REVISED SYLLABUS OF B.Sc. (COMPUTER MAINTENANCE) UNDER CBCS FRAMEWORK WITH EFFECT FROM 2020-2021

PROGRAMME: FOUR-YEAR B.Sc.

(B.Sc. Computer Maintenance)

(With Learning Outcomes, Unit-wise Syllabus, References, Co-curricular Activities & Model Q.P.)

For Fifteen Courses of 5 Semester

(To be Implemented from 2020-21 Academic Year)

Structure of Computer Maintenance Skill Enhancement Course

Programme: B.Sc. with Computer Maintenance as one of the stream.

Discipline: Computer Science

Year	Semester	Paper Code	Subject	Work Load Per Week	Credits	IA	ES	Total
Third	V	6A	Wireless Communication and Networks	4	3	25	75	100
		6A-P	Wireless Communication and Networks - LAB	2	2		50	50
		6B	Introduction to Unix and Linux	4	3	25	75	100
		6B-P	Introduction to Unix and Linux - LAB	2	2		50	50
		6C	Cryptography and Network Security	4	3	25	75	100
		6C-P	Cryptography and Network Security - LAB	2	2		50	50
		7A	Data Storage Technologies and Networks	4	3	25	75	100
		7A-P	Data Storage Technologies and Networks - LAB	2	2		50	50
		7B	Network Programming	4	3	25	75	100
		7B-P	Network Programming - LAB	2	2		50	50
		7C	Intrusion Detection and Prevention System	4	3	25	75	100
		7C-P	Intrusion Detection and Prevention System - LAB	2	2		50	50

6A Wireless Communication and Networks

Semester	Course Code	Course Title	Hours	Credits
I	6A	Wireless Communication and Networks	60	3

Course Outcomes

- Understand the concepts of wireless communication systems and their applications
- Know about the mobile radio propagation techniques and detailed understanding in wireless mobile communication
- Understand communication networks and detailed analysis of wireless communication networks.
- Understand the different protocols used for wireless communication systems and networks.

UNIT–I The Cellular Concept- System Design Fundamentals:

Introduction,FrequencyReuse,ChannelAssignmentStrategies,HandoffStrategies-PrioritizingHandoffs, Practical Handoff Considerations, Interference and system capacity – Co channel Interferenceand system capacity, Channel planning for Wireless Systems, Adjacent Channel interference , PowerControl for Reducing interference, Trunking and Grade of Service, Improving Coverage & Capacity inCellularSystems-CellSplitting,Sectoring.

UNIT –II Radio wave Propagation:

Large-Scale Path Loss: Introduction to Radio Wave Propagation, Free Space Propagation Model, Relating Power to Electric Field, TheThree Basic Propagation Mechanisms, Reflection- Reflection from Dielectrics, Brewster Angle, Reflection from prefect conductors, Ground Reflection (Two-Ray) Model, Diffraction- Fresnel Zone Geometry ,Knife- edge Diffraction Model, Multiple knife- edge Diffraction, Scattering, Outdoor Propagation Models-Longley Ryce Model, Okumura Model, Hata Model, PCS Extension to Hata Model,Walfisch and Bertoni Model, Wideband PCS Microcell Model, Indoor Propagation Models-Partition losses (Same Floor), Partition losses between Floors, Log-distance path lossmodel, Ericsson Multiple Breakpoint Model, Attenuation Factor Model, Signal penetration into buildings, Ray Tracing and Site Specific Modeling.

UNIT III Mobile Radio Propagation:

Small –Scale Fading and Multipath: Small Scale Multipath propagation-Factors influencing small scalefading, Doppler shift, Impulse Response Model of a multipath channel- Relationship between Bandwidthand Received power, Small-Scale Multipath Measurements-Direct RF Pulse System, Spread SpectrumSliding Correlator Channel Sounding, Frequency Domain Channels Sounding, Parameters of MobileMultipath Channels-Time Dispersion Parameters, Coherence Bandwidth, Doppler Spread and CoherenceTime, Types of Small-Scale Fading-Fading effects Due to Multipath Time Delay Spread, Flat fading,Frequency selective fading, Fading effects Due to Doppler

Spread-Fast fading, slow fading, StatisticalModels for multipath Fading Channels-Clarke's model for flat fading, spectral shape due to Dopplerspread in Clarke's model, Simulation of Clarke and Gans Fading Model, Level crossing and fadingstatistics,Two-rayRayleighFadingModel.

