Systems Assistant (Hardware & Networking)
Syllabus

1. **Module I : System Administration and Information Security**

System Administration : LINUX system Administration- Linux architecture and components-Linux Commands, Shell Scripting, Linux Server Administration, User and Group Management. Network Commands, Basic Network Troubleshooting
User Authentication: Means of authentication - Password based Authentication - Password attack strategies and counter measures – hashed passwords – password cracking – user password choices password File access control – password selection.
Authentication Methods:
Access control: Access control policies–requirements

Malicious Software: Virus structure–Antivirus approaches-Antivirus techniques–Worms - Worm Countermeasures - BOT – ROOTKIT Denial of Service: Denial of Service Attacks - Source Address Spoofing - SYN Spoofing - Flooding Attacks - ICMP Flood-UDP Flood-TCPSYN Flood-Distributed Denial of Service Attacks, Defences against DoS Attacks
Firewall : Types-Host based firewalls-Personal fire walls-Internal and external Firewall, Distributed Firewalls

Cryptography: Cipher fundamentals–Symmetric key cryptography–DES, Advanced Encryption Standard. Public key cryptography – RSA crypto systems, Diffie-Hellman key exchange. Digital signature. Authentication– Hash functions, collision resistance, Hash-based Message Authentication Code, Secure Hash Algorithm, Message Digest (MD5).Network Security fundamentals–IPSec, TLS, HTTPS, S/MIME, Security policy.

2. **Module II : Operating Systems and Computer Networks**

Operating Systems : Batch, microprogramming, timesharing, multiprocessor and real time systems, Process management, Process Control Block, Threading, multithreading, CPU Scheduling, Schedulers, Context switching, Pre-emptive and non-preemptive scheduling, Scheduling algorithms – FCFS, SJF, Priority, RR, Multi-level and multilevel feedback queue, Memory Management – Address bindings, logical and physical addresses, contiguous memory allocation – first fit, best fit, worst fit allocation, internal and external fragmentation, Paging and segmentation, Demand

paging, Virtual Memory Page replacement algorithms–FIFO, Optimal, LRU, Thrashing, File systems, Sequential and indexed file organization, Directory structures, Contiguous, linked and indexed allocations, Disk scheduling algorithms, I/O systems, protection & security.

Computer Networks : ISO/OSI reference model, TCP/IP model, Description of layers, Transmission impairments, Media–Guided and unguided, Encoding techniques, Modulation, Error detection and correction, ARQ techniques, Multiplexing, FDM-TDM-WDM, wired LAN – Ethernet protocol, wirelesss LAN– IEEE802.11 architecture, flow control, error control, IPV4 header format, IPV4 addressing, IPV6 header format, routing algorithms, congestion control, Transport layer services, Service primitives, Addressing,-Transport layer protocols–UDP–TCP–SCTP, Application layer services-WWW-URL–HTTP – FTP–Electronic mail–SMTP, POP and IMAP-TELNET–DHCP, DNS, Network Management Devices–Repeater, Hub, Switch, Router, Gateway, Wireless access point.

3. **Module III : Computer Architecture and Organization**

Digital Logic : Number representations and computer arithmetic (fixed and floating point) -logic functions, minimization-design and synthesis of combinational and sequential circuits.

Computer Organization : Machine instructions and addressing modes- control design -memory interface - I/O interface – DMA – interrupts - pipelining - memory hierarchy –Semiconductor memory – Internal organization, SRAM, DRAM, SDRAM, Ram bus memory, ROM technology, Cache memory, virtual memory, working of magnetic disks and tapes, optical disks, CISC, RISC processors, Hyper threading.

Microprocessors : Architecture of 8086,Registers, Addressing modes, Isolated and memory-mapped I/O, Instruction set of 8086, Programming, Interrupt mechanism, Keyboard/Display interface,

4. **Module IV: Web Programming and DBMS Web Programming**

Markup Language (HTML): Formatting and Fonts, Commenting Code, Anchors, Backgrounds, Images, Hyperlinks, Lists, Tables, Frames, HTML Forms.
Cascading Style Sheet (CSS) : The need for CSS, Basic syntax and structure, Inline Styles, Embedding Style Sheets, Linking External Style Sheets, Backgrounds, Manipulating text, Margins and Padding, Positioning using CSS.
Client Side Scripting using Java Script: Core features, Data types and

Variables, Operators-Expressions and Statements, Functions, Objects, Array, String-Date and Math related Objects, Document Object Model, Event Handling, Form handling and validations.

Server Side Scripting using PHP: Configuration of Apache, My SQL and PHP, PHP Programming basics-Print/echo, Variables and constants, Strings and Arrays, Operators, Control structures and looping structures, Functions,

Reading Data in Web Pages, Embedding PHP within HTML.

Database connectivity, Session handling, Cookies, File uploading, Sending emails in PHP, Developing story board, Web optimization, Webhosting– Domain name registration, Server space hiring, FTP utilities, Web promotion techniques.

Database Management Systems

Types of data and DBMS, entity-relationship models. SQL–DDL, DML and DCL, data types, Create, Drop, Select, Update, Insert, Delete commands, Integrity constraints, Grouping, Commit, Rollback, Views, Trigger, Cursors, Embedded and Dynamic SQL, ODBC and JDBC.

Normalization–first, second, third normal forms, Concurrency–Transaction model, concurrent transaction processing and recovery principles, logs, checkpoints, schedules (concurrent, serializable, recoverable, cascade-less), conflict serializability, two-phase locking. No SQL databases–Key-value database, document database, graph database.

5. **Module V : Data structure and Programming Languages**

Data Structures : Linked List, Stack, Queue, Priority Queues, Hashing, Binary trees, Tree traversal, Graphs-shortest paths, minimum spanning trees; Sorting algorithms.

Programming Language Concepts : Parameter passing, binding, scope, recursion ,imperative, declarative, functional and logic languages.

Programming in C : Data types, operators and expressions, type conversions, control statements, user defined functions, arrays, Pointers and dynamic memory management, structure and union, file operations.

Object oriented programming in JAVA : Classes, objects, methods, constructor/destructor, operator over loading, method overloading, objects as parameters to methods, static members. Inheritance–Superclass, subclass, protected members, method overriding, abstract class, and generic classes. Run time environment –Byte code, virtual machine like JVM. Dynamic binding, garbage collection, exception handling. Threads–Multi threading.