D.B.F. Dayanand College of Arts and Science, Solapur

Program Outcome [Entire Computer Science]

- Student will get ability to identify, critically analyze, formulate and develop computer application
- Student will be able to select modern computing tool and techniques and use them with dexterity
- Student will get skill to analyze a problem and identify and define the logical modeling of solution
- Students will be able to use the techniques, skills and modern hardware and software tools necessary for innovative software solutions. Student get ability to devise and conduct experiments, interpret data and provide well informed conclusions

D.B.F. Dayanand College of Arts and Science, Solapur

COURSE OUTCOME

Name of Department: Computer Science

B.A. / B.Sc. / M.A. / M.Sc. B.Sc. (ECS)		
NAME OF SUBJECT Fundamental of Computer		
SEM I / II / III / IV / V / VI Sem.- I		
COURSE NUMBER (PAPER NUMBER) **ECS101**		
TITLE OF COURSE (NAME OF PAPER) Fundamental of Computer		
COURSE CONTENT	OBJECTIVES	OUTCOME
Unit-I **Unit I:-Introduction to Computer** Introduction to computers, Evolution of personal computers; Generation of computers; Elements of a computer processing system- Hardware & Software, various categories of software; Computer Organization Overview-CPU, I/O devices, storage devices and media; Various type of displays and other peripherals used in PCs.	Learn and practice basic concepts of computers, types of computer, software, hardware input devices like keyboard and mouse etc.	Successful students will able to learn computer peripherals, types, knowledge of software & hardware etc.
Unit-II **Operating System Concept** Introduction to Operating system, Purpose of Operating Systems, services and features of OS, Types of Operating System, Components of OS. Introduction to PC Operating Systems:- DOS, Windows operating System, Linux operating system, Concept and working with files and folders. Introduction to Mobile Operating System: -Android, Windows, IOS, Symbian	learn basic concepts of computer and mobile Operating System Concept	Understanding the concept of Operating system, services and features of OS, Introduction to Mobile Operating System: -Android, Windows, IOS, Symbian
Unit –III **Unit III:-Microsoft Office** Microsoft Word:-Introduction to MS Word, opening, creating, saving, deleting document, page setting, formatting page, formatting text, adding images, Header footers, border and shading, bullets, mail merge, Table, graphics, label, Templates, Wizards and Printing Techniques. Microsoft Excel:- Introduction to excel, File management in excel, operations related to workbook, Formatting sheet, adding formulate and functions, charts and maps, data	learn basic word processing skills with Microsoft Word, such as text input and formatting, editing, cut, copy and paste, spell check, margin and tab controls, keyboard shortcuts, printing, As well as how to include some graphics such as pictures and charts.	Successful students will be able to create PowerPoint presentation, Word documents, Excel knowledge.

menu, view menu, work with multiple worksheets, importing and exporting of data. Microsoft PowerPoint: Introduction and Applications of Power Point, Create a New Presentation, Adding Slides, Clip Arts, Smart art, Charts, Text , images and other objects, Templates and Master Slides, Giving Animation effects, Links and Action buttons		

D.B.F. Dayanand College of Arts and Science, Solapur

COURSE OUTCOME

Name of Department: Computer Science

B.A. / B.Sc. / M.A. / M.Sc. B.Sc. (ECS)		
NAME OF SUBJECT Introduction to Web Designing		
SEM I / II / III / IV / V / VI Sem.- II		
COURSE NUMBER (PAPER NUMBER) **ECS202**		
TITLE OF COURSE (NAME OF PAPER) Introduction to Web Designing		
COURSE CONTENT	OBJECTIVES	OUTCOME
Unit-I **Overview of HTML & HTML5** Introduction to Networking, Network topology, LAN,MAN, WAN, Introduction to Internet, Requirement for Internet. Introduction to HTML, Overview of basic HTML , Structure of HTML, Creating and opening HTML file, Singular and paired tags, Text formatting tag, Anchor tag, Lists, Image, Image Map, Table, Frames and Frameset, HTML5: Introduction to HTML5, Need of HTML5, DOCTYPE Element, Tags-Section, Article, aside, header, footer, nav, dialog, figure etc. Events in HTML5, Input tag (Type, Auto focus, placeholder, required etc. attributes.) in HTML5, Graphics in HTML5, Media tags in HTML5	Learn and practice basic concepts of HTML & HTML5. Introduction to Internet, Requirement for Internet.	Successful students will able to design web pages using HTML & HTML5 languages, also students get the knowledge of Internet & Networking concepts.
Unit-II **Introduction to CSS** Introduction to CSS, Use of CSS, Types of CSS, Selectors, Properties, Values. CSS Properties :- Background, Text, Fonts, Link, List, Table, Box Model, Border, Margin, Padding, Display, Positioning, Floating, Opacity, Media type, Backgrounds and Borders Image, Values and Replaced Content, Text Effects,2D/3D Transformations ,Animations, Multiple Column Layout ,User Interface, CSS interact with JavaScript.	Learn basic concepts of CSS, types of CSS, how to add Border, Margin, Padding, Display etc in web pages.	Understanding the concept of CSS. How to apply CSS in web pages. Iinsert a graphic within a web page. Create a link within a web page. Create a table within a web page.

