

Detailed Curriculum

**Name of Unit of
Qualification**

:IT TOOLS AND BUSINESS SYSTEM

Duration

: 120 Hrs.

Topic	Contents	Hrs.
Acquire the foundation level knowledge required to understand computer and its operations	Characteristics of Computers, Input, Output, Storage units, CPU, Computer System, Binary number system, Binary to Decimal Conversion, Decimal to Binary Conversion, ASCII Code, Unicode	4
Understand the hardware and software components of the computer and Multimedia	Central Processing Unit - Processor Speed, Cache, Memory, RAM, ROM, Booting, Memory- Secondary Storage Devices: Floppy and Hard Disks, Optical Disks CD-ROM, DVD, Mass Storage Devices: USB thumb drive. Managing disk Partitions, File System Input Devices - Keyboard, Mouse, joystick, Scanner, web cam, Output Devices- Monitors, Printers – Dot matrix, inkjet, laser, Multimedia- What is Multimedia, Text, Graphics, Animation, Audio, Images, Video; Multimedia Application in Education, Entertainment, Marketing. Names of common multimedia file formats, Computer Software- Relationship between Hardware and Software; System Software, Application Software, Compiler, names of some high level languages, free domain software.	6
Understand the basic concept of operating system and get knowledge about various different operating systems.	Microsoft Windows- An overview of different versions of Windows, Basic Windows Elements, File management through Windows. Using essential accessories: System tools –Disk cleanup, Disk defragmenter, Entertainment, Games, Calculator, Imaging – Fax, Notepad, Paint, WordPad. Command Prompt- Directory navigation, path setting, creating and using batch files. Drives, files, directories, directory structure. Application Management: Installing, uninstalling, Running applications. Linux- An overview of Linux, Basic Linux elements: System Features, Software	13

	Features, File Structure, File handling in Linux: H/W, S/W requirements, Preliminary steps before installation, specifics on Hard drive repartitioning and booting a Linux system.	
Understand to use the package of word processing	Word processing concepts: saving, closing, Opening an existing document, Selecting text, Editing text, Finding and replacing text, printing documents, Creating and Printing Merged Documents, Character and Paragraph Formatting, Page Design and Layout. Editing and Profiling Tools: Checking and correcting spellings. Handling Graphics, Creating Tables and Charts, Document Templates and Wizards.	6
Understand to use the Package of Spreadsheet Concepts	Spreadsheet Concepts, Creating, Saving and Editing a Workbook, Inserting, Deleting Work Sheets, entering data in a cell / formula Copying and Moving from selected cells, handling operators in Formulae, Functions: Mathematical, Logical, statistical, text, financial, Date and Time functions, Using Function Wizard. Formatting a Worksheet: Formatting Cells – changing data alignment, changing date, number, character or currency format, changing font, adding borders and colors, Printing worksheets, Charts and Graphs – Creating, Previewing, Modifying Charts. Integrating word processor, spread sheets, web pages.	9
Understand to use the Package of Presentation Concepts.	Creating, Opening and Saving Presentations, Creating the Look of Your Presentation, Working in Different Views, Working with Slides, Adding and Formatting Text, Formatting Paragraphs, Checking Spelling and Correcting Typing Mistakes, Making Notes Pages and Handouts, Drawing and Working with Objects, Adding Clip Art and other pictures, Designing Slide Shows, Running and Controlling a Slide Show, Printing Presentations.	5
Understand various data base concepts and operations.	Data Manipulation-Concept: Database, Relational Database, Integrity. Operations: Creating, dropping, manipulating table structure. Manipulation of Data: Query, Data Entry Form, Reports	13
Understand the issues related to IT and IT applications.	Indian IT Act, Intellectual Property Rights – issues. Application of information Technology in Railways, Airlines, Banking, Insurance, Inventory Control, Financial systems, Hotel management, Education, Video games, Telephone exchanges, Mobile phones, Information kiosks, special effects in Movies	4

Practical/Tutorials		60
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Text books:

1. P.K. Sinha and P. Sinha, “Foundations of Computing” , BPB Publication, 2008.
2. Sagman S, “MS Office for Windows XP”, Pearson Education, 2007.
3. ITL Educational Society, “Introduction to IT”, Pearson Education, 2009.
4. Miller M, “Absolute Beginners Guide to Computer Basics”, Pearson Education, 2009.

Reference Books:

1. Turban, Mclean and Wetherbe, “Information Technology and Management” John Wiley & Sons.
2. Mansfield Ron, “Working in Microsoft Office”, 2008, Tata McGraw-Hill
3. Balagurusamy E, “Fundamentals of Computers”, 2009, Tata McGraw-Hill
4. Mavis Beacon, “All-in-one MS Office” CD based views for self learning, BPB Publication, 2008
5. Perry G, “MS Office 2007”, Pearson Education, 2008.
6. D“Suoza & D“souza, “Learn Computer Step by Step”, Pearson Education, 2006.
7. Kulkarni, “IT Strategy for Business”, Oxford University Press

**Name of Unit of
Qualification**

**: A2-R4 INTERNET TECHNOLOGY AND
WEB DESIGN**

Duration

: 120 Hours

Performance Criteria(OUTCO ME) No.	Contents	Hrs.
Understand the current topics in Web & Internet technologies	Internet, Growth of Internet, Owners of the Internet, Anatomy of Internet, ARPANET and Internet history of the World Wide Web, basic Internet Terminology, Net etiquette. Internet Applications – Commerce on the Internet, Governance on the Internet, Impact of Internet on Society – Crime on/through the Internet.	2
Understand the basic concepts for network implementation.	Packet switching technology, Internet Protocols: TCP/IP, Router, Internet Addressing Scheme: Machine Addressing (IP address), E-mail Addresses, Resources Addresses	3
Understand the basic concepts for network Communication	Connectivity types: level one, level two and level three connectivity, Setting up a connection: hardware requirement, selection of a modem, software requirement, modem configuration, Internet accounts by ISP: Telephone line options, Protocol options, Service options, Telephone line options – Dialup connections through the telephone system, dedicated connections through the telephone system, ISDN, Protocol options – Shell, SLIP, PPP, Service options – E-mail, WWW, News Firewall etc.	3
Understand the basic concepts for network Communication	Network definition, Common terminologies: LAN, WAN, Node, Host, Workstation, bandwidth, Interoperability, Network administrator, network security, Network Components: Servers, Clients, Communication Media, Types of network: Peer to Peer, Clients Server, Addressing in Internet: DNS, Domain Name and their organization, understanding the Internet	4

