

Scheme & Syllabus of
Bachelor of Vocational Studies
(B.Voc.)
Networking & System Administration
Batch 2025



By Department of Academics
IKG Punjab Technical University

I.K.GujralPunjabTechnicalUniversity,Jalandhar
B.Voc.(Networking&System Administration),Batch-2019

Semester1st

CourseCode	CourseTitle	Load Allocation		Marks Distribution		Total	Credits
		L	P	Internal	External		
BVNS101-19	PCHardware	3	0	40	60	100	3
BVNS102-19	ComputerNetworking	3	0	40	60	100	3
BVNS103-19	CommunicativeEnglish	3	0	40	60	100	3
BVNS104-19	BasicITSkills	3	0	40	60	100	3
BVNS105-19	PCHardwareLaboratory	0	3	30	20	50	1.5
BVNS106-19	ComputerNetworking Laboratory	0	3	30	20	50	1.5
BVDW204-21	Mathematics	3	0	40	60	100	3
On-JobTraining/QualificationPack*							
BVNS107-19	TestEngineer(SSC/Q1301)	OnJobTraining(OJT) in Collaboration with MoU industry		200		200	15
Total		12	6	220	480	700	30

*Thequalificationpacksmayvaryfrominstituteto institute.

Semester2nd

CourseCode	CourseTitle	Load Allocation		Marks Distribution		Total	Credits
		L	P	Internal	External		
BVNS201-19	DatabaseManagement Systems	3	0	40	60	100	3
BVNS202-19	Object Oriented ProgrammingusingC++	3	0	40	60	100	3
BVNS203-19	ComputerSystem Architecture	3	0	40	60	100	3
BVNS204-19	Mathematics	3	0	40	60	100	3
BVNS205-19	DatabaseManagement Systems Laboratory	0	3	30	20	50	1.5
BVNS206-19	ObjectOriented ProgrammingusingC++ Laboratory	0	3	30	20	50	1.5
EMC-101-25	Entrepreneurship Setup and Launch **	0	4	30	20	50	2
On-JobTraining/QualificationPack*							
BVNS207-19	SecurityAnalyst (SSC/Q0901)	OnJobTraining(OJT) in Collaboration with MoU industry		200		200	15
Total		12	6	220	480	700	30

**The department of Higher Education and Languages, Government of Punjab endeavor to AI-powdered entrepreneurship learning platform on the said course. The Institute /Campus shall appoint an assistant professor as faculty coordinator.

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Semester3rd

CourseCode	CourseTitle	Load Allocation		Marks Distribution		Total	Credits
		L	P	Internal	External		
BVNS301-19	OperatingSystem	3	0	40	60	100	3
BVNS302-19	DataStructures	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.

Semester4th

CourseCode	CourseTitle	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

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Semester5th

CourseCode	CourseTitle	Load Allocation		Marks Distribution		Total	Credits
		L	P	Internal	External		
BVNS501-19	Cloud Computing	3	0	40	60	100	3
BVNS502-19	ComputerPeripherals and Interfaces	3	0	40	60	100	3
BVNS503-19	Internetof Things	3	0	40	60	100	3
BVNS504-19	CyberForensics	3	0	40	60	100	3
BVNS505-19	Cloud Computing Lab	0	2	30	20	50	1
BVNS506-19	InternetofThings Lab	0	2	30	20	50	1
BVNS507-19	CyberForensicsLab	0	2	30	20	50	1
On-JobTraining/QualificationPack*							
BVNS508-19	HardwareEngineer (SSC/Q4701)	On Job Training(OJT) in CollaborationwithMoU industry			200	200	15
Total		12	6	250	500	750	30

Semester6th

CourseCode	CourseTitle	Load Allocation		Marks Distribution		Total	Credits
		L	P	Internal	External		
BVNS601-19	NetworkMaintenance and Troubleshooting	3	0	40	60	100	3
BVNS602-19	PenetrationTesting UsingOpenSource Technologies	3	0	40	60	100	3
BVNS603-19	NetworkSimulation Tools	3	0	40	60	100	3
BVNS604-19	Firewall&Intrusion Detection	3	0	40	60	100	3
BVNS605-19	NetworkMaintenance and Troubleshooting Lab	0	2	30	20	50	1
BVNS606-19	PenetrationTesting UsingOpenSource Technologies Lab	0	2	30	20	50	1
BVNS607-19	NetworkSimulation Tools Lab	0	2	30	20	50	1
On-JobTraining/QualificationPack*							
BVNS608-19	OnJobTrainingwithMoU Industry				200	200	15
Total		12	6	250	500	750	30

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

CourseCode:**BVNS101-19**

CourseName:**PCHardware**

Program: B.Voc.	L: 3 T: 0 P: 0
Branch: Networking&System Administration	Credits: 3
Semester: 1st	Contacthours: 33
Theory/Laboratory: Theory	Electivestatus: Core
Internalmax.marks: 40	Externalmax.marks: 60
Totalmarks: 100	

Course Outcomes:

CO#	Course outcomes
CO1	ToIdentifythehardwarecomponentsofacomputerincludingnamesandfunctionsof hardware ports and the parts of the motherboard.
CO2	Toidentifytheperipheraldevicesoutsidecomputer&toSearchPCforthevarious hardware components it contains.
CO3	Toidentify thesoftware'srunning on acomputer.
CO4	ToequipthestudentsabouttheBasicofhowComputerisassembledand troubleshooting it.

Detailedcontents	Contact hours
Unit 1: Assemble/setupandupgradepersonalcomputersystems:computersystemmodules/ componentsanditsoperations,needofhardwareandsoftwareforcomputertowork, 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: Performinstallation,configuration,andupgradingofmicrocomputer:Hardwareand software requirement, Assemble/setup microcomputer systems, accessory boards, typesofmotherboards,selectionofrightmotherboard,Installation&replacementof motherboard,troubleshootingproblemswithmemory.	8
Unit 3: Install/connectassociatedperipherals:Workingofprintersandscanners,Installation ofprintersandscanners,sharingaprinteroveralocalareanetwork,troubleshooting printer and scanner problems, troubleshooting hard drive problems.	8
Unit 4: Diagnoseandtroubleshootingofmicrocomputersystemshardware&softwareand other peripheral equipment: Approaches to solve a PC problem, troubleshooting a failedbootbeforetheOSisloaded,differentapproachestoinstallingandsupporting I/O device, managing faulty components.	8

TextBooks:

1. PCHardware:TheCompleteReference,McGraw-Hills.
2. TheIndispensablePCHardwareBook(4thEdition)Hans-PeterMessmer.

ReferenceBooks:

1. PCHardware:ABeginner'sGuidebyRon Gilster.

I.K.GujralPunjabTechnicalUniversity,Jalandhar
B.Voc.(Networking&System Administration),Batch-2019

CourseCode:**BVNS102-19**

CourseName:**Computer Networking**

Program: B.Voc.	L:3 T: 0 P: 0
Branch: Networking&System Administration	Credits:3
Semester: 1st	Contacthours: 33
Theory/Laboratory: Theory	Electivestatus: Core
Internalmax.marks: 40	Externalmax.marks: 60
Totalmarks: 100	

Course Outcomes:

CO#	Course outcomes
CO1	FamiliarwiththedifferentNetwork Models.
CO2	UnderstanddifferentprotocolsworkingatMediumAccess Sub-layer.
CO3	Learntheconceptofnetworkroutingthroughalgorithms.
CO4	LearnandunderstandInternetprotocolsandnetworksecurity.

Detailedcontents	Contact hours
Unit 1 : Data Communications Concepts: Digital and analog transmissions-Modem, parallelandserial,synchronousandasynchronous,Modesofcommunication: Simplex, half duplex, full duplex, Concept of multiplexing, De-multiplexing. Types of Networks: LAN, MAN, WAN NetworkTopologies:Bus,Star, Ring,Mesh,Tree, Hybrid CommunicationChannels:Wiredtransmissions:Telephonelines,leasedlines, switch line, coaxial cables-base band, broadband, optical fiber transmission.	9
Unit 2 : TransmissionMedia:GuidedMedia(TwistedPairCable,CoaxialCable,Fiber Optics Cable), Unguided Media (Radio Waves, Microwaves, Infrared) Communication Devices (Switches, Hub, Routers, gateway etc) IntroductiontoSwitching:CircuitSwitchNetworks,DatagramSwitchNetworks Network Models.	8
Unit 3 : IntroductiontoOSIModel–PhysicalLayer,DataLinkLayer,NetworkLayer, Transport Layer, Session Layer, Presentation Layer TCP/IP(LayerArchitecture)DataLinkLayer,InternetLayer,TransportLayer, Application Layer	8
Unit 4 : MACsublayer:802.4TokenBus,IEEE802.5TokenRing Concept of Internetworking.	8

TextBooks:

1. ComputerNetworks,Tanenbaum,Andrew,FifthEdition,PHI.
2. DataCommunicationandNetworking,Behrouz A.Forouzan,FourthEdition.
3. ComputerToday,S.K.Basandra,FirstEdition,Galgotia.

ReferenceBooks:

1. DataCommunicationSystem,Black,Ulysse,ThirdEdition,PHI.
2. DataandComputerCommunications, Stalling,NinthEdition,PHI.

I.K.GujralPunjabTechnicalUniversity,Jalandhar
B.Voc.(Networking&System Administration),Batch-2019

CourseCode:**BVNS103-19**

CourseName:**CommunicativeEnglish**

Program: B.Voc.	L: 3 T: 0 P: 0
Branch: Networking&System Administration	Credits: 3
Semester: 1st	Contacthours: 33
Theory/Laboratory: Theory	Electivestatus: Core
Internalmax.marks: 40	Externalmax.marks: 60
Totalmarks: 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 communications such as interviews, group discussions, office environments, important reading skills and writing skills.

Detailed contents	Contact hours
Unit-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/Punjab 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.GujralPunjabTechnicalUniversity,Jalandhar
B.Voc.(Networking&System Administration),Batch-2019

CourseCode:**BVNS104-19**

CourseName: **BasicIT Skill**

Program: B.Voc.	L: 3 T: 0 P: 0
Branch: Networking&System Administration	Credits: 3
Semester: 1st	Contacthours: 33
Theory/Laboratory: Theory	Electivestatus: Core
Internalmax.marks: 40	Externalmax.marks: 60
Totalmarks: 100	

Course Outcomes:

CO#	Course outcomes
CO1	Understandingtheconcept ofinputand outputdevicesof Computers.
CO2	Learn the functional units and classify types of computers, how they process informationandhowindividualcomputersinteractwithothercomputingsystems and devices.
CO3	Learnbasicwordprocessing,SpreadsheetandPresentationGraphicsSoftware skills.
CO4	StudytousetheInternetsafely,legally,andresponsibly.
CO5	TodevelopanunderstandingandpracticalexposuretodifferentITtoolsusedasan aid in business and ecommerce.

