and Routing

Course Objectives

As Enterprises migrate toward controller based architectures, the role and skills required of a core network engineer are evolving and more vital than ever. To prepare for this network transition, but ensure that they stay relevant with skill sets needed for the adoption.

Course Outcomes

This course let students understand the concepts of Switching and Routing. It will make student to be familiar with the related concepts of finding network paths, routing loops, Tree addressing.

Course Contents

Unit 1: Routing and Switching Strategies

Switching, Forwarding and Filtering Traffic, Forwarding Based on MAC Addresses, Routing: Finding Paths: Routing Devices, Static Routes, Default Routes, Dynamic Routes, Routing Protocols, Choosing or Installing a Route, Routing Loops, Discard or Null Routing, IPv6

Unit 2: Host Routing

The Decision Process (Case 1: Destination Is on the Same Network as the Source, Case 2: Destination Is on a Different Network than the Source), What If the Default Gateway Is Not Known?, Host Routing Tables, Addressing, Tracking the Packets: Case 1: Destination Is on the Same Network as the Source, Case 2: Destination Is on a Different Network than the Source

Unit 3: Spanning Tree and Rapid Spanning Tree

Why Are Loops Bad?, The Structure of Spanning Tree BPDUs : (The Comparison Algorithm, Some Definitions, Spanning Tree Addressing, Port States, Spanning Tree Timers), The Operation of Spanning Tree, Spanning Tree Messages, VLANs and Spanning Tree, The Rapid Spanning Tree Protocol, The Operation of RSTP, Security

Unit 4: VLANs and Trunking Problem

Big Broadcast Domains, What Is a VLAN? (The Effect of VLANs, VLAN Ports Do Not Need to be Continuous, Types of VLANs, VLANs Between Switches ,What is a Trunk? (Trunking Protocol Standards, Pruning, VLAN Design Considerations)

Unit 5: Routing Information Protocol

Version 1 V/S Version 2, Protocol Description, Structure, Basic Operation (Timers, Addressing), Advanced Operation (Split Horizon, Poisoning, Poison Reverse, Triggered Updates, Count to Infinity, How Do I Get Off of My Network?, RIP and Loops, Security ,RIP and IPv6

Unit 6: Open Shortest Path First

Protocol Description, Being Link State, Structure and Basic Operation, Hello, DB Description, Link State Request, Link State Update, Link State ACK, Timers, Advanced Operation, OSPF and IPv6

Text Books

1. CCNA Routing and Switching, Todd Lammle, Sybex

2. Switching Basics and Intermediate Routing CCNA 3 Companion Guide- Cisco.

Reference Books

1. Packet Guide to Routing and Switching by *Bruce Hartpence***,** O‟Reilly books

2. Network Basics of Bridging, Routing, and Switching- J. Walter, Junos OS for Dummies.

NCN-304 B: Linux and Network Administration

Course Objectives

This course introduces the UNIX/Linux family of operating systems. Basic commands, utilities, System structures, scripting and tools are explored. Elements of system administration are presented. This course is primarily oriented for would-be users of UNIX -- in the words of the course text, p. iv, for those "primarily interested in it as a tool". It is not a course in UNIX system programming (it is not a course in UNIX internals), nor is it a course in UNIX system administration, although I hope we will brush up against a few aspects of UNIX system administration during the course of the semester.

Course Outcome

Students who complete the course will have demonstrated the ability to do the use of basic UNIX/Linux commands from the command line (from a terminal window); organize and manage their files within the UNIX/Linux file system; organize and manage their processes within UNIX/Linux; usefully combine UNIX/Linux tools using features such as filters, pipes, redirection, and regular expressions; customize their UNIX/Linux working environment; be knowledgeable enough about basic UNIX/Linux shell scripting to be able to successfully read and write bash shell scripts; know how to use UNIX/Linux resources to find additional information about UNIX/Linux commands.

Course Contents

Unit- 1:

Definition of Operating System, Types of Operating System, features of Linux, Basic Architecture of Unix/Linux system, features of Kernel and Shell.

Unit-2:

Linux/Unix File system - Boot block, super block, Inode table, data blocks, How Unix/Linux kernel access files, Unix/Linux standard file system.

Unit 3:

Structure of file system, Essential Linux commands - Commands for files and directories creating and viewing files using cat, cd, ls, cp, md, rm, mkdir, rmdir, pwd, file, more, less, file comparisons –cmpandcomm, View files, disk related commands, checking disk free spaces, chmod with its options, cal,date,who,tty, lp,stty.

