Scheme & Syllabus of

Bachelor of Vocational Studies
(B.Voc.)
Networking & System Administration

Batch 2019

By Department of Academics
IKG Punjab Technical University

I.K. Gujral Punjab Technical University, Jalandhar
B. Voc. (Networking & System Administration), Batch-2019

Semester 1st

Course Code	Course Title	Load Allocation		Marks Distribution		Total	Credits
		L	P	Internal	External		
BVNS101-19	PC Hardware	3	0	40	60	100	3
BVNS102-19	Computer Networking	3	0	40	60	100	3
BVNS103-19	Communicative English	3	0	40	60	100	3
BVNS104-19	Basic IT Skills	3	0	40	60	100	3
BVNS105-19	PC Hardware Laboratory	0	3	30	20	50	1.5
BVNS106-19	Computer Networking Laboratory	0	3	30	20	50	1.5
On-Job Training / Qualification Pack*							
BVNS107-19	Test Engineer (SSC/Q1301)	On Job Training (OJT) in Collaboration with MoU industry			200	200	15
Total		12	6	220	480	700	30

***The qualification packs may vary from institute to institute.**

Semester 2nd

Course Code	Course Title	Load Allocation		Marks Distribution		Total	Credits
		L	P	Internal	External		
BVNS201-19	Database Management Systems	3	0	40	60	100	3
BVNS202 -19	Object Oriented Programming using C++	3	0	40	60	100	3
BVNS203-19	Computer System Architecture	3	0	40	60	100	3
BVNS204-19	Mathematics	3	0	40	60	100	3
BVNS205-19	Database Management Systems Laboratory	0	3	30	20	50	1.5
BVNS206-19	Object Oriented Programming using C++ Laboratory	0	3	30	20	50	1.5
On-Job Training / Qualification Pack*							
BVNS207-19	Security Analyst (SSC/Q0901)	On Job Training (OJT) in Collaboration with MoU industry			200	200	15
Total		12	6	220	480	700	30

I.K. Gujral Punjab Technical University, Jalandhar
B. Voc. (Networking & System Administration), Batch-2019

Semester 3rd

Course Code	Course Title	Load Allocation		Marks Distribution		Total	Credits
		L	P	Internal	External		
BVNS301-19	**Operating System**	**3**	**0**	**40**	**60**	**100**	**3**
BVNS302-19	**Data Structures**	**3**	**0**	**40**	**60**	**100**	**3**
BVNS303-19	**Windows Configuration and Server Administration**	**3**	**0**	**40**	**60**	**100**	**3**
BVNS304-19	**Computer Network Security**	**3**	**0**	**40**	**60**	**100**	**3**
BVNS305-19	**Data Structures Lab**	**0**	**3**	**30**	**20**	**50**	**1.5**
BVNS306-19	**Operating System Laboratory**	**0**	**3**	**30**	**20**	**50**	**1.5**
On-Job Training / Qualification Pack*							
BVNS307-19	Consultant Network Security (SSC/Q0917)	**On Job Training (OJT) in Collaboration with MoU industry**			**200**	**200**	**15**
Total		**12**	**6**	**220**	**480**	**700**	**30**

***The qualification packs may vary from institute to institute.**

Semester 4th

Course Code	Course Title	Load Allocation		Marks Distribution		Total	Credits
		L	P	Internal	External		
BVNS401-19	**Linux Operating System**	**3**	**0**	**40**	**60**	**100**	**3**
BVNS402-19	**Wireless Communication**	**3**	**0**	**40**	**60**	**100**	**3**
BVNS403-19	**TCP/IP Protocols**	**3**	**0**	**40**	**60**	**100**	**3**
BVNS404-19	**Programming using Python**	**3**	**0**	**40**	**60**	**100**	**3**
BVNS405-19	**Linux Operating System Lab**	**0**	**3**	**30**	**20**	**50**	**1.5**
BVNS406-19	**Programming using Python Lab**	**0**	**3**	**30**	**20**	**50**	**1.5**
On-Job Training / Qualification Pack*							
BVNS407-19	Junior Software Developer (SSC/Q0508)	**On Job Training (OJT) in Collaboration with MoU industry**			**200**	**200**	**15**
Total		**12**	**6**	**220**	**480**	**700**	**30**

I.K. Gujral Punjab Technical University, Jalandhar
B. Voc. (Networking & System Administration), Batch-2019

Semester 5th

Course Code	Course Title	Load Allocation		Marks Distribution		Total	Credits
		L	P	Internal	External		
BVNS501-19	Cloud Computing	**3**	**0**	**40**	**60**	**100**	**3**
BVNS502-19	Computer Peripherals and Interfaces	**3**	**0**	**40**	**60**	**100**	**3**
BVNS503-19	Internet of Things	**3**	**0**	**40**	**60**	**100**	**3**
BVNS504-19	Cyber Forensics	**3**	**0**	**40**	**60**	**100**	**3**
BVNS505-19	Cloud Computing Lab	**0**	**2**	**30**	**20**	**50**	**1**
BVNS506-19	Internet of Things Lab	**0**	2	**30**	**20**	**50**	**1**
BVNS507-19	Cyber Forensics Lab	**0**	**2**	**30**	**20**	**50**	**1**
On-Job Training / Qualification Pack*							
BVNS508-19	Hardware Engineer (SSC/Q4701)	**On Job Training (OJT) in Collaboration with MoU industry**			**200**	**200**	**15**
Total		**12**	**6**	**250**	**500**	**750**	**30**

Semester 6th

Course Code	Course Title	Load Allocation		Marks Distribution		Total	Credits
		L	P	Internal	External		
BVNS601-19	Network Maintenance and Troubleshooting	**3**	**0**	**40**	**60**	**100**	**3**
BVNS602-19	Penetration Testing Using Open Source Technologies	**3**	**0**	**40**	**60**	**100**	**3**
BVNS603-19	Network Simulation Tools	**3**	**0**	**40**	**60**	**100**	**3**
BVNS604-19	Firewall & Intrusion Detection	**3**	**0**	**40**	**60**	**100**	**3**
BVNS605-19	Network Maintenance and Troubleshooting Lab	**0**	**2**	**30**	**20**	**50**	**1**
BVNS606-19	Penetration Testing Using Open Source Technologies Lab	**0**	2	**30**	**20**	**50**	**1**
BVNS607-19	Network Simulation Tools Lab	**0**	**2**	**30**	**20**	**50**	**1**
On-Job Training / Qualification Pack*							
BVNS608-19	**On Job Training with MoU Industry**				**200**	**200**	**15**
Total		**12**	**6**	**250**	**500**	**750**	**30**

I.K. Gujral Punjab Technical University, Jalandhar
B. Voc. (Networking & System Administration), Batch-2019

Course Code: **BVNS101-19**
Course Name: **PC Hardware**

Program: **B. Voc.**	L: **3** T: 0 P: 0
Branch: **Networking & System Administration**	Credits: **3**
Semester: **1st**	Contact hours: **33**
Theory/Laboratory: **Theory**	Elective status: **Core**
Internal max. marks: **40**	External max. marks: **60**
Total marks: **100**	

Course Outcomes:

CO#	Course outcomes
CO1	To Identify the hardware components of a computer including names and functions of hardware ports and the parts of the motherboard.
CO2	To identify the peripheral devices outside computer & to Search PC for the various hardware components it contains.
CO3	To identify the software's running on a computer.
CO4	To equip the students about the Basic of how Computer is assembled and troubleshooting it.

Detailed contents	Contact hours
Unit 1: Assemble/setup and upgrade personal computer systems: computer system modules/ components and its operations, need of hardware and software for computer to work, different hardware components within a computer and connected to acomputer as peripheral devices, type of computer bus structures, different processors used for personal computers and note book computers	9
Unit 2: Perform installation, configuration, and upgrading of microcomputer: Hardware and software requirement, Assemble/setup microcomputer systems, accessory boards, types of motherboards, selection of right motherboard, Installation &replacement of motherboard, troubleshooting problems with memory.	8
Unit 3: Install/connect associated peripherals: Working of printers and scanners, Installation of printers and scanners, sharing a printer over a local area network, troubleshooting printer and scanner problems, troubleshooting hard drive problems.	8
Unit 4: Diagnose and troubleshooting of microcomputer systems hardware & software and other peripheral equipment: Approaches to solve a PC problem, troubleshooting a failed boot before the OS is loaded, different approaches to installing and supporting I/O device, managing faulty components.	8

Text Books:

1. PC Hardware: The Complete Reference, McGraw-Hills.
2. The Indispensable PC Hardware Book (4th Edition) Hans-Peter Messmer.

Reference Books:

1. PC Hardware: A Beginner's Guide by Ron Gilster.

I.K. Gujral Punjab Technical University, Jalandhar
B. Voc. (Networking & System Administration), Batch-2019

Course Code: **BVNS102-19**

Course Name: **Computer Networking**

Program: **B. Voc.**	L: **3** T: 0 P: 0
Branch: **Networking & System Administration**	Credits: **3**
Semester: **1st**	Contact hours: **33**
Theory/Laboratory: **Theory**	Elective status: **Core**
Internal max. marks: **40**	External max. marks: **60**
Total marks: **100**	

Course Outcomes:

CO#	Course outcomes
CO1	Familiar with the different Network Models.
CO2	Understand different protocols working at Medium Access Sub-layer.
CO3	Learn the concept of network routing through algorithms.
CO4	Learn and understand Internet protocols and network security.

Detailed contents	Contact hours
Unit 1 : Data Communications Concepts: Digital and analog transmissions-Modem, parallel and serial, synchronous and asynchronous, Modes of communication: Simplex, half duplex, full duplex, Concept of multiplexing, De-multiplexing. Types of Networks: LAN, MAN, WAN Network Topologies: Bus, Star, Ring, Mesh, Tree, Hybrid Communication Channels: Wired transmissions: Telephone lines, leased lines, switch line, coaxial cables-base band, broadband, optical fiber transmission.	9
Unit 2 : Transmission Media: Guided Media(Twisted Pair Cable, Coaxial Cable, Fiber Optics Cable), Unguided Media (Radio Waves, Microwaves, Infrared) Communication Devices (Switches, Hub, Routers, gateway etc) Introduction to Switching: Circuit Switch Networks, Datagram Switch Networks Network Models.	8
Unit 3 : Introduction to OSI Model – Physical Layer, Data Link Layer, Network Layer, Transport Layer, Session Layer, Presentation Layer TCP/IP (Layer Architecture) Data Link Layer, Internet Layer, Transport Layer, Application Layer	8
Unit 4 : MAC sub layer: 802.4Token Bus, IEEE 802.5 Token Ring Concept of Internetworking.	8

Text Books:

1. Computer Networks, Tanenbaum, Andrew, Fifth Edition, PHI.
2. Data Communication and Networking, Behrouz A. Forouzan, Fourth Edition.
3. Computer Today, S.K. Basandra, First Edition, Galgotia.

Reference Books:

1. Data Communication System, Black, Ulysse, Third Edition, PHI.
2. Data and Computer Communications, Stalling, Ninth Edition, PHI.