	Protocol Address. Network topologies: Bust, star and ring, Ethernet, FDDI, ATM and Intranet.	
Understand the Services on Internet (Definition and Functions)	E-mail, WWW, Telnet, FTP, IRC and Search Engine	4
Understand the basic protocol, structure and clients of Electronic Mail	Email Networks and Servers, Email protocols –SMTP, POP3, IMAp4, MIME6, Structure of an Email – Email Address, Email Header, Body and Attachments, Email Clients: Netscape mail Clients, Outlook Express, Web based E-mail. Email encryption- Address Book, Signature File.	7
Understand the Current Trends on Internet	Languages, Internet Phone, Internet Video, collaborative computing, e-commerce.	3
Understand fundamental tools and technologies for web designing and browsing	Overview, SGML, Web hosting, HTML. CGL, Documents Interchange Standards, Components of Web Publishing, Document management, Web Page Design. Consideration and Principles, Search and Meta Search Engines, WWW, Browser, HTTP, Publishing Tools.	10
Comprehend the technologies for Hypertext Mark-up Language (HTML).	HTML page structure, HTML Text, HTML links, HTML document tables, HTML Frames, HTML Images, multimedia	12
Deal with programming issues relating to VB Script, JavaScript, Java, ASP, Front Page and Flash	ASP, VB Script, JAVA Script, JAVA and Front Page, Flash	8
Figure out the various security hazards on the Internet and need of security measures	Overview of Internet Security, Firewalls, Internet Security, Management Concepts and Information Privacy and Copyright Issues, basics of asymmetric cryptosystems.	4
Practicals/Tutorials		60

Text books:

1. Greenlaw R and Hepp E “Fundamentals of Internet and www” 2nd EL, Tata McGrawHill,2007.
2. Ivan Bayross, “HTML, DHTML, JavaScript, Perl CGI”, 3rd Edition, BPB Publications.
3. D. Comer, “The Internet Book”, Pearson Education, 2009.

Reference Books:

1. M. L. Young,”The Complete reference to Internet”, Tata McGraw Hill, 2007.
2. Godbole AS & Kahate A, “Web Technologies”, Tata McGrawHill,2008.
3. Jackson, “Web Technologies”, Pearson Education, 2008.
4. B. Patel & Lal B. Barik, ” Internet & Web Technology “, Acme Learning Publishers
5. Leon and Leon, “Internet for Everyone”, Vikas Publishing House.

Name of Unit of Qualification

: A3-R4 PROGRAMMING AND PROBLEM SOLVING THROUGH 'C' LANGUAGE

Duration

: 60 Hours

Learning Outcome	Topics	Hours
Develop efficient algorithms	The Basic Model of Computation, Algorithms, Flow-charts, Programming Languages, Compilation, Linking and Loading, Testing and Debugging, Documentation.	4
Understand the Algorithms for Problem Solving	Exchanging values of two variables, summation of a set of numbers, Decimal Base to Binary Base conversion, Reversing digits of an integer, GCD (Greatest Common Division) of 49 two numbers, Test whether a number is prime, Organize numbers in ascending order, Find square root of a number, factorial computation, Fibonacci sequence, Evaluate „sin x“ as sum of a series, Reverse order of elements of an array, Find largest number in an array, Print elements of upper triangular matrix, multiplication of two matrices, Evaluate a Polynomial.	10
Understand the basic of 'C' Language	Character set, Variables and Identifiers, Built-in Data Types, Variable Definition, Arithmetic Operators and Expressions, Constants and Literals, Simple assignment statement, Basic input/output statement, Simple „C“ programs.	4
Understand Conditional Statements and Loops of 'C' Language	Decision making within a program, Conditions, Relational Operators, Logical Connectives, if statement, if-else statement, Loops: while loop, do while, for loop, Nested loops, Infinite loops, Switch statement, structured Programming.	7
Understand Arrays of 'C' Language	One dimensional arrays: Array manipulation; Searching, Insertion, Deletion of an element from an array; Finding the largest/smallest element in an array; Two dimensional arrays, Addition/Multiplication of two matrices, Transpose of a square matrix; Null terminated strings as array of characters, Standard library string functions	6
Understand Functions of 'C' Language	Top-down approach of problem solving, Modular programming and functions, Standard Library of C functions, Prototype of a function: Formal parameter list, Return Type, Function call, Block structure, Passing arguments to a Function: call by reference, call by value, Recursive Functions, arrays as function arguments.	6
Understand	Scope and extent, Storage Classes in a single	3

Storage Classes	source file: auto, extern and static, register, Storage Classes in a multiple source files: extern and static.	
Understand Structures and Unions	Structure variables, initialization, structure assignment, nested structure, structures and functions, structures and arrays: arrays of structures, structures containing arrays, unions	6
Understand Pointers	Address operators, pointer type declaration, pointer assignment, pointer initialization, pointer arithmetic, functions and pointers, Arrays and Pointers, pointer arrays, pointers and structures, dynamic memory allocation.	6
Understand simple data structures like arrays, stacks and linked list in solving problems	Creation of a singly connected linked list, Traversing a linked list, Insertion into a linked list, Deletion from a linked list	4
Understand package of File Processing	Concept of Files, File opening in various modes and closing of a file, Reading from a file, Writing onto a file.	4
Practical/Tutorials		60

Text Books:

1. Byron S Gottfried “Programming with C” Second edition, Tata McGrawhill, 2007 (Paper back)
2. R.G. Dromey, “How to solve it by Computer”, Pearson Education, 2008.
3. Kanetkar Y, “Let us C”, BPB Publications, 2007.
4. Hanly J R & Koffman E.B, “Problem Solving and Programm design in C”, Pearson Education, 2009.

