Kumaun University, Nainital, Uttarakhand

B.Sc. (COMPUTER SCIENCE)

Session 2016-2017

Eligibility Criteria: **At undergraduate level Computer Science may be selected as one of the subject only by B.Sc. students not by B.A. or B.Com. students, hence it will be included in science faculty only.**

SYLLABUS FOR B.Sc. (COMPUTER SCIENCE)

Year	Semester	Paper Code	Title of Paper	Marks		
				Internal	External	Total
First Year	I	BCS 101	Computer Fundamentals	20	60	80
		SCS 102	Introduction to C Programming	20	60	80
		BCS 103	Discrete Mathematics	20	60	80
		BCS L01	Lab : Practical (C Programming)	15	45	60
	II	BCS 201	Data Structures using C	20	60	80
		BCS 202	Digital Electronics	20	60	80
		BCS 203	Introduction to UNIX	20	60	80
		BCS L02	Lab : Practical (Data Structures)	15	45	60
Second Year	III	BCS 301	Computer System Architecture	20	60	80
		BCS 302	Computer Graphics	20	60	80
		BCS 303	Object Oriented Programming using 'C++'	20	60	80
		BCS L03	Lab : Practical ('C++')	15	45	60
	IV	BCS 401	Introduction to Data Base Systems	20	60	80
		BCS 402	Operating Systems	20	60	80
		BCS 403	Programming in JAVA	20	60	80
		BCS L04	Lab: Practical (JAVA)	15	45	60
Third Year	V	BCS 501	Software Engineering	20	60	80
		BCS 502	Computer Networks	20	60	80
		BCS 503	Programming in Python	20	60	80
		BCS L05	Lab : Practical (Python)	15	45	60
	VI	BCS 601	Artificial Intelligence	20	60	80
		BCS 602	Information Security	20	60	80
		BCS 603	Cloud Computing	20	60	80
		BCS L06	Project Work	15	45	60

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BCS 101: Computer Fundamentals

UNIT I

Evolution of Computers: Basic components of a Digital Computer- Control unit, ALU, Input/Output functions and memory, Generations, Computer Classification: Micro, Mini, Mainframe, Super Computer, PC, Server, Workstations.

UNIT II

Input/Output Units: Keyboard, Mouse, Trackball, Joystick, Digitizing tablet, Scanners, Digital Camera, MICR, OCR, OMR, Bar-code Reader, Voice Recognition, Light pen, Touch Screen, Monitors, Printers & types-Daisy wheel, Dot Matrix, Inkjet, Laser, Line Printer, Plotter, Sound Card and Speaker.

UNIT III

Memory: RAM, ROM, EPROM, PROM and other types of memory, Storage fundamentals-Primary Vs Secondary Data Storage, Various Storage Devices- Magnetic Tape, Magnetic Disks, Cartridge Tape, Hard Disk Drives, Floppy Disks, Optical Disks, CD, CD-R, CD-RW, DVD, DVD-RW Zip Drive, Flash drives Video Disk, Blue Ray Disc, USB Pen drive.

UNIT IV

Software and its Need, Types of Software-System software, Application software, System Software- Operating System, Utility Program, Assemblers, Compilers and Interpreter, DOS-Files and Directory, Study of all Internal & External commands, Types of files, Programming languages.

UNIT V

Data Representation within Computer: BIT, BYTE, WORD, ASCII, EBCDIC, BCD Code. Introduction to Number system: Binary, Octal, Decimal and Hexadecimal, Conversation from one number system to another number system.

Recommended Books:

1. Fundamentals of Computers- V. Rajaraman
2. Fundamentals of Computers- P. K. Sinha
3. Introduction to Computers and C Programming- S. K. Bajpai and D. S. Yadav

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BCS 102: Introduction to C Programming

UNIT I

Programming in C**:** History, Introduction to C Programming Languages, Structure of C programs, compilation and execution of C programs, Debugging Techniques, Algorithms, Flow Charts.

UNIT II

Data Types and Sizes, Declaration of variables, Modifiers, Identifiers and keywords, Symbolic constants.

Operators: Unary operators, Arithmetic & logical operators, Bit wise operators, Assignment operators and expressions, Conditional expressions, Precedence and order of evaluation.

UNIT III

Control statements: if-else, else-if clause, switch, goto statement. Loops: for, while, do-while, break, continue.