I.K. Gujral Punjab Technical University, Jalandhar
B. Voc. (Networking & System Administration), Batch-2019

Course Code: **BVNS103-19**
Course Name: **Communicative English**

Program: **B. Voc.**	L: **3** T: 0 P: 0
Branch: **Networking & System Administration**	Credits: **3**
Semester: **1st**	Contact hours: **33**
Theory/Laboratory: **Theory**	Elective status: **Core**
Internal max. marks: **40**	External max. marks: **60**
Total marks: **100**	

Course Outcomes:

CO#	Course outcomes
CO1	To introduce students to the theory, fundamentals and tools of communication.
CO2	To help the students become the independent users of English language.
CO3	To develop vital communication skills integral to their personal, social and professional interactions.
CO4	The syllabus shall address the issues relating to the Language of communication.
CO5	Students will become proficient in professional communication such as interviews, group discussions, office environments, important reading skills and writing skills.

Detailed contents	Contact hours
Unit1- 1 (Introduction) • Theory of Communication, • Types and modes of Communication	9
Unit- 2 (Language of Communication) • Verbal and Non-verbal • (Spoken and Written) • Personal, Social and Business • Barriers and Strategies • Intra-personal, Inter-personal and Group communication	8
Unit-3 (Reading and Understanding) • Close Reading • Comprehension • Summary Paraphrasing • Analysis and Interpretation • Translation(from Hindi/Punjabi to English and vice-versa • Literary/Knowledge Texts	8
Unit-4 (Writing Skills) • Documenting • Report Writing • Making notes • Letter writing	8

Text Books:

1. Fluency in English - Part II, Oxford University Press, 2006.
2. Business English, Pearson, 2008.

Reference Books:

1. Practical English Usage by Michael Swan. OUP. 1995.
2. Communication Skills by Sanjay Kumar and Pushp Lata. Oxford University Press. 2011.

I.K. Gujral Punjab Technical University, Jalandhar
B. Voc. (Networking & System Administration), Batch-2019

Course Code: **BVNS104-19**
Course Name: **Basic IT Skill**

Program: **B. Voc.**	L: **3** T: 0 P: 0
Branch: **Networking & System Administration**	Credits: **3**
Semester: **1st**	Contact hours: **33**
Theory/Laboratory: **Theory**	Elective status: **Core**
Internal max. marks: **40**	External max. marks: **60**
Total marks: **100**	

Course Outcomes:

CO#	Course outcomes
CO1	Understanding the concept of input and output devices of Computers.
CO2	Learn the functional units and classify types of computers, how they process information and how individual computers interact with other computing systems and devices.
CO3	Learn basic word processing, Spreadsheet and Presentation Graphics Software skills.
CO4	Study to use the Internet safely, legally, and responsibly.
CO5	To develop an understanding and practical exposure to different IT tools used as an aid in business and ecommerce.

Detailed contents	Contact hours
Unit 1 : Human Computer Interface, Concepts of Hardware and Software; Data and Information. Functional Units of Computer System: CPU, registers, system bus, main memory unit, cache memory, SMPS, Motherboard, Ports and Interfaces, expansion cards, ribbon cables, memory chips, processors. Devices: Input and output devices, keyboard, mouse, joystick, scanner, OCR, OMR, bar code reader, web camera, monitor, printer, plotter. Memory: Primary, secondary.	9
Unit 2: Types of Languages: Machine, assembly and High level Language; Operating system as user interface, utility programs. Word processing: Editing features, formatting features, saving, printing, table handling, page settings, spell-checking, macros, mail-merge, equation editors.	8
Unit 3: Spreadsheet: Workbook, worksheets, data types, operators, cell formats, freeze panes, editing features, formatting features, creating formulas, using formulas, cell references, replication, sorting, filtering, functions, Charts & Graphs. Presentation Graphics Software: Templates, views, formatting slide, slides with graphs, animation, using special features, presenting slide shows.	8
Unit 4: The Impact of Computing and the Internet on Society. Electronic Payment System: Secure Electronic Transaction, Types of Payment System: Digital Cash, Electronic Cheque, Smart Card, Credit/Debit Card E-Money, Immediate Payment System (IMPS).	8

Text Books:

1. Introduction to Information Technology, ITL Education Solutions limited, Pearson Education.
2. Computer Fundamentals, A. Goel, 2010, Pearson Education.
3. Fundamentals of Computers, P. K.Sinha& P. Sinha, 2007, BPB Publishers.

Reference Books:

1. Introduction to Computers by Peter Norton.
2. Computers Today by D. H. Sanders, McGraw Hill.
3. Computers by Larry long & Nancy long, 12th edition, Prentice Hall.

I.K. Gujral Punjab Technical University, Jalandhar
B. Voc. (Networking & System Administration), Batch-2019

Course Code: **BVNS105-19**
Course Name: **PC Hardware Laboratory**

Program: **B. Voc.**	L: 0 T: 0 P: **3**
Branch: **Networking & System Administration**	Credits: **1.5**
Semester: **1st**	Percentage of numerical/design problems:-
Theory/Laboratory: **Laboratory**	Duration of end semester exam (ESE):-
Internal max. marks: **30**	External max. marks: **20**
Total marks: **50**	Status (Elective/Core): **Core**

Course Outcomes:

CO#	Course outcomes
CO1	Perform a step by step assembly of a desktop computer.
CO2	Explain, install, and navigate an operating system; upgrade components based on needs and perform preventive maintenance and advanced troubleshooting.
CO3	Perform installation of various types of system software's & utility software's.

Task 1 :	Assembling and De Assembling of Computer System
Task 2 :	Loading and configuration procedure of Microsoft Client O/S Win XP /Win 7 and Windows 8
Task 3 :	Installation of utility tools (Software and Drivers)
Task 4 :	Firewall configuration, Antivirus/Internet security loading and configuration procedure
Task 5 :	Installation and configuration of , I/O devices – Printers , Webcams , Scanners, Digital Camera , USB Wifi , USB BT, USB Storages , Projectors
Task 6 :	Multiple OS loading and trouble shooting

Recommended Hardware:

Scrap CPUs, Scrap PC Cabinet, SMPS and other basic components, Scrap Motherboard and Different Types of Processors, Scrap RAM, Desktop PC without loading OS, Scrap UPS, Laptop.

Text Books:

1. PC Hardware: The Complete Reference, McGraw-Hills.
2. The Indispensable PC Hardware Book (4th Edition) Hans-Peter Messmer.

I.K. Gujral Punjab Technical University, Jalandhar
B. Voc. (Networking & System Administration), Batch-2019

Course Code: **BVNS106-19**
Course Name: **Computer Networking Laboratory**

Program: **B. Voc.**	L: 0 T: 0 P: **3**
Branch: **Networking & System Administration**	Credits: **1.5**
Semester: **1st**	Percentage of numerical/design problems:-
Theory/Laboratory: **Laboratory**	Duration of end semester exam (ESE):-
Internal max. marks: **30**	External max. marks: **20**
Total marks: **50**	Status (Elective/Core): **Core**

Course Outcomes:

CO#	Course outcomes
CO1	To execute and evaluate network administration commands and demonstrate their use in different network scenarios.
CO2	To demonstrate the installation and configuration of network simulator.
CO3	Demonstrate and measure different network scenarios and their performance behavior.

Task 1 :	Preparing Computer Network Cable using Connectors and Networking tools
Task 2 :	LAN & WAN Connectivity using Hub, Switch and Router
Task 3 :	Installation of Windows and Server
Task 4 :	Sharing Peripheral Devices.
Task 5 :	Configuration of Network Connectivity
Task 6 :	Troubleshooting of Computer Hardware and Network

Recommended Hardware:

Simple Network Components, Networking Components like Switch, Router, Hub, NIC, PC/Laptop, Router, Connectivity Network lab

Text Books:

1. Computer Networks, Tanenbaum, Andrew, Fifth Edition, PHI.
2. Data Communication and Networking, Behrouz A. Forouzan, Fourth Edition.
3. Computer Today, S.K. Basandra, First Edition, Galgotia.

I.K. Gujral Punjab Technical University, Jalandhar
B. Voc. (Networking & System Administration), Batch-2019

Course Code: **BVNS201-19**
Course Name: **Database Management Systems**

Program: **B. Voc.**	L: **3** T: 0 P: 0
Branch: **Networking & System Administration**	Credits: **3**
Semester: **2nd**	Contact hours: **33**
Theory/Laboratory: **Theory**	Status (Elective/Core): **Core**
Internal max. marks: **40**	External max. marks: **60**
Total marks: **100**	

Course Outcomes:

CO#	Course outcomes
CO1	Understand the basic concepts of DBMS.
CO2	Formulate, using SQL, solutions to a broad range of query and data update problems.
CO3	Demonstrate an understanding of normalization theory and apply such knowledge to the normalization of a database.
CO4	Understand the concept of Transaction and Query processing in DBMS.

Detailed Contents	Contact hours
Unit-I: Introduction of DBMS, Data Modeling for a Database, Three level Architecture of DBMS, Components of a DBMS. Introduction to Data Models, Hierarchical, Network and Relational Model, Comparison of Network, Hierarchical, Relational & Entity Relationship Model.	9
Unit-II Relational Database, Relational Algebra and Calculus, SQL Fundamentals, DDL, DML, DCL, PL/SQL Concepts, Cursors, Stored Procedures, Stored Functions, Database Triggers.	8
Unit-III Introduction to Normalization, First, Second, Third Normal Forms, Dependency Preservation, Boyce-Codd Normal Form, Multi-valued Dependencies and Fourth Normal Form, Join Dependencies and Fifth Normal Form, Domain-key normal form (DKNF).	8
Unit-IV Database Recovery, Concurrency Management, Database Security, Integrity and Control. Structure & Design of a Distributed Database.	8

Text Books:

1. An Introduction to Database System by Bipin C. Desai, Galgotia Publications Pvt Ltd-New Delhi, Revised Edition, (2012).
2. An Introduction to Database Systems by C. J. Date, A. Kannan & S. Swamynathan, 8th Edition, Pearson Education, (2006).

Reference Books:

1. SQL, PL/SQL The Programming Language of Oracle", Ivan Bayross, BPB Publications, 4th Revised Edition (2009).
2. Database System Concepts by Abraham Silberschatz, Henry F. Korth & S. Sudharshan, Tata McGraw Hill, 6th Edition, (2013).
3. Database Management Systems, Raghu Ramakrishnan, McGraw-Hill, 3rd Edition, 2014.

I.K. Gujral Punjab Technical University, Jalandhar
B. Voc. (Networking & System Administration), Batch-2019

Course Code: **BVNS2022-19**
Course Name: **Object Oriented Programming using C++**

Program: **B. Voc.**	L: **3** T: 0 P: 0
Branch: **Networking & System Administration**	Credits: **3**
Semester: **2nd**	Contact hours: **33**
Theory/Laboratory: **Theory**	Status (Elective/Core): **Core**
Internal max. marks: **40**	External max. marks: **60**
Total marks: **100**	

Course Outcomes:

CO#	Course outcomes
CO1	To learn programming from real world examples.
CO2	To understand Object oriented approach for finding Solutions to various problems with the help of C++ language.
CO3	To create computer based solutions to various real-world problems using C++.
CO4	To learn various concepts of object oriented approach towards problem solving.