Reference Books:

1. E. Balagurusamy, “Programming with ANSI-C”, Fourth Edition, 2008, Tata McGraw Hill.
2. Venugopal K. R and Prasad S. R, “Mastering „C””, Third Edition, 2008, Tata McGraw Hill.
3. B.W. Kernighan & D. M. Ritchie, “The C Programming Language”, Second Edition, 2001, Pearson Education
4. ISRD Group, “Programming and Problem Solving Using C”, Tata McGraw Hill, 2008.
5. Pradip Dey , Manas Ghosh, “Programming in C”, Oxford University Press, 2007.

Name of Unit of Qualification : **A4-R4 COMPUTER SYSTEM ARCHITECTURE**

Duration : 120 Hours

Performance Criteria(OUTCOME) No.	Contents	Hrs.
Understand basic Digital Components	Overview of computer organization: Logic gates, Adders, Flip-flops (as 1 bit memory device), Encoders, Decoders, Multiplexers, Registers, Shift Registers, Counters, RAM, ROM	10
Acquire Representation of data	Number system, Hexadecimal numbers, ASCII code, Two's complement, addition, subtraction, overflow, Floating point representation	04
Know Register Transfer & Micro Operations	Bus and memory transfers, Three state Bus Buffers, Binary ADDER, Binary Incrementer, Arithmetic circuit, Logic and Shift Micro-operations, ALU	04
Understand Basic Computer Organization	Instruction codes, Direct and indirect address, Timing and Control Signal generation, Instruction Cycle, Memory Reference Instructions, Input Output instructions	04
Understand how Central Processing Unit work	General Register Organization, Memory Stack, One address and two address Instructions, Data transfer, arithmetic, logical and shift instructions, Software and hardware interrupts (only brief introduction), Arithmetic and Instruction Pipelines.	08
Know different Computer Arithmetic and Algorithm	Addition and Subtraction with signed magnitude data, Multiplication Algorithms Hardware Algorithm and Booth Algorithm, Division Algorithm	06
Understand different Input-Output of a computer	Asynchronous Data transfer - Handshaking, Asynchronous Serial Transfer, Interrupt Initiated I/O, DMA transfer, Interfacing Peripherals with CPU (Introduction), Keyboard, Mouse, Printer, Scanner, Network card, Introduction to Pipelining and Linear	08

	Pipeline processor	
Understand different Memory Organization	ROM, RAM, Hard Disk, CD-ROM, Cache Memory - Direct mapping scheme, Virtual Memory concept, Cache memory working principles	08
.Understand Assembly Language Programming	Assembly Language of Intel 8086, Simple examples based on arithmetic and character operations.	08
Practical/Tutorials		60

Text Books:

1. Carter Nicholas, "Computer Architecture", Schaun outline Sevier , Tata McGraw-Hill, 2008.
2. M. Morris Mano, "Computer System Architecture", Pearson Education, 2008.
3. Peter Abel and N. Nizamuddin, "IBM PC Assembly Language and Programming", Pearson Education, 2009.

Reference Books:

1. J.P. Hayes, "Computer Architecture & Organization", Tata McGraw Hill
2. Michael J. Flynn, "Computer Architecture: Pipelined and Parallel Processor Design", Narosa Publishing House, 2002..

**Name of Unit of
Qualification**

**:A5-R4 STRUCTURED SYSTEM ANALYSIS
AND DESIGN**

Duration

: 120 Hours

Performance Criteria(OUTCOME) No.	Contents	Hrs
Study, Analysis and Design of a System	System Definition and concepts: General Theory systems, Manual and automated systems, Real-life Business Sub-Systems. System Environments and Boundaries, Real-time and distributed systems, Basic principles of successful systems, Approach to system Development: Structured System Analysis and Design, Prototype, Joint Application Development, Role and Need of Systems Analyst. Qualifications and responsibilities, System Analysis as a Profession.	03
Understand System Development Cycle	Introduction to Systems, Development Life Cycle (SDLC). Various phases of SDLC: Study Analysis, Design, Development, Implementation, Maintenance; Documentation: Principles of Systems Documentation, Types of documentation and their importance, Enforcing Documentation discipline in an organization.	03
Understand different System Planning	Data and fact gathering techniques: Interviews, Group Communication Questionnaires; Assessing Project Feasibility: Technical, Operational, Economic, Cost Benefits Analysis, Schedule, Legal and contractual, Political. Modern Methods for determining system requirements: Joint Application, Development Program, Prototyping, Business Process Re-engineering. System Selection Plan and Proposal	06
Understand Modular and Structured Design	Module specifications, Top-down and bottom-up design. Module coupling and cohesion.	02

	Structure Charts.	
Understand System Design and Modeling	Process Modeling, Logical and physical design, Conceptual Data Modeling: Entity/Relationship Analysis, Entity-Relationship Modeling, ERDs and DFDs, Concepts of Normalization. Process Description: Structured English, Decision Tree, Table; Documentation: Data Dictionary, Recording Data Descriptions.	14
Understand Input/output and Interface Design	Classification of forms, Input/output forms design. User-interface design, Graphical Interfaces. Standards and guidelines for GUI design, Designing Physical Files and Databases: Designing Fields, Designing Physical Records, Designing Physical Files, Designing Databases, Introduction to CASE Tools; Features, Advantages and Limitations of CASE Tools, Awareness about some commercial CASE Tools.	07
System Implementation and Maintenance	Planning considerations, Conversion methods, procedures and controls, System acceptance criteria, System Evaluation and Performance, Testing and Validation. Preparing, User Manual, Maintenance Activities and Issues.	03
Understand Security of Computer System	Security aspects of a Computer System; Control Measures; Disaster Recovery and Contingency Planning, Prevention of Computer Virus & Malicious Applications.	02
OO Analysis / Design	OO Development Life Cycle and Modeling. Static and dynamic modeling. Comparison of OO and Module-oriented Approach. Modeling using UML ; The UML diagrams; the process of Object modeling	12
Developing Information Management System for an Organization	Meaning and role of MIS, Systems approach to MIS. Types of information systems : Transaction Processing System, Management Information System, Decision Support System, Expert System	08