Pointer: Pointer notation, value at (*) and address of (&) operator, pointer to pointer.

UNIT IV

Functions: built-in and user-defined, function declaration and prototype, parameter passing: call by value, call by reference, recursive functions. Dynamic Memory allocation (malloc, calloc, free function)

UNIT V

Arrays**:** linear arrays, multidimensional arrays, passing arrays to functions, Strings-Declaration and initialization, Standard library functions, Array of strings.

File Handling in C: opening and closing a data file, file operations, File I/O, Read, Write and Other file function.

Recommended Books:

1. Let Us C- Yashavant Kanetkar
2. C Programming Language- B. W. Kernighan and D. M. Ritchie

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BCS 103: Discrete Mathematics

UNIT I

Set theory: Sets and Elements, Subsets, Venn Diagrams, Operations, Algebra of Sets, Duality, Finite Sets, Counting Principle, Classes of Sets, Power Sets, Partitions

UNIT II

Relation: Introduction, Product Sets, Relations, Pictorial Representatives of Relations, Composition of Relations, Types of Relations, Equivalence Relations, Partial Ordering Relations.

Function: Functions defined as relations, One-to-One,Onto, and Invertible Functions

UNIT III

Logic and Propositional Calculus: Introduction, Propositions and Compound Statements, Basic Logical Operations, Propositions and Truth Tables, Tautologies and Contradictions, Logical Equivalence, Algebra of Propositions, Conditional and Biconditional Statements

UNIT IV

Techniques of Counting: Basic Counting Principles, Mathematical Functions, Permutations, Combinations, Pigeonhole Principle, Inclusion–Exclusion Principle. Mathematical Induction.

UNIT V

Ordered Sets and Lattices: Introduction, Ordered Sets, Hasse Diagrams of Partially Ordered Sets, Supremum and Infimum, Isomorphic (Similar) Ordered Sets. Lattices, Bounded Lattices, Distributive Lattices, Complements, Complemented Lattices

Recommended Books:

1. Discrete Mathematics- Seymour Lipschutz
2. Discrete Mathematics and its Applications- Kenneth Rosen
3. Discrete Mathematics for Computer- Peter Grossman

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BCS 201: Data Structures using C

UNIT I

Introduction: Basic Terminology, Data type, Data object, Need of Data Structure, Types of Data Structure, Elementary Data Organization, Data Structure operations, Algorithm Complexity and Time-Space trade-off.

UNIT II

Arrays, Single and Multidimensional Arrays, address calculation, application of arrays, Character String in C. Searching- Sequential search, binary search. Sorting algorithms with efficiency- Bubble sort, Insertion sort, Merge sort, Quick Sort

UNIT III

Stacks: Array and linked representation and implementation of stack, Operations on Stacks: Push & Pop, Applications of stack: Conversion of Infix to Prefix and Postfix Expressions, Evaluation of postfix expression using stack. Recursion: Introduction, recursion in C, example of recursion, recursive functions.

UNIT IV

Queues: Array and linked representation and implementation of queues, Operations on Queue: Create, Insert, Delete, Full and Empty. Circular queue, Deques, and Priority Queues.
Linked list: Representation and implementation of Singly Linked Lists, Header List, Traversing and Searching of Linked List, Overflow and Underflow, Insertion and deletion to and from Linked Lists, Doubly linked list.

UNIT V

Trees: Basic terminology, Binary Trees, Binary tree representation, algebraic expressions, Complete Binary Tree., Traversing Binary trees, Binary Search Tree, searching BST, insertion and deletion in BST, AVL Trees.

Recommended Books:

1. Data Structures- Seymour Lipschutz
2. Data Structures using C and C++- Tanenbaum
3. Data Structure through C- Yashavant Kanetkar

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BCS 202: Digital Electronics

UNIT I

Digital Systems and binary numbers, Number base conversions, Octal and Hexadecimal numbers, complements of numbers, Signed binary numbers, Binary Fixed- Point Representation, Arithmetic operation on binary numbers, Overflow & underflow. Binary codes

UNIT II

Digital logic gates, Boolean Algebra-Axiomatic definition, truth tables, theorems and properties, Boolean functions, canonical and standard forms. Gate level minimization- K-Map method, 2, 3 and 4 variables map, POS and SOP simplification, Don't care conditions, NAND and NOR Implementations

UNIT III

Combinational Logic: Combinational circuits, analysis and design procedure, binary adder-subtractor, binary multiplier, magnitude comparator, Decoders, Encoders, Multiplexres, Parity Generation and Checking

UNIT IV

Sequential Logic: Sequential circuits, Storage elements-Latches and Flip-Flops (SK, D, JK, T), Analysis of clocked sequential circuits- state equations, state tables, state diagrams, Flip-Flop input equations, Design procedure, excitation tables.