Detailed Contents	Contact hours
Unit-I **Principles of object oriented programming:** Introduction to OOP and its basic features, Basic components of a C++, Program and program structure, Compiling and Executing C++ Program. Difference between Procedure Oriented Language(C) and Object Oriented Language.	9
Unit-II **Classes & Objects and Concept of Constructors:** Defining classes, Defining member functions, Declaration of objects to class, Access to member variables from objects, Different forms of member functions, Access specifiers (Private, public, protected), Array of objects. Introduction to constructors, Parameterized constructors, Copy Constructor, Multiple constructors in class, Dynamic initialization of objects, Destructors.	8
Unit-III **Inheritance and Operator overloading:** Introduction to Inheritance, Types of inheritance: - Single inheritance, Multiple inheritance, Multilevel inheritance, Hierarchical inheritance, Hybrid inheritance, Defining operator overloading, Overloading of Unary and Binary operators, Rules for overloading operators.	8
Unit-IV **Polymorphism and File Handling:** Early Binding, Late Binding, Virtual Functions, pure virtual functions, Abstract Classes. Opening and Closing File, Reading and Writing a file.	8

Text Books:

1. Object Oriented Progg. with C++, E. Balagurusami, Fourth Edition, Tata Mc-Graw Hill.
2. Object Oriented Progg. in Turbo C++, Robert Lafore, 4th Edition Galgotia Publications.

Reference Books:

1. C++ Progg. Language, Bjarna Stroustrup, 3rd Edition, Addison Wesley Publishing Comp.
2. Object Oriented Progg. Using C++, Salaria, R. S, Fourth Edition, Khanna Book Publishing.

I.K. Gujral Punjab Technical University, Jalandhar
B. Voc. (Networking & System Administration), Batch-2019

Course Code: **BVNS203-19**
Course Name: **Computer System Architecture**

Program: **B. Voc.**	L: **3** T: 0 P: 0
Branch: **Networking & System Administration**	Credits: **3**
Semester: **2nd**	Contact hours: **33**
Theory/Laboratory: **Theory**	Status (Elective/Core): **Core**
Internal max. marks: **40**	External max. marks: **60**
Total marks: **100**	

Course Outcomes:

CO#	Course outcomes
CO1	To know about the basic functioning of various parts of computer system from hardware point of view and interfacing of various peripheral devices used with the system.
CO2	To learn number system and various types of micro-operations of processor.
CO3	To learn the communication of various components through common bus.
CO4	To learn how to design Combinational & Sequential circuits.

Detailed Contents	Contact hours
Unit-I **Logic Gates:** AND, OR, NOT, NAND, NOR, XOR, XNOR, NAND & NOR as Universal Gates, Logic Gates Applications. **Boolean Algebra:** Introduction, Theorems, Simplification of Boolean Expression using Boolean Algebra, SOP & POS Forms, Realization of Boolean Expression using Gates, K-Maps, Simplification of Boolean Expression using K-Maps.	9
Unit-II **Combinational Logic Circuits:** Half Adder & Half Subtractor, Full Adder & Full Subtractor, Parallel Binary Adder, Binary Adder/Subtractor. **Combinational Logic Circuits:** Multiplexers & Demultiplexers, Implementation of Boolean equations using Multiplexer and Demultiplexer, Encoders & Decoders.	8
Unit-III **Sequential Logic Circuits:** Latch, Flip Flops- R-S Flip-Flop, J-K Flip-Flop, Race Around Condition, Removing Race Around Condition, Master-Slave JK Flip-Flop, D Flip-Flop, T Flip-Flop, Applications of Flip-Flops.	8
Unit-IV **Introduction to Computer Organization:** Introduction to Computer and CPU (Computer Organization, Computer Design and Computer Architecture), Stored Program Concept- Von Neumann Architecture, Harvard Architecture, RISC and CISC Architecture. **Register Transfer and Micro operations:** Introduction to Registers, Instruction Format, Types of Instructions- Memory Reference Instructions, Register Reference Instructions and Input-Output Instructions. **Common Bus System:** Introduction to Common Bus System, Types of Buses (Data Bus, Control Bus, Address Bus), 16-bit Common Bus System--Data Movement among registers using Bus.	8

Text Books:

1. Computer System Architecture, M.M. Mano, Third Edition, PHI.
2. Digital Computer Electronics, Malvino, Second Edition, Mc-Graw Hill.
3. Modern Digital Electronics, R. P. Jain, Fourth Edition, TMH.

Reference Books:

1. Computer Organization and Architecture, Stallings, Eighth Edition, PHI.
2. Computer Organization and Architecture, J.P.Hayes, Third Edition, TMH.
3. Digital and Electronic Circuits, T. C. Bartee, McGraw Hill.

I.K. Gujral Punjab Technical University, Jalandhar
B. Voc. (Networking & System Administration), Batch-2019

Course Code: **BVNS204-19**
Course Name: **Mathematics**

Program: **B. Voc.**	L: **3** T: 0 P: 0
Branch: **Networking & System Administration**	Credits: **3**
Semester: **2nd**	Contact hours: **33**
Theory/Laboratory: **Theory**	Status (Elective/Core): **Core**
Internal max. marks: **40**	External max. marks: **60**
Total marks: **100**	

Course Outcomes:

CO#	Course outcomes
CO1	Represent data using various mathematical notions.
CO2	Explain different terms used in basic mathematics.
CO3	Describe various operations and formulas used to solve mathematical problems.

Detailed Contents	Contact hours
Unit-I Set Introduction, Objectives, Representation of Sets (Roster Method, Set Builder Method), Types of Sets (Null Set, Singleton Set, Finite Set, Infinite Set, Equal Set, Equivalent Set, Disjoint Set, Subset, Proper Subset, Power Set, Universal Set) and Operation with Sets (Union of Set, Intersection of Set, Difference of Set, Symmetric Difference of Set) Universal Sets, Complement of a Set.	9
Unit-II Logic Statement, Connectives, Basic Logic Operations (Conjunction, Disjunction, Negation) Logical Equivalence/Equivalent Statements, Tautologies and Contradictions.	8
Unit-III Matrices Introduction, Types of Matrix (Row Matrix, Column Matrix, Rectangular Matrix, Square Matrix, Diagonal Matrix, Scalar Matrix, Unit Matrix, Null Matrix, Comparable Matrix, Equal Matrix), Scalar Multiplication, Negative of Matrix, Addition of Matrix, Difference of two Matrix, Multiplication of Matrices, Transpose of a Matrix.	11
Unit-IV Progressions Introduction, Arithmetic Progression, Sum of Finite number of quantities in A.P, Arithmetic Means, Geometric Progression, Geometric Mean.	11

Text Books:

1. Discrete Mathematics and Its Applications by Kenneth H. Rosen, Mc Graw Hill, 6th Edition.
2. College Mathematics, Schaum's Series, TMH.

Reference Books:

1. Elementary Mathematics, Dr. RD Sharma.
2. Comprehensive Mathematics, Parmanand Gupta.
3. Elements of Mathematics, ML Bhargava.

I.K. Gujral Punjab Technical University, Jalandhar
B. Voc. (Networking & System Administration), Batch-2019

Course Code: **BVNS2055-19**
Course Name: **Database Management Systems Laboratory**

Program: **B.Voc**	L: 0 T: 0 P: **3**
Branch: **Networking & System Administration**	Credits: **1.5**
Semester: **2nd**	
Theory/Laboratory : **Laboratory**	Percentage of numerical/design problems:-
Internal max. marks: **30**	Duration of end semester exam (ESE):-
External max. marks: **20**	Status (Elective/Core): **Core**
Total marks: **50**	

Course Outcomes:

CO#	Course outcomes
CO1	Able to understand various queries and their execution
CO2	Populate and query a database using SQL DML/DDL commands.
CO3	Declare and enforce integrity constraints on a database
CO4	Programming PL/SQL including stored procedures, stored functions, cursors, packages
CO5	Able to design new database and modify existing ones for new applications and reason about the efficiency of the result

Task 1:	Used of CREATE, ALTER, RENAME, DROP, INSERT INTO, DELETE and UPDATE statement in the database tables (relations)
Task 2:	Use of simple select statement, select query on two relations, nesting of queries, aggregate functions, substring comparison & order by statement
Task 3:	Write a PL/SQL code to add two numbers and display the result. Read the numbers during run time.
Task 4:	Write a PL/SQL code to find sum of first 10 natural numbers using while and for loop.
Task 5:	Write a program to create a trigger which will convert the name of a student to upper case before inserting or updating the name column of student table.
Task 6:	Write a PL/SQL block to increase the salary of all doctors by 1000.
Task 7:	Write a PL/SQL code to multiply two numbers using procedure inside the block.
Task 8:	Design database for Student Management System for your college using E-R model and Normalization.
Task 9:	Design and Develop Conceptual Data Model (E-R Diagram) for Library Management System with all the necessary entities, attributes, constraints and relationships. Design and build Relational Data Model for application specifying all possible constraints.

Recommended Hardware & Software:
Intel Core i-3 / i-5 / i-7 processor with a speed of minimum 2 GHz, RAM 2 GB or higher, HDD 200 GB or higher, LED / LCD screen and Oracle/ Microsoft SQL Server/ MySQL/ Microsoft Access.

Text Books:

1. SQL, PL/SQL Programming Language of Oracle by 4th Revised Edition, Ivan Bayross.
2. Oracle PL/SQL Programming by 5th Edition, Steven Feuerstein and Bill Pribyl.

I.K. Gujral Punjab Technical University, Jalandhar
B. Voc. (Networking & System Administration), Batch-2019

Course Code: **BVNS2066-19**
Course Name: **Object Oriented Programming using C++ Laboratory**

Program: **B. Voc.**	L: 0 T: 0 P: **3**
Branch: **Networking & System Administration**	Credits: **1.5**
Semester: **2nd**	Percentage of numerical/design problems:-
Theory/Laboratory: **Laboratory**	Duration of end semester exam (ESE):-
Internal max. marks: **30**	External max. marks: **20**
Total marks: **50**	Status (Elective/Core): **Core**

Course Outcomes:

CO#	Course outcomes
CO1	To learn programming from real world examples.
CO2	To understand Object oriented approach for finding Solutions to various problems with the help of C++ language.
CO3	To create computer based solutions to various real-world problems using C++ .
CO4	To learn various concepts of object oriented approach towards problem solving.

Task 1:	Write a program to enter mark of 6 different subjects and find out the total mark (Using cin and cout statement).
Task 2:	Write a function using reference variables as arguments to swap the values of pair of integers.
Task 3:	Write a function to find largest of three numbers.
Task 4:	Write a program to find the factorial of a number.
Task 5:	Define a class to represent a bank account which includes the following members as Data members: a) Name of the depositor b) Account Number c) Withdrawal amount d) Balance amount in the account Member Functions: a) To assign initial values b)To deposit an amount c) To withdraw an amount after checking the balance d) To display name and balance.
Task 6:	Write the above program for handling n number of account holders using array of objects.
Task 7:	Write a program for overloading of Unary ++ operator & Binary + operator.
Task 8:	Write a program of Virtual Functions & Abstract Class.
Task 9:	Write a program to read and write from file.

Recommended Hardware & Software:
Intel Core i-3 / i-5 / i-7 processor with a speed of minimum 2 GHz, RAM 2 GB or higher, HDD 200 GB or higher, LED / LCD screen and Oracle/ Microsoft SQL Server/ MySQL/ Microsoft Access.

