Computer Science Papers for B.Sc. (Mathemetical Sciences)

PROGRAM (Discipline) COURSES and CONCURRENT COURSES

DEPARTMENT OF COMPUTER SCIENCE
FACULTY OF MATHEMATICAL SCIENCES
UNIVERSITY OF DELHI
DELHI – 110007
2010

Structure

	No.of lectures per week	Exam. Hours	Max. Marks
Theory	4+1	3	100
Practical	4	4	50

Theory Papers for Program (Discipline) courses:

CSPT 101 –Fundamentals of Programming
CSPT 202 – Data Structures
CSPT 303 – Computer System Architecture
CSPT 404 – Operating Systems
CSPT 505 - Computer Networks
CSPT 606 – Database Management Systems

Practical Papers for Program (Discipline) courses:

CSPL 101 –Fundamentals of Programming Lab: Practicals based on CSPT 101
CSPL 202 – Data Structures Lab: Practicals based on CSPT 202
CSPL 303 – Computer System Architecture Lab:Practicals based on CSPT 303
CSPL 404 – Operating Systems Lab: Practicals based on CSPT 404
CSPL 505 Computer Networks Lab:
Practicals based on CSPT 505
CSPL 606 – Database Management Systems Lab: Practicals based on CSPT 606.

Theory Papers for CONCURRENT Courses

CSCT 101 Linux System Administration
CSCT 202 Elective

Elective (i): Multimedia Systems and Applications
Elective (ii): Network and Information Security

Practical Papers for CONCURRENT Courses

CSCL 301 Linux System Administration Lab: Practicals based on CSCT 101
CSCL 402 Software Lab; Practicals based on CSCT 202

Infrastructure Recommended

Equipment:
Networked Lab with internet facility on at least 20 nodes. LCD Projection systems should be provided in Class Room/ Lab.

Software: Open Source softwares

Batch Size requirement:
Every lab session should be supervised by a teacher and the batch size should be restricted to 20. For a group of more than 20 students, the group should be divided into batches.

Programming using C/ C++: Basic data types; constants and variables, arithmetic and logical expressions; input-output methods; control structures; procedural abstractions; strings and arrays; command line arguments; basic file handling; error handling.

Introduction to the object-oriented programming concepts: data abstraction and encapsulation — objects and classes; inheritance; polymorphism.

References:

1. E. Balaguruswamy, Object Oriented Programming with C++ (4th ed.), Tata McGraw Hill, 2000.

2. J. R. Hubbard, Programming with C++ (2nd ed.), Schaum's Outlines, Tata McGraw Hill, 2000.

3. B. A. Forouzan and R. F. Gilberg, Computer Science, A structured Approach using C++, Cengage Learning, 2004.

4. D S Malik, C++ Programming Language, Cengage Learning, First Indian Reprint 2009.

5. R. Albert and T. Breedlove, C++: An Active Learning Approach, Jones and Bartlett India Ltd. 2009.

CSPL 101 –Fundamentals of Programming Lab

Practicals based on CSPT 101

CSPT 202 – Data Structures

ADTs and Arrays: Single and Multidimensional arrays, Sequential Allocation

Stacks : Definition of stack, array implementation of stack, conversion of infix expression to prefix, postfix expressions, evaluation of postfix expression.

Queues : Definition of Queue, circular queues, priority queues, array implementation of queues.

Linked lists : Linked List and its implementation, Link list implementation of stack and queue, Circular and doubly linked list.

Searching and sorting: Insertion sort, selection sort, bubble sort, merge sort, Linear Search, binary

search.

Trees : Introduction to trees, Binary search tree, preorder, postorder and inorder traversal.

References :

1. Nell Dale, C++ Plus Data Structure (4th Edition), Jones and Barlett 2006.
2. Data structures, Algorithms and Applications in C++ by S.Sahni, University press (India). pvt ltd / Orient Longman pvt.ltd., 2nd edition 2004.
3. Adam Drozdek, Data Structures and Algorithms in C++, Second edition, Vikas Publishing House 2004.
4. B.R. Preiss, Data structures and algorithms with object oriented design patterns in C++, John Wiley and sons, 1999.