Detailedcontents	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:Inputandoutputdevices,keyboard,mouse,joystick,scanner,OCR,OMR, bar code reader, web camera, monitor, printer, plotter. Memory:Primary,secondary.	9
Unit 2: TypesofLanguages:Machine,assemblyandHighlevelLanguage;Operating system as user interface, utility programs. Wordprocessing:Editingfeatures,formattingfeatures,saving,printing,table handling,pagesettings,spell-checking,macros,mail-merge,equationeditors.	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: TheImpactofComputingandthe InternetonSociety. Electronic Payment System: Secure Electronic Transaction, Types of Payment System:DigitalCash,ElectronicCheque,SmartCard,Credit/DebitCardE-Money, Immediate Payment System (IMPS).	8

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TextBooks:

1. IntroductiontoInformationTechnology,ITL EducationSolutionslimited,PearsonEducation.
2. ComputerFundamentals,A.Goel,2010,PearsonEducation.
3. FundamentalsofComputers, P.K.Sinha& P.Sinha, 2007,BPBPublishers.

ReferenceBooks:

1. IntroductiontoComputersby PeterNorton.
2. ComputersTodaybyD. H.Sanders,McGrawHill.
3. ComputersbyLarrylong&Nancylong,12th edition,Prentice Hall.

I.K.GujralPunjabTechnicalUniversity,Jalandhar
B.Voc.(Networking&System Administration),Batch-2019

CourseCode:**BVNS105-19**

CourseName: **PCHardwareLaboratory**

Program: B.Voc.	L: 0 T: 0 P: 3
Branch: Networking&System Administration	Credits: 1.5
Semester: 1st	Percentageofnumerical/designproblems:-
Theory/Laboratory: Laboratory	Durationofendsemester exam(ESE):-
Internalmax.marks: 30	Externalmax.marks: 20
Totalmarks: 50	Status(Elective/Core): Core

Course Outcomes:

CO#	Course outcomes
CO1	Performastepby step assembly ofadesktop computer.
CO2	Explain,install,andnavigateanoperatingsystem;upgradecomponentsbasedon needs and perform preventive maintenance and advanced troubleshooting.
CO3	Performinstallationofvarioustypesofsystemsoftware's&utilitysoftware's.

Task1:	Assemblingand DeAssembling of Computer System
Task2:	LoadingandconfigurationprocedureofMicrosoftClientO/SWinXP/Win7and Windows 8
Task3:	Installationofutilitytools(SoftwareandDrivers)
Task4:	Firewallconfiguration,Antivirus/Internetsecurityloadingandconfiguration procedure
Task5:	Installationandconfigurationof,I/Odevices–Printers,Webcams,Scanners, Digital Camera , USB Wifi , USB BT, USB Storages , Projectors
Task6:	MultipleOS loadingand trouble shooting

RecommendedHardware:

Scrap CPUs, Scrap PC Cabinet, SMPS and other basic components, Scrap Motherboard and DifferentTypesofProcessors,ScrapRAM,DesktopPCwithoutloadingOS,ScrapUPS,Laptop.

TextBooks:

1. PCHardware:TheCompleteReference,McGraw-Hills.
2. TheIndispensablePCHardwareBook(4thEdition)Hans-PeterMessmer.

I.K.GujralPunjabTechnicalUniversity,Jalandhar
B.Voc.(Networking&System Administration),Batch-2019

CourseCode:**BVNS106-19**

CourseName:**ComputerNetworkingLaboratory**

Program: B.Voc.	L: 0 T: 0 P: 3
Branch: Networking&System Administration	Credits: 1.5
Semester: 1st	Percentageofnumerical/designproblems:-
Theory/Laboratory: Laboratory	Durationofendsemester exam(ESE):-
Internalmax.marks: 30	Externalmax.marks: 20
Totalmarks: 50	Status(Elective/Core): Core

Course Outcomes:

CO#	Course outcomes
CO1	Toexecuteandevaluatetworkadministrationcommandsanddemonstratetheiruse in different network scenarios.
CO2	Todemonstratetheinstallationandconfigurationofnetwork simulator.
CO3	Demonstrateandmeasuredifferentnetworkscenariosandtheirperformancebehavior.

Task1:	PreparingComputerNetworkCableusingConnectorsandNetworking tools
Task2:	LAN& WANConnectivity usingHub, Switchand Router
Task3:	Installationof Windows andServer
Task4:	SharingPeripheralDevices.
Task5:	ConfigurationofNetworkConnectivity
Task6:	TroubleshootingofComputerHardwareandNetwork

Recommended Hardware:

SimpleNetworkComponents,NetworkingComponentslikeSwitch,Router,Hub,NIC, PC/Laptop, Router, Connectivity Network lab

TextBooks:

1. ComputerNetworks,Tanenbaum,Andrew,FifthEdition,PHI.
2. DataCommunicationandNetworking,Behrouz A.Forouzan,FourthEdition.
3. ComputerToday,S.K.Basandra,FirstEdition,Galgotia.

I.K.GujralPunjabTechnicalUniversity,Jalandhar
B.Voc.(Networking&System Administration),Batch-2019

CourseCode:**BVDW204-19**

CourseName: **Mathematics**

Program: B.Voc.	L: 3 T: 0 P: 0
Branch: Data&WebAnalytics	Credits: 3
Semester: 1st	Contacthours: 33
Theory/Laboratory: Theory	Status(Elective/Core): Core
Internalmax.marks: 40	Externalmax.marks: 60
Totalmarks: 100	

CourseOutcomes:

CO#	Courseoutcomes
CO1	Representdatausingvariousmathematicalnotions.
CO2	Explainedifferenttermsused inbasic mathematics.
CO3	Describevariousoperationsandformulas usedtosolvemathematicalproblems.

DetailedContents	Contacthours
Unit-I SetIntroduction,Objectives,RepresentationofSets(RosterMethod,SetBuilderMethod),TypesofSets(NullSet,SingletonSet,FiniteSet,InfiniteSet,Equal Set, Equivalent Set, Disjoint Set, Subset, Proper Subset, Power Set,UniversalSet)andOperationwithSets(UnionofSet,IntersectionofSet, Difference of Set, Symmetric Difference of Set) Universal Sets, Complementof aSet.	9
Unit-II LogicStatement,Connectives,BasicLogicOperations(Conjunction,Disjunction, Negation)LogicalEquivalence/EquivalentStatements,Tautologiesand Contradictions.	8
Unit-III MatricesIntroduction,TypesofMatrix(RowMatrix,ColumnMatrix,Rectangular Matrix,SquareMatrix,DiagonalMatrix,ScalarMatrix,UnitMatrix,NullMatrix,C omparableMatrix,EqualMatrix),ScalarMultiplication, NegativeofMatrix,AdditionofMatrix,DifferenceoftwoMatrix,Multiplicationof Matrices, Transpose of aMatrix.	11
Unit-IV Progressions Introduction, Arithmetic Progression, Sum of Finite number ofquantitiesinA.P,ArithmeticMeans,GeometricProgression,GeometricMean.	11

TextBooks:

1. DiscreteMathematicsandIts ApplicationsbyKennethH. Rosen,McGrawHill, 6thEdition.
2. CollegeMathematics,Schaum'sSeries,TMH.

ReferenceBooks:

1. ElementaryMathematics,Dr.RDSharma.
2. ComprehensiveMathematics,Parmanand Gupta.
3. ElementsofMathematics,MLBhargava.

I.K.GujralPunjabTechnicalUniversity,Jalandhar
B.Voc.(Networking&System Administration),Batch-2019

CourseCode:**BVNS201-19**

CourseName:**DatabaseManagementSystems**

Program: B.Voc.	L: 3 T: 0 P: 0
Branch: Networking&System Administration	Credits: 3
Semester: 2nd	Contacthours: 33
Theory/Laboratory: Theory	Status(Elective/Core): Core
Internalmax.marks: 40	Externalmax.marks: 60
Totalmarks: 100	

Course Outcomes:

CO#	Course outcomes
CO1	UnderstandthebasicconceptsofDBMS.
CO2	Formulate,usingSQL,solutions toabroad range ofquery anddataupdateproblems.
CO3	Demonstrateanunderstandingofnormalizationtheoryandappliesuchknowledgeto the normalization of a database.
CO4	Understandthe conceptofTransactionandQuery processinginDBMS.

DetailedContents	Contact hours
Unit-I: IntroductionofDBMS,DataModelingforaDatabase,Threelevel ArchitectureofDBMS,ComponentsofaDBMS.IntroductiontoData 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 DependenciesandFourthNormalForm,JoinDependenciesandFifth NormalForm,Domain-keynormalform(DKNF).	8
Unit-IV DatabaseRecovery,ConcurrencyManagement,DatabaseSecurity,Integrity and Control. Structure & Design of a Distributed Database.	8

TextBooks:

1. AnIntroductiontoDatabaseSystembyBipinC.Desai,Galgotia PublicationsPvtLtd-New Delhi, Revised Edition, (2012).
2. AnIntroductiontoDatabaseSystemsbyC.J.Date,A.Kannan&S.Swamynathan,8th Edition, Pearson Education, (2006).

ReferenceBooks:

1. SQL,PL/SQLTheProgrammingLanguageofOracle”,IvanBayross,BPBPublications,4th Revised Edition (2009).
2. DatabaseSystemConceptsbyAbrahamSilberschatz,HenryF.Korth&S.Sudharshan,Tata McGraw Hill, 6th Edition, (2013).
3. DatabaseManagementSystems,RaghuRamakrishnan,McGraw-Hill,3rd Edition,2014.