Text Books:

1. Computer Networks, Tanenbaum, Andrew, Fifth Edition, PHI.
2. Data Communication and Networking, Behrouz A. Forouzan, Fourth Edition.
3. Computer Today, S.K. Basandra, First Edition, Galgotia.

I.K. Gujral Punjab Technical University, Jalandhar
B. Voc. (Networking & System Administration), Batch-2019

Course Code: **BVNS301-19**

Course Name: **Operating System**

Program: B. Voc.	**L**: 3 **T**: 0 **P**: 0
Branch: Networking and System Administration	**Credits:** 3
Semester: 3rd	**Contact hours:** 33
Theory/Practical: Theory	**Elective status:** Core
Internal max. marks: 40	**External max. marks:** 60
Total marks: 100	

Prerequisite: -NA-

Co requisite: -NA-

Additional material required in ESE: -NA-

Course Outcomes: After studying this course, students will be able to:

CO#	Course outcomes
CO1	Define the role of operating system
CO2	Discuss the management of various resources in operating system.
CO3	Differentiate between various levels of operating system views.

Detailed contents	Contact hours
Unit 1: **Fundamentals of Operating system**: Introduction to Operating system, Functions of an operating system. Operating system as a resource manager. Structure of operating system (Role of kernel and Shell). Views of operating system. Evolution and types of operating systems	8
Unit 2: **Process & Management**: Program vs. Process; PCB, State transition diagram, Scheduling Queues, Types of schedulers, Concept of Thread, Benefits, Types of threads. **CPU Scheduling**: Need of CPU scheduling, CPU I/O Burst Cycle, Preemptive vs. Non-pre-emptive scheduling, Different scheduling criteria's, scheduling algorithms.	8
Unit 3: **Memory Management**: Introduction, address binding, relocation, loading, linking, memory sharing and protection; Paging and segmentation; Virtual memory: basic concepts of demand paging, page replacement algorithms.	8

Unit 4: **I/O Device Management**: I/O devices and controllers, device drivers; disk storage. **File Management**: Basic concepts, file operations, access methods, directory structures and management, file protection.	9

TextBooks:

1. Operating System Principles by Abraham Silberschatz and Peter Baer Galvin, Seventh Edition, Published by Wiley-India.
2. Principals of Operating System by Naresh Chauhan, Published by OXFORD University Press, India.

I.K. Gujral Punjab Technical University, Jalandhar
B. Voc. (Networking & System Administration), Batch-2019

Course Code: BVNS302-19
Course Name: Data Structures

Program: B. Voc.	**L**: 3 **T**: 0 **P**: 0
Branch: Networking and System Administration	**Credits:** 3
Semester: 3rd	**Contact hours:** 33
Theory/Practical: Theory	**Elective status:** Core
Internal max. marks: 40	**External max. marks:** 60
Total marks: 100	

Prerequisite: -NA-

Co requisite: -NA-

Additional material required in ESE: -NA-

Course Outcomes: After studying this course, students will be able to:

CO#	Course outcomes
CO1	List various types of Data Structures.
CO2	Differentiate between the basic functionality of each data structure.
CO3	Explain basic operations on different data structures.

Detailed contents	Contact hours
Unit 1: **An Overview of Computers and Programming -** Simple program logic, The steps involved in the program development cycle, Pseudo code statements and flowchart, The evolution of programming models. The concept of data structure, type of data structures and operations on data structures. Introduction to arrays, memory representation of arrays, Insertion and deletion in an array, multidimensional array, memory representation of 2-D array.	8
Unit 2: Introduction to the Linked List of Stacks, Basic operations on linked list, Stacks and queues as a circular linked list, Header nodes, Doubly Linked List, Circular Linked List.	7
Unit 3: Introduction to stack & primitive operation on stack, Stacks applications, Infix, post fix, Prefix notations. Introduction to queues, Primitive Operations on the Queues, Circular queue, Dequeue, Priority queue, Applications of queue	8

Unit 4: TREES - Basic Terminology, Binary Trees, Tree Representations as Array & Linked List, Basic operation on Binary tree, Traversal of binary trees: - In order, Preorder & post order. Definition of graph, Terminology, Directed, Undirected & Weighted graph, Representation of graphs, Graph Traversal-Depth first & Breadth first search. Sequential Search, Binary search, Insertion sort, Selection sort, Quick sort, Bubble sort.	10

TextBooks:

1. Brijesh Bakariya. Data Structures and Algorithms Implementation through C, BPB Publications.
2. Kruse R.L. Data Structures and Program Design in C; PHI

I.K. Gujral Punjab Technical University, Jalandhar
B. Voc. (Networking & System Administration), Batch-2019

Course Code: BVNS303-19
Course Name: Windows Configuration and Server Administration

Program: B. Voc.	**L**: 3 **T**: 0 **P**: 0
Branch: Networking and System Administration	**Credits:** 3
Semester: 3rd	**Contact hours:** 33
Theory/Practical: Theory	**Elective status:** Core
Internal max. marks: 40	**External max. marks:** 60
Total marks: 100	

Prerequisite: -NA-

Co requisite: -NA-

Additional material required in ESE: -NA-

Course Outcomes: After studying this course, students will be able to:

CO#	Course outcomes
CO1	Install windows server.
CO2	Discuss various configuration settings

Detailed contents	Contact hours
Unit 1: **Installation**: Installing Server, Drivers, Working with windows server Devices, Troubleshooting Devices & Drivers, Managing system updates. **Working With Disk Storage**: Type of Disk Storage, Type of volumes, Implementing fault tolerance, Use disk management tools, Disk Quota, Troubleshooting disk management, Shadow copy**.**	9
Unit 2: **Domain Controller**: Install Active Directory, Manage Active Directory Component, Working with OU Structure, Working with Domain User account, Working with Domain Groups, Troubleshooting Active Directory.	8
Unit 3: **Domain Name Services (DNS)**: Define Name resolution, Install DNS, Configure DNS Client, Manage and Troubleshoot DNS. **Dynamic Host Configuration Protocol:** Configure DNS Server, Working With Super Scope, Configure DHCP Client, Manage and Troubleshoot DHCP Server.	8

Unit 4: **Backup and Restore:** Requirement for Backup and Recovery AD, Issue for AD Backup and Recovery, Steps for Backup and Recovery AD.	8

TextBooks.

1. Windows Server 2016: The Administrator's Reference Paperback – September 2016, Publisher: Createspace Independent Pub,

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I.K. Gujral Punjab Technical University, Jalandhar
B. Voc. (Networking & System Administration), Batch-2019

Course Code: BVNS304-19
Course Name: Computer Network Security

Program: B. Voc.	**L**: 3 **T**: 0 **P**: 0
Branch: Networking and System Administration	**Credits:** 3
Semester: 3rd	**Contact hours:** 33
Theory/Practical: Theory	**Elective status:** Core
Internal max. marks: 40	**External max. marks:** 60
Total marks: 100	

Prerequisite: -NA-

Co requisite: -NA-

Additional material required in ESE: -NA-

Course Outcomes: After studying this course, students will be able to:

CO#	Course outcomes
CO1	Discuss various issues in network security.
CO2	Explain the impact of viruses on computer systems.
C03	Explain various security measures to protect networks.

Detailed contents	Contact hours
Unit 1: Basic web security model- Browser content, Document object model (DOM). Web Application Security- SQL injection, Cross-site request forgery, Cross-site scripting, Attacks and Defenses, Generating and storing session tokens, Authenticating users, The SSL protocol.	9
Unit 2: Network Protocols and Vulnerabilities- Overview of basic networking infrastructure and network protocols, IP, TCP, Routing protocols, DNS. Network Defenses- Network defense tools, Secure protocols, Firewalls, VPNs, Tor, I2P, Intrusion Detection and filters, Host-Based IDS vs Network-Based IDS, Dealing with unwanted traffic: Denial of service attacks, Malicious Software.	8

Unit 3: Software Security- Malicious Web, Internet Security Issues, Types of Internet Security Issues, Computer viruses, Spyware, Key-Loggers, Secure Coding, Electronic and Information Warfare. Mobile platform security models.	8
Unit 4: Risk Management, Security Risk Assessment: Introduction, Information Security Risk Assessment: Case Studies, Risk Assessment in Practice.	8

TextBooks:

1. William Stallings, Network Security Essentials: Applications and Standards, Prentice Hall, 4th edition, 2010.
2. Michael T. Goodrich and Roberto Tamassia, Introduction to Computer Security, Addison Wesley, 2011.
3. William Stallings, Network Security Essentials: Applications and Standards, Prentice Hall, 4th edition, 2010.

Course Code: BVNS305-19

Course Name: Data Structures Laboratory

Program: B. Voc.	**L**: 0 **T**: 0 **P**: 3
Branch: Networking and System Administration	**Credits:** 1.5
Semester: 3rd	**Contact hours:** 3 hours per week
Theory/Practical: Practical	**Elective status:** Core
Internal max. marks: 30	**External max. marks:** 20
Total marks: 50	

Prerequisite: -NA-

Co requisite: -NA-

Additional material required in ESE: -NA-

Course Outcomes: After studying this course, students will be able to:

CO#	Course outcomes
CO1	Write programs to insert, delete element in data structures.
CO2	Implement search and sorting on data structure

Instructions:

1.	Implement stack. Write functions like push, pop, Initialize, Empty or Full.
2.	Implement the insert and delete operation on queue.
3.	WAP to implement insertion sort.
4.	WAP to implement selection sort.
5.	WAP to implement binary search
6.	WAP to implement linear sort.

7.	WAP to implement breadth first search
8.	WAP to implement depth first search
9.	WAP to implement any of the traversing algorithm on tree.
10.	WAP to create a basic linked list.

Course Code: BVNS306-19

Course Name: Operating system Lab

Program: B. Voc.	**L**: 0 **T**: 0 **P**: 3
Branch: Networking and System Administration	**Credits:** 1.5
Semester: 3rd	**Contact hours:** 3 hours per week
Theory/Practical: Practical	**Elective status:** Core
Internal max. marks: 30	**External max. marks:** 20
Total marks: 50	

Prerequisite: -NA-

Co requisite: -NA-

Additional material required in ESE: -NA-

Course Outcomes: After going through the practical, student will be able to:

CO#	Course outcomes
CO1	Install & configure different operating systems.
CO2	Write programs/ scripts for different scheduling algorithms.

Instructions:

1	Installation of windows OS.
2	Installation of Linux OS.

3	Dual boot installation of Operating systems.
4	Implementation of FCFS Scheduling algorithm
5	Implementation of SJF Scheduling algorithm
6	Implementation of Round-Robin Scheduling algorithm
7	Vi Editor & its commands
8	Shell Commands
9	Shell Scripting- Using variables
10	Shell Scripting- Input & Output
11	Shell Scripting- Data types
12	Shell Scripting- Use of arithmetic operators
13	Shell Scripting- if control statement programs
14	Shell Scripting- while control statement
15	Shell Scripting- for control statement

Reference Books:

1. Linux: The complete reference by Richard Petersen, Published by Tata McGraw- Hill Publication.
2. Operating System Principles by Abraham Silberschatz and Peter Baer Galvin, Seventh Edition, Published

Course Code: **BVNS401-19**
Course Name: **Linux Operating System**

Program: **B. Voc.**	L: **3** T: 0 P: 0
Branch: **Networking and System Administration**	Credits: **3**
Semester: **4th**	Contact hours: **33**
Theory/Laboratory: **Theory**	Status (Elective/Core): **Core**
Internal max. marks: **40**	External max. marks: **60**
Total marks: **100**	

Course Outcomes:

CO#	Course outcomes
CO1	Set up environment for Linux Operating system.
CO2	Implement various file and directory related commands.
CO3	Write Shell Programming using Linux commands.
CO4	Perform basic system administration using Linux.