Unit –III **JavaScript** Introduction to JavaScript , JavaScript Variables & Data types, Operators, Bulit in functions in JavaScript ,Control structure in JavaScript ,DOM, Math, Array, History, Navigator, Location, Windows, String, Date, Document objects, user defined function, Validation in JavaScript, event & event handling in JavaScript.	Understand the basics of Javascript. Write the SCRIPT element for including Javascript in a web page. Be able to write out to a page using document.write. Declare and set values for Javascript variables	Successful students will be able to create Use operators, variables, arrays, control structures, functions and objects in JavaScript. Map HTML using the DOM - Document Object Model. Identify popular JavaScript Libraries. Create dynamic styles. Create animation on a web page.

D.B.F. Dayanand College of Arts and Science, Solapur

COURSE OUTCOME

Name of Department: Computer Science

B.A. / B.Sc. / M.A. / M.Sc.	B.Sc. (ECS)
NAME OF SUBJECT	Web Technology and E-Commerce-I
SEM I / II / III / IV / V / VI	Sem.- V
COURSE NUMBER (PAPER NUMBER)	**Paper XII**
TITLE OF COURSE (NAME OF PAPER)	Web Technology and E-Commerce-I

COURSE CONTENT	OBJECTIVES	OUTCOME
Unit-I Introduction to ASP.Net: Introduction & difference between ASP & ASP.Net 1.1 & 2.0 Application, Web Architecture Model, Introduction to Visual Studio for Web Application.	Set up a programming environment for ASP.net programs.	Successful students will able to design web applications using ASP.NET
Unit-II Application and Page Frameworks: Application Location Options-Built-In Web Server, IIS, FTP, Web Site Requiring FrontPage Extensions. The ASP.NET Page Life Cycle, the ASP.NET Page Structure Options- Inline Coding, New Code-Behind Pages. ASP.NET 2.0 Page Directives-@Page, @Master, @Control, @Import, @Implements, @Register, @Assembly, @PreviousPageType, @MasterType, @OutputCache, @Reference. ASP.NET Page Events, Dealing with PostBacks-Cross-Page Posting, ASP.NET Application Folders-\App_Code Folder, \App_Data Folder, \App_Themes Folder, \App_GlobalResourcesFolder,\App_LocalResources, \App_WebReferences, \App_Browsers, Compilation, Global.asax.	Configure an asp.net application. Creating ASP.Net applications using standard .net controls.	Successful students will be able to use ASP.NET controls in web applications
Unit –III ASP.NET Server Controls and Validation Controls: ASP.Net Server Controls, Understanding Validation, Client-Side versus Server-Side Validation, Turning Off Client-Side Validation.	Understand the fundamental development of Validation Controls	Successful students will be able to create web pages using validation controls
Unit-IV Working with Master Pages: Need and basics of Master Pages, Master Page and Content Page, Programmatically Assigning the Master Page, Nesting Master Pages, Master Page Events.	Understand the fundamental development of Validation Controls	Successful students will be able to create Website using Master page

		concept
Unit –V **State Management:** Application State, Session State, Client & server storing, View state, Cache, Hidden Variable, Session object.	Maintain session and controls related information for user used in multi-user web applications	Successful students will be able to create web pages using state management concepts
Unit-VI **Data Access with ADO.NET:** ADO.NET Overview, Using Database Connections, Commands-Executing Commands, Calling Stored Procedures, Fast Data Access: The Data Reader, Data Adapter.	Connecting to data sources and managing them.	Successful students will be able to create database driven ASP.NET web applications and web services
Unit-VII **Introduction to electronic commerce:** Electronic commerce- The scope of electronic commerce ,definition of electronic commerce, Electronic commerce and the trade cycle, electronic markets, electronic data interchange, internet commerce, e-Commerce Perspectives.	Fundamental Knowledge of electronic commerce	Students learn the concept of E-commerce, online shopping etc.

