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1. **Computer fundamentals**
  - 1.1 Computers, kinds of Computers in respect of size and function,
  - 1.2 Generation of Computers,
  - 1.3 Components and Architecture of Computers, Connecting, the Components,
  - 1.4 **Getting started:** Orientation to personal computer, The system unit, Starting the Computers
  - 1.5 **Input Devices:** The keyboard, The mouse, Other input devices
  - 1.6 **Processing:** CPU Memory
  - 1.7 **Storages devices:** Overview of Storage Devices, The floppy Disk Drive, The hard Drive, The Universal Serial Bus (USB) Devices and Other Storage Devices
  - 1.8 **Output Devices:** Monitors, Printers, Modems, Soundboards
  - 1.9 **Dos survival guide:** Using Command Prompt, Creating and using AUTOEXEC.BAT and CONFIG.SYS
  - 1.10 **Windows survival guide:** The windows Desktop, The Program Manager, Organizing the Desktop, The File Manager
  - 1.11 **Application software:** Using Application Software
  - 1.12 Windows Explorer, E-mails, Internet, Intranet, Extranets, Ethernet HTTP
  - 1.13 Computer Viruses, Antivirus
2. **Data Structure and Algorithms**
  - 2.1 Fundamental of Data Structures, Abstract Data types,
  - 2.2 Lists, Linked Lists, Stacks,
  - 2.3 Queues, Priority Queue
  - 2.4 **Trees:** Traversal, Implementations, Binary Trees, Binary Search Trees, Balanced Search Tree, AVL Trees
  - 2.5 Indexing Methods. Hashing Trees, Suffix Trees
  - 2.6 Worst-Case and Expected time Complexity.
  - 2.7 Analysis of Simple Recursive and Nonrecursive Algorithms.
  - 2.8 Searching, Merging and Sorting.
  - 2.9 **Introductory Notions of algorithm design:** Divide-and-Conquer, Dynamic Programming, Greedy Methods, Backtracking
  - 2.10 **Graph algorithms:** Depth-first search and Breadth-first Search, Shortest Path Problems, Minimum Spanning Trees, Directed Acyclic Graphs.
3. **System Analysis and Design**
  - 3.1 Defining the System, System Owner, System User, System Designers and System Builders, System Analysts, Variations on the System Analyst title, System life Cycle,
  - 3.2 **Joint Application Development (JAD) :** JAD definition, JAD purpose, JAD philosophy, JAD Scope.
  - 3.3 **Involved in a JAD:** Sponsor, Business Users, System Analyst
  - 3.4 **Roles of JAD Group Member:** Project Leader, Record Keeper, Time Keeper.
  - 3.5 **The System Design Environment:** Development Process, Management Process, System Structure, Basic Component of Computer based Information system, Personal/Centralized/Distribution System.
  - 3.6 **Concept formation:** Introduction Finding the Problem, Evaluating the Proposal, Technical Feasibility, Operational Feasibility, Economic Feasibility.
  - 3.7 **Requirement Analysis:** Representing System Analysis Model, Requirement Model, Design Model.
  - 3.8 **Development Process:** Design Method

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- 3.9 **Entity Relationship Diagram (E-R Diagram):** Notations, Entities: Strong Entities, Weak Entities, Attributes: Simple and Composite, Single Valued and Multiple Valued, Null and Derived Attribute.
- 3.10 **Relationship Sets:** Degree of Relationship and Cardinality Relationship, Specialization, Generalization, Aggregation
- 3.11 **Data Flow Diagram (DFDS):** Introduction, Data flow Diagram, Symbol, Files or data store, External entities, Data flows
- 3.12 **Describing System by Data Flow Diagram:** Context diagram, Top level DFD, Expansion Level DFD, Conversions of Data.
- 3.13 **Object Modeling:** Object-Oriented Concept, Object Structure, Object Feature, Class and Object.
- 3.14 **Representation:** Association and Composition, Inheritance, Multiple Inheritances.
- 3.15 **Modeling:** Use Case Diagram, State Diagram, Event Flow Diagram.
- 3.16 **Documentation:** Automatic and Manual System.
4. **Operating Systems**
  - 4.1 Define an Operating System, Trace the Developments in Operating, Identify the functions of Operating Systems.
  - 4.2 Describe the basic components of the Operating System, Understand Information Storage and Management Systems.
  - 4.3 List disk Allocation and Scheduling Methods, Identify the Basic Memory Management strategies, List the Virtual Memory Management Techniques, Define a Process and list the feature of the Process Management System.
  - 4.4 Identify the Features of Process Scheduling, List of features of Inter-Process Communication and Deadlocks.
  - 4.5 Identify the Concepts of Parallel and Distributed Processing, Identify Security Threats to Operating System.
  - 4.6 Overview of the MS-DOS Operating System
  - 4.7 Introduction to the Windows Family Of Products, Unix Family of Products, Linux Family of Products
  - 4.8 Introduction to Windows Networking.
  - 4.9 Windows Architecture, Linux Architecture
  - 4.10 Troubleshooting Windows, & Linux
  - 4.11 Managing Network Printing
  - 4.12 Managing Hard Disks and Partitions
  - 4.13 Monitoring and Proubleshooting Windows
  - 4.14 Users, Groups and Permission Linux and Windows.
5. **Database Management System and Design**
  - 5.1 Introduction, A Database Model, Relational Database Model Integrity, RDBMS.
  - 5.2 SQL and Embedded SQL
  - 5.3 Writing Basic SQL LELECT Statemets
  - 5.4 Restricting and Sorting data
  - 5.5 Single Row Fuctions
  - 5.6 Displaying Data from Multiple Tables
  - 5.7 Aggregation Data Using Group Functions
  - 5.8 Sub Queries, Manipulating Data and Creating & Managing Tables
  - 5.9 Creating Views and Controlling User Access
  - 5.10 Using Set Operators, Datetime Function
  - 5.11 **Database Design:** Logical Design, Conceptual Design, Mapping Conceptual to Logical, Pragmatic issues, Physical Design, Integrity and Correctness, Relational Algebra, Relational Calculus.
  - 5.12 Normalization: 1NF, 2NF, 3NF, BCNF, 4NF, 5NF, DKNF
  - 5.13 **Architecture of DNBS:** Client-server, Open Architectures, transaction Processing, Multi-User & Concurrency, and Backup & Recovery Database.
  - 5.14 **Basic Concept of Major RDBMS products:** Oracle, Sybase, DB2, SQL Server and other Databases.
6. **Programming Language**
  - 6.1 Overview of Programming Language: History, Programming Paradigma, the role of Language translates in the Programming Process.
  - 6.2 Fundamental Issues in Language Design.