I.K.GujralPunjabTechnicalUniversity,Jalandhar
B.Voc.(Networking&System Administration),Batch-2019

CourseCode:**BVNS2022-19**

CourseName:**ObjectOrientedProgrammingusingC++**

Program: B.Voc.	L: 3 T: 0 P: 0
Branch: Networking&System Administration	Credits: 3
Semester: 2nd	Contacthours: 33
Theory/Laboratory: Theory	Status(Elective/Core): Core
Internalmax.marks: 40	Externalmax.marks: 60
Totalmarks: 100	

Course Outcomes:

CO#	Course outcomes
CO1	To learn programming from real world examples.
CO2	To understand Object oriented approach for finding Solution to various problems with the help of C++ language.
CO3	To create computer based solution 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&ObjectsandConceptofConstructors: 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:

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

Reference Books:

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

I.K.GujralPunjabTechnicalUniversity,Jalandhar
B.Voc.(Networking&System Administration),Batch-2019

CourseCode:**BVNS203-19**

CourseName:**ComputerSystemArchitecture**

Program: B.Voc.	L:3 T: 0 P: 0
Branch: Networking&System Administration	Credits:3
Semester: 2nd	Contacthours: 33
Theory/Laboratory: Theory	Status(Elective/Core): Core
Internalmax.marks: 40	Externalmax.marks: 60
Totalmarks: 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

I.K.GujralPunjabTechnicalUniversity,Jalandhar
B.Voc.(Networking&System Administration),Batch-2019

TextBooks:

1. ComputerSystemArchitecture,M.M.Mano, ThirdEdition,PHI.
2. DigitalComputerElectronics,Malvino,SecondEdition,Mc-GrawHill.
3. ModernDigitalElectronics,R. P.Jain,FourthEdition, TMH.

ReferenceBooks:

1. ComputerOrganizationandArchitecture,Stallings,EighthEdition,PHI.
2. ComputerOrganizationandArchitecture,J.P.Hayes,ThirdEdition,TMH.
3. DigitalandElectronicCircuits,T.C.Bartee,McGrawHill.

I.K.GujralPunjabTechnicalUniversity,Jalandhar
B.Voc.(Networking&System Administration),Batch-2019

CourseCode:**BVNS204-19**

CourseName:**Mathematics**

Program: B.Voc.	L:3 T: 0 P: 0
Branch: Networking&System Administration	Credits:3
Semester: 2nd	Contacthours: 33
Theory/Laboratory: Theory	Status(Elective/Core): Core
Internalmax.marks: 40	Externalmax.marks: 60
Totalmarks: 100	

Course Outcomes:

CO#	Course outcomes
CO1	Representdatausingvariousmathematicalnotions.
CO2	Explainedifferentterms usedinbasicmathematics.
CO3	Describevariousoperationsandformulasusedto solvemathematicalproblems.

DetailedContents	Contact hours
Unit-I Set Introduction, Objectives, Representation of Sets (Roster Method, Set BuilderMethod),TypesofSets(NullSet,SingletonSet,FiniteSet,InfiniteSet, Equal Set, Equivalent Set, Disjoint Set, Subset, Proper Subset, Power Set, UniversalSet)andOperationwithSets(UnionofSet,IntersectionofSet, 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,NullMatrix,ComparableMatrix,EqualMatrix),ScalarMultiplication, 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 quantitiesinA.P,ArithmeticMeans,GeometricProgression,GeometricMean.	11

TextBooks:

1. DiscreteMathematicsandItsApplications byKennethH.Rosen, McGrawHill,6thEdition.
2. CollegeMathematics,Schaum'sSeries,TMH.

ReferenceBooks:

1. ElementaryMathematics,Dr.RD Sharma.
2. ComprehensiveMathematics,Parmanand Gupta.
3. ElementsofMathematics,MLBhargava.

I.K.GujralPunjabTechnicalUniversity,Jalandhar
B.Voc.(Networking&System Administration),Batch-2019

CourseCode:**BVNS2055-19**

CourseName:**DatabaseManagementSystemsLaboratory**

Program: B.Voc	L: 0 T: 0 P: 3
Branch: Networking&System Administration	Credits: 1.5
Semester: 2nd	
Theory/Laboratory: Laboratory	Percentageofnumerical/designproblems:-
Internalmax.marks: 30	Durationofendsemester exam(ESE):-
Externalmax.marks: 20	Status(Elective/Core): Core
Totalmarks: 50	

Course Outcomes:

CO#	Course outcomes
CO1	Abletounderstandvariousqueriesandtheirexecution
CO2	Populateand query adatabaseusing SQLDML/DDI commands.
CO3	Declareandenforceintegrityconstraintsona database
CO4	ProgrammingPL/SQLincludingstored procedures,storedfunctions,cursors,packages
CO5	Abletodesignnewdatabaseandmodifyexistingonesfornewapplicationsandreason about the efficiency of the result

Task 1:	UsedofCREATE,ALTER,RENAME,DROP,INSERTINTO,DELETE andUPDATE statementinthedatabase tables(relations)
Task 2:	Useofsimpleselectstatement,selectqueryontworelations,nestingofqueries,aggregate functions, substring comparison & order by statement
Task 3:	WriteaPL/SQLcodetoaddtwonumbersanddisplaytheresult.Readthenumbersduring run time.
Task 4:	WriteaPL/SQLcodetofind sum of first10 natural numbers usingwhileand for loop.
Task 5:	Writeaprogramtocreatatriggerwhichwillconvertthenameofastudenttoupperc case before inserting or updating the name column of student table.
Task 6:	WriteaPL/SQLblock toincreasethe salary ofalldoctorsby 1000.
Task 7:	WriteaPL/SQLcodetomultiply twonumbersusing procedureinsidetheblock.
Task 8:	DesigndatabaseforStudentManagementSystemforyourcollegeusingE-Rmodeland Normalization.
Task 9:	DesignandDevelopConceptualDataModel(E-RDiagram)forLibrary Management Systemwithallthenecessaryentities,attributes,constraintsandrelationships.Designand build Relational Data Model for application specifying all possible constraints.

RecommendedHardware&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.

TextBooks:

1. SQL,PL/SQLProgrammingLanguageofOracleby4th RevisedEdition,IvanBayross.
2. OraclePL/SQLProgrammingby5th Edition,StevenFeuerstein andBillPribyl.

I.K.GujralPunjabTechnicalUniversity,Jalandhar
B.Voc.(Networking&System Administration),Batch-2019

CourseCode: **BVNS2066-19**

CourseName:**Object Oriented Programmingusing C++ Laboratory**

Program: B.Voc.	L: 0 T: 0 P: 3
Branch: Networking&System Administration	Credits: 1.5
Semester: 2nd	Percentageofnumerical/designproblems:-
Theory/Laboratory: Laboratory	Durationofendsemester exam(ESE):-
Internalmax.marks: 30	Externalmax.marks: 20
Totalmarks: 50	Status(Elective/Core): Core

Course Outcomes:

CO#	Course outcomes
CO1	Tolearnprogrammingfromrealworldexamples.
CO2	TounderstandObjectorientedapproachforfindingSolutionstovariousproblems with the help of C++ language.
CO3	Tocreatecomputerbasedsolutionstovariousreal-worldproblemsusingC++.
CO4	Tolearnvariousconceptsofobjectoriented approachtowardsproblemsolving.

Task1:	Writeaprogramtoentermarkof6differentsubjectsandfindoutthetotalmark (Using cin and cout statement).
Task2:	Writeafunctionusingreferencevariablesasargumentstoswapthevaluesofpair of integers.
Task3:	Writeafunctionto findlargest ofthreenumbers.
Task4:	Writeaprogram tofind thefactorialof a number.
Task5:	Defineaclasstorepresentabankaccountwhichincludesthefollowingmembers as Data members: a) Name of the depositor b) Account Number c) Withdrawal amount d) Balance amountintheaccountMemberFunctions:a)Toassigninitialvaluesb)Todeposit an amount c) To withdraw an amount after checking the balance d) To display name and balance.
Task6:	Writetheaboveprogramforhandlingnnumberofaccountholdersusingarrayof objects.
Task7:	WriteaprogramforoverloadingofUnary ++operator& Binary+operator.
Task8:	WriteaprogramofVirtualFunctions&AbstractClass.
Task9:	Writeaprogramtoreadandwrite fromfile.

RecommendedHardware&Software:

IntelCorei-3/i-5/i-7processorwithaspeedofminimum2GHz, RAM2GBorhigher, HDD200GBor higher, LED / LCD screen and Oracle/ Microsoft SQL Server/ MySQL/ Microsoft Access.

TextBooks:

1. ComputerNetworks,Tanenbaum,Andrew,FifthEdition, PHI.
2. DataCommunicationandNetworking,Behrouz A.Forouzan,FourthEdition.
3. ComputerToday,S.K.Basandra,FirstEdition,Galgotia.

I.K.GujralPunjabTechnicalUniversity,Jalandhar
B.Voc.(Networking&System Administration),Batch-2019

Couse Code: EMC-101-25

CourseName: **Entrepreneurship Setup and Launch**

Introduction:

This semester lays the foundation for the learner to understand what entrepreneurship is, beyond just starting a business. It introduces key ideas like problem-solving, value creation, and self-awareness. The learner will begin exploring basic business concepts while discovering their own interests and strengths.

Learners Objective:

1. Understand the core concepts of entrepreneurship through relatable, real-life examples.
2. Begin to see themselves as problem-solvers and creators.
3. Learn about business paths and choose one to try based on interest or local fit.
4. Launch a micro-hustle (online or offline) to earn their first income.
5. Build confidence and self-belief by doing.

Outcome: By the end of this semester, learners will start a simple business activity, earn their first income, and build belief in their ability to do business.