	Case Studies (Illustrative) : MIS for Accounting and Finance Function, MIS for Marketing System.	
Practicals/Tutorials		60

Text Books:

- 1 Hoffer J. A, George J.F, Valacich J.S, and Panigrahi P.K “Modern Systems Analysis and Design”, Pearson Education, 2007.
2. A. Dennis and B. H. Wixom, “Systems Analysis and Design”, John Wiley & Sons, Inc..

Reference Books:

1. Whitten J. L, Bentley L. D, “Systems Analysis and Design Methods”, Tata McGraw-Hill, 2008.
2. Kendall & Kendall, “Systems Analysis and Design”, Seventh Edition, Pearson Education.

Name of Unit of Qualification

: A6-R4DATA STRUCTURE THROUGH 'C++'

Duration

: 120 Hours

Performance Criteria(OUTC OME) No.	Contents	Hrs.
Understand and the concepts of object oriented language such as C++	Introduction to Algorithm Design and Data Structures: Design and analysis of algorithm: Algorithm definition, comparison of algorithms. Top down and bottom up approaches to Algorithm design. Analysis of Algorithm; Frequency count, Complexity measures in terms of time and space. Structured approach to programming.	10
Understand Basics of C++, Elementary Data Structures : Arrays, linked lists	Basics of C++: Structure of a program Variables. Data Types. Constants Operators, Basic Input/output, Control Structure, Functions, Compound Data Types: Arrays, Pointers, Dynamic Memory, Object Oriented Programming: Classes, Encapsulation, Abstraction, inheritance, Polymorphism, Representation of arrays: single and multidimensional arrays. Address calculation using column and row major ordering. Various operations on Arrays, Vectors. Application of arrays: Matrix multiplication, Sparse polynomial representation and addition, Stacks and Queues : Representation of stacks and queues using arrays and linked-list. Circular queues, Priority Queue and D-Queue. Applications of stacks: Conversion from infix to postfix and prefix expressions, Evaluation of postfix - 95 - expression using stacks. Pointers: Definition, Pointer Arithmetic, Array of pointers, Arrays in terms of pointers. Linked list: Singly linked list; operations on list, Linked stacks and queues. Polynomial representation and manipulation using linked lists. Circular linked lists, Doubly linked lists. Generalized list structure. Sparse Matrix representation using generalized list structure, stacks, queues.	18
Develop Abstract Data types Stacks and Queues	Definition of ADT, Stack ADT (array implementation), FIFO queue ADT (array implementation)	05
Implementation of tree	Binary tree traversal methods: Preorder, In-order, Post-ordered traversal. Recursive Algorithms for above mentioned Traversal	15

	methods. Representation of trees and its Applications: Binary tree representation of a general tree. Conversion of forest into tree. Threaded binary trees. Binary search tree. : Height balanced (AVL) tree, B-trees.	
Analyze different algorithm of tree	Selection sort, Insertion sort, Bubble sort, Quick sort, merge sort , Heap sort, Radix sort and their complexity, Searching: Sequential search, Binary Search, Binary Search Tree, ASVL trees, B trees, Searching , sorting and complexity, Searching : Sequential and binary searches, Indexed search, Hashing Schemes. Sorting : Insertion, selection, bubble, Quick, merge, radix, Shell, Heap sort, comparison of time complexity.	10
Analyze different algorithm of Graph	Graph representation: Adjacency matrix, Adjacency lists, Traversal schemes: Depth first search, Breadth first search. Spanning tree: Definition, Minimal spanning tree algorithms. Shortest Path algorithms (Prime"s and Kruskal,,s).	05
Practicals/Tutorials		60

Text Books:

1. Hubbard John. R, "Schaum"s outline of Data Structures with C++", TataMcGraw-Hill, 2007.
2. Langsam Y, Augenstein M.J and Tanenbaum A. M, "Data Structures Using C and C++", Second Edition, Pearson Education, 2007.
3. Kruse R, Tonodo C.L. and Leung B, "Data Structures and Program Design in C", Pearson Education, 2007.

Reference Books:

1. Horowitz E, Sahni S and Mehta D, "Fundamentals of Data Structures in C++," Galgotia Publication, 2009.
2. Weiss M A, "Data Structures and Algorithm Analysis in C++", Pearson Education, 2007.
3. Litvin G, "Programmking with C++ and Data Structures", Vikas Publishing House.

Name of Unit of Qualification

:A7-R4 INTRODUCTION TO DATABASE MANAGEMENT SYSTEM

Duration

: 120 Hours

Performance Criteria(OUTCOME) No.	Contents	Hrs.
Understand basic of Database Management System	What is database?, Why database?, database system, database management system (DBMS), advantages of DBMS.	04
Understand Database Architecture	Three levels of architecture, mappings, role of database administrator(DBA), E-R model, three approaches of DBMS- relational, hierarchical and network.	04
Understand basics of Relational Database Management System (RDBMS)	Introduction, RDBMS terminology, relational model, base tables, keys.	08
Normalization	Normal forms, Boyce-Codd Normal form, higher normal forms.	08
Relational Algebra and Relational Calculus	Relational operators, tuple calculus, well formed formulae.	08
Understand basic of SQL Language	Introduction, Characteristics of SQL, data definition, data manipulation, SQL commands, SQL operators, Queries, aggregate functions.	12
Backup and Recovery	Transaction recovery, system recovery, SQL support	02
Security	General considerations, controls, audit trail, data encryption, SQL support.	02
Integrity	General considerations, integrity rules, SQL support.	02
Design and Development of Database Applications	Database applications using some standard RDBMS.	10
Practicals/Tutorials		60

Text Books:

1. Silberschatz A, Korth H.F and Sudarshan S, “Database System Concepts”, Fifth Edition, Tata McGraw-Hill, 2006.
2. C.J.Date, “ An introduction to Database Systems”, Pearson Education, 2007.
3. R. Elmasri, S. B Navathe, “ Fundamentals of Database System”, Pearson Education, 2007.
4. Desai C. Bipin, “An Introduction to Database Systems”, Galgotia Publication, 2009.