Unit 4:

Filters and pipes: head, tail ,wc, pr, cut, paste, sort, uniqe, grep, egrep, fgrep ,tee,
The process: shell process, parent and children, process status, system process, multiple jobs in background and foreground, changing process priority with nice, premature termination of process, Mathematical commands- bc, expr, factor, units.

Unit 5:

Creating and editing files with VI editor with their command options, Operators, text deletion, text movement, changing text, yanking text, filtering text, the ex mode, moving text from one file to another. Communication: The bulletin board –news, write, mesg, talk, mail, elm, pine, finger, vacation and connecting to remote machine.

Unit 6:

System administration Common administrative tasks, identifying administrative files configuration and log files, Role of system administrator, Managing user accounts-adding and deleting users, changing permissions and ownerships, Installation of Unix/Linux system– Unix/Linux Installation requirement, complete Procedure steps, Partitioning the Hard drive, System startup and shut-down process, init and run levels. File system mounting, lpstat, backup strategy, installing software on Unix/Linux.

Text Books

1. Unix – Syed Mansoor Sarwar, Robert kortskey - Pearson Education.

Reference Books:

1. Unix concepts and Application- Sumitabha Das, Tata McHill
2. Using Linux – David Bandel and Napier, Pearson Education

Course Code:	NCN-305	Lab-5 : Network Design and Analysis	Credits: 02
Course Objectives: As per the Lab Manual circulated to students by the concerned Teacher			
Course Outcome: As per the Lab Manual circulated to students by the concerned Teacher			
Experiments As per the Lab Manual circulated to students by the concerned Teacher			

NCN-306 Lab-6: Linux Administration

Lab Course Objectives

This course explores different ways that Linux can be deployed with a strong emphasis on command line administration; students will learn how to manage user accounts, file systems, and processes while gaining hands-on experience installing, configuring, and administering a Linux system.

1. Installation of Red HAT/any other available Linux operating system.
a. Partitioning drives b. Configuring boot loader (GRUB/LILO) c. Network configuration d. Setting time zones e. Creating password and user accounts f. Shutting down
2. Software selection and installation
3. Basic Commands
4. Do the following changes in Grub file a. Write the path where the grub file is located. b. Change the timeout and title of the system.
5. Setting up Samba Server
6. Configuring dhcp server and client
7. Configure a DNS Server with a domain name of your choice.
8. Configure a Linux server and transfer files to a windows client . (Setting up NFS File Server)
9. Connecting to the internet a. Setting up linux as a proxy server b. Configuring mozilla or firefox to use as a proxy.
10. Configuring Mail Server.
11. Configure FTP on Linux Server. Transfer files to demonstrate the working of the same.
12. Using gcc compiler (Programming using C).
13. Using gcc ++ compiler (Programming using C++).
14. Configuring Apache Web Server.
15. Linux system administration a.)Becoming super user b.)Temporarily changing user identity with su command c.)Using graphical administrative tools d.) Administrative commands e.) Administrative configuration files Using javac compiler

Code: NCN-307 A	Third Semester	Open Elective	Credits:04
Open Elective : University recognized MOOC (NPTEL / SWAYAM / others) OR Intra / Inter Departmental courses or Intra School or Inter School			

OR

NCN-307 B: Mobile Communications

Course Objectives

This course to make students familiar with fundamentals of mobile communication systems. To choose system (TDMA/FDMA/CDMA) according to the complexity, installation cost, speed of transmission, channel properties etc. To identify the requirements of mobile communication as compared to static communication. To identify the limitations of 2G and 2.5G wireless mobile communication and use design of 3G and beyond mobile communication systems. As a prerequisite for the course in Wireless LANs.

Course Outcomes

This course make students familiar with various generations of mobile communications. To understand the concept of cellular communication. To understand the basics of wireless communication. Knowledge of GSM mobile communication standard, its architecture, logical channels, advantages and limitations.

Course Contents

Unit 1 Wireless Communication Fundamentals:
Introduction , Wireless transmission , Frequencies for radio transmission , Signals , Antennas , Signal Propagation , Multiplexing , Modulations , Spread spectrum , MAC , SDMA , FDMA , TDMA , CDMA , Cellular Wireless Networks.