Guiding Principles/Approach:

This syllabus is built on principles of **experiential learning, growth mindset development, and identity-first learning**. Drawing from learning science and behavior design, the course shifts students from passive learning to *active doing*, where they try out small business activities in real contexts. The design helps students not just learn entrepreneurship but begin to see themselves as entrepreneurs. Emphasis is placed on *small wins, peer collaboration, and locally relevant opportunities* to ensure learning feels achievable and connected to their realities. The curriculum focuses on conceptual understanding without heavy theory, combining *practical action, reflection, and collaboration*. *By making progress visible and success feel possible, it plants the seeds of self-reliance, initiative, and long-term motivation.*

SemesterSyllabus:

Format:12weeks,4hours/week|2credits

RevenueTarget:₹10,000

Week	Learning Goal	MeasurableOutcome
1	Understandwhatentrepreneurship isand who can be an entrepreneur	Studentsdefineentrepreneurshipintheir ownwordsandlist 2entrepreneursfrom theirlocalareaor community
2	Connectpersonalidentity to entrepreneurship(strengths, interests, struggles)	Studentscreatea“value map”showinghow askill/interest/problemfromtheirlifecould become a business opportunity
3	Learn about 5 business paths: contentcreation,drop-shipping, cloudkitchen/foodbusiness,gig economyand localservices	Students explore 1–2 examples from each domainandshareonethey’re mostcurious to try and why

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4	Choose a path and generate a basic business idea	Students write down a clear offer (what, for whom, why) and one way to reach their customer
5	Take first real action: message, post, pitch, or sell	Students reach out to serve 1 real potential customer and record what happened
6	Reflect on first attempt and share with peers	Students share their result, a challenge faced, and one idea to improve next time
7	Improve and try again: aim for first ₹100	Students apply a change, try again, and aim to make their first ₹100 or get meaningful response
8	Learn how to identify and understand your target customer	Students talk to 2 potential customers or observe them and list 3 insights about their needs
9	Learn how to serve your target audience better	Students improve one part of their offer (product, delivery, messaging, or interaction) based on customer feedback or need
10	Explore core entrepreneurial values (resilience, honesty, effort)	Students reflect on 1 value they're building and show it in a business task or peer story
11	Focus on earning and staying consistent	Students complete a second earning task and track their consistency (e.g., same product or message for 3 days)
12	Reflect on earnings, grit, and how to keep going	Students record total earnings, one resilience moment, and one support system or habit they'll continue with

Weekly Component:

Component	Duration	Description
Learning Module	~1.5hrs	- Introduces key concepts in a simple and engaging way - Includes examples, and 1–2 interactive discussions or quizzes
Action Lab	~2hrs	- Hands-on task on the weekly concept - Includes step-by-step guidance, templates, and worksheets - Ends with a submission (e.g., video, reflection, or proof of action)
Resources	Self-paced	- Supplementary videos, short readings, real-life stories, and tools to deepen understanding at their own pace

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EvaluationCriteria

Evaluation Component	Description	Weightage
WeeklyTask Completion	Timelysubmissionofweeklytasksincluding reflections,activities,quizzesetc.	40%
Target Completion	Performance-basedevaluationonhitting revenueor profittargets (e.g.,generating₹10,000revenue)	30%
FinalProject	Acomprehensiveprojectbasedonthe semester's theme	30%

Week1:WhatisEntrepreneurship?WhoCanBeanentrepreneur?

INTRODUCTION:CouldYouBeanentrepreneur?

When people hear “entrepreneur,” they often think it means having a company, investors, or an MBA. Some even believe it's only for toppers or those with high grades. But entrepreneurship is more about mindset than qualifications: it's about seeing a problem and doing something about it. Like someone who starts selling snacks because their school canteen is always shut, or a friend who fixes broken chargers for others. If you've ever spotted a need and thought, “I can solve this,” - you've already taken your first step.

Component1:LearningModule(~1.5hours)Unit1:

Whatis Entrepreneurship?

1. *Solving problems or creating value in exchange for money.*
2. *Entrepreneurship is not just about starting a company: it's about initiative, resourcefulness, and value creation.*
3. *Different types of entrepreneurs: small shop owners, street vendors, YouTubers, local tailors, mechanics, and more.*
4. *Entrepreneurs build opportunities instead of waiting for them.*

Simple Slide/Visual Aid Tip:

A circle that says "Problem", an arrow pointing to "Solution", then an arrow to "Earn". That's entrepreneurship.

<A video that visually shows how entrepreneurship starts with spotting a problem (e.g., long food lines), creating a solution (e.g., pre-order lunch service), and earning from it: illustrating the simple flow: Problem → Solution → Earn>

MCQ1

Q:What best describes entrepreneurship?

- A. Getting a job in a company
- B. Solving problems for others and earning from it 
- C. Studying business in college
- D. Buying expensive things

Feedback:

1. *Correct! Entrepreneurs solve problems or offer value and get paid for it.*
2. *Not quite! Entrepreneurship is about creating something useful, not just getting a job or studying.*

Unit2:WhoCanBeanentrepreneur?

Entrepreneurship starts with spotting a problem, finding a solution, and creating value. Today, anyone with a phone and an internet connection can start a business: money helps, but mindset and initiative matter more at the start.

You just need:

1. A problem to solve
2. A simple skill or product
3. The courage to start small

Examples Carousel (Swipeable cards)

1. **Pooja (India)** – Sell shand maderakhison Instagram, learned designing on YouTube.
Problem she saw: Expensive or generic rakhis in the market; no personal touch.
2. **Luis (Mexico)** – Repairs used phones in his garage, now has loyal customers.
Problem he saw: Many people couldn't afford new phones or didn't trust local repair shops.
3. **Sana (Kolkata)** – Started tiffin delivery from her home kitchen, now earns ₹500/day.
Problem she saw: Office workers struggled to find affordable, homemade meals.
4. **Sal Khan (USA)** – Started Khan Academy with YouTube lessons to help his cousin.
Problem he saw: His cousin needed help with math, but good learning resources were hard to access.

MCQ

Q: Which of these can be a form of entrepreneurship?

- A. Making reels on skin care tips and selling homemade face packs 
- B. Buying new clothes from malls
- C. Studying engineering
- D. Playing games without sharing or streaming

Feedback:

1. Correct! Sharing useful tips + selling a product = solving a need!
2. Try again! Entrepreneurship is about creating value and helping others.

Reflection Prompt

1. If you had to earn ₹100 this week, what would you do?

Component 2: Action Lab (~2 hours)

Task

Find & Learn from 2 Entrepreneurs Near You

You

Steps (Checklist):

1. Look around your neighborhood or online: find 2 people who earn through their own work
2. Ask or observe:

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- a) Whatdotheydo?
- b) Howdothey earn?

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- c) Whatmakesthementrepreneurial?
3. Usethe**EntrepreneurTrackerTemplate**(availableintheresourcestab)

FinalDeliverable

Learnersubmits:

1. Ashortdefinitionofentrepreneurship(intheirwords)
2. 2entriesfromtheEntrepreneurTracker(name,whattheydo,what learner learned)

→Submittedinthesubmissionstab.

SupplementaryResources(Optional)

1. [DannyO'Neill-Gettingstarted|Entrepreneurship|KhanAcademy](#)
2. [TheBetterIndia–Storiesoflocalentrepreneurs](#)

Week2:CanIBeanentrepreneur?

INTRO–WhatMakesanentrepreneur?

You don't need a suit, a degree, or a lot of money to be an entrepreneur.

You need one thing: a mind set. Entrepreneurs notice problems around them; and do something about it. From the boy fixing bikes outside his house to the girl teaching dance on Instagram, they all started small. What matters most is not what you have: it's how you think and act.

Component1:LearningModule(~1.5hour

s) Unit 1: What Makes an

entrepreneur?

Key Concepts:

1. **Entrepreneurs are driven by curiosity:** they ask questions, explore possibilities, and seek better ways to do things.
2. **They take initiative:** they act, experiment, and create using limited resources with creativity and courage
3. **They learn by doing:** embracing mistakes as stepping stones to progress.
4. **They take full ownership:** one day they're the marketer, the delivery person, and the customer support, all in one.
5. **They are resilient:** they persist through challenges, adapt to change, and keep moving forward with purpose.

Real-Life Examples:

1. Nithin & Nikhil Kamath (Zerodha) – Started India's largest stock brokerage without formal degrees or external funding, just deep curiosity about stock markets and a desire to simplify investing.
2. *Qualities: Took initiative early and stayed persistent through challenges.*
3. Prajakta Koli (Mostly Sane) – Started by making comedy sketches about everyday Indian life: family, school, relationships; and became one of India's top digital creators.
4. *Qualities: Stayed consistent, adapted over time, and built strong audience trust.*
5. Tilak Mehta (PapernParcels) – As a teenager, launched a courier startup using Mumbai's dabbawala network for delivery.
6. *Qualities: Thought creatively and acted with confidence at a young age.*

Unit2:StartSmall:BuildIdeasfromWhatYouKnow

In the last unit, you learned that entrepreneurs don't just have ideas: they act, solve problems, and use what they have.

But the big question now is:

“What can I offer?”

That's where the Value Map comes in. It helps you take your first step toward thinking and acting like an entrepreneur: in your own way.

What is a Value Map?

A Value Map connects three simple things:

A. What people around you need

→ Look around: is there something people often struggle with or something that could be better?

B. What you enjoy or are willing to try

→ You don't need to be an expert. Start with small things you like doing: talking to people, fixing, organizing, helping, designing, or learning something new.

→ Even if you're just curious about something: that's enough to begin.

C. What solution you can create

→ Use what you enjoy or are learning to try solving a real need around you: even in a small way

Visuals:

3 overlapping circles:

1. “People Need”
2. “I Can”
3. “My Offer”

Examples:

1. People Need → Affordable meals

I Can → Cook + have access to home kitchen My Offer → ₹40 tiffin service

2. People Need → Study tips in Punjabi

I Can → Speak clearly + love teaching

My Offer → 3-minute video tip on Instagram

MCQ

Q: What's the first step to being an entrepreneur?

- A. Waiting for the perfect idea
- B. Solving a problem with your skills 
- C. Buying a shop
- D. Studying for years

Feedback:

1. *Correct!Entrepreneursstartbysolvingsmallproblemsusing whattheyalreadyhave.*
2. *Tryagain!It'snotaboutwaiting:it'sabout starting.*

ReflectionPrompt

1. Ifsomeonegaveyou ₹500 andaskedyouto earnfromit, whatwould you do?

Component2:ActionLab(~2 hours)

Task:CreateYourPersonalValueMapSteps(checklistin app):

1. Thinkof2–3problemspeoplefacearoundyou(hunger,phonerepair,boredom,etc.)
2. Listyourownskills,interests,orresources.
3. Matcheachproblemwithsomethingyoucouldoffer.
4. Usethe**ValueMapTemplate**intheresourcestoorganizeyourideas.

FinalDeliverable(SubmittedinApp):

1. Yourcompleted**ValueMap**(in3columns:Need,Skill,Offer)
2. Highlight**1idea**you'dliketoexploreforyourfuturehustle

SupplementaryResources(Optional)

1. "StartwithWhy"bySimonSinek
2. [10CharacteristicsofSuccessful Entrepreneurs|Business:Explained](#)

I.K.GujralPunjabTechnicalUniversity,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: Networkingand SystemAdministration	Credits:3
Semester: 3 rd	Contacthours:33
Theory/Practical: Theory	Electivestatus:Core
Internalmax.marks: 40	Externalmax.marks: 60
Total marks: 100	

Prerequisite:-NA-

Corequisite:-NA-

AdditionalmaterialrequiredinESE:-NA-

CourseOutcomes:After studyingthis course,studentswill beable to:

CO#	Course outcomes
CO1	Definetheroleof operating system
CO2	Discussthemangementofvariousresourcesinoperatingsystem.
CO3	Differentiatebetweenvariouslevelsofoperatingsystemviews.

