

Final Version  
**School of Computational Science**  
**New Syllabus (2011-12)**  
 Credit distribution and details of CGPA System  
**M. Sc. (Computer Application) & M.Sc. (Computer Network)**  
 First Year [Two Semesters]

<b>Semester I</b>					
<b>Code No.</b>	<b>Title of the Paper</b>	<b>Internal Credits</b>	<b>External Credits</b>	<b>Total Credits</b>	<b>Total No. of Classes (in hrs)</b>
CA/CN-101	Object Oriented Programming with Java	2	2	4	40
CA/CN-102	Operating System Concept	2	2	4	40
CA/CN-103	Network Operating System	2	2	4	40
CA/CN-104	Networking Essentials	2	2	4	40
CA/CN-105	Practical 1 (JAVA)	2	2	4	60
CA/CN-106	Practical 2 (Linux)	2	2	4	60
CA/CN-107	Seminar	1	0	1	40
<b>Total Credits</b>		<b>13</b>	<b>12</b>	<b>25</b>	

<b>Semester II</b>					
<b>Code No.</b>	<b>Title of the Paper</b>	<b>Internal Credits</b>	<b>External Credits</b>	<b>Total Credits</b>	<b>Total No. of Classes (in hrs)</b>
CA/CN-201	Data Structure & Analysis of Algorithm	2	2	4	40
CA/CN-202	Advance JAVA	2	2	4	40
CA/CN-203	Dot Net Technology	2	2	4	40
CA/CN-204	RDBMS-I	2	2	4	40
CA/CN-205	Practical 3 (Advance JAVA)	2	2	4	60
CA/CN-206	Practical 4 (VB.Net)	2	2	4	60
CA/CN-207	Seminar	1	0	1	40
<b>Total Credits</b>		<b>13</b>	<b>12</b>	<b>25</b>	

# School of Computational Science

## New Syllabus

Credit distribution and details of CGPA System

M. Sc. (Computer Application) Second Year [Two Semesters]

Semester III					
Code No.	Title of the Paper	Internal Credits	External Credits	Total Credits	Total No. of Classes (in hrs)
CA/CN-301	Advance Server Side Web Programming	2	2	4	40
CA/CN-302	RDBMS-II	2	2	4	40
CA-303	Information System Security	2	2	4	40
CA-304	Web Development Using ASP.Net	2	2	4	40
CA-305	Practical 5 (PHP & ASP.Net)	2	2	4	60
CA-306	Practical 6 (Oracle)	2	2	4	60
CA-307	Seminar	1	0	1	40
<b>Total Credits</b>		<b>13</b>	<b>12</b>	<b>25</b>	

Semester IV					
Code No.	Title of the Paper	Internal Credits	External Credits	Total Credits	Total No. of Classes (in hrs)
CA-401	Object Oriented Software Engineering & Software Testing	2	2	4	40
<b>CA-402</b>	<b>Elective – I</b>	2	2	4	40
A	Web Technologies-JAVA Script, VB Script				
B	Mobile Computing/Communication				
C	Multimedia Animation				
D	Distributed Operating System				
<b>CA-403</b>	<b>Elective – II</b>	2	2	4	40
A	Network Security & UTMS				
B	Object Oriented Analysis and Design Using UML				
C	Data Mining and Warehouse				
D	Soft Computing				
CA-404	Project/Dissertation	3	5	8	80
CA-405	Practical 7	2	2	4	40
CA-406	Seminar	1	0	1	40
<b>Total Credits</b>		<b>12</b>	<b>13</b>	<b>25</b>	

## M. Sc. (Computer Networking) Second Year [Two Semesters]

Semester III					
Code No.	Title of the Paper	Internal Credits	External Credits	Total Credits	Total No. of Classes (in hrs)
CA/CN-301	Advance Server Side Web Programming	2	2	4	40
CA/CN-302	RDBMS-II	2	2	4	40
CN-303	Internetworking	2	2	4	40
CN-304	Linux Operating System Administration	2	2	4	40
CN-305	Practical 5 (PHP & RDBMS-II)	2	2	4	60
CN-306	Practical 6 (LOSA)	2	2	4	60
CN-307	Seminar	1	0	1	40
<b>Total Credits</b>		<b>13</b>	<b>12</b>	<b>25</b>	

Semester IV					
Code No.	Title of the Paper	Internal Credits	External Credits	Total Credits	Total No. of Classes (in hrs)
CN-401	Switching and Routing	2	2	4	40
<b>CN-402</b>	<b>Elective – I</b>	2	2	4	40
A	Web Technologies-JAVA Script, VB				
B	Network Management				
C	Computer Forensics				
D	Computer Network Analysis & Simulation				
<b>CN-403</b>	<b>Elective – II</b>	2	2	4	40
A	Network Security & UTMS				
B	Wireless Networking				
C	Cyber Security and Cyber Law				
D	Network Programming				
CN-404	Project/Dissertation	3	5	8	80
CN-405	Practical 7	2	2	4	40
CN-406	Seminar	1	0	1	40
<b>Total Credits</b>		<b>12</b>	<b>13</b>	<b>25</b>	

<b>Paper Code</b>	<b>CA/CN-101</b>
<b>Title</b>	<b>Object Oriented Programming with Java</b>
<b>Total Credits</b>	<b>4</b>

### **Java Evolution**

Java History, Java Features, How Java Differs from C++ and C, Java and Internet, Java Support System, Java Environment.

### **Overview of Java Language**

Introduction, Simple Java Program, More of Java, An Application with Two Classes, Java Program Structure, Java Tokens, Java Statements, Implementing a Java Program, Java Virtual Machine, Command Line Arguments, Programming Style.