CSPL 202 – Data Structures Lab

Practicals based on CSPT 202

CSPT 303 – Computer System Architecture

Introduction : Logic gates, boolean algebra, combinational circuits, circuit simplification, decoders, multiplexors, registers, memory units and memory hierarchy

Data Representation and basic Computer Arithmetic : Number systems, complements, fixed and floating-point representation, character representation, addition, subtraction, magnitude comparison

Basic Computer Organization and Design : Computer registers, bus system, instruction set, timing and control, instruction cycle, memory reference, input-output and interrupt, design of basic computer.

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, RISC/CISC architectures

Input-output Organization: Peripheral devices, I/O interface, introduction to modes of data transfer, direct memory access.

References:

1. M. Morris Mano, Computer System Architecture, 3rd edition Pearson Education, 1992.

2. William Stallings, Computer Organization and Architecture, Prentice Hall of India, 2009.

3. J. Dos Reis, Assembly language and computer architecture using C++ and JAVA, Cengage Learning, 2004.

CSPL 303 – COMPUTER SYSTEM ARCHITECTURE LAB

Practicals based on CSPT 303

CSPT 404 – Operating Systems

Introduction : System software, resource abstraction, OS strategies; Types of operating systems - multiprogramming, batch, time sharing, Operating systems for personal computers & workstations, process control & real time systems

Operating System Organization: Basic OS functions; processor modes, system calls and system programs; kernel

Process Management : System view of the process and resources, process abstraction, resource abstraction, process hierarchy, thread model; process scheduling, non-pre-emptive and pre-emptive scheduling algorithms, concurrent processes, critical section, semaphores, deadlocks

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

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

Protection and Security: Policy mechanism, authentication and authorization.

References:

1. Flynn/McHoes Operating Systems, Cengage Learning Third Indian Reprint 2008.

2. A.S. Tanenbaum, Modern Operating Systems, 3rd Edition, Pearson Education .

3. W. Stallings, Operating Systems, 5th Edition, Prentice Hall of India 2004.

4. A Silberschatz, P.B. Galvin, G. Gagne, Operating Systems Concepts, 8th Edition, John Wiley Publications 2008.

CSPL 404 – Operating Systems Lab

Practicals based on CSPT 404 – Operating Systems

CSPT 505 Computer Networks

Basic concepts : Components of data communication, standards and organizations, Network Classification, Network Topologies ; network protocol; layered network architecture; overview of OSI reference model; overview of TCP/IP protocol suite.

Physical Layer : Cabling, Network Interface Card, Transmission Media Devices- Repeater, Hub, Bridge, Switch, Router, Gateway

Data Link Layer : Framing techniques; Error Control; Flow Control Protocols; Shared media protocols - CSMA/CD and CSMA/CA.

Network Layer : Virtual Circuits and Datagram approach, IP addressing methods – Subnetting; Routing Algorithms (adaptive and non-adaptive)

Application Layer : Application layer protocols and services – Domain name system, HTTP, WWW, telnet, FTP, SMTP

Network Security : Common Terms, Firewalls, Virtual Private Networks

References:

1. B.A. Forouzan: Data Communication and Networking, 4th Edition, Tata McGraw Hill, 2007.
2. D.E. Comer, Internetworking with TCP/IP, Vol. I, Prentice Hall of India, 1998.
3. W. Stalling, Data & Computer Communication, 8th edition, Prentice Hall of India, 2006.
4. D. Bertsekas, R. Gallager, Data Networks, 2nd edition, Prentice Hall of India, 1992.

CSPL 505 Computer Networks LAB

Practicals based on CSPT 505 Computer Networks

CSPT 606 – Database Management Systems

Introduction to Database Management Systems : Characteristics of database approach, data models, database system architecture and data independence.

Entity Relationship Modeling : Entity types, relationships, constraints, and object modeling.

Relational data model : Relational model concepts, relational constraints, relational algebra, SQL queries, programming using embedded SQL.

Database design : ER model to relational mapping, functional dependencies, normalazation

Web based databases: XML documents and databases.