Reference Books.

1. Leon A and Leon M, “Fundamentals of DBMS”, Vijay Nicole & Tata McGraw-Hill, 2007.
2. Gill P.S, “DBMS”, I.K. International, 2008.
3. Singh S.K, “Database Systems: Concepts, Design & Applications”, Pearson Education, 2008.
4. Leon A and Leon M, “Database Management Systems”, Vikas Publishing House.

Name of Unit of Qualification

: A8-R4BASICS OF OS, UNIX AND SHELL PROGRAMMING

Duration

: 120 Hours

Performance Criteria(OUTC OME) No.	Contents	Hrs.
Understanding Operating System Concepts	Overview of OS. System Calls, Process Management, Memory Management, Disk and file systems, Networking, Security, Graphical User Interface, Device Drivers.	04
Learn Linux history and ideas	What is Open Source? , Linux Origins, Red Hat Distributions, Linux Principles	01
Understand Basics of Linux and its Usage	Logging in to a Linux System, Switching between virtual consoles and the graphical environment, Elements of the X Window System, Starting the X server, Changing your password, The root user, Changing identities, Editing text files.	02
Running Commands and Getting Help	Running Commands, Some Simple commands, Getting Help, The what is command, The – help Option, Reading Usage Summaries, The man command, Navigating man pages, The info command, Navigating info pages, Extended Documentation, Red Hat Documentation.	02
Understand the Browsing of File System	Linux File Hierarchy Concepts, Some Important Directories, Current Working Directory, File and Directory Names, Absolute and Relative Pathnames, Changing Directories, Listing Directory Contents, Copying Files and Directories, Copying Files and Directories: The Destination, Moving and Renaming Files and Directories, Creating and Removing Files, Creating and Removing Directories, Using Nautilus, Determining File Content.	04
Learn X-Window System	XOrg: The X11 Server, XOrg Server Design, XOrg Server Configuration, XOrg Modularity, Server and Client Relationship, XOrg in runlevel 3, XOrg in runlevel 5, Configuration Utilities, Remote X Sessions.	04
Users, Groups and Permissions	Users, Groups, Linux File Security, Permission Precedence, Permission Types, Examining Permissions, Interpreting Permissions, Changing File Ownership, Changing Permissions – Symbolic Method, Changing Permissions – Numeric Method, Changing Permissions – Nautilus	03

Advanced Topics in Users, Groups and Permissions	User and Group ID Numbers, /etc/passwd, /etc/shadow and /etc/group files, User Management tools, System Users and Groups, Monitoring Logins, Default Permissions, Special Permissions for Executables, Special Permissions for Directories.	03
The Linux File System In-depth	Partitions and Filesystems, Inodes, Directories, Inodes and Directories, cp and inodes, mv and inodes, rm and inodes, Hard Links, Symbolic (or soft) Links, The Seven Fundamental Filetypes, Checking Free Space, Removable Media, Mounting CDs and DVDs, Mounting USB Media, Mounting Floppy Disks, Archiving Files and Compressing Archives, Creating, Listing and Extracting File Archives, Creating File Archives: Other Tools.	06
vim: An Advanced Text Editor	Introducing vim, vim: A Modal Editor, vim basics, Opening a file in vim, Modifying a file, Saving a file and exiting vim, Using Command Mode, Moving around, Search and Replace, - 130 - Manipulating Text, Undoing changes, Visual Mode, Using multiple “windows”, Configuring vi and vim, Learning more.	03
Understand Standard I/O and Pipes	Standard Input and Output, Redirecting Output to a File, Redirecting STDOUT to a Program(Piping), Combining Output and Errors, Redirecting to Multiple Targets (tee), Redirecting STDIN from a file, Sending Multiple Lines to STDIN.	02
Using the Bash Shell	Bash Introduction, Bash Heritage and Features, Command Line Shortcuts, History Tricks, Command Line Expansion, Command Editing Tricks, gnome-terminal	03
Configuring the Bash Shell	Bash Variables, Environment variables, The TERM Environment variable, The PATH Environment variable, Some common variables, Aliases, How bash expands a Command Line, Preventing Expansion, Login vs non-login shells, Bash startup tasks: profile, Bash startup tasks: bashrc, Bash exit tasks	04
Text Processing Tools	Tools for Extracting Text, Viewing File Contents, Viewing File Excerpts, Extracting Text by Keyword, Extracting Text by column, Tools for analyzing text, Gathering text statistics, Sorting Text, Eliminating Duplicate Lines, Comparing Files, Duplicating File Changes, Spell Checking with aspell, Tools for manipulating Text, sed, Special Characters for Complex Searches.	03

Shell Programming	Scripting Basics, Creating Shell Scripts, Generating Output, Handling Input, Exit Status, Control Structures, Conditional Execution, File Tests, String Tests, for and sequences, continue and break, Using positional parameters, handling parameters with Spaces, Scripting at the command line, Shell Script debugging.	06
Investigating and Managing Process	What is a Process? Listing Processes, Finding Processes, Signals, Sending Signals to Processes, Scheduling Priority, Altering Scheduling Priority, Interactive Process Management tools, Job Control, Scheduling a Process to execute later, Crontab File format.	04
Finding and Processing Files	Locate, Locate Examples, find, Basic find Examples, find and Logical Operators, find and Permissions, find and Numeric Criteria, find and Access Times, Executing commands with find, find Execution Examples, The GNOME Search Tool.	02
Basic System Configuration Tools	TCP/IP Network Configuration, Managing Ethernet Connections, Graphical Network Configuration, Network Configuration Files, Printing in Linux, Setting the System's Date and Time, Managing Services.	04
Practicals/Tutorials		60