Detailed contents	Contact hours

Unit 1: Linux introduction and file system - Basic Features, Advantages, Installing requirement, Basic Architecture of Unix/Linux system, Kernel, Shell. Linux File system-Boot block, super block, Inode table, data blocks, How Linux access files, storage files, Linux standard directories, Commands for files and directories cd, ls, cp, md, rm, mkdir, rmdir, more, less, creating and viewing files, using cat, file comparisons, View files, disk related commands, checking disk free spaces. Partitioning the Hard drive for Linux, Installing the Linux system, System startup and shut-down.	9
Unit 2: Essential Linux commands Understanding shells, Processes in Linux process fundamentals, connecting processes with pipes, redirecting input output, manual help, Background processing, managing multiple processes, changing process priority, scheduling of processes at command, batch commands, kill, ps, who, sleep, Printing commands, grape, fgrep, find, sort, Cal, banner, touch, file, file related commands-ws, sat, cut, grep, dd, etc. Mathematical commands- bc, expr, factor, units. vi, joe, vim editor	8
Unit 3: Shell programming Basic of shell programming, Various types of shell, shell programming in bash, conditional and looping statements, case statements, parameter passing and arguments, Shell variables, shell keywords, Creating Shell programs for automate system tasks and report printing, use of grep in shell, awk programming	8
Unit 4: System administration Common administrative tasks, identifying administrative files –log files, Role of system administrator, Managing user accounts-adding & deleting users, changing permissions and ownerships, Creating and managing groups, modifying group attributes, Temporary disable user's accounts, creating and mounting file system, checking and monitoring system performance file security & Permissions, becoming super user using su. Getting system information - host name, disk partitions & sizes, users, kernel. Backup and restore files, linuxconf. utility in GUI, reconfiguration hardware with kudzu Configure desktop-X configurator, understanding XF86config file, starting & using X desktop. KDE & Gnome graphical interfaces, changing X settings.	8

Text Books:

1. Operating Systems Concepts, Fifth Edition; Silberschatz and Galvin
2. Cristopher Negus – Red Hat Linux Bible, Wiley Dreamtech India 2005 edition.
3. Yeswant Kanethkar – UNIX Shell Programming, First edition, BPB.

Reference Books:

1. Linux System Programming, Robert Love, O'Reilly, SPD
2. Official Red Hat Linux Users guide by Redhat, Wiley Dreamtech India
3. Graham Glass & King Ables – UNIX for programmers and users, Third Edition, Pearson Education.
4. Neil Mathew & Richard Stones – Beginning Linux Programming, Fourth edition, Wiley Dreamtech India.

I.K. Gujral Punjab Technical University, Jalandhar
B. Voc. (Networking & System Administration), Batch-2019

Course Code: **BVNS402-19**
Course Name: **Wireless Communication**

Program: **B. Voc.**	L: **3** T: 0 P: 0
Branch: **Networking and System Administration**	Credits: **3**
Semester: **4th**	Contact hours: **33**
Theory/Laboratory: **Theory**	Status (Elective/Core): **Core**
Internal max. marks: **40**	External max. marks: **60**
Total marks: **100**	

Course Outcomes:

I.K. Gujral Punjab Technical University, Jalandhar
B. Voc. (Networking & System Administration), Batch-2019

CO#	Course outcomes
CO1	Understand the basic elements of Cellular Radio Systems and its design
CO2	Explain the concept of Digital communication through fading multipath channel.
CO3	Discuss Multiple Access techniques for Wireless communication
CO4	Compare various Wireless standards and systems

Detailed contents	Contact hours
Unit 1: Elements of Cellular Radio Systems Design: Basic cellular system, Performance criteria, Components and Operation of cellular systems, Planning a cellular system, Analog & Digital cellular systems, Concept of frequency reuse channels, Co-channel interference, Reduction factor, desired C/I for a normal case in an omni directional antenna system, Cell splitting.	9
Unit 2: Digital Communication through fading multipath channels: Fading channels and their characteristics- Channel modelling, Digital signalling over a frequency non selective slowly fading channel. Concept of diversity branches and signal paths. Combining methods: Selective diversity combining, Switched combining, Maximal ratio combining, Equal gain combining.	8
Unit 3: Multiple Access Techniques for Wireless Communications: Introduction, Frequency Division Multiple Access (FDMA), Time Division Multiple Access (TDMA), Spread Spectrum Multiple Access, Space Division Multiple Access (SDMA), Packet Radio Protocols; Pure ALOHA, Slotted ALOHA.	8
Unit 4: Wireless Systems & Standards: AMPS and ETACS, United states digital cellular (IS- 54 & IS 136), IEEE Standards, Global system for Mobile (GSM): Services, Features, System Architecture and Channel Types, Frame Structure for GSM, Speech Processing in GSM, GPRS/EDGE specifications and features. 3G systems: UMTS & CDMA 2000 standards and specifications. CDMA Digital standard (IS 95): Frequency and Channel specifications, Forward CDMA Channel, Reverse CDMA Channel, Wireless Cable Television. Overview of 4G & 5G Mobile techniques and Emerging technologies.	8

Text Books:

1. Wireless Communications and Networking,Vijay Garg, Elsevier
2. Wireless Communications-T.L.Singh-TMH
3. Adhoc Mobile Wireless network, C.K.Toh Pearson.

Reference Books:

1. T.S. Rappaport, Wireless Communications: Principles and Practice, 2nd Edition, Pearson Education Asia, 2010.
2. William C Y Lee, Mobile Cellular Telecommunications, 2nd Edition, MGH, 2004.
3. Raj Pandya, ―Mobile and Personal Communication systems and services‖, Prentice Hall of India, 2001.
4. Wireless and Digital Communications; Dr. Kamilo Feher (PHI), 1998.

I.K. Gujral Punjab Technical University, Jalandhar
B. Voc. (Networking & System Administration), Batch-2019

Course Code: **BVNS403-19**
Course Name: **TCP/IP Protocols**

Program: **B. Voc.**	L: **3** T: 0 P: 0

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B. Voc. (Networking & System Administration), Batch-2019

Branch: **Networking and System Administration**	Credits: **3**
Semester: **4th**	Contact hours: **33**
Theory/Laboratory: **Theory**	Status (Elective/Core): **Core**
Internal max. marks: **40**	External max. marks: **60**
Total marks: **100**	

Course Outcomes:

CO#	Course outcomes
CO1	Demonstrate an understanding of the TCP/IP layers, components and functions
CO2	Identify the services that TCP/IP applications provide
CO3	Identify the protocols used to transport data over the Internet
CO4	Utilize a variety of tools to navigate and search the Internet
CO5	Install, maintain and troubleshoot a TCP/IP Network

Detailed contents	Contact hours
Unit 1: INTRODUCTION TO TCP/IP, Origin of TCP/IP and Internet, A Brief History of the Internet, Architecture of the Internet, TCP/IP Layer and Protocols, Network Access Layer, Internet Layer, Need for IP Address.	9
Unit 2: INTERNET PROTOCOL: Overview of Internet Protocol, IP Header, IP Address, IP Address Classes, Subnet Masks and CIDR Networks (Classless IP Addresses), Internet-Legal Versus Private Addressing, IP Routing, Routing Protocol, Routing Algorithms	8
Unit 3: TRANSPORT LAYER PROTOCOLS: Overview of TCP, Transmission Control Protocol (TCP), TCP Header, TCP Connection Establishment and Termination, TCP Connection Establishment, TCP Connection Termination, User Datagram Protocol (UDP)	8
Unit 4: APPLICATION LAYER PROTCOLS: Domain Name System (DNS), Hierarchical Name Space, Domain Servers, Working of DNS Work in Internet, Domain Name Resolution, Messages Used in DNS, Dynamic DNS (DDNS). Overview of Electronic Mail, Simple Mail Transfer Protocol (SMTP), Message Transfer Agent, User Agent, Post Office Protocol (POP), Internet Mail Access Protocol (IMAP),Multipurpose Internet Mail Extension (MIME), Telnet , File Transfer Protocol (FTP)	8

Text Books:

1. Kurose and Ross , Computer Networking: A Top-Down Approach , 6th ed., 2012, Morgan Kaufmann
2. Douglas E.Comer – "Internetworking with TCP/IP Principles, Protocols and Architecture", Vol. 1 & 2 fourth edition, Pearson Education Asia, 2003
   (Unit I in Comer Vol. I, Units II, IV & V – Comer Vol. II)

Reference Books:

1. Michael J. Donahoo and Kenneth L. Calvert , TCP/IP Sockets in Java , 2nd ed., 2011
2. TCP/IP protocol suite, Forouzan, 2nd edition, TMH, 2003
3. W.Richard Stevens “TCP/IP illustrated” Volume 2 Pearson Education 2003.

I.K. Gujral Punjab Technical University, Jalandhar
B. Voc. (Networking & System Administration), Batch-2019

Course Code: BVNS404-19
Course Name: Programming using Python

Program: **B. Voc.**	L: **3** T: 0 P: 0
Branch: **Networking and System Administration**	Credits: **3**
Semester: **4th**	Contact hours: **33**
Theory/Laboratory: **Theory**	Status (Elective/Core): **Core**
Internal max. marks: **40**	External max. marks: **60**
Total marks: **100**	

Course Outcomes:

CO#	Course outcomes
CO1	Explain Python syntax and semantics.
CO2	Demonstrate handling Strings and File Systems.
CO3	Create Python Programs using core data structures like Lists, Dictionaries and use Regular Expressions.
CO4	Implementing of Object-Oriented Programming in Python.
CO5	Implement socket programming using python.

Detailed contents	Contact hours
Unit 1: Introduction to Python language, Setting up the Python development environment, Basic syntax, interactive shell, editing, saving, and running a script, Concept of data types, Random number, Real numbers, immutable variables, Python console Input / Output using input and print statements. Arithmetic operators and expressions, Conditions, Comparison operators, Logical Operators, Is and In operators, Control statements: If , If-else ,Nested if-else, Break and Continue, Loops: For ,While ,Nested loops	9
Unit 2: Function and Methods, Defining a function ,Calling a function ,Types of functions ,Function Arguments , Global and local variables Modules: Importing modules: Math module ,Random module , Tuples ,Arrays and Matrices, Sets ,Lists, Accessing list ,Operations ,Working with lists , Dictionaries: Introduction ,Accessing values in dictionaries , Data Frames, Date and Time Value Manipulation , String Handling, Unicode strings, Strings Manipulation:-compare strings, concatenation of strings, Slicing strings in python, converting strings to numbers and vice versa.	8

Unit 3: Classes and Object-oriented Programming: Abstract Data Types and Classes, Inheritance, Encapsulation and information hiding. Exceptions and Assertions: Errors and Formatting, Handling exceptions, text files: reading/writing text and numbers from/to a file; creating and reading a formatted file (csv or tab-separated).	8
Unit 4: Overview of TCP/IP Networking, UDP and TCP Protocols, IP Addresses and Ports, Network Interfaces. Socket programming: Introduction to sockets, Getting port Information, Creating a TCP Client, Creating a Banner, Port Scanning and Sockets, TCP and UDP Protocols for Sockets, TCP Sockets and UDP Sockets.	8

Text Books:

1. **Core Python Programming**, Wesley J. Chun, Second Edition, Pearson.