UNIT V

Registers, shift registers, Counters, ripple counters, synchronous counters, Memory- RAM, ROM, Programmable Logic Array (PLA)

Recommended Books:

1. Digital Logic and Computer design- M. Morris Mano
2. Modern Digital Electronics- R. P. Jain
3. Digital Electronics Principals and Integrated circuits- Anil K. Maini

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BCS 203: Introduction to UNIX

UNIT I

Concepts in Operating System: Introduction, Functions of OS, Management of resources, OS classification- Batch, Multiprogramming, Multitasking, Multiprocessing, Multiuser, Time sharing, Real time. Basic knowledge of DOS, UNIX, Windows, Linux, UBUNTU, Android and IOS.

UNIT II

Introduction to UNIX, Hardware requirements for UNIX, Features of UNIX, UNIX System Organization- Kernel and Shell, types of Shell- Bourne, Korn and C Shells. System calls. Logging in UNIX system, UNIX commands and command switches.

UNIT III

General purpose utilities: cal, date, echo, bc, who, who am i, tty, wall, tput, bc. Filters- pr, head, tail, tee, combining commands with pipes. I/O redirection. Process, ps, kill and nice.

UNIT IV

UNIX File System: The File, blocks, Parent-Child relationship, file system hierarchy, file types, directory and device files, File and Directory permissions. File and directory related commands- touch, cat, cp, rm, mv, cmp, comm, diff, wc, sort, cut, paste, grep, pwd, ls, mkdir, rmdir, cd, chmod.

UNIT V

vi Editor: Modes of operation, Entering, add and delete text, search, find and replace, delete and paste, quit vi.

Shell Programming: Shell scripts, read, shell variables, shell keywords, positional parameter, command line arguments. Decision control, logical operator, loop control- while, until, for, break and continue

Recommended Books:

1. Unix Shell Programming- Yashwant Kanitkar
2. Unix Concepts and applications- Sumitabha Das
3. Advanced Unix programming guide- Parata

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BCS 301: Computer System Architecture

UNIT I

Basic Computer Organization and Design

Computer registers, bus system, instruction set, timing and control, instruction cycle, memory reference, input-output and interrupt, Interconnection Structures, Bus Interconnection design of basic computer.

UNIT II

Central Processing Unit: Register organization, arithmetic and logical micro-operations, stack organization, micro programmed control. Instruction formats, addressing modes, instruction codes, machine language, assembly language. Booth algorithm.

UNIT III

Input-Output Organization: Peripheral devices, I/O interface, Modes of Transfer, Priority Interrupt, Direct Memory Access, Input-Output Processor, and Serial Communication. I/O Controllers, Asynchronous data transfer, Strobe Control, Handshaking.

UNIT IV

Memory Organization: Memory Hierarchy, Main memory (RAM/ROM chips), Auxiliary memory, Associative memory, Cache memory, Virtual Memory, Memory Management Hardware, hit/miss ratio, magnetic disk and its performance, magnetic Tape etc.

UNIT V

Pipelining: Parallel processing, Flynn's classification, space time diagram, speedup ration, Arithmetic pipeline, Instruction pipeline.

Recommended Books:

1. M. Mano, Computer System Architecture, Pearson Education 1992
2. A. J. Dos Reis, Assembly Language and Computer Architecture using C++ and JAVA, Course Technology, 2004
3. W. Stallings, Computer Organization and Architecture Designing for Performance, 8th Edition, Prentice Hall of India,2009
4. M.M. Mano , Digital Design, Pearson Education Asia,2013
5. Carl Hamacher, Computer Organization, Fifth edition, McGrawHill, 2012.

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BCS 302: Computer Graphics

UNIT I
Introduction, Basic elements of Computer graphics, Applications of Computer Graphics.