Unit 2 Telecommunication Networks:
Telecommunication systems , GSM , GPRS , DECT , UMTS , IMT-2000 , Satellite Networks - Basics , Parameters and Configurations , Capacity Allocation , FAMA and DAMA , Broadcast Systems , DAB - DVB.

Unit 3 Wireless LAN:
WIRLESS LAN : Wireless LAN , IEEE 802.11 - Architecture , services , MAC , Physical layer, IEEE 802.11a - 802.11b standards , HIPERLAN , Blue Tooth.

Unit 4 Mobile Network Layer:
Mobile IP, Dynamic Host Configuration Protocol - Routing , DSDV , DSR , Alternative Metrics.

Unit 5 Transport and Application Layer:
Traditional TCP, Classical TCP improvements, WAP, WAP 2.0.

Unit 6 Mobile Operating System:
Symbian OS, Android, Mac OS X (iPhone),Others (Windows Mobile, BlackBerry, Palm, Linux), Cross - platform: Java ME.

Text Books

1. Wireless Communications: Principles and Practice- Theodore S Rappaport, Pearson.
2. Digital Communication with Emphasis on Data Modems: Theory, Analysis, Design, Simulation, Testing, and Applications- Richard W. Middlestead, Wiley Press.

Reference Books

1. Satellite Communications Systems Engineering: Atmospheric Effects, Satellite Link Design and System Performance- Louis J. Ippolito Jr., Wiley Press.

Course Code:NCN-308

Course Title: Seminar Presentation Activity (SK-03 Skill Based Activity)

Objectives :

1. To enable a student to be familiar with Communication skills
2. Student is expected to Learn – how to deliver a seminar
3. Every student must deliver a seminar on recent topic and one seminar report has to be submitted

NCN-401: Mobile Application Development

Course Objectives

Today's applications are increasingly mobile. This course teaches students how to build mobile apps for Android that is today's mobile operating platforms. Students learn to write both web apps and native apps for Android using Eclipse and the Android SDK platforms.

Course Outcomes

At the conclusion of the course, students should be able to understand the basic concepts of mobile computing, Learn the basics of mobile telecommunication system, Be exposed to Ad-Hoc networks and Gain knowledge about different mobile platforms and application development

Course Contents

Unit 1 Introduction

Introduction to Mobile Computing, Introduction to Android Development Environment, Factors in Developing Mobile Applications, Mobile Software Engineering, Frameworks and Tools, Generic UI Development, Android User Understanding B4A for Android: Installing Basic4Android and Android SDK, Install and configure Basic4Android, Installing Android Emulator, My first program (MyFirstProgram.b4a), Second program (SecondProgram.b4a)

Unit 2 Understanding Android Mobiles and the IDE of B4A

Screen sizes and resolutions (Special functions like 50%x, 50dip, PerXToCurrent, PerYToCurrent - 50%x, DipToCurrent - 50dip), Understanding various Android Emulators for B4A, Understanding B4A bridge (The Designer, Tools, General Setting)

Menu and Toolbar, Toolbar, File menu, Edit menu, Project menu, Tools menu, Code area, tabs

Unit 3 Process and Activity life cycle

Variables and objects, Variable Types, Names of variables, declaring variables, Simple variables, Array variables, Array of views (objects), Type variables, Casting, Scope(Process variables, Activity variables, Local variables), Tips and Modules(Activity modules, Code modules, Service modules)

Unit 4 Understanding Basic Language

Program flow, Process Globals routine, Globals routine, Activity Create (First Time As Boolean) routine, Activity Resume routine, Activity Pause (User Closed As Boolean) routine, Expressions (Mathematical expressions, Relational expressions, Boolean expressions), Conditional statements (If – Then – End If, Select – Case) Loop structures (For – Next, Do – Loop), Subs (Declaring, Calling a Sub, Naming, Parameters, Returned value),Events, Libraries (Standard libraries, Additional libraries folder)

Unit 5 Creating User Interface,

Menu example, TabHost example, Button toolbox example, Scroll View examples, SQLite Database (SQLite Database basics, SQLite Database example program), GPS (GPS Library, GPS Objects)

Unit 6:

String manipulations, Files (File object, Text Writer, Text Reader, Text encoding), Graphics and Drawing

Text Books

1. Fundamentals of Mobile Computing- Prasant Kumar Pattnaik, Rajib Mall, PHI Learning Pvt.Ltd, New Delhi.

Reference Books

1. Java: A Beginner‟s Guide- Herbert Schildt, Oracle Press.

2. Learning Java by Building Android Games- John Horton, Packt Publishing.

3. Android Programming for Beginners- John Horton, Packt Publishing.

NCN-402: Introduction to Web Technologies

Course Objectives

This course will cover the practical aspects of multi-tier application development using the .NET framework. This course is to introduce the basics of distributed application development. Technologies covered include the Common Language Runtime (CLR), .NET framework classes, VB, ASP.NET, and ADO.NET. It also cover service oriented architecture, design, performance, security, content managements and deployment issues building multi-tier applications.