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- 6.3 Virtual Machines, Code Generation, Loop Optimization.
- 6.4 Concept of Procedural Programming, Structural Programming, Object-Oriented Programming.
- 6.5 Concept of C Programming, C++ Programming.
- 6.6 Java Programming for Declaration, Modularity and Storage Management Software development.
- 7. **Networking**
  - 7.1 **Basic Network Theory:** Network Definition Network Models, Connectivity, Network Addressing.
  - 7.2 **Network Connectivity:** The Data package, Establishing a Connection, Reliable Delivery, Network Connectivity, Noise Control, Building Codes, Connection Devices.
  - 7.3 **Advance Network Theory:** The OSI model, Ethernet, Network, Resources, Token Ring, FDDI, Wireless Networking.
  - 7.4 **Common Network Protocols:** Families of Protocols, NetBEUT, Bridge and Switches, The TCP/IP Protocol, Building TCP/IP Network, The TCP/IP Suite.
  - 7.5 **TCP/IP Services:** Dynamic Host Configuration Protocol, DNS Name Resolution, NetBIOS support, SNMP, TCP/IP Utilities, FTP.
  - 7.6 **Network LAN Infrastructure:** LAN Protocols on a Network, IP Routing, IP Routing Tables, Router Discovery Protocols, Data Movement in a Routed Network, Virtual LANs (VLANS)
  - 7.7 **Network WAN infrastructure:** The WAN Environment, Wan Transmission Technologies, Wan Connectivity Devices, Voice Over Data Services.
  - 7.8 **Remote Networking:** Remote Networking Remote Access Protocols, VPN Technologies.
  - 7.9 **Computer Security:** Computer Virus, Worm, Trojan Horse.
  - 7.10 **Network Security:** Introduction, Virus Protection, Local Security, Network Access, Internet Security.
  - 7.11 **Disaster Recovery:** The need for Disaster Recovery, Disaster Recovery plan, Data backup, Fault Tolerance.
  - 7.12 **Advance Data Storage Techniques:** Enterprise Data Storage, Clustering, Network Attache Storage, Storage Area Networks.
  - 7.13 **Network Troubleshooting:** Using Systematic Approach To Troubleshooting.
  - 7.14 **Network Support Tools:** Utilities, The Network, Baseline.
  - 7.15 Network Access Points (NAP), Common Network Component, Common Peripheral Ports.
- 8. **Computer Architecture & Organization**
  - 8.1 Evaluation of Computers, Design Methodology, Set Architecture, MIPS ISA, ALU Design
  - 8.2 Datapath Design: Single and Multiple Cycle Implementations, Pipelining, Memory Hierarchy, Input/Output System: Bus & Role of Operating System.
- 9. **Compiler Design**
  - 9.1 Introduction to Comliling,
  - 9.2 Logical Analysis, Syntax Analysis, Semantic Analysis
  - 9.3 Run Time environment,
  - 9.4 Intermediate Code Generation, Code Optimization
  - 9.5 Compiler Generation Tools.
- 10. **E-Commerce Technology**
  - 10.1 Introduction of E-Commerce
  - 10.2 Electronics Commerce Strategies.
  - 10.3 Electronics Commers Security Issues.
  - 10.4 Success Model of E-Governance.
  - 10.5 E-Business: b2b, b2c, b2e, c2c, g2g, g2c
  - 10.6 Principle of Electronic Payment, Strategies & Systems,
  - 10.7 E-marketing Reverse Engineering

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- 10.8 E-Banking, EDI Methods, SWIFT.
- 109 Encryption and Decryption Methods, XML, Layout Managers, Enent Medel.
- 11. **MIS and Web Engineering**
  - 11.1 Information Systems, Client-Server Computing
  - 11.2 Information System and Decision Making.
  - 10.3 Database Design issues, Data Mining, Data Warehousing.
  - 11.4 Knowledge Management, The strategic use of Information Technology.
  - 11.5 Work Process Redesign (Reengineering) with information Technology, Enterprise Resources Planning System, Information System Security, Information Privacy, and Global Information Technology issues.
  - 11.6 Software supported Demonstrations including advanced Spreadsheet topics, Software Component Based System (CBSE)
  - 11.7 Multimedia
  - 11.8 Object-Oriented Programming with COMS & DECOMS
  - 11.9 Group Decision Support Systems
  - 11.10 Basics of Website Design
- 12. **IT in Nepal**
  - 12.1 History of IT in Nepal
  - 12.2 IT Policy of Nepal, 2067 B.S.
  - 12.3 Electronic Transaction Act, 2063 B.S.
  - 12.4 Copyright Act,. 2059 B.S.
  - 12.5 User of Computers and software Development
  - 12.6 Nepali Unicode, Nepali Fonts
  - 12.7 Licensing Issues

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