Detailedcontents	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

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

Unit 4: I/ODeviceManagement: I/Odevicesandcontrollers,devicedrivers;diskstorage. FileManagement: Basicconcepts,fileoperations,accessmethods,directory structures and management, file protection.	9
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TextBooks:

1. OperatingSystemPrinciplesbyAbrahamSilberschatzandPeterBaerGalvin,Seventh Edition, Published by Wiley-India.
 2. PrincipalsofOperatingSystembyNareshChauhan,PublishedbyOXFORDUniversity Press, India.
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I.K.GujralPunjabTechnicalUniversity,Jalandhar
B.Voc.(Networking&System Administration),Batch-2019

Course Code: BVNS302-19

CourseName:DataStructures

Program: B.Voc.	L: 3 T: 0 P: 0
Branch: Networkingand System Administration	Credits: 3
Semester: 3 rd	Contacthours: 33
Theory/Practical: Theory	Electivestatus: Core
Internalmax.marks: 40	Externalmax.marks: 60
Total marks: 100	

Prerequisite:-NA-

Corequisite:-NA-

AdditionalmaterialrequiredinESE:-NA-

CourseOutcomes:After studyingthis course,studentswill beable to:

CO#	Course outcomes
CO1	Listvarious types ofDataStructures.
CO2	Differentiatebetweenthebasicfunctionalityofeachdatastructure.
CO3	Explainbasicoperationsondifferentdatastructures.

Detailedcontents	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 deletioninanarray,multidimensionalarray,memoryrepresentationof2-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,postfix,Prefixnotations. Introductionto queues,PrimitiveOperations on the Queues, Circular queue, Dequeue, Priority queue, Applications of queue	8

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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. Definitionofgraph, Terminology, Directed, Undirected&Weightedgraph, Representation of graphs, Graph Traversal-Depth first & Breadth first search. Sequential Search, Binary search, Insertion sort, Selection sort, Quick sort, Bubble sort.	10
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TextBooks:

1. BrijeshBakariya.DataStructuresandAlgorithmsImplementationthroughC,BPB Publications.
 2. KruseR.L.DataStructuresand ProgramDesigninC;PHI
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I.K.GujralPunjabTechnicalUniversity,Jalandhar
B.Voc.(Networking&System Administration),Batch-2019

CourseCode:BVNS303-19

CourseName:Windows ConfigurationandServer Administration

Program: B.Voc.	L: 3 T: 0 P: 0
Branch: Networkingand System Administration	Credits: 3
Semester: 3 rd	Contacthours: 33
Theory/Practical: Theory	Electivestatus: Core
Internalmax.marks: 40	Externalmax.marks: 60
Total marks: 100	

Prerequisite:-NA-

Corequisite:-NA-

AdditionalmaterialrequiredinESE:-NA-

CourseOutcomes:Afterstudying this course,students willbeable to:

CO#	Course outcomes
CO1	Installwindows server.
CO2	Discussvariousconfigurationsettings

Detailedcontents	Contact hours
Unit 1: Installation: InstallingServer,Drivers,WorkingwithwindowsserverDevices, Troubleshooting Devices & Drivers, Managing system updates. WorkingWithDiskStorage: TypeofDiskStorage,Typeofvolumes, Implementingfault tolerance,Usediskmanagementtools,DiskQuota, 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: DomainNameServices(DNS): DefineNameresolution,InstallDNS,Configure DNS Client, Manage and Troubleshoot DNS. DynamicHostConfigurationProtocol: ConfigureDNSServer,WorkingWith Super Scope, Configure DHCP Client, Manage and Troubleshoot DHCP Server.	8

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Unit 4: BackupandRestore: RequirementforBackupandRecoveryAD,IssueforAD Backup and Recovery, Steps for Backup and Recovery AD.	8
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TextBooks.

1. WindowsServer2016:TheAdministrator'sReferencePaperback–September 2016, Publisher: Createspace Independent Pub,

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I.K.GujralPunjabTechnicalUniversity,Jalandhar
B.Voc.(Networking&System Administration),Batch-2019

CourseCode:BVNS304-19

CourseName:ComputerNetwork Security

Program: B.Voc.	L: 3 T: 0 P: 0
Branch: Networkingand System Administration	Credits: 3
Semester: 3 rd	Contacthours: 33
Theory/Practical: Theory	Electivestatus: Core
Internalmax.marks: 40	Externalmax.marks: 60
Total marks: 100	

Prerequisite:-NA-

Corequisite:-NA-

AdditionalmaterialrequiredinESE:-NA-

CourseOutcomes:After studyingthis course,studentswill beable to:

CO#	Course outcomes
CO1	Discussvariousissuesinnetworksecurity.
CO2	Explaintheimpactofvirusesoncomputer systems.
C03	Explainvarioussecurity measurestoprotectnetworks.

Detailedcontents	Contact hours
Unit 1: Basicwebsecuritymodel-Browsercontent,Documentobjectmodel(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- Networkdefensetools, 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

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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: RiskManagement,SecurityRiskAssessment:Introduction,InformationSecurity Risk Assessment: Case Studies, Risk Assessment in Practice.	8

TextBooks:

1. WilliamStallings,NetworkSecurityEssentials:ApplicationsandStandards,PrenticeHall,4th edition, 2010.
2. MichaelT.GoodrichandRobertoTamassia,IntroductiontoComputerSecurity,AddisonWesley,2011.
3. WilliamStallings,NetworkSecurityEssentials:ApplicationsandStandards,PrenticeHall,4th edition, 2010.

CourseCode:BVNS305-19

CourseName:DataStructuresLaboratory

Program: B.Voc.	L: 0 T: 0 P:3
Branch: Networkingand System Administration	Credits: 1.5
Semester: 3 rd	Contacthours: 3hoursperweek
Theory/Practical: Practical	Electivestatus: Core
Internalmax.marks: 30	Externalmax.marks: 20
Total marks: 50	

Prerequisite:-NA-

Corequisite:-NA-

AdditionalmaterialrequiredinESE:-NA-

CourseOutcomes:After studyingthis course,studentswill beable to:

CO#	Course outcomes
CO1	Writeprogramstoinsert, deleteelementindatastructures.
CO2	Implementsearchandsortingondata structure

Instructions:

1.	Implementstack.Write functionslikepush,pop,Initialize,Emptyor Full.
2.	Implementtheinsertanddeleteoperationonqueue.
3.	WAPtoimplementinsertion sort.
4.	WAPto implementselection sort.
5.	WAPtoimplementbinary search
6.	WAPtoimplementlinearsort.

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7.	WAPtoimplement breadthfirst search
8.	WAPtoimplement depthfirst search
9.	WAPto implementany ofthe traversingalgorithm on tree.
10.	WAPto createabasiclinked list.

CourseCode:BVNS306-19

CourseName:OperatingsystemLab

Program: B.Voc.	L: 0 T: 0 P:3
Branch: Networkingand System Administration	Credits: 1.5
Semester: 3 rd	Contacthours: 3hoursperweek
Theory/Practical: Practical	Electivestatus: Core
Internalmax.marks: 30	Externalmax.marks: 20
Total marks: 50	

Prerequisite:-NA-

Corequisite:-NA-

AdditionalmaterialrequiredinESE:-NA-

CourseOutcomes:Aftergoingthroughthepractical,studentwillbeableto:

CO#	Course outcomes
CO1	Install&configuredifferentoperatingsystems.
CO2	Writeprograms/scriptsfordifferentschedulingalgorithms.

Instructions:

1	InstallationofwindowsOS.
2	InstallationofLinuxOS.

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3	DualbootinstallationofOperatingsystems.
4	ImplementationofFCFSSchedulingalgorithm
5	ImplementationofSJFScheduling algorithm
6	ImplementationofRound-RobinSchedulingalgorithm
7	ViEditor&itscommands
8	ShellCommands
9	ShellScripting-Usingvariables
10	ShellScripting-Input&Output
11	ShellScripting-Datatypes
12	ShellScripting-Useofarithmeticoperators
13	ShellScripting-ifcontrolstatementprograms
14	ShellScripting-whilecontrol statement
15	ShellScripting-forcontrolstatement

ReferenceBooks:

1. Linux:ThecompletereferecebyRichardPetersen,PublishedbyTataMcGraw-HillPublication.
2. OperatingSystemPrinciplesbyAbrahamSilberschatzandPeterBaerGalvin,SeventhEdition,Published

CourseCode:**BVNS401-19**

CourseName:**LinuxOperatingSystem**

Program: B.Voc.	L: 3 T: 0 P: 0
Branch: NetworkingandSystem Administration	Credits: 3
Semester: 4th	Contacthours: 33
Theory/Laboratory: Theory	Status(Elective/Core): Core
Internalmax.marks: 40	Externalmax.marks: 60
Totalmarks: 100	

Course Outcomes:

CO#	Course outcomes
CO1	SetupenvironmentforLinuxOperatingsystem.
CO2	Implementvariousfileanddirectoryrelatedcommands.
CO3	WriteShellProgrammingusingLinuxcommands.
CO4	PerformbasicsystemadministrationusingLinux.

Detailedcontents	Contact hours

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Unit1: Linuxintroductionandfilesystem -BasicFeatures,Advantages,Installingrequirement,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 viewingfiles,usingcat,filecomparisons,Viewfiles,diskrelatedcommands,checkingdiskfree spaces. Partitioning the Hard drive for Linux, Installing the Linux system, System startup and shut-down.	9
Unit2: Essential Linux commands Understanding shells, Processes in Linux process fundamentals, connectingprocesseswithpipes,redirectinginputoutput,manualhelp,Backgroundprocessing, managing multiple processes, changing process priority, scheduling of processes at command, batchcommands, kill, ps,who,sleep, Printing commands, grape, fgrep,find,sort, Cal, banner, touch,file,filerelatedcommands-ws,sat,cut,grep,dd,etc.Mathematicalcommands-bc,expr, factor, units. vi, joe, vim editor	8
Unit3: 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
Unit4: SystemadministrationCommonadministrativetasks,identifyingadministrativefiles-logfiles, Role of system administrator, Managing user accounts-adding & deleting users, changing permissions and ownerships, Creating and managing groups, modifying group attributes, Temporarydisableuser'saccounts,creatingandmountingfilesystem,checkingandmonitoring systemperformancefilesecurity&Permissions,becomingsuperuserusingsu.Gettingsystem information - host name, disk partitions & sizes, users, kernel. Backup and restore files, linuxconf. utility in GUI, reconfiguration hardware with kudzu Configure desktop-X configurator,understandingXF86configfile,starting&usingXdesktop.KDE&Gnome graphicalinterfaces,changingXsettings.	8

TextBooks:

1. OperatingSystemsConcepts,FifthEdition;SilberschatzandGalvin
2. CristopherNegus-RedHatLinuxBible,WileyDreamtech India2005 edition.
3. YeswantKanethkar-UNIXShellProgramming,Firstedition,BPB.