Reference Books:

1. Learning Python by Mark Lutz, 5th Edition
2. Python Cookbook, by David Beazley , 3rd Edition

Course Code: BVNS405-19

Course Name: Linux Operating System Lab

Program: **B. Voc.**	L: **3** T: 0 P: 3
Branch: **Web Technology & Multimedia**	Credits: **1.5**
Semester: **4th**	Contact hours: **33**
Theory/Laboratory: **Practical**	Status (Elective/Core): **Core**
Internal max. marks: **30**	External max. marks: **20**
Total marks: **50**	

List of Tasks:

1. Basic LINUX commands and its Use.
2. Study of editors in LINUX
3. Detail study of File Access Permission in LINUX.
4. Detail study of LINUX Shell Programming.
5. Advance Shell Programming.
6. Common Administrative Tasks.

LAB OUTCOMES: At the end of the course, the students are able to:

1. Use shell script to create files and handle text documents
2. Demonstrate Linux administration and its environment
3. Demonstrate installation of Linux operating system and understand the importance of Linux
4. Appraise various command usage of files and directories.

5. Show the working of vi editor in all its modes using various commands.

Course Code: BVNS406-19
Course Name: Programming in Python Lab

Program: **B. Voc.**	L: **3** T: 0 P: 3
Branch: **Web Technology & Multimedia**	Credits: **1.5**
Semester: **4th**	Contact hours: **33**
Theory/Laboratory: **Practical**	Status (Elective/Core): **Core**
Internal max. marks: **30**	External max. marks: **20**
Total marks: **50**	

Detailed List of Tasks:

Machine Exercises based on:

1. Use of Data Types, Integer Arithmetic, Variables and Assignment
2. Use of Print Function, Branching programs, Strings and Input, Iteration
3. Implementation of Functions and Recursion
4. Application of Global variables
5. Implementation of Tuples, List and Dictionaries.
6. Implementation of Modules, Files and Dictionaries
7. Implementation of Array and Matrices
8. Implementation of Exception Handling.
9. Applications of Classes and Object-oriented Programming
10. File I/O, Reading CSV and Excel Files, Reading Text Files, Writing and Saving to Files.
11. Getting port information.
12. Creating TCP Client.
13. Port scanning.
14. Implementing TCP and UDP sockets.

I.K. Gujral Punjab Technical University, Jalandhar
B. Voc. (Networking & System Administration), Batch-2019

LAB OUTCOMES: At the end of the course, the students are able to:

1. Write, Test and Debug Python Programs
2. Implement Conditionals and Loops for Python Programs
3. Use functions and represent Compound data using Lists, Tuples and Dictionaries
4. Read and write data from & to files.

Course Code: **BVNS501-19**

Course Name: Cloud Computing

Program: **B. Voc.**	L: **3** T: 0 P: 0
Branch: **Networking & System Administration**	Credits: **3**
Semester: **5th**	Contact hours: **33**
Theory/Laboratory: **Theory**	Elective status: **Core**
Internal max. marks: **40**	External max. marks: **60**
Total marks: **100**	

Course Outcomes:

CO#	Course outcomes
CO1	TO Explain the basic concept and importance of cloud computing.
CO2	To apply migration to a cloud environment.
CO3	To Discuss virtualization technologies.
CO4	To Monitor and manage the cloud resources, applications and data.
CO5	To implement cloud tools.

Detailed contents	Contact hours

Overview of Computing Paradigm: Recent trends in Computing - Grid Computing, Cluster Computing, Distributed Computing, Utility Computing, Cloud Computing. **Introduction to Cloud Computing:** Vision of Cloud Computing, Defining a Cloud, Cloud Reference Model, Deployment Model, Characteristics, Benefits of Cloud Computing, Challenges ahead. Cloud computing vs. Cluster computing vs. Grid computing. [CO1]	9
Migrating into a Cloud: Introduction, Broad approaches to Migrating into the Cloud, The Seven-Step Model of Migration Into a Cloud. [CO2] **Virtualization:** Introduction, Characteristics of Virtualized environment, Taxonomy of Virtualization techniques, Virtualization and Cloud Computing, Pros and Cons of Virtualization, Technology Examples- Xen, VMware, Microsoft Hyper-V. [CO3] **Capacity Planning**: Introduction, Defining Baseline and Metrics, Baseline Measurements, System Metrics, Load Testing, Resource Ceilings, Server and Instance types; Network Capacity, Scaling. [CO1]	8
SLA Management in Cloud Computing: Inspiration, Traditional Approaches to SLO Management, Types of SLA, Life Cycle of SLA, SLA management in Cloud. Automated Policy-based management. Securing Cloud services: Cloud Security, Securing Data-Brokered Cloud Storage Access, Storage location and tenancy, Encryption, Auditing and compliance. [CO4] **Cloud Storage:** Provisioning Cloud Storage, Virtual storage containers, Cloud Storage Interoperability (CDMI, OCCI), Database Storage, Resource Management, [CO4]	8
Advance Topics in Cloud: Energy Efficiency in cloud, Market Oriented Cloud Computing, Federated Cloud Computing, Mobile Cloud Computing, Fog computing, BigData Analytics, Basics of IoT. [CO1] **Cloud Platforms in Industry:** Amazon Web Services-Compute Services, Storage Services, Communication Services, Additional Services. Google AppEngine- Architecture and Core Concepts, Application Life Cycle. Cost Model. Microsoft Azure-Azure Core Concepts, SQL Azure, Windows Azure Platform Appliance. [CO5]	8

Text Books:

1. Mastering Cloud Computing, Rajkumar Buyya, Christian Vecchiola, and ThamaraiSelvi, Tata McGraw Hill, ISBN-13: 978-1-25-902995-0, New Delhi, India,Feb 2013.

2. Cloud Computing Bible, Barrie Sosinsky, Wiley India Pvt. Ltd, ISBN-13: 978-81-265- 2980-3,New Delhi, India, 2011.

3. Cloud Computing: Principles and paradigms, Raj Kumar Buyya, James Broberg, AndrezeiM.Goscinski, Wiley India Pvt. Ltd, ISBN-13: 978-81-265-4125-6,New Delhi, India, 2011

Reference Books:

1. Cloud Computing For Dummies, Fern Halper, Hurwitz, Robin Bloor, Marcia Kaufman, Wiley India Pvt. Ltd, ISBN-13: 978-0-47-0597422, New Delhi, India, 2011.

Course Code: **BVNS502-19**

Course Name: Computer Peripherals and Interfaces

Program: **B. Voc.**	L: **3** T: 0 P: 0
Branch: **Networking & System Administration**	Credits: **3**
Semester: **5th**	Contact hours: **33**
Theory/Laboratory: **Theory**	Elective status: **Core**

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Internal max. marks: **40**	External max. marks: **60**
Total marks: **100**	

Course Outcomes:

CO#	Course outcomes
CO1	Describe the operational details of various peripheral devices.
CO2	Explain the role of input/ output interfaces.
CO3	Discuss the recent Progress in the Peripheral and Bus systems.

Detailed contents	Contact hours
Unit 1: **System Resources:** Interrupt, DMA Channel, I/O Port Addresses and resolving and resolving the conflict of resources. I/O buses- ISA, EISA, Local bus, VESA Local bus, PCI bus, PCI Express, Accelerated graphics port bus. [co1] **IDE & SCSI Interfaces:** IDE origin, IDE Interface ATA standards ATA1 to ATA7. ATA feature, ATA RAID and SCSI RAID, SCSI Cable and pin Connector pin outs SCSI V/s IDE Advantages and limitation. [CO1]	9
Unit 2: **Video Hardware**: Video display technologies, DVI Digital signals for CRT Monitor, LCD Panels, Video adapter types, Integrated Video/ Motherboard chipset, Video RAM, Video driver and multiple Monitor, Graphic accelerators. Advanced 3D Technologies, TV Tuner and Video Capture upgrades troubleshooting Video Cards and Drivers. [CO1]	8
Unit 3: **I/O Interfaces:** I/O Interfaces from USB and IEEE1394, I/O Interface from serial and Parallel to IEEE1394 and USB 961, Parallel to SCSI converter. Testing of serial and parallel port, USB Mouse/ Keyboard Interfaces. [CO2]	8
Unit 4: **Future Trends:** Detailed Analysis of recent Progress in the Peripheral and Bus systems. Some aspects of cost Performance analysis while designing the system. [CO3]	8

Suggested /Readings / Books

1. Douglas V. Hall ,"Microprocessors and Interfacing", Tata McGraw Hill 2006.
2. Barry B. Brey & C.R.Sarma" The intel microprocessors," Pearson 2003.
3. P. Pal Chandhari , "Computer Organization and design" Prentice Hall of India Pvt. Ltd, 1994.
4. Del Corso, H.Kirrman, JD Nicond "Microcomputer buses & links" Academic Press 1986.

Course Code: **BVNS503-19**

Course Name: Internet of Things

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Program: **B. Voc.**	L: **3** T: 0 P: 0
Branch: **Networking & System Administration**	Credits: **3**
Semester: **5th**	Contact hours: **33**
Theory/Laboratory: **Theory**	Elective status: **Core**
Internal max. marks: **40**	External max. marks: **60**
Total marks: **100**	

Course Outcomes:

CO#	Course outcomes
CO1	To identify the role of various components of IoT.
CO2	To discuss the integration of IoT data with cloud.
CO3	To describe the roles of various sensors used in IoT applications.
CO4	To implement basic applications related to IoT

Detailed contents	Contact hours
Unit 1. Introduction to IoT Architectural Overview, Design principles and needed capabilities, IoT Applications, Sensing, Actuation, Basics of Networking, M2M and IoT Technology Fundamental Devices and gateways, Data management, Business processes in IoT, Everything as a Service (XaaS), Role of Cloud in IoT, Security aspects in IoT. [co1]	9
Unit 2: Elements of IoT Hardware Components- Computing (Arduino, Raspberry Pi), Communication, Sensing, Actuation, I/O interfaces. Software Components- Programming API's (using Python /Node.js /Arduino) for Communication, Protocols-MQTT, ZigBee, Bluetooth, CoAP, UDP, TCP. [CO2]	8
UNIT 3. IoT Application Development Solution framework for IoT applications- Implementation of Device integration, Data acquisition and integration, Device data storage- Unstructured data storage on cloud/local server, Authentication, authorization of devices [CO3]	8
Unit 4: IoT Case Studies IoT case studies and mini projects based on Industrial automation, Transportation, Agriculture, Healthcare, Home Automation. [CO4]	8

List of suggested books :

1. Vijay Madisetti, Arshdeep Bahga, Ïnternet of Things, "A Hands on Approach", University Press
2. Dr. SRN Reddy, Rachit Thukral and Manasi Mishra, "Introduction to Internet of Things: A practical Approach", ETI Labs
3. Pethuru Raj and Anupama C. Raman, "The Internet of Things: Enabling Technologies, Platforms, and Use Cases", CRC Press
4. Jeeva Jose, "Internet of Things", Khanna Publishing House, Delhi
5. Adrian McEwen, "Designing the Internet of Things", Wiley.