Course Outcomes

Upon completion of this course, the student will be able apply technical knowledge and perform specific technical skills, including design web applications using ASP.NET.

Course Contents

Unit 1 Web Components

Introduction to Internet, Web Client/Server Model, Protocols for Web Client/Server Communication, Understanding Web Server IIS.

Unit 2 Introduction to ASP.NET

DOT NET Framework, CLR, Framework Class Library, Garbage Collection, MSIL, Web Services, COM+ Component Services, Intro to ASP.NET, ASP.NET and HTML Controls, ASP.NET Events and Events Handler.

Unit 3 Web Programming with VB.

Data Types, Variables, Expressions, Flow Control, Operators, Conditional Statements, Looping Structures, Arrays, OOP Concepts, Objects, Properties, Methods, Classes, Scope, Events

Unit 4 Essentials ASP.NET

Working with Web forms, Directory Structure in ASP.NET, ASP.NET Compilation Model, Code behind Model, Working with Web form Controls, Navigation Controls, Validation Controls, Validation Groups, Client/Server Side Validation.

Unit 5 ASP.NET Master Page

ASP.NET Master Page Overview, Master Page Layout with CSS, Master Page Directive and Content Place Holder, Creating and Applying Themes, Cookies, ASP.NET Session State, Application State

Unit 6 Data Access with ADO.NET

Working with ADO.NET, Overview of ADO.NET Objects, Working with Connection Object, Command Object, Data Adapter Object, Data Set Object, Data Reader Object, Data Table Object.

Text Books

1. ASP.NET and VB.NET Web Programming - Coruch Matt J, Addison Wesley.

2. ASP.net – The Complete Reference- Matthew MacDonald, Tata McGraw Hill

3. Beginning ASP.NET 2.0- John Wiley and Sons, Wrox Publication.

Reference Books:

1. ASP.NET3.5 in C# and VB- Bill Evjen, S. Hanselman, Devin Rader, Wrox Publication

2. Pro ADO.NET 2.0- Sahil Malik, A-Press.

3. Ado.Net: The Complete Reference- Michael Otey, Tata McGraw-Hill Education

Course Code: NCN-403
Course Title: Major Project development Activity

Course Objectives:

To provide a postgraduate level knowledge in computer science, including understanding, analysis, management, and handling of real-life information technology problems in workplace. Students are encouraged to problems from real life / NGO/ / state-central govt projects/ hackathon/ etc

Course Outcome:

Project based learning will increase their capacity and learning through shared cognition. Students will have an ability to identify, formulate and implement computing solutions. Students will be able to design a system, component or process as per needs and specification.

Guidelines for Project Development:

1. A group of maximum three students should be formed at the beginning of the semester
2. Each project will be allotted one project guide.
3. Students must submit the project topic and synopsis to the project guide.
4. Students will be given a project approval letter signed by the head of department and the project guide.
5. After receiving a project approval letter, students must submit at least three progress reports of their development in project to the guide, one per month.
6. After completion of project students have to give pre-exam demo to his guide.
7. After finalization of the project, students must prepare minimum 03 copies of the project reports, out of which one copy is for the college and one copy is for the university records. University/College copy must be bind with black covering with golden embossment and it should contain
   i. First Page
   ii. Certificate
   iii. Declaration
   iv. Acknowledgement
   v. Project Approval letter
   vi. Three Progress reports
   vii. System Flow Diagram/DFD
   viii. Chapter wise briefing, results, conclusions, snapshots, code, etc
   ix. Bibliography

NCN-404 A : Internet of Things (IoT)

Course Objectives

The objective of the course is to Vision and Introduction to IoT Data and Knowledge Management and use of Devices in IoT Technology. Understand State of the Art IoT Architecture. Industrial Automation and Commercial Building Automation in IoT.