UNIT–IV Equalization and Diversity:

Introduction, Fundamentals of Equalization, Training A Generic Adaptive Equalizer, Equalizers in acommunication Receiver, Linear Equalizers, Non linear Equalization - Decision Feedback Equalization(DFE), Maximum Likelihood Sequence Estimation(MLSE) Equalizer, Algorithms for adaptive equalization-Zero Forcing Algorithm, Least Mean Square Algorithm, Recursive least squares algorithm.DiversityTechniques-DerivationofselectionDiversityimprovement,DerivationofMaximalRatioCombiningimprovement,PracticalSpaceDiversityConsideration-SelectionDiversity,FeedbackorScanningDiversity,MaximalRatioCombining,EqualGainCombining,PolarizationDiversity,FrequencyDiversity,TimeDiversity,RAKEReceiver.

UNIT–V Wireless Networks:

Introduction to wireless Networks, Advantages and disadvantages of Wireless Local Area Networks,WLAN Topologies,WLAN Standard IEEE 802.11,IEEE 802.11 Medium Access Control,Comparisionof IEEE 802.11 a,b,g and n standards, IEEE 802.16 and its enhancements, Wireless PANs, HiperLan,WLL.

TEXTBOOKS

1. WirelessCommunications,Principles,Practice–Theodore,S.Rappaport,2ndEd., 2002,PHI.
2. WirelessCommunications-Andrea Goldsmith,2005CambridgeUniversityPress.
3. MobileCellularCommunication–GottapuSasibhushanaRao,PearsonEducation, 2012.

Semester	Course Code	Course Title	Hours	Credits
V	6A-P	Wireless Communication and Networks	30	2

LAB : - Any one Hands on Practice from each Unit.

6B Introduction to Unix and Linux

Semester	Course Code	Course Title	Hours	Credits
V	6B	Introduction to Unix and Linux	60	3

Course Objective :-

- ToStudyindetailabout kernelstructuresassociatedwithvariousOperatingsystems
- ToStudyindetailaboutvarioussystemscalls,statementsandtheirargumentsassociatedwithUnix.
- ToStudyindetailaboutvarioussystemscalls,statementsandtheirargumentsassociatedwithLinux

CourseOutcome:

Aftercompletionofthecoursestudentswillbeableto

- Get complete knowledge regarding different types of operating systems and their Kernelstructures.
- ToworkeffectivelyonUnix Platform
- ToworkeffectivelyonLinuxPlatform

UNITI

INTRODUCTION

General Overview of the System : History – System structure – User perspective – Operating systemservices – Assumptions about hardware. Introduction to the Kernel : Architecture of the UNIX operatingsystem – Introduction to system concepts. The Buffer Cache: Bufferheaders– Structure of the bufferpool–Scenariosforretrievalofabuffer–Readingandwritingdiskblocks–Advantagesanddisadvantagesof thebuffercache.

UNITII

UNIX I*:* Overview of UNIX system, Structure, files systems, type of file, ordinary & Special files, filepermissions, Introduction to shell. UNIX basic commands & command arguments, Standard input / outputInput / output redirection, filters and editors, System calls related file structures, input / output processcreation&termination.

UNITIII

INTERPROCESS COMMUNICATION IN UNIX: Introduction, file and record locking, Client–Server example, pipes, FIFOs, Streams & Messages, Name Speces, Systems V IPC, Message queues,Semaphores,SharedMemory,Sockets&TLI.

UNITIV

INTRODUCTION TO NETWORKS AND NETWORK PROGRAMMING IN UNIX:

NetworkPrimer,TCP/IP, InternetProtocols,SocketProgramming, Introduction&overview,UNIXdomainprotocols,SocketAddresses,ElementarySocketsystemcalls,Simpleexamples.

UNITV

LINUX: Introduction to LINUX System,Editors and Utilities, Type of Shells, Shell Operations,Filestructure, File Management,Operations.Memory ManagementPolicies: Swapping –Demand paging.The I/OSubsystem:DriverInterface–DiskDrivers–TerminalDrivers–Streams–Interprocesscommunication.

TEXTBOOKS:

1. MauriceJ.Bach,"Thedesign oftheUNIXOperatingSystems",PHI
2. Kernighan& Pike,"TheUNIXProgrammingEnvironment",PHI

Semester	Course Code	Course Title	Hours	Credits
V	6B-P	Introduction to Unix and Linux - LAB	30	2

LAB : - Any one Hands on Practice from each Unit.

6 C Cryptography and Network Security

Semester	Course Code	Course Title	Hours	Credits
V	6C	Cryptography and Network Security	60	3

CourseObjective:

- Tostudyaboutneedandroleofsecurityandcryptographyincomputernetworks.
- Tostudyaboutdifferenttechniquesassociatedwithencryption.
- Tostudyaboutdifferentalgorithmsassociatedwithcomputer networks.
- Tostudyaboutdifferentsecurityarchitectureanddesigningissues relatedtofirewalls.