Text Books:

1. Maurice J. Bach, "Design of the Unix Operating System", Pearson Education, 2008.
2. Sumitabha Das, "Unix : Concepts and Applications", Tata McGraw-Hill , 2008.
3. ISRD Group, "Basics of OS, UNIX and SHELL Programming" , Tata McGraw-Hill, 2006.
4. Sarwar, Koretsky, and Sarwar, "Unix , The Text Book", Pearson Education, 2007

Reference Books

1. Stephen Prata "Advanced Unix -A programmer's Guide"., BPB Publication, 2008.
2. Kochan S & Wood P, "Unix Shell Programming", Pearson Education, 2008.
3. Stevens W R, Rago S.A, "Advanced Programming in Unix Environment", Pearson Education, 2008.

Name of Unit of Qualification

: A9-R4DATA COMMUNICATION AND NETWORK TECHNOLOGIES

Duration

: 120 Hours

Performance Criteria(OUTCOME) No.	Contents	Hrs.
Understand basic of Data Communications	Introduction, Communication Systems, Signal and data, Transmission modes, Synchronous and asynchronous transmission, Circuits, channels and multi channeling, Signaling, Encoding and decoding, Error detection and Recovery, Flow control, Sliding Window, Congestion Management, Multiplexing [FDM, TDM, CDM, WDM] and Spreading [DS-FH], Concept of Modulation, Baseband versus Broadband; Pulse Code Modulation (PCM), Shift Keying [ASK, FSK, PSK, QPSK, DPSK]; Encoding techniques and CODEC; Classification of Modems, Standards and Protocols, Protocols used by Modem to Transfer files, Establishing a Connection (Internet connectivity); Digital Subscriber Loop (DSL)	06
Understand basic of Communication Network	Introduction, Switching techniques: Circuit Switching, Packet switching, Datagram, Virtual circuit and Permanent Virtual Circuit, Connectionless and connection oriented communication, Message switching, Cell switching (ATM); Telephone network signaling Network topologies, Layering the communication process, Open Systems Interconnection (OSI) model, Data encapsulation; Protocols, services and layering, PDU/SDU; TCP/IP suite, Hour-glass model, Internet Architecture and Protocol overview.	08
Understand various Media Access Control	Introduction, Access Techniques (STDM, FDMA, TDMA, Spread Spectrum techniques and CDMA, DSSS, FHSS); Media Access Control: Aloha and Slotted Aloha, Media Access Control Address, Polling, CSMA, CSMA/CA, CSMA/CD and Reservation Aloha, Digital hierarchies [SONET/SDH]	06
Understand Categories and topologies of networks	Introduction, LAN Hardware, LAN Operating Systems, Transmission Media: Guided Media (Twisted pair, Co-axial cable, Optical fiber); Unguided Media (Radio, VHF, microwave,	06

	Satellite, Infrared); Fiber Optics Communication Components (Source, Channel Detector.	
Link Control and MAC Protocols	Framing, Error Detection and Correction; Window-based Flow Control; Logical Link Control, HDLC Protocol, Point-to-Point Protocol (PPP), X.25 CCITT standard for packet data transmission; Media access control, Random Access Techniques, Scheduling Mechanisms.	05
Local Area Network (LAN)	LAN topologies and protocols; IEEE 802 Standard; Ethernet (Standard, Fast, Gigabit), Token Ring, FDDI, Wireless LANs (802.11x); Connecting LANs: Repeaters, Bridges, Switches, Routers; Virtual LANs	05
Wide Area Network (WAN)	Network Layer Addressing and Routing concepts (Forwarding Function, Filtering Function); Routing Methods (Static and dynamic routing, Distributed routing, Hierarchical Routing); Distance Vector Protocol, Link State protocol, Open Shortest Path First (OSPF); Internet Protocol (IP): Addressing & Routing; Internet Control Message Protocol, (ICMP), Address Resolution Protocol (ARP), Dynamic Host Control Protocol (DHCP), Network Address Translation (NAT), IPv6, Mobile IP Process-to-Process delivery in Transport Layer: User Datagram Protocol (UDP), Transmission Control Protocol (TCP), congestion control	08
Application Protocols	Client/Server Model, Network File System (NFS), Remote Login: Telnet; File Transfer Protocol (FTP), Trivial File Transfer Protocol (TFTP); E-mail system: Simple Mail Transfer Protocol (SMTP), Post Office Protocol (POP); World Wide Web (WWW), Domain Name System (DNS), DNS servers; Hyper Text system: Hyper Text Transfer Protocol (HTTP), Hyper Text markup Language (HTML)	08
Wireless Networks	Radio Communications, Cellular Radio, Mobile Telephony (GSM & CDMA), Satellite Networks (VSAT), Mobile Adhoc Networks (MANET).	03
Strategies for securing network applications in enterprises	Cryptography, IPsec, SSL/TLS, PGP, secure HTTP, proxy, firewall, VPN; Simple Network Management Protocol (SNMP), Network policies.	05
Practicals/Tutorials		60

Text Books:

1. Behrouz A Forouzan, “Data Communication and Networking”, Tata McGraw-Hill, 2008
2. William Stallings, “Data and Computer Communications”, Pearson Education, 2008.
3. Rajneesh Agrawal and Bharat Bhushan Tiwari, “Data Communication and Computer Networks”, Vikas Publishing house Ltd. , 2005.
4. Tomasi Wayne, “Introduction to Data Communications and Networking”, Pearson Education, 2007

Reference Books

1. A. S. Tanenbaum, “Computer Networks”, Fourth Edition, Pearson Education.
2. A. Leon-Gracia and I. Widjaja, “Communication Networks”, Tata McGraw Hill, 2004.
3. K. Pahlavan and P. Krishnamurthy, “Principles of Wireless Networks”, EEE/ Prentice Hall of India, 2003..