Course Outcomes

At the end of the course the student will be able to understand the vision of IoT from a global context. Use of Devices, Gateways and Data Management in IoT. Building state of the art architecture in IoT. Application of IoT in Industrial and Commercial Building Automation.

Course Contents

Unit -1 M2M to IoT

The Vision-Introduction, From M2M to IoT, M2M towards IoT-the global context, A use case example, Differing Characteristics.

Unit-2 M2M to IoT

A Market Perspective, Introduction, Some Definitions, M2M Value Chains, IoT Value Chains, An emerging industrial structure for IoT, The international driven global value chain and global information monopolies. M2M to IoT-An Architectural Overview– Building an architecture, Main design principles and needed capabilities, An IoT architecture outline, standards considerations.

Unit -3 M2M and IoT Technology Fundamentals

Devices and gateways, Local and wide area networking, Data management, Business processes in IoT, Everything as a Service (XaaS), M2M and IoT Analytics, Knowledge Management

Unit -4 IoT Architecture-State of the Art

Introduction, State of the art, Architecture Reference Model- Introduction, Reference Model and architecture, IoT reference Model

Unit-5 IoT Reference Architecture

Introduction, Functional View, Information View, Deployment and Operational View, Other Relevant architectural views. Real-World Design Constraints- Introduction, Technical Design constraints-hardware is popular again, Data representation and visualization, Interaction and remote control

Unit -6 Industrial Automation

Service-oriented architecture-based device integration, SOCRADES: realizing the enterprise integrated Web of Things, IMC-AESOP: from the Web of Things to the Cloud of Things, Commercial Building Automation- Introduction, Case study: phase one-commercial building automation today, Case study: phase two- commercial building automation in the future.

Text Books

1. From Machine-to-Machine to the Internet of Things: Introduction to a New Age of Intelligence- Jan Holler, Vlasios Tsiatsis, 1st Edition, Academic Press.

Reference Books

1. Internet of Things A Hands-on-Approach- Vijay Madisetti and Arshdeep Bahga, VPT.

NCN-404 B: Advanced Operating Systems

Course Objectives

This course covers general issues of design and implementation of advanced modern operating systems. The focus is on issues that are critical to the applications of distributed systems and computer networks, which include interposes communication, distributed processing, sharing and replication of data and files.

Course Outcomes

Completion of this course will help students to learn fundamentals of operating systems. To gain the knowledge on distributed operating system concepts that includes architecture, mutual exclusion algorithms, deadlock detection algorithm and agreement protocols.

Course Contents

Unit 1:

Introduction Functions of operating systems, Design approaches: layered, kernel based and virtual machine approach, why advanced operating systems, types of advanced operating systems

Unit 2:

Distributed Operating Systems Architecture of distributed operating systems, system architecture types, issues in distributed operating systems, inherent limitation of distribute systems, distributed mutual exclusion: classification of mutual exclusion algorithms, Lamport‟s ,token based algorithm, Suzuki-Kasami‟s Broadcast algorithm, Raymond‟s Tree based algorithm, Distributed deadlock detection, Distributed file systems, Distributed shared memory, Distributed scheduling

Unit 3:

Multiprocessor Operating Systems Introduction, structure of multiprocessor operating system, operating system design issues, threads, the test and set instruction, the swap instruction, implementation of the process wait , processor scheduling, reliability and fault tolerance.

Unit 4:

Real Time Operating System Introduction to Real time systems and Real Time Operating Systems, Characteristics of Real Time operating Systems, Classification of Real Time Operating Systems, Services, structure, goal and feature of RTOS, architecture of RTOS, micro kernels and monolithic kernels, tasks in RTOS, Performance measures, estimating program runtimes, task assignment, scheduling in RTOS, rate monotonic scheduling, priority inversion, task management, inter task communication, applications of various RTOS.

Unit 5:

Data base operating Systems Introduction to database operating systems, concurrency control: theoretical aspect, distributed database system, concurrency control algorithms

Unit 6:

Mobile Operating System Symbian O.S.: introduction, kernel design in Symbian OS, scheduling in Symbian OS, File systems on mobile phones, I/O in Symbian OS, Application development using Android. Introduction to cloud OS.