Reference Books:

1. LinuxSystemProgramming,RobertLove,O'Reilly,SPD
2. OfficialRedHatLinuxUsersguidebyRedhat,WileyDreamtechIndia
3. GrahamGlass&KingAbles-UNIXforprogrammersandusers,ThirdEdition,PearsonEducation.
4. NeilMathew&RichardStones-BeginningLinuxProgramming,Fourthedition,WileyDreamtechIndia.

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CourseCode:BVNS402-19
CourseName:Wireless Communication

Program: B.Voc.	L: 3 T: 0 P: 0
Branch: NetworkingandSystem Administration	Credits: 3
Semester: 4th	Contacthours: 33
Theory/Laboratory: Theory	Status(Elective/Core): Core
Internalmax.marks: 40	Externalmax.marks: 60
Totalmarks: 100	

CourseOutcomes:

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CO#	Course outcomes
CO1	UnderstandthebasicelementsofCellularRadioSystemsanditsdesign
CO2	ExplaintheconceptofDigitalcommunicationthroughfadingmultipathchannel.
CO3	DiscussMultipleAccesstechniquesforWirelesscommunication
CO4	ComparevariousWirelessstandardsandsystems

Detailedcontents	Contact hours
Unit1: ElementsofCellularRadioSystemsDesign:Basiccellularsystem,Performancecriteria, 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
Unit2: 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:Selectivediversitycombining,Switchedcombining,Maximalratiocombining, Equal gain combining.	8
Unit3: 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
Unit4: Wireless Systems & Standards: AMPS and ETACS, United states digital cellular (IS- 54 &IS136),IEEEStandards,GlobalsystemforMobile(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,ForwardCDMAChannel,ReverseCDMAChannel,WirelessCable Television. Overview of 4G & 5G Mobile techniques and Emerging technologies.	8

TextBooks:

1. WirelessCommunicationsandNetworking,VijayGarg,Elsevier
2. WirelessCommunications-T.L.Singh-TMH
3. AdhocMobileWirelessnetwork,C.K.ToHPearson.

Reference Books:

1. T.S.Rappaport,WirelessCommunications:PrinciplesandPractice,2ndEdition,PearsonEducationAsia,2010.
2. WilliamCYLee,MobileCellularTelecommunications,2ndEdition,MGH,2004.
3. RajPandya,—MobileandPersonalCommunicationsystemsandservicesI,PrenticeHallofIndia,2001.
4. WirelessandDigitalCommunications;Dr.KamiloFeher(PHI),1998.

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CourseCode:BVNS403-19
CourseName:TCP/IP Protocols

Program: B.Voc.	L:3	T: 0	P: 0
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Branch: NetworkingandSystem Administration	Credits: 3
Semester: 4th	Contacthours: 33
Theory/Laboratory: Theory	Status(Elective/Core): Core
Internalmax.marks: 40	Externalmax.marks: 60
Totalmarks: 100	

CourseOutcomes:

CO#	Course outcomes
CO1	DemonstrateanunderstandingoftheTCP/IPlayers,componentsandfunctions
CO2	Identifytheservices thatTCP/IPapplicationsprovide
CO3	Identifytheprotocolsusedtotransportdataoverthe Internet
CO4	Utilizeavarietyoftoolstonavigateand searchtheInternet
CO5	Install,maintainandtroubleshootaTCP/IPNetwork

Detailedcontents	Contact hours
Unit1: INTRODUCTIONTOTCP/IP,OriginofTCP/IPandInternet,ABriefHistoryofthe Internet, Architecture of the Internet, TCP/IP Layer and Protocols, Network Access Layer, Internet Layer, Need for IP Address.	9
Unit2: INTERNET PROTOCOL: Overview of Internet Protocol, IP Header, IP Address, IP AddressClasses,SubnetMasksandCIDRNetworks(ClasslessIPAddresses),Internet- Legal Versus Private Addressing, IP Routing, Routing Protocol, Routing Algorithms	8
Unit3: TRANSPORTLAYERPROTOCOLS:OverviewofTCP,TransmissionControlProtocol (TCP), TCP Header, TCP Connection Establishment and Termination, TCP Connection Establishment, TCP Connection Termination, User Datagram Protocol (UDP)	8
Unit4: APPLICATIONLAYERPROTOCOLS:DomainNameSystem(DNS),HierarchicalName Space, Domain Servers, Working of DNS Work in Internet, Domain Name Resolution, Messages Used in DNS, Dynamic DNS (DDNS). OverviewofElectronicMail,SimpleMailTransferProtocol(SMTP),MessageTransfer Agent, User Agent, Post Office Protocol (POP), Internet Mail Access Protocol (IMAP),Multipurpose Internet Mail Extension (MIME), Telnet , File Transfer Protocol (FTP)	8

TextBooks:

1. KuroseandRoss,ComputerNetworking:ATop-DownApproach,6thed.,2012,Morgan Kaufmann
2. DouglasE.Comer–“InternetworkingwithTCP/IPPrinciples,ProtocolsandArchitecture”,Vol.1&2fourth edition, Pearson Education Asia, 2003
(UnitlinComer Vol.I,UnitsII,IV&V– ComerVol.II)

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Reference Books:

1. MichaelJ.DonahooandKennethL.Calvert,TCP/IPSocketsinJava,2nded.,2011
2. TCP/IPprotocolsuite,Forouzan,2ndedition,TMH,2003
3. W.RichardStevens“TCP/IPillustrated”Volume2PearsonEducation2003.

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CourseCode:BVNS404-19

CourseName: ProgrammingusingPython

Program: B.Voc.	L: 3 T: 0 P: 0
Branch: NetworkingandSystem Administration	Credits: 3
Semester: 4th	Contacthours: 33
Theory/Laboratory: Theory	Status(Elective/Core): Core
Internalmax.marks: 40	Externalmax.marks: 60
Totalmarks: 100	

CourseOutcomes:

CO#	Course outcomes
CO1	ExplainPythonsyntaxandsemantics.
CO2	DemonstratehandlingStringsandFileSystems.
CO3	Create Python Programs using core data structures like Lists, Dictionaries and use RegularExpressions.
CO4	ImplementingofObject-OrientedProgramminginPython.
CO5	Implementsocketprogrammingusingpython.

Detailedcontents	Contact hours
Unit1: IntroductiontoPythonlanguage,SettingupthePythondevelopmentenvironment,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, Comparisonoperators,LogicalOperators,IsandInoperators,Controlstatements:If ,If- else ,Nested if-else, Break and Continue, Loops: For ,While ,Nested loops	9
Unit2: FunctionandMethods,Definingafunction ,Callingafunction ,Typesof 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

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Unit3: ClassesandObject-orientedProgramming:AbstractDataTypesandClasses,Inheritance,Encapsulationandinformationhiding.ExceptionsandAssertions:ErrorsandFormatting,Handlingexceptions,textfiles: reading/writingtextandnumbersfrom/toafile;creating and reading a formatted file (csv or tab-separated).	8
Unit4: Overview of TCP/IP Networking, UDP and TCP Protocols, IP Addresses and Ports, Network Interfaces. Socket programming: Introductionto sockets, Gettingport Information, Creatinga TCP Client, Creating a Banner, Port Scanning and Sockets, TCP and UDP Protocols for Sockets, TCP Sockets and UDP Sockets.	8

TextBooks:

1. **CorePythonProgramming**, WesleyJ.Chun, SecondEdition, Pearson.

Reference Books:

1. LearningPythonbyMark Lutz, 5th Edition
2. PythonCookbook,byDavidBeazley,3rdEdition

CourseCode:BVNS405-19

CourseName:LinuxOperatingSystemLab

Program: B.Voc.	L: 3 T: 0 P: 3
Branch: WebTechnology&Multimedia	Credits: 1.5
Semester: 4th	Contacthours: 33
Theory/Laboratory: Practical	Status(Elective/Core): Core
Internalmax.marks: 30	Externalmax.marks: 20
Totalmarks: 50	

List ofTasks:

1. BasicLINUXcommandsanditsUse.
2. StudyofeditorsinLINUX
3. DetailstudyofFileAccessPermissionin LINUX.
4. DetailstudyofLINUXShellProgramming.
5. AdvanceShell Programming.
6. CommonAdministrativeTasks.

LABOUTCOMES:Attheendofthecourse,thestudentsareableto:

1. Useshellscripttocreate filesand handletext documents
2. DemonstrateLinuxadministrationanditsenvironment
3. DemonstrateinstallationofLinuxoperatingsystemandunderstandtheimportanceof Linux
4. Appraisevariouscommandusageoffilesanddirectories.

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

CourseCode: BVNS406-19

CourseName: 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. Application 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.

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LABOUTCOMES: Attheendofthecourse,thestudentsareableto:

1. Write,TestandDebugPython Programs
2. ImplementConditionalsandLoopsforPythonPrograms
3. UsefunctionsandrepresentCompounddatausingLists,Tuplesand Dictionaries
4. Readandwritedatafrom& tofiles.

CourseCode: **BVNS501-19**

CourseName:Cloud Computing

Program: B.Voc.	L: 3 T: 0 P: 0
Branch: Networking&System Administration	Credits: 3
Semester: 5th	Contacthours: 33
Theory/Laboratory: Theory	Electivestatus: Core
Internalmax.marks: 40	Externalmax.marks: 60
Totalmarks: 100	

Course Outcomes:

CO#	Course outcomes
CO1	TOExplainthebasicconceptandimportanceofcloud computing.
CO2	Toapplymigrationtoacloudenvironment.
CO3	ToDiscussvirtualizationtechnologies.
CO4	ToMonitorandmanagethecloudresources,applicationsanddata.
CO5	Toimplementcloudtools.