D.B.F. Dayanand College of Arts and Science, Solapur

COURSE OUTCOME

Name of Department: Computer Science

B.A. / B.Sc. / M.A. / M.Sc. B.Sc. (ECS)		
NAME OF SUBJECT Web Technology and E-Commerce-II		
SEM I / II / III / IV / V / VI Sem.- VI		
COURSE NUMBER (PAPER NUMBER) **Paper XII**		
TITLE OF COURSE (NAME OF PAPER) Web Technology and E-Commerce-II		
COURSE CONTENT	OBJECTIVES	OUTCOME
Unit-I **Site Navigation:** Site Navigation technique, SiteMap file, SiteMapPath, TreeView and MenuView control, Using XML file.	Creating ASP.Net applications using standard .net controls like Menu, SiteMap etc.	Successful students will able to design web sites using different Site Navigations.
Unit-II **ASP.Net State Management:** Application State, Session State, Client & server storing, View state, Cache, Hidden Variable, Session object, Profiles, Overview of HTTP Handler & Modules.	Configure an asp.net application. Maintain session and controls related information for user used in multi-user web applications	Successful students will be able to create web pages using state management concepts
Unit –III **Security:** What is Authentication and Authorization?, Windows Authentication, Forms Authentication Passport Authentication, Anonymous Authentication, Securing pages & folders, Roles Management, Creating & Authenticating Roles, Creating & Authenticating Users Using Membership.	Understand the fundamental development of Security concepts.	Successful students will be able to create web sites using different Security concepts.
Unit-IV **Working with MVC:** Introduction to .Net MVC Framework, MVC Framework Features,MVC Architecture,MVC Components, MVC Application Folders, Configuration files, golbal.asax, packages.config, web.config, Working with Views, Woking with Controls.	Understand the fundamental development of .Net MVC Framework	Successful students will be able to create Website using .Net MVC Framework
Unit-VI	Fundamental Knowledge	Students learn the

Business to Business Electronic commerce: Inter-organizational Transactions- Inter-organizational Transactions, The credit Transaction Trade cycle, A Variety of Transactions, Electronic markets, Usages of electronic markets, Advantages and disadvantages of electronic markets-Future of electronic markets, Electronic data interchange (EDI)-Introduction to EDI, EDI Definition, The benefits of EDI, EDI Example, The Elements of e- commerce- Elements, E-visibility, The e-shop, Online Payments, Delivering the goods, After sales service, Internet e-commerce security.	of Business to Business Electronic commerce	concept of E-commerce, Advantages and disadvantages of electronic markets, , The Elements of e-commerce- Elements, E-visibility, The e-shop, Online Payments
Unit-VII **Introduction to electronic commerce:** Electronic commerce- The scope of electronic commerce ,definition of electronic commerce, Electronic commerce and the trade cycle, electronic markets, electronic data interchange, internet commerce, e-Commerce Perspectives.	Fundamental Knowledge of electronic commerce	Students learn the concept of E-commerce, online shopping etc.