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Course Code: **BVNS504-19**
Course Name: Cyber Forensics

Program: **B. Voc.**	L: **3** T: 0 P: 0
Branch: **Networking & System Administration**	Credits: **3**
Semester: **5th**	Contact hours: **33**
Theory/Laboratory: **Theory**	Elective status: **Core**
Internal max. marks: **40**	External max. marks: **60**
Total marks: **100**	

Course Outcomes:

CO#	Course outcomes
CO1	To Discuss the fundamental concepts of cyber forensics.
CO2	To become familiar with forensics tools
CO3	To analyze and validate forensics data.
CO4	To apply concepts related to ethical hacking and social engineering.

Detailed contents	Contact hours
Unit 1: Introduction to Traditional Computer Crime, Traditional problems associated with Computer Crime. Introduction to Identity Theft & Identity Fraud. Types of CF techniques - Incident and incident response methodology - Forensic duplication and investigation. Preparation for IR: Creating response tool kit and IR team. - Forensics Technology and Systems - Understanding Computer Investigation – Data Acquisition. [CO1]	9
Unit 2: Processing Crime and Incident Scenes – Working with Windows and DOS Systems. Current Computer Forensics Tools: Software/ Hardware Tools [CO2]	8
Unit 3 Validating Forensics Data – Data Hiding Techniques – Performing Remote Acquisition – Network Forensics – Email Investigations – Cell Phone and Mobile Devices Forensics [CO3]	8

Unit 4: ETHICAL HACKING Introduction to Ethical Hacking –Foot printing and Reconnaissance - Scanning Networks - Enumeration - System Hacking - Malware Threats - Sniffing Social Engineering - Denial of Service - Session Hijacking - Hacking Web servers - Hacking Web Applications – SQL Injection - Hacking Wireless Networks - Hacking Mobile Platforms [CO4]	8

TEXT BOOKS:

1. Bill Nelson, Amelia Phillips, Frank Enfinger, Christopher Steuart, ―Computer Forensics and Investigations‖, Cengage Learning, India Edition, 2016.
2. CEH official Certified Ethical Hacking Review Guide, Wiley India Edition, 2015.

Course Code: **BVNS505-19**

Course Name: **Cloud Computing Lab**

Program: **B. Voc.**	L: 0 T: 0 P: **3**
Branch: **Networking & System Administration**	Credits: **1.5**
Semester: **5th**	Percentage of numerical/design problems:-
Theory/Laboratory: **Laboratory**	Duration of end semester exam (ESE):-
Internal max. marks: **30**	External max. marks: **20**
Total marks: **50**	Status (Elective/Core): **Core**

Course Outcomes:

CO#	Course outcomes
CO1	To create Virtual machines by installing different OS on top of an existing OS.
CO2	To simulate the working on cloud computing
CO3	To deploy virtual machines.

Task 1	Install Virtualbox/VMware Workstation with different flavours of linux or windows OS on top of windows7 or 8.
Task 2	Install a C compiler in the virtual machine created using virtual box and execute Simple Programs
Task 3	Install Google App Engine. Create hello world app and other simple web applications using python/java.
Task 4	Simulate a cloud scenario using CloudSim and run a scheduling algorithm that is not present in CloudSim.

Task 5	Find a procedure to transfer the files from one virtual machine to another virtual machine.
Task 6	Find a procedure to launch virtual machine using trystack (Online Openstack Demo Version)

Reference Books:

1. Cloud Computing For Dummies, Fern Halper, Hurwitz, Robin Bloor, Marcia Kaufman, Wiley India Pvt. Ltd, ISBN-13: 978-0-47-0597422, New Delhi, India, 2011.
2. Dr. Saurabh Kumar, Cloud Computing: Insights Into New-Era Infrastructure, Wiley India Pvt. Ltd, ISBN-13: 978-8-12-6528837, New Delhi, India, 2011.

Course Code: **BVNS506-19**
Course Name: **Internet of Things Lab**

Program: **B. Voc.**	L: 0 T: 0 P: **3**
Branch: **Networking & System Administration**	Credits: **1.5**
Semester: **5th**	Percentage of numerical/design problems:-
Theory/Laboratory: **Laboratory**	Duration of end semester exam (ESE):-
Internal max. marks: **30**	External max. marks: **20**
Total marks: **50**	Status (Elective/Core): **Core**

Course Outcomes:

CO#	Course outcomes
CO1	To setup software needed to build IoT Applications.
CO2	Install/ Assemble different IoT related sensors
CO3	Develop basic applications related to IoT.

Task 1:	Familiarization with Arduino/Raspberry Pi and perform necessary software installation.
Task 2:	To interface LED/Buzzer with Arduino/Raspberry Pi and write a program to turn ON LED for 1 sec after every 2 seconds
Task 3:	To interface Push button/Digital sensor (IR/LDR) with Arduino/Raspberry Pi and write a program to turn ON LED when push button is pressed or at sensor detection.
Task 4:	To interface DHT11 sensor with Arduino/Raspberry Pi and write a program to print temperature and humidity readings.
Task 5:	To interface motor using relay with Arduino/Raspberry Pi and write a program to turn ON motor when push button is pressed

Task 6:	To interface OLED with Arduino/Raspberry Pi and write a program to print temperature and humidity readings on it.
Task 7:	To interface Bluetooth with Arduino/Raspberry Pi and write a program to send sensor data to smartphone using Bluetooth.
Task 8:	To interface Bluetooth with Arduino/Raspberry Pi and write a program to turn LED ON/OFF when '1'/'0' is received from smartphone using Bluetooth.
Task 9:	Write a program on Arduino/Raspberry Pi to upload temperature and humidity data to things peak cloud
Task 10:	Write a program on Arduino/Raspberry Pi to retrieve temperature and humidity data from things peak cloud
Task 11:	To install MySQL database on Raspberry Pi and perform basic SQL queries.
Task 12:	Write a program on Arduino/Raspberry Pi to publish temperature data to MQTT broker.

Course Code: **BVNS507-19**
Course Name: **Cyber Forensics Lab**

Program: **B. Voc.**	L: 0 T: 0 P: **3**
Branch: **Networking & System Administration**	Credits: **1.5**
Semester: **5th**	Percentage of numerical/design problems:-
Theory/Laboratory: **Laboratory**	Duration of end semester exam (ESE):-
Internal max. marks: **30**	External max. marks: **20**
Total marks: **50**	Status (Elective/Core): **Core**

Course Outcomes:

CO#	Course outcomes
CO1	To setup Kali Linux.
CO2	Implement various tools for cyber forensics
CO3	Analyze sql injection attacks

LIST OF EXPERIMENTS

Serial No	Experiment
Task 1	Use Google and Who.is for Reconnaisasance.
Task 2	Use TraceRoute, ping, ifconfig, netstat Command

Task 3	To learn about different hacking tools and skills using Kali Linux.
Task 4	Use Steghide steganographic tool helps to hide the data in various types of images and audio files.
Task 5	Work on Nmap scanner to perform port scanning
Task 6	Use WireShark sniffer to capture network traffic and analyze.
Task 7	Perform SQL injection attack.

Course Code: **BVNS601-19**
Network Maintenance & Troubleshooting

Program: **B. Voc.**	L: 3 T: 0 P: **0**
Branch: **Networking & System Administration**	Credits: **3**
Semester: **6th**	Percentage of numerical/design problems:-
Theory/Laboratory: **Theory**	Duration of end semester exam (ESE):-
Internal max. marks: **40**	External max. marks: **60**
Total marks: **100**	Status (Elective/Core): **Core**

Course Outcomes:

CO#	Course outcomes
CO1	To understand network layered models, topologies and types of networks
CO2	To identify different types of cables and prepare specifications of network devices as per customer requirements
CO3	To be skillful in configuring network devices and design WAN
CO4	To explore latest tools for remote access, comprehend security threats and technologies

Detailed contents	Contact hours
Unit 1: Overview of different types of Computer Network Type of Networks – Local Area Networks (LAN), Metropolitan Area Networks (MAN), Personal Area Network (PAN), Controller Area Network (CAN), Wide Area Networks (WAN), Internet, Ethernet, WI-Fi, Bluetooth, Mobile Networking, Wire and wireless Networking, Difference between Intranet and Internet. Extranet, 3G, 4G, 5G.	7

Unit 2: Network Cabling and Devices Introduction to Data Communication – Analog and Digital Signals, Simplex, Half-Duplex and Full-Duplex transmission mode. Crimping & Punching – Overview of Communication Media and Connectors, Unshielded twisted-pair (UTP), shielded twisted-pair (STP), Fibre Optic and coaxial cable: RJ-45, RJ-11, BNC, Understanding colour codes of CAT5 cable, 568A and 568B convention Network Components - Modems, Firewall, Hubs, Bridges, Routers, Gateways, Repeaters, Transceivers, Switches, Access point, functions, advantages and applications of Network Components, Specifications of Network Devices	9
Unit 3: IP Addressing Network Device Configurations IPv4 address basics, classes of IP addresses, Concept of Network address, Network mask, Subnet, Broadcast address, setting of subnet mask as per requirement Layer 2 manage switch configuration and use it on network, Layer 3 switch configuration, VLAN Basic and Configurations, router configuration, Testing connectivity using network tools. Explore open source network simulators, design WAN in simulator,	8
Unit 4: Control, Monitoring and Security of Computer Network Remote desktop software like NetMeeting, Team Viewer, Audit process of a switch/router/APs, Surveillance using network devices, Remote management of devices, Network monitoring and maintaining techniques Modern Network Security- Threats and the basics of securing a network, Secure Administrative Access, LAN security considerations, Wi-Fi security considerations, various types of malwares, Firewall, IDS.	9

Text Books:

1. Data Communications and Networking By Behrouz A. Forouzan.

Course Code: **BVNS605-19**

Network Maintenance & Troubleshooting Lab

Program: **B. Voc.**	L: 0 T: 0 P: **2**
Branch: **Networking & System Administration**	Credits: **1**
Semester: **6th**	Percentage of numerical/design problems:-
Theory/Laboratory: **Theory**	Duration of end semester exam (ESE):-
Internal max. marks: **30**	External max. marks: **20**
Total marks: **50**	Status (Elective/Core): **Core**

Course Outcomes:

CO#	Course outcomes
CO1	To identify different types of cables and prepare specifications of network devices as per customer requirements
CO2	To configure network devices and design WAN
CO3	To explore latest tools for remote access, comprehend security threats and technologies

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Detailed contents
1. Identify various Network tools like: (a) Wire crimper, (b) Wire Map Testers, (c) Multifunction Cable Tester, (d) LAN Tester, (e) Tone Generator 2. Identify various Network device like: (a) Switch (Normal and Managed), (b) Router (Normal and wireless), (c) Rack, Patch Panel, I/O box, (d) Access Point 3. Understand the Layout of network on your lab and campus. Draw network map of campus. 4. Practice crimping with straight and cross CAT 6 cables. 5. Punching practice in I/O Box and patch panel. 6. Install & Configure a Peer to Peer Network using Windows and Linux Software 7. Connect computers using Bluetooth, WI-FI, hotspot. 8. Configure Layer 3 Switch and router 9. Use popular TCP/IP (windows and Linux) Utilities like PING, IPCONFIG, HOSTNAME, ROUTE, TRACERT 10. Implement remote desktop access and control and VoIP. 11. To perform case study of various malwares