Detailedcontents	Contact hours

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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, Big Data Analytics, Basics of IoT. [CO1] Cloud Platforms in Industry: Amazon Web Services-Compute Services, Storage Services, Communication Services, Additional Services. Google App Engine-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 Thamarai Selvi, 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, Andrezei M. 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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Internalmax.marks: 40	Externalmax.marks: 60
Totalmarks: 100	

Course Outcomes:

CO#	Course outcomes
CO1	Describetheoperationaldetailsofvariousperipheraldevices.
CO2	Explaintheroleofinput/outputinterfaces.
CO3	DiscusstherecentProgressinthePeripheralandBussystems.

Detailedcontents	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&SCSIInterfaces: IDEorigin,IDEInterfaceATAstandardsATA1toATA7.ATA feature,ATARAIDandSCSIRAIID,SCSICableandpinConnectorpinoutsSCSIV/sIDE Advantagesandlimitation.[CO1]	9
Unit2: VideoHardware: Video display technologies, DVI Digital signals for CRT Monitor, LCD Panels, Video adapter types, Integrated Video/ Motherboard chipset, Video RAM, Video driver and multipleMonitor, Graphicaccelerators. Advanced 3D Technologies, TV Tuner and Video Capture upgrades troubleshooting Video Cards and Drivers. [CO1]	8
Unit 3: I/OInterfaces: I/OInterfacesfromUSBandIEEE1394,I/OInterfacefromserialand ParalleltoIEEE1394andUSB961,ParalleltoSCSIconverter.Testingofserial andparallel port,USBMouse/KeyboardInterfaces.[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. DouglasV.Hall,“MicroprocessorsandInterfacing”,TataMcGrawHill2006.
2. BarryB.Brey&C.R.Sarma”Theintelmicroprocessors,”Pearson2003.
3. P.PalChandhari,“ComputerOrganizationanddesign”PrenticeHallofIndiaPvt.Ltd,1994.
4. DelCorso,H.Kirrmann,JDNicond“Microcomputerbuses&links”AcademicPress1986.

CourseCode: BVNS503-19

CourseName:Internet of Things

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Program: B.Voc.	L:3 T: 0 P: 0
Branch: Networking&System Administration	Credits: 3
Semester: 5th	Contacthours: 33
Theory/Laboratory: Theory	Electivestatus: Core
Internalmax.marks: 40	Externalmax.marks: 60
Totalmarks: 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
Unit1. 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
Unit2: 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
UNIT3. 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
Unit4: 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 Madiseti, Arshdeep Bahga, Internet 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", ETILabs
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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CourseCode: **BVNS504-19**

CourseName: CyberForensics

Program: B.Voc.	L:3 T: 0 P: 0
Branch: Networking&System Administration	Credits:3
Semester:5 th	Contacthours: 33
Theory/Laboratory: Theory	Electivestatus: Core
Internalmax.marks: 40	Externalmax.marks: 60
Totalmarks: 100	

Course Outcomes:

CO#	Course outcomes
CO1	ToDiscussthefundamentalconceptsof cyber forensics.
CO2	Tobecomefamiliarwithforensicstools
CO3	Toanalyzeandvalidateforensicsdata.
CO4	Toapplyconceptsrelatedto ethicalhackingandsocial engineering.

Detailedcontents	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-Incidentandincidentresponse methodology-Forensicduplicationand investigation.PreparationforIR:CreatingresponsetoolkitandIRteam.-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

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Unit 4: ETHICALHACKING 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
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TEXTBOOKS:

1. BillNelson,AmeliaPhillips,FrankEnfinger,ChristopherSteuart,—ComputerForensicsand Investigations||, Cengage Learning, India Edition, 2016.
2. CEHofficialCertifiedEthicalHackingReviewGuide,WileyIndiaEdition,2015.

CourseCode:BVNS505-19

CourseName:CloudComputingLab

Program: B.Voc.	L: 0 T: 0 P: 3
Branch: Networking&System Administration	Credits: 1.5
Semester: 5th	Percentageofnumerical/designproblems:-
Theory/Laboratory: Laboratory	Durationofendsemester exam(ESE):-
Internalmax.marks: 30	Externalmax.marks: 20
Totalmarks: 50	Status(Elective/Core): Core

CourseOutcomes:

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.

Task1	Install Virtualbox/VMware Workstation with different flavour of linux or windows OS on top of windows 7 or 8.
Task2	Install a C compiler in the virtual machine created using virtualbox and execute Simple Programs
Task3	Install Google App Engine. Create hello world app and other simple web applications using python/java.
Task4	Simulate a cloud scenario using CloudSim and run a scheduling algorithm that is not present in CloudSim.

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Task5	Findaproceduretotransferthefilesfromonevirtualmachineto another virtual machine.
Task6	Findaproceduretolaunchvirtualmachineusingtrystack(Online Openstack Demo Version)

ReferenceBooks:

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.

CourseCode:BVNS506-19

CourseName:**InternetofThingsLab**

Program: B. Voc.	L: 0 T: 0 P: 3
Branch: Networking&System Administration	Credits: 1.5
Semester: 5th	Percentageofnumerical/designproblems:-
Theory/Laboratory: Laboratory	Durationofendsemester exam(ESE):-
Internalmax.marks: 30	Externalmax.marks: 20
Totalmarks: 50	Status(Elective/Core): Core

Course Outcomes:

CO#	Course outcomes
CO1	TosetupsoftwareneededtobuildIoT Applications.
CO2	Install/AssembledifferentIoTrelatedsensors
CO3	Developbasic applicationsrelatedtoIoT.

Task1:	FamiliarizationwithArduino/RaspberryPiandperformnecessarysoftwareinstallation.
Task2:	TointerfaceLED/BuzzerwithArduino/RaspberryPiandwriteaprogramtoturnONLED for 1 sec after every 2 seconds
Task3:	TointerfacePushbutton/Digitalsensor(IR/LDR)withArduino/RaspberryPiandwritea program to turn ON LED when push button is pressed or at sensor detection.
Task4:	TointerfaceDHT11sensorwithArduino/RaspberryPiandwriteaprogramtoprint temperatureandhumidityreadings.
Task5:	TointerfacemotorusingrelaywithArduino/RaspberryPiandwriteaprogramtoturnON motor when push button is pressed

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Task6:	To interface OLED with Arduino/Raspberry Pi and write a program to print temperature and humidity readings on it.
Task7:	To interface Bluetooth with Arduino/Raspberry Pi and write a program to send sensor data to smartphone using Bluetooth.
Task8:	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.
Task9:	Write a program on Arduino/Raspberry Pi to upload temperature and humidity data to things peak cloud
Task10:	Write a program on Arduino/Raspberry Pi to retrieve temperature and humidity data from things peak cloud
Task11:	To install MySQL database on Raspberry Pi and perform basic SQL queries.
Task12:	Write a program on Arduino/Raspberry Pi to publish temperature data to MQTT broker.

Course Code: **BVNS507-19**

Course Name: **CyberForensics 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
Task1	Use Google and Who.is for Reconnaissance.
Task2	Use TraceRoute, ping, ifconfig, netstat Command

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Task3	To learn about different hacking tools and skills using Kali Linux.
Task4	Use Steghide steganographic tool help to hide the data in various types of images and audio files.
Task5	Work on Nmap scanner to perform port scanning
Task6	Use Wireshark sniffer to capture network traffic and analyze.
Task7	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

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Unit2:NetworkCablingand 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, Unshieldedtwisted-pair(UTP),shieldedtwisted-pair(STP),FibreOpticandcoaxial cable: RJ-45, RJ-11, BNC, Understanding colour codes of CAT5 cable, 568A and 568B convention NetworkComponents-Modems,Firewall,Hubs,Bridges,Routers,Gateways, Repeaters, Transceivers, Switches, Access point, functions, advantages and applications of Network Components, Specifications of Network Devices	9
Unit3:IPAddressingNetworkDeviceConfigurations 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. Exploreopensourcenetworksimulators,design WANin simulator,	8
Unit4:Control,MonitoringandSecurityofComputer 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 ModernNetworkSecurity-Threatsandthebasicsofsecuringanetwork,Secure AdministrativeAccess,LANsecurityconsiderations,Wi-Fisecurityconsiderations,various types of malwares, Firewall, IDS.	9

TextBooks:

1. DataCommunicationsandNetworkingByBehrouzA.Forouzan.

CourseCode:BVNS605-19

NetworkMaintenance&TroubleshootingLab

Program: B.Voc.	L: 0 T: 0 P: 2
Branch: Networking&System Administration	Credits: 1
Semester: 6th	Percentageofnumerical/designproblems:-
Theory/Laboratory: Theory	Durationofendsemester exam(ESE):-
Internalmax.marks: 30	Externalmax.marks: 20
Totalmarks: 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	Toconfigurenetworkdevicesanddesign WAN
CO3	Toexplorelatesttoolsforremoteaccess,comprehendsecuritythreatsandtechnologies

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Detailedcontents
1. IdentifyvariousNetworktoolslike:(a)Wirecrimper,(b)WireMapTesters,(c) Multifunction Cable Tester, (d) LAN Tester, (e) Tone Generator 2. IdentifyvariousNetworkdevicelike:(a)Switch(NormalandManaged),(b)Router (Normal and wireless), (c) Rack, Patch Panel, I/O box, (d) Access Point 3. UnderstandtheLayoutofnetworkonyourlabandcampus.Drawnetworkmapofcampus. 4. PracticecrimpingwithstraightandcrossCAT6cables. 5. PunchingpracticeinI/O Boxandpatchpanel. 6. Install&Configure aPeertoPeerNetworkusingWindowsandLinux Software 7. ConnectcomputersusingBluetooth,WI-FI,hotspot. 8. ConfigureLayer3Switchand router 9. UsepopularTCP/IP(windowsandLinux)UtilitieslikePING,IPCONFIG,HOSTNAME, ROUTE, TRACERT 10. Implement remotedesktopaccessandcontroland VoIP. 11. Toperform casestudyof variousmalwares

CourseCode:BVNS602-19

CourseName:**PenetrationTestingUsingOpenSource Technologies**

Program: B.Voc.	L: 3 T: 0 P: 0
Branch: Networking&SystemAdministration	Credits:3
Semester: 6th	Percentageofnumerical/designproblems:-
Theory/Laboratory: Theory	Durationofendsemester exam(ESE):-
Internalmax.marks: 40	Externalmax.marks: 60
Totalmarks: 100	Status(Elective/Core): Core