CourseOutcome:

Aftercompletionofthiscoursestudentswillbeabletoknow

- Theneedandroleofsecurityandcryptographyincomputernetworks.
- Gainknowledgeaboutdifferenttechniquesassociatedwithencryption.
- Functioningof differentalgorithmsassociatedwithcomputernetworks.
- Gain knowledge regarding different security architecture and designing issues related to firewalls.

UNIT–I

Introduction: Attacks,servicesandmechanisms,securityattacks,securityservices,amodelforinternetworksecurity,protectionthroughcryptography,theroleofcryptographyinnetworksecurity.

UNIT–II

ConventionalEncryption: Substitutiontechniquesandtranspositiontechniques,blockcipherprinciples,blockcipherdesignprinciples,blockciphermodesofoperation.Thedataencryptionstandard

UNIT–III

Public-keyencryption: Principlesofpublic-keycryptosystems,theRSAalgorithm,keymanagement.Authenticationrequirements,authenticationfunctions,messageauthenticationcodes,hashfunctions.

UNIT–IV

DigitalSignaturesandAuthenticationProtocols: Digitalsignatures,Digitalsignaturestandard, AuthenticationProtocols,MD5,messagedigestalgorithm,securehashalgorithm,HMAC.

UNIT–V

Mallsecurity&IPsecurity: Prettygood privacy,IPsecurity overview,IPsecurityarchitecture,Intruders,virusesandrelatedthreats, firewalldesignprinciples

TEXTBOOKS:

1. W.Stallings**,"**Cryptography&NetworkSecurity", 3/e, PHI, 2003
2. EricMaiwald**,"**FundamentalofNetworkSecurity",Dreamtechpress OsborneMGH,2004
3. SeanConvery,"NetworkSecurityArchitectures,PublishedbyCiscoPress,FirstEd.2004.
4. AtulKahate,"CryptographyandNetworkSecurity", Tata McGrawHill,2003.

Semester	Course Code	Course Title	Hours	Credits
V	6C-P	Cryptography and Network Security - LAB	60	3

LAB : - Any one Hands on Practice from each Unit.

7A Data Storage Technologies and Networks

Semester	Course Code	Course Title	Hours	Credits
V	7A	Data Storage Technologies and Networks	60	3

Course Outcomes:

- To provide learners with a basic understanding of Enterprise Data Storage and Management Technologies

• Study storage technologies: SAN, NAS, IP storage etc., which will bridge the gap between the emerging trends in industry and academics.

Course Outcomes:

• Explain the Optical, Semiconductor media and techniques for read/write operations
• Overview of Virtualization Technologies, Storage Area Network
• Discuss the Networked Attached Storage and Networking issues.
• Classify the applications as per their requirements and select relevant SAN solutions.

UNIT-1: Storage Media and Technologies – Magnetic, Optical and Semiconductor Media, Techniques for read/write Operations, Issues and Limitations.

UNIT-II: Usage and Access – Positioning in the Memory Hierarchy, Hardware and Software Design for Access, Performance issues.

UNIT-III: Large Storages – Hard Disks, Networked Attached Storage, Scalability issues, Networking issues.

UNIT-IV: Storage Architecture - Storage Partitioning, Storage System Design, Caching, Legacy Systems.

UNIT-V: Storage Area Networks – Hardware and Software Components, Storage Clusters/Grids. Storage QoS– Performance, Reliability and Security issues.

Text Books:

1. The Complete Guide to Data Storage Technologies for Network-centric Computing Paperback– Import, Mar 1998 by Computer Technology Research Corporation
2. Data Storage Networking: Real World Skills for the CompTIA Storage by Nigel Poulton

Semester	Course Code	Course Title	Hours	Credits
V	7A -P	Data Storage Technologies and Networks - LAB	30	2

LAB : - Any one Hands on Practice from each Unit.

7B NETWORK PROGRAMMING

Semester	Course Code	Course Title	Hours	Credits
V	7B	NETWORK PROGRAMMING	60	3

Course Objectives:

• Students will gain the understanding of core network programming by using sockets and transport layer protocols like TCP and UDP
• Students will gain the understanding of inter process communication and implementation of different forms of IPC in client-server environment

- Students will get an exposure to various application layer protocols which are designed using sockets and transport layer protocols

Course Outcomes:

- Explain the client-server paradigm and socket structures.
- Describe the basic concepts of TCP sockets and TCP echo client-server programs.
- Discuss the UDP sockets and UDP echo client-server programs.
- Explain Socket options and ability to understand IPC.
- Apply the applications of sockets and demonstrate skill to design simple applications like FTP, TELNET etc.