COURSE OUTCOME

Name of Department: Computer Science

B.A. / B.Sc. / M.A. / M.Sc.	B.Sc. (ECS)	
NAME OF SUBJECT	Operating System	
SEM I / II / III / IV / V / VI	Sem.- III	
COURSE NUMBER (PAPER NUMBER)	**ECS303**	
TITLE OF COURSE (NAME OF PAPER) Operating System		
COURSE CONTENT	OBJECTIVES	OUTCOME
Unit-I: Introduction Operating System: - Definition Operating systems, Types of Operating Systems-Batch, Multiprogramming, Time-Sharing, Real-Time, Distributed, Parallel. OS Service, System components, System Calls.	To learn the fundamentals of Operating Systems and its types.	Analyse the structure of OS and basic architectural components involved in OS design
Unit II: Process Management:- Concept of Process, Process states, Process Control Block, Context switching, Operations on Process, Co-operating Process, Threads – Types of threads, Benefits of threads. Concept of Process Scheduling- Types of Schedulers ,Scheduling criteria , Scheduling algorithms : Preemptive and Non-preemptive, FCFS, SJF, Round Robin, Priority Scheduling, Multilevel Queue Scheduling, Multilevel-feedback Queue Scheduling. Process Synchronization and Deadlocks:-The Producer Consumer Problem, Race Conditions, Critical Section Problem, Semaphores, and Classical Problems of Synchronization: Reader-Writer Problem, Dinning Philosopher Problem, Critical Regions. Definition, System Model, Dead Lock Characterization, Resource Allocation Graph, Methods of Handling Dead Locks- Deadlock Prevention, Deadlock Avoidance -banker's algorithm, resource-request algorithm, Deadlock detection and Recovery.	1. To learn the mechanisms of OS to handle processes and threads and their communication 2. To gain knowledge on distributed operating system concepts that includes architecture, Mutual exclusion algorithms, deadlock detection algorithms and agreement protocols	1. Analyse and design the applications to run in parallel either using process or thread models of different OS 2. Understand the Mutual exclusion, Deadlock detection and agreement protocols of Distributed operating system
Unit III: Memory Management:- Basic Hardware Address Binding, Logical and Physical address Space, Dynamic Loading, Overlays, Swapping, and Memory allocation: Contiguous Memory allocation – Fixed and variable partition – Internal and External fragmentation and Compaction, Paging, Segmentation. Basics of Virtual Memory, demand paging, Page fault, Page Replacement policies: Optimal (OPT), First in First Out	To learn the mechanisms involved in memory management in contemporary OS	Analyse the various device and resource management techniques for timesharing and distributed systems

(FIFO), Least Recently used (LRU), Thrashing. Storage Management:- File Management: File concept, Access methods, File types, File operation, Directory structure, File System structure, Allocation methods (contiguous, linked, indexed), Free-space management (bit vector, linked list, grouping). Disk Management: disk structure, disk scheduling (FCFS, SSTF, SCAN,CSCAN) , disk reliability, disk Formatting, boot block, bad blocks.		

Signature of HOD

B.A. / B.Sc. / M.A. / M.Sc. B.Sc. (ECS)		
NAME OF SUBJECT Data Structure		
SEM I / II / III / IV / V / VI Sem.- III		
COURSE NUMBER (PAPER NUMBER) **ECS304**		
TITLE OF COURSE (NAME OF PAPER) Data Structure		
COURSE CONTENT	OBJECTIVES	OUTCOME
Unit I: Introduction: Need of Data Structure, Types of Data Structure, ADT, And Algorithm: Definition, characteristics, Space complexity, time complexity, Asymptotic notation (Big O, Omega Ω, theta Φ) Stack: Introduction to stack, Representation-static & dynamic, stack Operations, Application -infix to postfix & prefix, postfix evaluation, recursion, expression validity. Queues: Introduction to Queue, Representation - static & dynamic, Operations, Circular queue, De-queue, priority queues.	To design and implement various data structure algorithms. Introduce the concept of data structures through ADT including Stack and Queues.	Students will be able to implement Linear and Non-Linear data structures. Implement operations like searching, insertion, and deletion, traversing mechanism etc. on various data structures.
Unit II: Linked List:-Introduction to List, Implementation of List – static & dynamic representation, Types of Linked List, Operations on List, Applications of Linked List – polynomial manipulation Trees: Concept & Terminologies, Binary tree, binary search tree, Representation – static &dynamic, Operations on BST – create, Insert, delete, traversals (preorder, inorder, postorder), counting leaf, non-leaf & total nodes	To Understand basic concepts about lists and trees.	Ability to describe linked list and tree operations.
Unit III: Algorithm design strategies: Divide and Conquer, Greedy, Dynamic programming, Backtracking, Branch and Bound. Sorting: Bubble sort, Quick sort, Simple Insertion sort, Shell sort, Address calculation sort, Binary Search Tree, Heap Sort, Merge sort, Radix Sort. Searching: Linear Search, Binary Search, Tree searching methods, Multiway search tree (B-tree, B+ tree), and Height balance tree- AVL trees-Rotations. Hash function (open and	Solve problems using algorithm design methods such as the greedy method, divide and conquer, dynamic programming, backtracking, and branch and bound and writing programs for these solutions. Solve problems using data structures such as linear lists, stacks, queues, hash tables, binary trees, heaps, tournament trees, binary	Select appropriate data structures as applied to specified problem definition. Determine and analyse the complexity of given Algorithms Ability to summarize searching and sorting techniques