CourseOutcomes: Studentwill beable to

CO#	Course outcomes
CO1	IdentifytheneedofethicalHacking
CO2	DiscussvariousOSvulnerabilities.
CO3	Explaintheneed ofPenetration testing
CO4	Explorevarious penetration testing tools

Detailedcontents	Contact hours
INTRODUCTIONTOHACKING: IntroductiontoHacking—Importance ofSecurity—ElementsofSecurity—PhasesofanAttack—TypesofHacker Attacks — Vulnerability Research —Introduction to Footprinting — InformationGatheringMethodology.	8

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OS VULNERABILITIES: Windows OS Vulnerabilities — Tools forIdentifyingVulnerabilities—Countermeasures—LinuxOSVulnerabilities—ToolsforIdentifyingVulnerabilities—Countermeasures	8
INTRODUTIONTOPENETRATIONTESTING: Introduction— Security Assessments — Types of Penetration Testing-Phases of Penetration Testing— Tools —	8
PENETRATIONTESTINGTOOLS: ChoosingDifferentTypesofPen-Test Tools — Penetration Testing Tools, Information Gathering Tools, VulnerabilityAnalysesTools.ToolsforWirelessAttacks,Toolsfor WebsitePenetrationTesting,ExploitationTools.ToolsPasswordCracking Tools,Maintaining Access Tools.	9

1. Penetration Testing with Kali Linux: Learn Hands-on Penetration Testing Using a Process-Driven Framework,30July2021,PranavJoshiDeepayanChanda(Author),BPBPublications,ISBN-10:939068479X, ISBN-13 :978-9390684793

CourseCode:**BVNS606-19**

PenetrationTestingUsingOpenSourceTechnologiesLab

Program: B.Voc.	L: 0 T: 0 P: 2
Branch: Networking&System Administration	Credits: 1
Semester: 6th	Percentageofnumerical/designproblems:-
Theory/Laboratory: Theory	Durationofendsemester exam(ESE):-
Internalmax.marks: 30	Externalmax.marks: 20
Totalmarks: 50	Status(Elective/Core): Core

Course Outcomes:

CO#	Course outcomes
CO1	ToInstalland configure KaliLinux
CO2	ToImplementpenetration testing
CO3	Toidentifyvariousattacksand vulnerabilities.

Detailedcontents

1. KaliLinux-InstallationandConfiguration.
2. KaliLinux–InformationGatheringTools.
1. NMAPandZenMAP.
2. StealthScan.
3. Searchsploit.
4. DNSTools.
- (i) dnsenum.pl.
- (ii) DNSMAP.
- iii) dnstracer.
5. LBD(LoadBalancingDetector)Tools.
6. Hping3.
- 3.KaliLinux-VulnerabilityAnalysesTools.
1. CiscoTools.
2. CiscoAuditingTool.
3. CiscoGlobalExploiter.
4. BED.
- 4.KaliLinux -WirelessAttacks.
- 1.FernWifiCracker. 2.Kismet.
- 3.GISKismet.
5. KaliLinux-WebsitePenetrationTesting.
- Vega Usage.
6. KaliLinux-ExploitationTools.
1. Metasploit.
2. Armitage.
7. KaliLinux-PasswordCrackingTools.
1. Hydra.
2. Johnny.
3. John.
4. SQLdict.
- 8.KaliLinux-Maintaining Access.
1. Powersploit
2. Sbd
3. Webshells

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CourseCode:BVNS603-19

CourseName:**NetworkSimulationTools**

Program: B. Voc.	L: 3 T: 0 P: 0
Branch: Networking&System Administration	Credits: 3
Semester: 6th	Percentageofnumerical/designproblems:-
Theory/Laboratory: Theory	Durationofendsemester exam(ESE):-
Internalmax.marks: 40	Externalmax.marks: 60
Totalmarks: 100	Status(Elective/Core): Core

Course Outcomes:

CO#	Course Outcomes
Afterstudying this course, the studentswill beableto :-	
CO1	Explainhowdiscrete-eventssimulationmethodscanbeusedtosimulatecomputer networks
CO2	Describemodelsforsimulatingvariousnetworkprotocols,e.g.TCP,BGP, CSMA/CA
CO3	Analyzehowthenumberofsimulationeventsscaleswiththenumberofnodesfor different network topologies and traffic patterns
CO4	Simulateavarietyofnetworktopologiesandprotocolsusingamodernnetwork simulation tool such as NS-3

DetailedContents	Contact hours
Unit 1: NetworkSimulationBasics a. Creatingtopologies b. Definingdataflows c. Definingqueuingdisciplines d. Tracefileanalysis methods e. UsingNetworkanimation IntroductiontoSimulation a. DiscreteEventSimulation (DES) b. SimulatingNetworkswith DES c. ModelingNetwork Elements d. Levelsofabstraction	9

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Unit 2: Overview of Network Simulation Tools a. NS3 b. Opnet c. Omnet++ d. GloMoSim e. CiscoPacketTracer 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

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a. DropTail,RED,Priority,WFQ,SCFQ	
b. Implementationofactivequeuesin NetworkSimulators	
c. Measuringthe affectofAQM	

TextBooks:

1. ModelingandToolsforNetworkSimulation,KlausWehrle(Editor),MesutGünes(Editor),JamesGross(Editor), Springer

ReferenceBooks:

1. **PacketTracerNetworkSimulator**,JesinA,PacketPublishing,ISBN:9781782170426

Course Code: **BVNS607-19**

NetworkSimulationToolsLab

Program: B.Voc.	L: 0 T: 0 P: 2
Branch: Networking&System Administration	Credits: 1
Semester: 6th	Percentageofnumerical/designproblems:-
Theory/Laboratory: Theory	Durationofendsemester exam(ESE):-
Internalmax.marks: 30	Externalmax.marks: 20
Totalmarks: 50	Status(Elective/Core): Core

CO#	Course Outcomes
Afterstudying this course, the studentswill beableto :-	
CO1	Knowaboutthevariousnetworkingdevices,toolsandalsounderstandthe implementation of network topologies
CO2	Createvarious networkingcables and knowhowtotest thesecables
CO3	Createandconfigurenetworksinpackettracer toolusingvariousnetworkdevicesand topologies
CO4	Configureroutersusingvariousrouterconfiguration commands.

Detailedcontents

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Task1: TostudythedifferenttypesofNetworkcablesandnetwork topologies.

Task2: Practicallyimplementandtestthecross-wiredcableandstraight through cable using clamping tool and network lab cable tester.

Task3: Studyandfamiliarizationwithvariousnetworkdevices.

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

Task5: StudyandImplementationofIPAddressingSchemes

Task6: CreationofSimpleNetworkingtopologiesusinghubsandswitches

Task7: SimulationofwebtrafficinginPacket Tracer

Task8: Studyandimplementationofvariousrouterconfigurationcommands

Task9: CreationofNetworksusing routers.

Task10: Configuringnetworksusingtheconceptofsubnetting

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

Task12: Configurationofnetworksusingstaticanddefaultroutes.

SuggestedTools-NS2/3,CiscoPacketTracer,Netsimetc..

CourseCode:BVNS604-19

CourseName:**Firewall&IntrusionDetection**

Program: B.Voc.	L: 3 T: 0 P: 0
Branch: Networking&SystemAdministration	Credits: 3
Semester: 6th	Percentageofnumerical/designproblems:-
Theory/Laboratory: Theory	Durationofendsemester exam(ESE):-
Internalmax.marks: 40	Externalmax.marks: 60
Totalmarks: 100	Status(Elective/Core): Core

Course Outcomes:

CO#	Course outcomes
CO1	IdentifyrisksrelatedtoComputerSecurityandinformationhazardinvarious situations.

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CO2	Applyuseridentificationandauthenticationmethods.
CO3	Applymeasures toprevent attackson networkusing firewall.
CO4	ApplyCryptographicalgorithms andprotocolsto maintainComputer Security

Detailedcontents	Contact hours
Unit1:IntroductiontoComputerandInformationSecurity Security Basics : Confidentiality, Integrity, Availability, Accountability, Non-Repudiation, Reliability; Threat to Security : Viruses, Worms, Trojan Horse, Intruders; Risk and Threat Analysis. TypesofAttacks:ActiveandPassiveattacks,DenialofService,DDOS,Backdoors and Trapdoors, Sniffing, Spoofing, TCP/IP Hacking. InformationSecurity:Needandimportanceofinformation,CriteriaforInformation Classification, Principles of Information Classification.	9
Unit2:UserAuthenticationandAccessControl UserAuthentication:PasswordandCertificatebased. BiometricAuthentication:Finger/Handprints,Retina,Patterns,Signatureandwriting patterns. AccessControls:AuthenticationMechanism,PrincipleAuthentication,Authorization, Audit and Policies.	8
Unit3:Firewall andIntrusionDetection Firewall:TypesofFirewalls,Policies,Configurationlimitations. IntrusionDetectionSystem:VulnerabilityAssessment,MisuseDetection,Anomaly Detection, Network Based IDS, Host Based IDS, Honeypots	8
Unit4:Cryptography,CyberLawsandComplianceStandards Cryptography : Introduction to Plan & Cipher Text, Cryptography, Cryptanalysis,Cryptology, Encryption, Decryption, RSA Algorithm IPSecurity:Overview,Protocols,Modes.EmailSecurity:AMTP,PEM,PGP. Public Key Infrastructure : Certificate and Registration Authority. CyberCrime:Hacking,DigitalForgery, IdentityTheftandFraud. CyberLaws:Need,CrimeAgainstIndividual,GovernmentandProperty. ComplianceStandards: ImplementingandInformationSecurityManagement	8

TextBooks:

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3. AtulKahate,“Cryptography&NetworkSecurity”,McGraw Hill
4. HarishChander,“CyberLawsandITProtection”,PHI
5. WilliamStalling,“Cryptography&NetworkSecurity”, PHI
6. Forouzan“Cryptography&NetworkSecurity”,PHI

ReferenceBooks:

7. DieterGollmann,“ComputerSecurity”,WileyPublication
8. WenboMao."ModernCryptography,Theory&Practice",PearsonEducation.
9. C.Boyd,A.Mathuria"ProtocolsforAuthenticationandKeyEstablishment",Springer.