Name of Unit of Qualification

A10.1-R4 INTRODUCTION TO OBJECT ORIENTED PROGRAMMING THROUGH JAVA.

Duration

: 120 Hours

Performance Criteria(OUTC OME) No.	Contents	Hrs.
Basics of Object Oriented Programming.	<p>1) Thinking Object-Oriented (1 Hr.)</p> <ul style="list-style-type: none"> • Why Is OOP Popular? A New Paradigm, A Way of Viewing the World. • Why Is OOP Popular? A New Paradigm, A Way of Viewing the World. <p>2) Abstraction (1 Hr.)</p> <ul style="list-style-type: none"> • Layers of Abstraction, Other Forms of Abstraction. <p>3) Classes and Methods (1 Hr.)</p> <ul style="list-style-type: none"> • Encapsulation, Class Definitions, Methods. <p>- 153 -</p> <p>4) Messages, Instances, and Initialization (2 Hrs.)</p> <ul style="list-style-type: none"> • Message-Passing Syntax, Statically and Dynamically Typed Languages, Accessing the Receiver from Within a Method, Object Creation, Pointers and Memory Allocation, Constructors {Constant Values}, Destructors and Finalizers. <p>5) Inheritance and Substitution (3 Hrs.)</p> <ul style="list-style-type: none"> • An Intuitive Description of Inheritance, Inheritance in Various Languages, [Subclass, Subtype, and Substitution], Overriding and Virtual Methods, Interfaces and Abstract Classes, Forms of Inheritance, The Benefits of Inheritance, The Costs of Inheritance. Examples (Language independent) <p>6) Static and Dynamic Behavior (1 Hr.)</p> <ul style="list-style-type: none"> • Static versus Dynamic Typing, Static and Dynamic Classes, Static versus Dynamic Method Binding. <p>7) Multiple Inheritance (1 Hr.)</p> <ul style="list-style-type: none"> • Inheritance as Categorization, Problems Arising from Multiple Inheritance, Inner Classes. <p>8) Polymorphism and Software Reuse (1 Hr.)</p>	14

	<ul style="list-style-type: none"> • Polymorphism in Programming Languages, Mechanisms for Software Reuse, Efficiency and Polymorphism, Will Widespread Software Reuse Become Reality? <p>9) Overloading and Overriding (3 Hrs.)</p> <ul style="list-style-type: none"> • Type Signatures and Scopes, Overloading Based on Scopes, Overloading Based on Type Signatures, Redefinition, Notating Overriding, Replacement versus Refinement, Deferred Methods, Overriding versus Shadowing, Covariance and Contra variance. 	
<p>Introduction to Java Programming Language</p>	<p>1) An Introduction to Java (1 Hr.)</p> <ul style="list-style-type: none"> • Java as a Programming Platform, The Java "White Paper" Buzzwords, Java and the Internet, A Short History of Java, Common Misconceptions About Java. <p>2) The Java Programming Environment (1Hr.)</p> <ul style="list-style-type: none"> • Installing the Java Development Kit, Choosing a Development Environment, Using the Command-Line Tools, Using an Integrated Development Environment, Compiling and Running Programs from a Text Editor, Running a Graphical Application, Building and Running Applets. <p>3) Fundamental Programming Structures in Java (2 Hrs.)</p> <ul style="list-style-type: none"> • A Simple Java Program, Comments, Data Types, Variables, Operators, Strings, Input and Output, Control Flow, Big Numbers, Arrays. <p>4) Objects and Classes (2 Hrs.)</p> <ul style="list-style-type: none"> • Introduction to Object-Oriented Programming, Using Predefined Classes, <p>- 154 -</p> <ul style="list-style-type: none"> Defining Your Own Classes, Static Fields and Methods, Method Parameters, Object Construction, Packages, Documentation Comments, Class Design Hints. <p>5) Inheritance (2 Hrs.)</p> <ul style="list-style-type: none"> • Classes, Superclasses, and Subclasses, Object: The Cosmic Superclass, 	<p>32</p>