close).	search trees, and graphs and writing programs for these solutions.	

Signature of HOD

B.A. / B.Sc. / M.A. / M.Sc. B.Sc. (ECS)		
NAME OF SUBJECT Theory of Computer Science		
SEM I / II / III / IV / V / VI Sem.: - V		
COURSE NUMBER (PAPER NUMBER): - **X**		
TITLE OF COURSE (NAME OF PAPER): - Theory of Computer Science		
COURSE CONTENT	OBJECTIVES	OUTCOME
Unit -I Preliminaries: Basic Definitions, Sets, Various ways of describing a Set, Subsets, operations on Sets, Infinite Sets Relations, Properties of relations, Equivalence of relations.	The student will be able to identify and use set properties and set notation. The student will be able to perform set operations. The student will be able to solve applications involving sets.	Students will demonstrate knowledge of basic mathematical models of set and subset describes how they relate to formal languages.
Unit -II Finite Automata: Introduction, Deterministic Finite Automata, Non Deterministic Finite Automata, The Equivalence of DFA‟s and NFA‟s, Finite Automata with € Moves, Equivalence of NFA with € Transitions and NFA without Transitions, Finite Automata with output , Moore Machine, Melay Machine Equivalence of Moore and Melay Machine.	Understand basic properties of deterministic and nondeterministic finite automata	Define deterministic and nondeterministic finite automata.
Unit-III Regular Expression and Properties of Regular Sets: Regular Expression Operations on set of strings, Regular Expression, Regular Sets, Equivalence of finite automata and regular expression Properties of Regular Sets Closure properties, The pumping lemma of regular sets, Application of pumping lemma.	Be able to prove the equivalence of languages described by finite state machines and regular expressions	Design a finite automaton to recognize a given regular language. Transform a language into regular expression or finite automaton or transition graph. Determine whether a given language is context-free language or not.
Unit-IV Regular and Context Free Grammars: Context Free Grammars (CFG) Derivation and Language generated by grammar, Derivation Trees, Ambiguity of CFG, Simplification of CFG, Normal forms of CFG Regular Grammars Equivalence of regular grammars and finite automata Closure	Understand basic properties of formal languages and formal grammars	Define relationship between regular languages and context-free grammars.

properties of CFG.		
Unit-V Pushdown Automata: Introduction, Definitions, Equivalence of acceptance by final state and empty stack, Definition of DPDA and NPDA their correlation and examples of NPDA, CFG(in GNF) to PDA: Method and example, Closure properties of Regular language, Application of PDA.	Be able to construct pushdown automata and the equivalent context free grammars. Be able to prove the equivalence of languages described by pushdown automata and context free grammars.	Prove properties of context-free languages. Building a context-free grammar for pushdown automata.
Unit-VI Introduction of Turing Machine: Turing Machine model and definition of TM, Language accepted by TM, Design of TM and examples.	Be able to construct Turing machines and Post machines	Design Turing machine and Post machine for a given language. Determine decidability, finiteness and equivalence properties.

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D.B.F. Dayanand College of Arts and Science, Solapur