UNIT-I: Introduction to Network Programming: OSI model-transport layer protocols: TCP, UDP and SCTP-network architecture: client-server and peer-to-peer systems, Sockets-socket Address structures: IPv4, IPv6 and Generic-value result arguments-Byte ordering functions-Byte manipulation functions-Address conversion functions

UNIT-II: TCP: introduction to TCP-TCP connection establishment and termination-TIME_WAIT State. Elementary TCP sockets – Socket-connect-bind-listen-accept-fork-exec function-concurrent servers-Close function-read and write functions

UNIT-III: TCP echo client server program-getsockname and getpeername functions I/O multiplexing: I/O models-Select function-TCP echo server using select function-shutdown function-Poll function

UNIT-IV: UDP: Introduction to UDP-difference between TCP and UDP-recvfrom( ) and sendto( ) functions-UDP echo client server program-UDP echo client server using select function. Socket Options: IPv4 socket options-IPv6 socket options

UNIT-V: Socket Options: Generic socket options-TCP socket options. IPC: Introduction to IPC-forms of IPC-UNIX kernel support for pipes, FIFO, message queues, semaphores and shared memory Network programming concepts Implementation: FTP-ping-arp-SMTP-TELNET

Text Books:

1. Unix Network programming, the socket networking API, W.Richard Stevens, bill fenner, Andrew m.rudoff ,PHI.

References Books:

1. Advanced programming in the UNIX environment, W.Richard Stevens ,pearson education

Semester	Course Code	Course Title	Hours	Credits
V	7B-P	NETWORK PROGRAMMING -LAB	30	2

LAB : - Any one Hands on Practice from each Unit.

7C INTRUSION DETECTION & PREVENTION SYSTEMS

Semester	Course Code	Course Title	Hours	Credits
V	7C	INTRUSION DETECTION & PREVENTION SYSTEMS	60	3

Course Objectives:

- Understand when, where, how, and why to apply Intrusion Detection tools and techniques in order to improve the security posture of an enterprise.
- Apply knowledge of the fundamentals and history of Intrusion Detection in order to avoid common pitfalls in the creation and evaluation of new Intrusion Detection Systems
- Analyze intrusion detection alerts and logs to distinguish attack types from false alarms

Course Outcomes:

- Explain the fundamental concepts of Network Protocol Analysis and demonstrate the skill to capture and analyze network packets.
- Use various protocol analyzers and Network Intrusion Detection Systems as security tools to detect network attacks and troubleshoot network problems.

UNIT-I: History of Intrusion detection, Audit, Concept and definition, Internal and external threats to data, attacks, Need and types of IDS, Information sources Host based information sources, Network based information sources.

UNIT-II: Intrusion Prevention Systems, Network IDs protocol based Ids, Hybrid IDs, Analysis schemes, thinking about intrusion. A model for intrusion analysis, techniques Responses requirement of responses, types of responses mapping responses to policy Vulnerability analysis, credential analysis non credential analysis.

UNIT-III: Introduction to Snort; Snort Installation Scenarios, Installing Snort, Running Snort on Multiple, Network Interfaces, Snort Command Line Options. Step-By-Step Procedure to Compile and Install Snort Location of Snort Files, Snort Modes Snort Alert Modes.

UNIT-IV: Working with Snort Rules, Rule Headers, Rule Options, and the Snort Configuration File etc. Plug-in, Pre-processors and Output Modules, Using Snort with My-SQL.

UNIT-V: Using ACID and Snort Scarf with Snort, Agent development for intrusion detection, Architecture models of IDs and IPs.

Text Books:

1. Rafeeq Rehman : " Intrusion Detection with SNORT, Apache, MySQL, PHP and ACID," 1st Edition, Prentice Hall , 2003.

Reference Books:

1. Christopher Kruegel,Fredrik Valeur, Giovanni Vigna: "Intrusion Detection and Correlation Challenges and Solutions", 1 st Edition, Springer, 2005.

2. Carl Endorf, Eugene Schultz and Jim Mellander“ Intrusion Detection & Prevention”, 1 st Edition, Tata McGraw-Hill, 2004.
3. Stephen Northcutt, Judy Novak : “Network Intrusion Detection”, 3 rd Edition, New Riders Publishing,2002
4. T. Fahringer, R. Prodan, “A Text book on Grid Application Development and Computing Environment”. 6th Edition, KhannaPublihsers, 2012.

Semester	Course Code	Course Title	Hours	Credits
V	7C - P	INTRUSION DETECTION & PREVENTION SYSTEMS - LAB	30	2

LAB : - Any one Hands on Practice from each Unit.

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