UNIT II
Graphics Hardware, Architecture of Raster and Random scan display devices, input/output devices.

UNIT III
Fundamental Techniques in Graphics, Raster scan line, circle and ellipse drawing, thick primitives, Polygon filling, line and polygon clipping algorithms, 2D and 3D Geometric Transformations, 2D and 3D Viewing Transformations (Projections- Parallel and Perspective), Vanishing points.

UNIT IV
Geometric Modeling, Representing curves & Surfaces.

UNIT V
Visible Surface determination, Hidden surface elimination. Surface rendering.
Illumination and shading models. Basic color models and Computer Animation.

Recommended Books :

1. J.D.Foley, A.Van Dan, Feiner, Hughes Computer Graphics Principles & Practice 2nd edition Publication Addison Wesley 1990.
2. D.Hearn, Baker: Computer Graphics, Prentice Hall of India 2008.
3. D.F.Rogers Procedural Elements for Computer Graphics, McGraw Hill 1997.
4. D.F.Rogers, Adams Mathematical Elements for Computer Graphics, McGraw Hill 2nd edition 1989.

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BCS 303: Object Oriented Programming using C++

UNIT I

Object Oriented Concepts: Elements of Object Oriented programming, Objects, Classes, OOPs features. Classes & Objects: Specifying a Class, Creating Objects, Accessing Class members, Defining member function, Outside Member Functions as inline, Accessing Member Functions within the class, Static data member, Access Specifiers: Private, Protected and Public Members.

UNIT II

Constructors & Destructors: Roles and types of Constructors, Roles of Destructors, Parameterized Constructors, Constructor Overloading, Constructors with Default Arguments, Copy Constructor, Destructor, Order of Construction and Destruction, Static data members with Constructor and Destructors.

UNIT III

Operator Overloading: Definition, Overloadable Operators, Unary and Binary Operators overloading through Member Functions and Friend Functions, Function Overloading

UNIT IV

Dynamic Memory Allocation: Pointers to Objects, Creating and Deleting Dynamic Objects: New and Delete operators, Array of Objects, Array of Pointers to Objects, Pointers to Object Members, 'this' Pointer.

UNIT V

Inheritance: Single, Multilevel, Multiple, Hierarchical, Hybrid Inheritance, Roles of Constructors and Destructors in Inheritance. Virtual Functions. Template class.

Recommended Books:

1. Herbert Scildt, C++ The Complete Reference, Tata McGraw-Hill
2. Robert Lafore, Object Oriented Programming in C++, PHI
3. Bjarne Stroustrup, The C++ Programming Language, Addison Wesley, 2004.
4. Lipman Intoduction to object oriented programming

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BCS 401: Introduction to Data Base Systems

UNIT I

Basic Concepts – Data, Information, Records and files. Database Management System (DBMS), DBMS Functions and Components, Advantages and Disadvantages of DBMS. Roles in the Database Environment - Data and Database Administrator, Database Designers, Applications Developers and Users.

UNIT II

Database System Architecture – Three Levels of Architecture, External, Conceptual and Internal Levels, Schemas, Mappings and Instances. Data Independence – Logical and Physical Data Independence. Classification of Database Management System, Centralized and Client Server architecture to DBMS

UNIT III

Entity-Relationship Model – Entity Types, Entity Sets, Attributes Relationship Types, Relationship Instances and ER Diagrams.

Relational Data Model:-Brief History, Relational Model Terminology-Relational Data Structure, Database Relations, Properties of Relations, Keys, Domains, Integrity Constraints over Relations.

UNIT IV

Functional Dependencies and Normalization:-Purpose, Data Redundancy and Update Anomalies. Functional Dependencies:-Partial, Full Functional Dependencies and Transitive Functional Dependencies, Characteristics of Functional Dependencies. Decomposition and Normal Forms (1NF, 2NF, 3NF & BCNF).

UNIT V

SQL: Data Definition and data types, Specifying Constraints in SQL, Schema, Change statement, Basic Queries in SQL, Insert, Delete and Update Statements, Views.