Text Books:

1. Advanced Concepts in Operating Systems- M Singhal and NG Sivaratri, Tata McGraw Hill

2. Distributed Operating system- A.S. Tanenbaum, Pearson Education Asia.

3. Modern Operating system- A.S. Tanenbaum, 3rd edition, Prentice Hall.

Reference Books:

1. Real Time Operating System- Sebastian Fischmeister, Barr Group Publishing.

2. Real-Time Systems- Jane Liu, Pearson Ed. Asia.

3. Real -Time Systems- Krishna and Shin, McGraw Hill International.

4. Smart phone operating system concepts with Symbian O.S. A tutorial Guide- Michael J. Jipping. Symbian Press, Wiley.

5. Application development using Android, Hello, Android, mobile development platform-Ed Burnett, 3rd Edition, The Pragmatic Bookshelf.

NCN-405 : Lab-7 : Mobile Application Development

1. Develop an application that uses GUI components, Font and Colours
2. Develop an application that uses Layout Managers and event listeners.
3. Develop a native calculator application.
4. Write an application that draws basic graphical primitives on the screen.
5. Develop an application that makes use of database.
6. Develop an application that makes use of RSS Feed.
7. Implement an application that implements Multi threading
8. Develop a native application that uses GPS location information.
9. Implement an application that writes data to the SD card.
10. Implement an application that creates an alert upon receiving a message.
11. Write a mobile application that creates alarm clock

NCN-406 : Lab-8: Web Technologies

Lab Course Objectives

This course will cover the practical aspects of multi-tier application development using the .NET framework. This course is to introduce the basics of distributed application development. Technologies covered include the Common Language Runtime (CLR), .NET framework classes, VB, ASP.NET, and ADO.NET. It also cover service oriented architecture, design, performance, security, content managements and deployment issues building multi-tier applications.

List of Experiments

1. Simple application using web controls a) Finding factorial Value b) Money Conversion c) Quadratic Equation d) Temperature Conversion e) Login control
2. States of ASP.NET Pages
3. Ad-rotator Control
4. Calendar control a) Display messages in a calendar control b) Display vacation in a calendar control c) Selected day in a calendar control using style d) Difference between two calendar dates
5. Tree-view control a) Tree-view control and data-list b) Tree-view operations
6. Validation controls
7. Query textbox and Displaying records
8. Display records by using database
9. Data-list link control
10. Data-binding using drop-down-list control
11. Inserting record into a database
12. Deleting record into a database
13. Data-binding using data-list control
14. Data-list control templates
15. Data-binding using data-grid
16. Data-grid control template
17. Data-grid hyperlink
18. Data-grid button column
19. Data-list event
20. Data-grid paging
21. Creating own table format using data-grid

Code: NCN-407 A	Forth Semester	Open Elective	Credits:04
Open Elective : University recognized MOOC (NPTEL / SWAYAM / others) OR Intra / Inter Departmental courses or Intra School or Inter School			

OR

NCN-407 B : Client and Server Technology

UNIT-I Client/Server Computing – Advantages of Client / Server Computing – Technology Revolution – Connectivity – Ways to improve Performance – How to reduce network Traffic

UNIT-II Components of Client/Server Applications – The Client: Role of a Client – Client Services – Request for Service. Components of Client/Server Applications – The Server: The Role of a Server – Server Functionality in Detail – The Network Operating System – What are the Available Platforms – The Server Operating system.

UNIT-III Components of Client/Server Applications – Connectivity: Open System Interconnect – Communications Interface Technology – Inter process communication – WAN Technologies.

UNIT-IV Components of Client/Server Applications–Software: Factors Driving demand for application software development – Rising Technology Staff costs – Need to improve Technology – Need for Common Interface across Platforms – Client/Server System Development Methodology. Components of Client/Server Applications–Hardware: Hardware/Network Acquisition – PC-Level

Text Book

1. Network Basics of Bridging, Routing, and Switching- J. Walter, Junos OS for Dummies
2. B.A. Forouzan, "Data communication & Networking", TMH, 4th Edition.

Course Code:NCN-408
Course Title:Skill Based Activity
(SK-04 Soft Skills)

- Soft skill Necessary for IT recruitment and further studies
- Strong technical skills are essential for any IT (information technology) position. However, IT employees also need soft skills, sometimes known as interpersonal skills. IT professionals need to be able to interact successfully with others, as well as manage projects and teams.
- Employers have found that many IT professionals possess as many interpersonal skills as anyone else. Technology experts suffering from more severe social handicaps (such as functional forms of autism) are able to practice and learn interpersonal and other soft skills to help them integrate well within a team.