Reference:

1. R. Elmasri, S.B. Navathe, Fundamentals of Database Systems (5th Ed.), Pearson Education, 2010.

2. C. J. Date, A. Kannan and S. Swamynathan, Database Systems (8th Ed.), Pearson Education, 2003.

3. A. Silberschatz, H.F. Korth, S. Sudarshan, Database System Concepts (5th Ed.), McGraw Hill, 2010.

4. Philip J. Pratt. Joseph J. Adamski, Database Management Systems, Cengage Learning, First Indian Reprint 2009.

CSPL 606 – Database Management Systems Lab

Practicals based on CSPT 606 – Database Management Systems

CSCT 101 Linux System Administration

System Administration: Installation, Configuration, Disk Formatting/Partitioning, Installing Linux, Super user, Controlling Processes, User and group management, Backup management , Security management

System Maintenance : Linux Distributions, BIOS, Devices and drivers, System Monitoring, System Configuration, Applications Installation and Configuration, Maintenance (service packs, patches, etc.),Server services (database, web, network services.) ,Client services

Network System Maintenance: Network Configuration, Network services (File printing on Network, DHCP, DNS, FTP, HTTP, Mail, SNMP and Telnet)

Books:

1. E.Nemith, G. Snyder, T.R. Hein, Linux Administration Handbook, 2nd edition, Pearson Education, 2006.
2. Linux in a Nutshell, 6th Edition, Author : Ellen Siever, Stephen Figgins, 6th Edition O'Reilly, 2009.
3. Tony Bautts, Gregor N. Purdy Terry Dawson Linux Network Administrator's Guide, 3rd Edition By, O'Reilly Media, 2005.
4. Nicholas Wells, the Complete Guide to Linus System Administration, Cengage Learning Indian Edition, 2005.
5. Documentation available at www.linux.org.

CSCL 301 Linux System Administration

Practicals based on CSCT 101 Linux System Administration

CSCT 202 (i) Multimedia Systems and Applications

Multimedia Input Devices : Scanner, digital camera, microphone, video camera type setter.

Multimedia Output Devices : Sound/speaker, colour monitors, printers, storage devices: CD Roms, DVD.

Coding and Compression Formats for Image, Audio, Video.

Nonlinear Form of Presentation : Hypertext, hypermedia, human/ computer interaction.

Cognitive Aspects of Information Transfer: Various models of structuring of content methodology for developing multimedia CDROMs.

Use of Multimedia tools: Sound editor, video editor, animator, authorising tools Multimedia databases, multimedia applications in education, libraries publishing, art and culture, medicine and industry.

References :

1. Ze-Nian, Li Mark, F Drew, Fundamentals of Multimedia, Pearson Education–International Edition, 2005.
2. Tay Vaughan, Multimedia: Making it work, 7th Edition, Tata McGraw Hill, 2006.
3. Ranjan Parekh, Principles of Multimedia, Tata McGraw Hill, 2006.

CSCT 202(ii) Network and Information Security

Computer Networks and Topologies: Peer to Peer Networks, Server-Based Network, Bus, Start, Ring Topology, OSI Model Introduction.

TCP/IP and Internet: IPv4 Address Format, IPV6 Address Format, TCP, UDP, Use of IP address on Internet, DNS

Routing : Introduction to Routing, PING, CIDR, Trace Route, Ports and Sockets

Digital Crime: Computer Network as a Threat. Hardware vulnerability, Software Vulnerability, Criminology of Computer crime.

Risk Analysis and Threat: Risk Analysis Process, Understanding Computer Crime, Key principles of conventional computer security, Security Policies,   Authentication, Data protection, Access

control, Internal vs External Threat, security assurance, Computer Forensics and Incident Response

Information Gathering Techniques : Tools of the Attacker, Information and Cyber Warfare, Scanning and Spoofing, Password Cracking, Malicious Software, Session hijacking, Mail Vulnerabilities, Web Application Vulnerabilities, OS Vulnerabilities

Safety Tools and Issues: Cryptography, Firewalls, Logging and Intrusion Detection Systems, NT and Windows Security, UNIX/Linux Security, Ethics of Hacking and Cracking

Legal Standards: Policies, standards, procedures, and Cyber Law

Books :

1. Network Security, Terry Parode, Gordon Snyder, Cengage Learning, 2004.

2. Information Security Principles and practices by Mark Merkow and Jim Breithaupt, Pearson Education, 2005.

3. Computer Security concepts, Issues and Implementation by Alfred Basta, Wolf Halton, Cengage Learning India Edition, 2008.

CSCL 402 Software Lab

Practicals based on CSCT 202.