Recommended Books:

1. Elmasri & Navathe, “Fundamentals of Database Systems”, 5th edition, Pearson Education.
2. Ivan Bayross, “SQL, PL/SQL-The Programming Language of ORACLE”, BPB Publications 3rd edition.
3. C. J. Date, “An Introduction to Database Systems”, 8th edition, Addison Wesley N. Delhi

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BCS 402: Operating Systems

UNIT I

Introduction : Basic OS functions, resource abstraction, types of operating systems– multiprogramming systems, batch systems , time sharing systems; operating systems for personal computers & workstations, process control & real time systems. Mobile operating systems.

UNIT II

Operating System Organization: Processor and user modes, kernels, system calls and system programs.

UNIT III

Process Management: System view of the process and resources, process abstraction, process hierarchy, threads, threading issues, thread libraries; Process Scheduling, non-pre-emptive and pre-emptive scheduling algorithms; concurrent and processes, critical section, semaphores, deadlocks.

UNIT IV

Memory Management: Physical and virtual address space; memory allocation strategies – fixed and variable partitions, paging, segmentation, virtual memory

UNIT V

File and I/O Management: Directory structure, file operations, file allocation methods, device management.

Recommended Books:

1. A Silberschatz, P.B. Galvin, G. Gagne, Operating Systems Concepts, 8th Edition, John Wiley Publications 2008.
2. A.S. Tanenbaum, Modern Operating Systems, 3rd Edition, Pearson Education 2007.
3. G. Nutt, Operating Systems: A Modern Perspective, 2nd Edition Pearson Education 1997.
4. W. Stallings, Operating Systems, Internals & Design Principles , 5th Edition, Prentice Hall of India. 2008.
5. M. Milenkovic, Operating Systems- Concepts and design, Tata McGraw Hill 1992

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BCS 403: Programming in Java

UNIT I

Introduction to Java, features of Java, getting started with Java, Compilation and execution of any JAVA program, Variables , Rules of variables, Scope of variable, Data types:-Integers, Char, String, Float etc. Java tokens.

UNIT II

Operators: Arithmetic, Assignment, Unary, Comparison, Shift, Bit- Wise, Logical, Conditional, New, Special, Relational. Order of precedence of operators Streams.

UNIT III

Creating a class & subclass: -Declaring a class, Naming class, Rules to assign Class & Subclass, Creating a new object, Class of an object. Data members: -Declaring data member, Naming variables, using class members. Methods: -Using data members, Invoke a method, passing arguments to a method, calling method. Access Specifier & Modifiers: - public, private, protected, static & final.

Overloading: -Method overloading, Constructor overloading.

UNIT IV

Decision making & loops:-if-then-else, Switch,? : operator, While-loop, do-while loop, for. Array: -Creating an array, one-dimensional array, two-dimensional array. String: String array, string methods.

Inheritance, abstract class, interfaces, defining interfaces, extending interfaces, implementing interfaces.

UNIT V

Packages: -Java API packages, creating packages, accessing packages, adding a class to packages. Import statement: - Introduction & implementation of import statement. Threads in Java, Applets:-Introduction to Applets & Application, An applet. Applets life cycle,

Recommended Books:

1.. Java-Complete References
2. Black Book on Java
3. John R. Hubbard, "Programming with JAVA", Schaum's Series, 2nd Edition, 2004.

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BCS 501: Software Engineering

UNIT I

Introduction: The Evolving Role of Software, Software Characteristics, Changing Nature of Software, Software Engineering as a Layered Technology, Software Process Framework, Framework and Umbrella Activities, Process Models, Capability Maturity Model Integration (CMMI).

UNIT II

Requirement Analysis : Software Requirement Analysis, Initiating Requirement Engineering Process, Requirement Analysis and Modeling Techniques, Flow Oriented Modeling, Need for SRS, Characteristics and Components of SRS.

UNIT III

Software Project Management: Estimation in Project Planning Process, Project Scheduling.
Risk Management: Software Risks, Risk Identification, Risk Projection and Risk Refinement,

UNIT IV

Quality Management: Quality Concepts, Software Quality Assurance, Software Reviews, Metrics for Process and Projects.
Design Engineering : Design Concepts, Architectural Design Elements, Software Architecture, Data Design at the Architectural Level and Component Level, Mapping of Data Flow into Software Architecture, Modeling Component Level Design.

UNIT V

Testing Strategies & Tactics : Software Testing Fundamentals, Strategic Approach to Software Testing, Test Strategies for Conventional Software, Validation Testing, System testing, Black-Box Testing, White-Box Testing and their type, Basis Path Testing.