Course Code: **BVNS602-19**
Course Name: **Penetration Testing Using Open Source Technologies**

Program: **B. Voc.**	L: 3 T: 0 P: **0**
Branch: **Networking & System Administration**	Credits: **3**
Semester: **6th**	Percentage of numerical/design problems:-
Theory/Laboratory: **Theory**	Duration of end semester exam (ESE):-
Internal max. marks: **40**	External max. marks: **60**
Total marks: **100**	Status (Elective/Core): **Core**

Course Outcomes: Student will be able to

CO#	**Course outcomes**
CO1	Identify the need of ethical Hacking
CO2	Discuss various OS vulnerabilities.
CO3	Explain the need of Penetration testing
CO4	Explore various penetration testing tools

Detailed contents	**Contact hours**
INTRODUCTION TO HACKING: Introduction to Hacking — Importance of Security — Elements of Security — Phases of an Attack — Types of Hacker Attacks — Vulnerability Research —Introduction to Footprinting — Information Gathering Methodology.	8

OS VULNERABILITIES: Windows OS Vulnerabilities — Tools for Identifying Vulnerabilities —Countermeasures — Linux OS Vulnerabilities — Tools for Identifying Vulnerabilities — Countermeasures	8
INTRODUTION TO PENETRATION TESTING: Introduction — Security Assessments — Types of Penetration Testing-Phases of Penetration Testing— Tools —	8
PENETRATION TESTING TOOLS: Choosing Different Types of Pen-Test Tools — Penetration Testing Tools, Information Gathering Tools, Vulnerability Analyses Tools.Tools for Wireless Attacks, Tools for Website Penetration Testing, Exploitation Tools. Tools Password Cracking Tools, Maintaining Access Tools.	9

1. Penetration Testing with Kali Linux: Learn Hands-on Penetration Testing Using a Process-Driven Framework,30 July 2021, Pranav Joshi Deepayan Chanda (Author), BPB Publications , ISBN-10 : 939068479X, ISBN-13 : 978-9390684793

Course Code: **BVNS606-19**
Penetration Testing Using Open Source Technologies Lab

Program: **B. Voc.**	L: 0 T: 0 P: **2**
Branch: **Networking & System Administration**	Credits: **1**
Semester: **6th**	Percentage of numerical/design problems:-
Theory/Laboratory: **Theory**	Duration of end semester exam (ESE):-
Internal max. marks: **30**	External max. marks: **20**
Total marks: **50**	Status (Elective/Core): **Core**

Course Outcomes:

CO#	Course outcomes
CO1	To Install and configure Kalli Linux
CO2	To Implement penetration testing
CO3	To identify various attacks and vulnerabilities.

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Detailed contents
1. Kali Linux - Installation and Configuration. 2. Kali Linux – Information Gathering Tools. 1. NMAP and ZenMAP. 2. Stealth Scan. 3. Searchsploit. 4. DNS Tools. (i) dnsenum.pl. (ii) DNSMAP. iii) dnstracer. 5. LBD (Load Balancing Detector) Tools. 6. Hping3. 3. Kali Linux - Vulnerability Analyses Tools. 1. Cisco Tools. 2. Cisco Auditing Tool. 3. Cisco Global Exploiter. 4. BED. 4. Kali Linux - Wireless Attacks. 1. Fern Wifi Cracker. 2.Kismet. 3. GISKismet. 5. Kali Linux - Website Penetration Testing. Vega Usage. 6. Kali Linux - Exploitation Tools. 1. Metasploit. 2. Armitage. 7. Kali Linux - Password Cracking Tools. 1. Hydra. 2. Johnny. 3. John. 4. SQLdict. 8. Kali Linux - Maintaining Access. 1. Powersploit 2. Sbd 3. Webshells

1. Penetration Testing with Kali Linux: Learn Hands-on Penetration Testing Using a Process-Driven Framework,30 July 2021, Pranav Joshi Deepayan Chanda (Author), BPB Publications , ISBN-10 : 939068479X, ISBN-13 : 978-9390684793

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Course Code: **BVNS603-19**
Course Name: **Network Simulation Tools**

Program: **B. Voc.**	L: 3 T: 0 P: **0**
Branch: **Networking & System Administration**	Credits: **3**
Semester: **6th**	Percentage of numerical/design problems:-
Theory/Laboratory: **Theory**	Duration of end semester exam (ESE):-
Internal max. marks: **40**	External max. marks: **60**
Total marks: **100**	Status (Elective/Core): **Core**

Course Outcomes:

CO#	Course Outcomes
After studying this course, the students will be able to :-	
CO1	Explain how discrete-event simulation methods can be used to simulate computer networks
CO2	Describe models for simulating various network protocols, e.g. TCP, BGP, CSMA/CA
CO3	Analyze how the number of simulation events scales with the number of nodes for different network topologies and traffic patterns
CO4	Simulate a variety of network topologies and protocols using a modern network simulation tool such as NS-3

Detailed Contents	Contact hours
Unit 1: **Network Simulation Basics** a. Creating topologies b. Defining data flows c. Defining queuing disciplines d. Trace file analysis methods e. Using Network animation **Introduction to Simulation** a. Discrete Event Simulation (DES) b. Simulating Networks with DES c. Modeling Network Elements d. Levels of abstraction	9

Unit 2: **Overview of Network Simulation Tools** a. NS3 b. Opnet c. Omnet++ d. GloMoSim e. Cisco Packet Tracer **Measuring Network Performance by Simulation** a. Performance Metrics b. Throughput, Loss, Delay, Jitter, etc. c. Factors Affecting Performance d. Predicting Effect of Changes	8
Unit 3: **Transmission Control Protocol (TCP)** a. Modeling TCP b. Existing TCP Variations c. Factors Affecting TCP Performance d. New TCP variations e. Congestion Avoidance in TCP f. Using simulation to measure TCP performance **Multicast** a. Multicast group management b. Source based trees vs. Core based trees c. Modeling multicast in network simulations d. Measuring multicast routing protocol overhead	8
Unit 4: **Simulating Routing Protocols** a. Routing in Network Simulators b. Modeling EIGRP and BGP **Active Queue Management (AQM) and Queuing Disciplines**	8

a. DropTail, RED, Priority, WFQ, SCFQ b. Implementation of active queues in Network Simulators c. Measuring the affect of AQM	

Text Books:

1. Modeling and Tools for Network Simulation, Klaus Wehrle (Editor), Mesut Günes (Editor), James Gross (Editor), Springer

Reference Books:

1. **Packet Tracer Network Simulator, Jesin A, Packet Publishing, ISBN: 9781782170426**

Course Code: **BVNS607-19**
Network Simulation Tools Lab

Program: **B. Voc.**	L: 0 T: 0 P: **2**
Branch: **Networking & System Administration**	Credits: **1**
Semester: **6th**	Percentage of numerical/design problems:-
Theory/Laboratory: **Theory**	Duration of end semester exam (ESE):-
Internal max. marks: **30**	External max. marks: **20**
Total marks: **50**	Status (Elective/Core): **Core**

CO#	Course Outcomes
After studying this course, the students will be able to :-	
CO1	Know about the various networking devices, tools and also understand the implementation of network topologies
CO2	Create various networking cables and know how to test these cables
CO3	Create and configure networks in packet tracer tool using various network devices and topologies
CO4	Configure routers using various router configuration commands.

Detailed contents

Task 1: To study the different types of Network cables and network topologies.

Task 2: Practically implement and test the cross-wired cable and straight through cable using clamping tool and network lab cable tester.

Task 3: Study and familiarization with various network devices.

Task 4: Familiarization with Packet Tracer Simulation tool/any other related tool.

Task 5: Study and Implementation of IP Addressing Schemes

Task 6: Creation of Simple Networking topologies using hubs and switches

Task 7: Simulation of web traffic in Packet Tracer

Task 8: Study and implementation of various router configuration commands

Task 9: Creation of Networks using routers.

Task 10:Configuring networks using the concept of subnetting

Task 11:Practical implementation of basic network command and Network configuration commands like ping, ipconfig, netstat, tracert etc. for troubleshooting network related problems.

Task 12: Configuration of networks using static and default routes.

Suggested Tools - NS2/3, Cisco Packet Tracer, Netsim etc..

Course Code: **BVNS604-19**
Course Name: **Firewall & Intrusion Detection**

Program: **B. Voc.**	L: 3 T: 0 P: **0**
Branch: **Networking & System Administration**	Credits: **3**
Semester: **6th**	Percentage of numerical/design problems:-
Theory/Laboratory: **Theory**	Duration of end semester exam (ESE):-
Internal max. marks: **40**	External max. marks: **60**
Total marks: **100**	Status (Elective/Core): **Core**

Course Outcomes:

CO#	Course outcomes

CO1	Identify risks related to Computer Security and information hazard in various situations.
CO2	Apply user identification and authentication methods.
CO3	Apply measures to prevent attacks on network using firewall.
CO4	Apply Cryptographic algorithms and protocols to maintain Computer Security

Detailed contents	**Contact hours**
Unit 1: Introduction to Computer and Information Security Security Basics : Confidentiality, Integrity, Availability, Accountability, Non-Repudiation, Reliability; Threat to Security : Viruses, Worms, Tojan Horse, Intruders; Risk and Threat Analysis. Types of Attacks : Active and Passive attacks, Denial of Service, DDOS, Backdoors and Trapdoors, Sniffing, Spoofing, TCP/IP Hacking. Information Security : Need and importance of information, Criteria for Information Classification, Principles of Information Classification.	9
Unit 2: User Authentication and Access Control User Authentication: Password and Certificate based. Biometric Authentication : Finger/Hand prints, Retina, Patterns, Signature and writing patterns. Access Controls : Authentication Mechanism, Principle Authentication, Authorization, Audit and Policies.	8
Unit 3: Firewall and Intrusion Detection Firewall : Types of Firewalls, Policies, Configuration limitations. Intrusion Detection System : Vulnerability Assessment, Misuse Detection, Anomaly Detection, Network Based IDS, Host Based IDS, Honeypots	8
Unit 4: Cryptography, Cyber Laws and Compliance Standards Cryptography : Introduction to Plan & Cipher Text, Cryptography, Cryptanalysis, Cryptology, Encryption, Decryption, RSA Algorithm IP Security : Overview, Protocols, Modes. Email Security : AMTP, PEM, PGP. Public Key Infrastructure : Certificate and Registration Authority. Cyber Crime : Hacking, Digital Forgery, Identity Theft and Fraud. Cyber Laws : Need, Crime Against Individual, Government and Property. Compliance Standards : Implementing and Information Security Management	8

Text Books:

3. Atul Kahate, “Cryptography & Network Security”, Mc Graw Hill
4. Harish Chander, “Cyber Laws and IT Protection”, PHI
5. William Stalling, “Cryptography & Network Security”, PHI
6. Forouzan “Cryptography & Network Security”, PHI

Reference Books:

7. Dieter Gollmann, “Computer Security”, Wiley Publication
8. Wenbo Mao."Modern Cryptography, Theory & Practice", Pearson Education.
9. C. Boyd, A. Mathuria "Protocols for Authentication and Key Establishment", Springer.