	<p>Generic ArrayLists, Object Wrappers and Autoboxing, Reflection, Enumeration Classes, Design Hints for Inheritance.</p> <p>6) Interfaces and Inner Classes (2 Hrs.) • Interfaces, Object Cloning, Interfaces and Callbacks, Inner Classes, Proxies.</p> <p>7) Introduction to GUI (2 Hrs.) • AWT Architecture, Light-Weight vs Heavy-Weight, AWT Event Model, AWT Event Hierarchy & Event Handling, Using Top-Levels, components and containers, Introduction to Layouts, Focus Architecture.</p> <p>8) Graphics Programming (4 Hrs.) • Java2D Rendering Model, Strokes & Fills, Geometries, Fonts and Text Layout, Transformations, Display and manipulation of Images and offscreen buffers, Using Color, Printing through Java, Doing More with Images using Image IO, Hardware Acceleration and Active Rendering Techniques.</p> <p>9) User Interface Components with Swing (4 Hrs.) • The Model-View-Controller Design Pattern, Introduction to Layout Management, Text Input, Choice Components, Menus, Sophisticated Layout Management, Dialog Boxes.</p> <p>10) Deploying Applets and Applications (2 Hrs.) • Applet Basics, The Applet HTML Tags and Attributes, Multimedia, The Applet Context, JAR Files, Application Packaging, Java Web Start, Storage of Application Preferences.</p> <p>11) Exceptions and Debugging (2 Hrs.) • Dealing with Errors, Catching Exceptions, Tips for Using Exceptions, Logging, Using Assertions, Debugging Techniques, Using a Debugger.</p> <p>12) Streams and Files (3 Hrs.)</p>	
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	<ul style="list-style-type: none"> • The Complete Stream Zoo, ZIP File Streams, Use of Streams, Object Streams, File Management, New I/O, Regular Expressions. <p>13) Database Programming (5 Hrs.)</p> <ul style="list-style-type: none"> • The Design of JDBC, The Structured Query Language, JDBC Installation, Basic JDBC Programming Concepts, Query Execution, Scrollable and Updatable Result Sets, Metadata, Row Sets, Transactions, Advanced Connection Management, Introduction to LDAP. 	
<p>Introduction to UML</p>	<p>1) Introduction, An outline Development Process and Use cases (2 Hrs.)</p> <ul style="list-style-type: none"> • What Is the UML?, How We Got Here, Notations and Meta-Models, Why Do Analysis and Design?, Overview of the Process, Inception, Elaboration, Planning the Construction Phase, Construction, Transition, When to Use Iterative Development, Use Case Diagrams, Business and System Use Cases, When to Use Cases. <p>2) Class Diagrams and Advance Concepts (4 Hrs.)</p> <ul style="list-style-type: none"> • Perspectives, Associations, Attributes, Operations, Generalization, Constraint Rules, When to Use Class Diagrams, Stereotypes, Object Diagram, Class Scope Operations and Attributes, Multiple and Dynamic Classification, Aggregation and Composition, Derived Associations and Attributes, Interfaces and Abstract Classes, Reference Objects and Value Objects, Collections for Multivalued Association Ends, Frozen, Classification and Generalization, Qualified Associations, Association Class, Parameterized Class, Visibility. <p>3) Interaction Diagrams, Packages and Collaborations (1 Hr.)</p> <ul style="list-style-type: none"> • Sequence Diagrams, Collaboration Diagrams, Comparing Sequence and Collaboration Diagrams, When to Use Interaction Diagrams, Packages, Collaborations, When to Use Package Diagrams and Collaborations. 	<p>14</p>

	<p>4) State and Activity Diagrams (1 Hr.) • Concurrent State Diagrams, When to Use State Diagrams, Decomposing an Activity, Dynamic Concurrency, Swimlanes, When to Use Activity Diagrams.</p> <p>5) Physical Diagrams (1 Hr.) • Deployment Diagrams, Component Diagrams, Combining Component and Deployment Diagrams, When to Use Physical Diagrams.</p> <p>6) Case Studies (5 Hrs.)</p>	
Practicals/Tutorials		60

Text Books:

1. Timothy Budo, "An Introduction to Object-Oriented Programming with Java", Pearson Education, 2009.
2. Martin Fowler, "UML Distilled: A Brief Guide to the Standard Object Modeling Language", 3rd Edition, Pearson Education, 2009

Reference Books

1. H. Schildt, "The Complete Reference -Java2", Tata McGraw-Hill, 2008.
2. P. J Dietel and H. M Dietel, "Java How to Program", 7th Edition, Pearson Education, 2008.
3. Grady Booch, James Rumbaugh, Ivar Jacobson, "Unified Modeling Language User Guide", 2nd Edition, Pearson Education, 2009.
4. Wu C Thomas, "Introduction to Object Oriented Programming with Java", 4th Edition, Tata McGraw-Hill, 2008.
5. Balaguruswamy E, "Programming with Java", Tata McGraw-Hill, 2007.
6. Muthu C, "Essentials of Java Programming", 2008, Tata McGraw-Hill, 2007.
7. Bhavne M.P, Patekar S.A, "Programming with Java", Pearson Education , 2009.
8. Khurana Rohit , "Object Oriented Programming with C++", Vikas Publishing Hou

Name of Unit of Qualification

: A10.2-R4SOFTWARE TESTING AND QUALITY MANAGEMENT

Duration

: 120 Hours

Performance Criteria (OUTCOME) No.	Contents	Hrs.
Introduction	Software program and its objective, Software development techniques, top-down verses Bottom-up approach, modular and structures programming. A brief introduction about object Oriented approach.	02
Importance of Software Testing	Software testing and its importance, software development life cycle verses software testing life cycle, Deliverables, version and error control	04
Testing Techniques and Strategy	Unit testing, Integration testing, System testing, Acceptance testing White-Box testing: Flow Graph notation, Cyclomatic Complexity, Graph matrices, control structure and loop testing. Black-Box testing: Equivalence partitioning, Boundary Value Analysis, Orthogonal Array testing.	10
Verification and Validation	Requirement verification, Coding standards, Walk through, Formal Inspection, Design validation and verification, Function test, Design metrics, correctness proof and its requirement.	06
Building Test Cases and Plans	Format of test cases, Du, dc and other data paths, Test data selection, branch coverage, statement coverage, pre-condition and post-condition, Test schedule and check pointing, suitable exercises for creating test cases for each type of techniques mentioned in para 3.	20
Quality Assurance and Standards	Basic software quality parameters and its metrics, Software Configuration Change and types of errors, Quality management models: ISO, SPICE, IEEE, CMM	10

Debugging Technique and Tools	Integrated development environment, debugging, tracing, data inspection, exception errors, code and data redundancy, unreachable code.	04
External Source of Errors	Main memory, conflicting dll and unknown interface as source of error and their rectification.	04
Practicals/Tutorials		60

Text Books:

1. Desikan S, Ramesh G, "Software Testing", Pearson Education, 2008.
2. Tamres L, "Introducing Software Testing", Pearson Education, 2007.
3. Dustin E, "Effective Software Testing", Pearson Education, 2007.
4. Mathur A.P, "Fundamentals of Software Testing", Pearson Education, 2008

Reference Books.

1. Brian Marick, "The Craft of Software Testing", Pearson Education, 2008.
2. Rajani & Oak, "Software Testing : Methodology, Tools and Processes" Tata McGraw-Hill, 2007.
3. R. Pressman, "Software Engineering", 6th Edition, Tata McGraw-Hill.