COURSE OUTCOME

Name of Department: COMPUTER SCIENCE

B.A. / B.Sc. / M.A. / M.Sc.	B.Sc.(ECS)	
NAME OF SUBJECT	Object Oriented Programming using C++	
SEM I / II / III / IV / V / VI	Sem III	
COURSE NUMBER (PAPER NUMBER)	**Paper V**	
TITLE OF COURSE (NAME OF PAPER)	**Object Oriented Programming using C++**	
COURSE CONTENT	OBJECTIVES	OUTCOME
Introduction to Object-Oriented-Programming: Comparison with Procedure Oriented programming, Object oriented Programming paradigm, Basic concepts of object oriented programming, Benefits of OOP, object oriented Languages, Applications of OOP. **Introduction to C++:** Tokens, Keywords, Identifiers and constants, Basic data types, User defined data types, Derived data types, symbolic constants, Type compatibility, Declaration of variables, Dynamic initialization of variables, reference variables, operators & Expressions in C++, Scope resolution operator, member dereferencing operators, Memory management operators, Type casting, Control structures.	To get the knowledge about the basic c++ programming and their deep introduction with its various features.	The students have understood the basic difference between c and c++ language with its implementation.
Introduction of function:- The main function, Types of Functions, Function prototyping, parameter passing technique, Inline functions, Default arguments, Function Overloading. **Classes and Objects:-** Structures in C++, specifying a class, Access specifires, Defining member functions, Making an outside function inline, Nesting of member functions, Private member functions, Memory allocation for the objects, Static data members, static member functions, Array of objects, objects as Function arguments, Friend functions, Returning objects, Constant member functions, Local classes. **Constructors &Destructors:-** Types of Constructors, Multiple Constructors in a class, Constructors with default arguments,	To get the knowledge about functions in c++, classes, creating and destructing of the object and it's certain overloading.	The student have understood overall concept very well with its implementation.

Dynamic initialization of objects, Constructing two Dimensional Arrays, Const Objects, Destructors. **Operator overloading and Type Conversions:-** Introduction, Defining operator overloading, Overloading Unary and Binary operators, Manipulation of string using operators, Rules for Overloading operators, Type Conversion.		
Inheritance:- Extending classes, Introduction, Defining derived classes, Single Inheritance, Making private member Inheritable, Multilevel Inheritance, Multiple Inheritance, Hierarchical Inheritance, Hybrid Inheritance, Virtual base classes, Abstract classes, Constructors in derived classes, Member classes: Nesting of classes, Pointers, virtual functions. **Polymorphism:-** Introduction, Pointers to objects, this pointer, Pointer to derived classes, virtual functions, pure virtual functions. **Managing Console I/O Operations:-** Introduction, C++ stream classes, Unformatted I/O Operations, Managing output with manipulators, Working With Files, classes for file stream operations, Opening and closing a file, Detecting end of file, File modes, file pointers and their manipulations, sequential Input and output operations, Random access, Error handling During file Operations, Command-Line Arguments.	To get the knowledge about inheriting properties, pointers and also input/output streams.	The students have understood the concept of inheritance and its properties, concept of polymorphism and console I/O operations with its implementation.

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D.B.F. Dayanand College of Arts and Science, Solapur

COURSE OUTCOME

Name of Department: COMPUTER SCIENCE

B.A. / B.Sc. / M.A. / M.Sc. B.Sc.(ECS)		
NAME OF SUBJECT Software Engineering		
SEM I / II / III / IV / V / VI SEM III		
COURSE NUMBER (PAPER NUMBER) **Paper VI**		
TITLE OF COURSE (NAME OF PAPER) **Software Engineering**		
COURSE CONTENT	OBJECTIVES	OUTCOME
System concepts:- Introduction, Definition, Elements of system, system concepts, Types of system, System Analysis, Role of System Analyst. **Software Engineering:-** Definition, Characteristics of software, Qualities of software, System Development life cycle, Process Models-Waterfall model, v shape model, Spiral model, Prototyping, incremental, RAD.	To get the knowledge about software engineering, its different models.	The students have understood the concept of software engineering, its role and its characteristics.
Requirement Analysis, Fact finding techniques:- Interviews, Questionnaire, Record reviews, Observation, Basic and User design requirements, Organization Dependant Requirements, Analysis and Design Tools: Flow charting, Decision tables, Decision Trees, Structure charting Techniques (HIPO). **System Design:-** Data flow Diagram (Physical, Logical), Entity relation diagram, Input output design, Structured chart, Data Dictionary, Dependencies, Normalization (1NF, 2NF, 3NF, BCNF, 4NF, 5NF)	To get the knowledge about system design, data flow, flow chart, normalization.	The students have understood the design, its flow chart, input/output design and normalization.
Configuration of the System:- Collection of system statistics, Setting Sub-system boundaries. Construction of the system: traditional and incremental approaches, conversion methods, Software Testing: Need of Testing, types of testing, Software Implementation and maintenance, System **Development Tools:-** Role, Benefits and weakness of case Tools, Taxonomy of case tools, Case studies: Pay Roll,	To get the knowledge about configuring the system, development tools and its roles.	The students have understood the concept of system statistics, testing and its types, development tools very well.