Recommended Books:

1. R.S. Pressman, Software Engineering: A Practitioner‘s Approach (7th Edition), McGrawHill, 2009.
2. P. Jalote, An Integrated Approach to Software Engineering (2nd Edition), Narosa Publishing House, 2003.
3. K.K. Aggarwal and Y. Singh, Software Engineering (2nd Edition), New Age International Publishers, 2008.
4. I. Sommerville, Software Engineering (8th edition), Addison Wesley, 2006.
5. D. Bell, Software Engineering for Students (4th Edition), Addison-Wesley, 2005.
6. R. Mall, Fundamentals of Software Engineering (2nd Edition), Prentice-Hall of India, 2004.

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BCS 502: COMPUTER NETWORKS

UNIT I

Introduction to Computer Networks : Network definition; network topologies; network classifications; network protocol; layered network architecture; overview of OSI reference model; overview of TCP/IP protocol suite. back-bone networks- repeaters, hubs, switches, bridges, router and gateways;

UNIT II

Data Communication Fundamentals and Techniques : Analog and digital signal; data-rate limits; digital to digital line encoding schemes; pulse code modulation; digital to analog modulation-; multiplexing techniques- FDM, TDM; transmission media.

UNIT III

Data Link Layer Functions and Protocol : Error detection techniques; data-link control-framing and flow control; error recovery protocols- stop and wait ARQ, go-back-n ARQ;.
Multiple Access Protocol and Networks : CSMA/CD protocols; Ethernet LANS; connecting LAN.

UNIT IV

Networks Switching Techniques and Access mechanisms: Circuit switching; packet switching- connectionless datagram switching, connection-oriented virtual circuit switching; dial-up modems; digital subscriber line; cable TV for data transfer,

UNIT V

Networks Layer Functions and Protocols: Routing algorithms; Distance vector routing and link state routing, protocol of Internet- IP protocol (IP4, IP6)
Transport Layer Functions and Protocols: TCP- Connection establishment and release-three way handshake.

Recommended Books:

1. B. A. Forouzan: Data Communications and Networking, Fourth edition, THM ,2007
2. A. S. Tanenbaum: Computer Networks, Fourth edition, PHI , 2002
3. James F. Kurose, Keith W. Ross, “Computer Networking”, Pearson Education.
4. Michael A. Gallo, William M. Hancock, “Computer Communications and Networking Technologies”, CENGAGE Learning.

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BCS 503: Programming in Python

UNIT I

Programming in Python, Planning the Computer Program: Concept of problem solving, Problem definition, Program design, Debugging, Types of errors in programming, Documentation.

UNIT II

Techniques of Problem Solving: Flowcharting, decision table, algorithms, Structured programming
concepts, Programming methodologies viz. top-down and bottom-up programming.

UNIT III

Overview of Programming : Structure of a Python Program, Elements of Python

UNIT IV

Introduction to Python: Python Interpreter, Using Python as calculator, Python shell, Indentation. Atoms, Identifiers and keywords, Literals, Strings, Operators (Arithmetic operator, Relational operator, Logical or Boolean operator, Assignment, Operator, Ternary operator, Bit wise operator, Increment or Decrement operator).

UNIT V

Creating Python Programs : Input and Output Statements, Control statements(Branching, Looping, Conditional Statement, Exit function, Difference between break, continue and pass.), Defining Functions, default arguments.

Recommended Books

1. T. Budd, Exploring Python, TMH, 1st Ed, 2011
2. Python Tutorial/Documentation www.python.or 2015
3. Allen Downey, Jeffrey Elkner, Chris Meyers, How to think like a computer scientist : learning with
   Python , Freely available online.2012
4. http://docs.python.org/3/tutorial/index.html
5. http://interactivepython.org/courselib/static/pythonds
6. http://www.ibiblio.org/g2swap/byteofpython/read/

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BCS 601: Artificial Intelligence

UNIT I

Introduction: Introduction to Artificial Intelligence, Background and Applications, AI techniques, Tic-Tac-Toe problem, Problem Characteristics.

UNIT II

Problem Solving and Searching Techniques: Problem Characteristics, Production Systems, Water Jug Problem, Control Strategies, Breadth First Search, Depth First Search, Hill climbing and its Variations, Heuristics Search Techniques: Best First Search. 8-Puzzle Problem.

UNIT III

Knowledge Representation: Definition of Knowledge, Knowledge Based Systems, Representation of Knowledge. Introduction to First Order Predicate Logic, Conversion to clausal form, Unification, Resolution Principle.

UNIT IV

Expert Systems: Introduction to Expert Systems, Characteristic Features of Expert Systems, Applications of Expert Systems, Components and Working of Expert Systems.

UNIT V

Introduction to Machine Learning Techniques: Fuzzy Logic, Fuzzy Set, Membership Function, Union, intersection and complement of a fuzzy set, Introduction to Artificial Neural Network, Back Propagation Method, Introduction to Support Vector Machine.

Recommended Books:

1. DAN.W. Patterson, Introduction to A.I and Expert Systems – PHI, 2007.
2. Russell &Norvig, Artificial Intelligence-A Modern Approach, LPE, Pearson Prentice Hall, 2nd edition, 2005.
3. Rich & Knight, Artificial Intelligence – Tata McGraw Hill, 2nd edition, 1991.
4. W.F. Clocksin and Mellish, Programming in PROLOG, Narosa Publishing House, 3rd edition, 2001.

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BCS 602 Information Security

UNIT I

Introduction Security, Attacks, Computer Criminals, Security Services, Security Mechanisms.

UNIT II

Cryptography, Substitution ciphers, Transpositions Cipher, Confusion, diffusion, Symmetric, Asymmetric Encryption. DES Modes of DES, Uses of Encryption, Hash function, key exchange, Digital Signatures, Digital Certificates.

UNIT III

Program Security Secure programs, Non malicious Program errors, Malicious codes virus, Trap doors, Salami attacks, Covert channels, Control against program

UNIT IV

Threats. Protection in OS: Memory and Address Protection, Access control, File Protection, User Authentication, Database security.

UNIT V

Security in Networks Threats in Networks, Security Controls, firewalls, Intrusion detection systems, Secure e-mails

Recommended Books:

1. C. P. Pfleeger, S. L. Pfleeger; Security in Computing, Prentice Hall of India, 2006
2. W. Stallings; Network Security Essentials: Applications and Standards, 4/E, 2010

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BCS 603: Cloud Computing

UNIT I

Cloud Computing Overview, Recent trends in Computing, Grid Computing, Cluster Computing, Distributed Computing, Utility Computing, Cloud Computing,

UNIT II

Introduction to Cloud Computing, History of Cloud Computing, Cloud service providers, Benefits and limitations of Cloud Computing,

UNIT III

Cloud Computing Architecture, Comparison with traditional computing architecture (client/server), Services provided at various levels, Service Models- Infrastructure as a Service(IaaS), Platform as a Service (PaaS), Software as a Service(SaaS), How Cloud Computing Works, Deployment Models- Public cloud, Private cloud, Hybrid cloud, Community cloud, Case study of NIST architecture.

UNIT IV

Service Management in Cloud Computing, Service Level Agreements (SLAs), Billing & Accounting, Comparing Scaling Hardware: Traditional vs. Cloud, Economics of scaling.

UNIT V

Cloud Security : Infrastructure Security- Network level security, Host level security, Application level security, Data security and Storage- Data privacy and security Issues, Jurisdictional issues raised by Data location, Authentication in cloud computing.

Recommended Books:

1. Cloud Computing Bible, Barrie Sosinsky, Wiley-India, 2010
2. Cloud Computing: Principles and Paradigms, Editors: Rajkumar Buyya, James Broberg, Andrzej M. Goscinski, Wile, 2011
3. Cloud Computing: Principles, Systems and Applications, Editors: Nikos Antonopoulos, Lee Gillam, Springer, 2012
4. Cloud Security: A Comprehensive Guide to Secure Cloud Computing, Ronald L. Krutz, Russell Dean Vines, Wiley-India, 2010
5. Gautam Shroff, Enterprise Cloud Computing Technology Architecture Applications , Adobe Reader ebooks available from eBooks.com,2010
6. Toby Velte, Anthony Velte, Robert Elsenpeter, Cloud Computing, A Practical Approach ,McGraw Hills, 2010.
7. Dimitris N. Chorafas, Cloud Computing Strategies ,CRC Press, 2010.