Fixed Deposit, Inventory system, College Admission System, Library System, Loan		

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D.B.F. Dayanand College of Arts and Science, Solapur

COURSE OUTCOME

Name of Department: COMPUTER SCIENCE

B.A. / B.Sc. / M.A. / M.Sc.	B.Sc.(ECS)	
NAME OF SUBJECT	Data Communication and Networking – I	
SEM I / II / III / IV / V / VI	SEM V	
COURSE NUMBER (PAPER NUMBER)	**Paper IX**	
TITLE OF COURSE (NAME OF PAPER)	**Data Communication and Networking - I**	
COURSE CONTENT	OBJECTIVES	OUTCOME
Introduction to Data Communication & Networking: Data Communication: Internet: History of Internet, The ARPANET, NSFNET, Internet usage Architecture of the internet, Components, Data Representation, Data Flow, Communication Model. Computer Network: Introduction of Network, Uses of a computer network, Network Criteria, Network Topologies, Types of Networks, Inter-networking, Applications of Internet.	To get the knowledge about data communication, internet and its history, communication model, types of network.	The students have understood the concept of data communication and its implementation in today's world, various networks and its uses.
Network Models: Protocols & Standards, Protocol Hierarchies, Design Issues of Layers, Services Primitives, Connection oriented and connection less services, Reference Model: ISO-OSI reference model, TCP/IP reference model.	To get the knowledge about protocols, connection and connectionless services, reference models	The students have understood the concept of protocols, issues in design and different models.
Physical layer : Signals: Analog & Digital Signals, Period, Frequency, Phase, Amplitude, Bandwidth, Bit Rate, Bit Length, Fourier analysis. Transmission Impairment: Attenuation, Distortion, Noise, Nyquiest Theorem, Shannon Capacity Theorem. Transmission Media: Guided Media-Magnetic Media, Twisted Pair, Coaxial Cable, Fiber Optic Cable, Unguided Media- Wireless Radio Waves, Microwaves, Infrared, Satellite Communication Analog Transmission: Modem, Telephone System, RS232C, Modulation - Amplitude Modulation, Frequency Modulation, Phase Modulation Digital Transmission: Pulse Code Modulation, Manchester & Differential Manchester	To get the knowledge about various signals, different theorems, transmission media, modulation, multiplexing with its real world examples.	The students have understood the concept of signals, various transmissions medium, modulation and multiplexing with its types and implementation.

Coding. Transmission Mode: Parallel, Serial, Synchronous Transmission, Asynchronous Transmission. Multiplexing- Frequency Division Multiplexing, Time Division Multiplexing, Wavelength Division Multiplexing. Switching- Circuit Switching, Message Switching, Packet Switching.		
Data link layer: Data link layer Design issues, Error Detection & Correction: Types of Errors, Hamming Distance, Error Detection: Parity Check, Cyclic Redundancy Check, Checksum Check Error correction, Data Link Control: Framing, Flow & Error Control, Protocols: Simplex, Stop and Wait, Stop and Wait ARQ, Go Back N ARQ, Selective repeat ARQ. Multiple Access Protocol: ALOHA, CSMA, CSMA/CD, CSMA/CA Channelization, FDMA, TDMA, CDMA.	To get the knowledge about data link layer, its error detection and correction techniques and various protocols.	The students have understood the concept of issues in data link layer, different error detecting and correcting techniques and various protocols.
Network layer: Network layer Design issues, Routing Algorithm: Optimality Principle, Shortest Path Routing, Distance Vector Routing, Link State Routing, Broadcast Routing, Multicast Routing Congestion Control Algorithm: General principle of congestion control, Congestion prevention policies, Congestion Control in Virtual-Circuit Subnets, Congestion Control in Datagram Subnets.	To get the knowledge about issues in network layer, various routing algorithms and congestion control.	The students have understood the concept of network layer, various algorithm of routing and congestion control with its implementation.

Signature of HOD