### **Constants, Variables and Data Types**

Introduction, Constants, Variables, Data Types, Declaration of Variables, Giving Value to Variables, Scope of Variables, Symbolic Constants, Type Casting, Getting Value of Variables, Standard Default Values.

### **Operators and Expressions**

Introduction, Types of Operators, Arithmetic Expressions, Evaluation of Expressions, Precedence of Arithmetic Operators, Type Conversions in Expressions, Operator Precedence and Associativity, Mathematical Functions.

### **Decision Making : Branching and Looping**

Introduction, if and switch Statement, The ?: Operator, while, do and for Statements, Jumps in Loops, Labeled Loops.

### **Classes, Objects and Methods**

Introduction, Defining a Class, Adding Variables, Adding Methods, Creating Objects, Accessing Class Members, Constructors, Method Overloading, Static Members, Nesting Methods, Inheritance : Extending a Class, Overriding Methods, Final Variables and Methods, Final Classes, Finalizer Methods, Abstracts Methods and Classes, Visibility Controls.

### **Arrays, Strings and Vectors**

Arrays, One-Dimensional Arrays, Creating an Array, Two-Dimensional Arrays, Strings, Vectors, Wrapper Classes.

### **Interface: Multiple Inheritance**

Introduction, Defining Interfaces, Extending Interfaces, Implementing Interfaces, Accessing Interface Variables.

### **Package: Putting Class Together**

Introduction, Java API Packages, Using System Packages, Naming Conventions, Creating Packages, Accessing Packages, Using Packages, Adding a Class to a Package, Hiding Classes.

### **Multithreaded Programming**

Introduction, Creating Threads, Extending the Thread Class, Stopping and Blocking Thread, Life Cycle of Thread, Using Thread Methods, Thread Exceptions, Thread Priority, Synchronization, Implementing the 'Runnable' Interface.

### **Managing Errors and Exceptions**

Introduction, Types of Errors, Exceptions, Syntax of Exception Handling code, Multiple catch Statements, Using finally block, Throwing Our Own Exceptions, Using Exceptions for Debugging.

### **Applet Programming**

Introduction, How Applet Differ from Application, Preparing to Write Applets, Building Applet Code, Applet Life Cycle, Creating an Executable Applet,

Designing a Web Page, Applet Tag, Adding Applet to HTML File, Running the Applet, More about Applet Tag, Passing Parameter to Applet, Aligning the Display, More about HTML tag, Display Numerical Values, Getting Input from User.

### **Graphics Programming**

Introduction, The Graphics Class, Lines and Rectangles, Circles and Ellipses, Drawing Arcs, Drawing Polygon, Line Graphs, Using Control Loops in Applets, Drawing Bar Charts

### **Reference Books:**

1. Java : Complete Reference Naughton Scheldt
2. Java Primer Balaguruswamy
3. Java: An introduction to problem solving and programming by Walther Savitch, Fourth Edition, Pearson/Prentice Hall

<b>Paper Code</b>	<b>CA/CN-102</b>
<b>Title</b>	<b>Operating System Concepts</b>
<b>Total Credits</b>	<b>4</b>

### **Operating System Concepts**

Operating Systems definitions and functions, Mainframe System, Desktop System, Multiprocessor System, Distributed System, Clustered System, Real time Systems, Operating System Components, Operating System services, Virtual Machines

### **Processes and Threads**

Processes- Process Concept, Process Scheduling, Operations on Processes, Inter process Communication, Threads-Overview, Multithreading Models, Threading Issues.

### **Scheduling and Process Synchronization**

Scheduling-Basic Concepts, Scheduling Criteria, Scheduling Algorithms. Process Synchronization-The Critical-Section Problem, Semaphores, Classic Problems of Synchronization, Critical Regions

### **Deadlocks**

System Model, Deadlock Characterization, Methods for Handling Deadlocks, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, Recovery from Deadlock

### **MEMORY MANAGEMENT**

Swapping, Contiguous Memory Allocation, Paging, Segmentation, Demand Paging, Page Replacement.

### **PROTECTION AND SECURITY**

Protection- Goals of Protection, Principles of Protection, Domain of Protection, Access Matrix, Security-The Security Problem, Program Threats, System Threats., User Authentication, Intrusion detection

### **Reference Books:**

1. Operating system Concepts 6th Edition- Silberschatz,Galvin,Gagne
2. Modern Operating Systems- Andrew S Tenanbaum
3. Introduction to Operating System- Dietal H.M.
4. Operating system- Madenick and Donovan

<b>Paper Code</b>	<b>CA/CN-103</b>
<b>Title</b>	<b>Network Operating System</b>
<b>Total Credits</b>	<b>4</b>

### **Overview and History of Linux**

Unix , The GNU Project and the Free Software Foundation, The Linux Kernel, Linux Resources. Advantages of Linux .

### **Installation of Linux**

Installation Overview, Understand runlevels and GRUB, Starting the Installation Process, Booting the Installer, Configuring Language and Installation Source, Installing Using anaconda , Advance Installation Options.

### **X Windows System and Desktops**

Basic X concepts , Installing and Configuring X , GNOME Desktop Environment, Getting documentation locally and online.

### **Managing Storage Devices**

Understanding basic disk concepts and manage system disks , logical volume concepts and managing logical volumes , manage file system attributes and swap space.

### **Creating and Viewing Files**

Basic shell concept, shell commands, I/O redirection, pipelines, vi editor, gedit.

### **Introduction to the File system**

Linux File system, manage files using shell, Understanding file permissions.

### **Shell Scripting**

Introduction to Shell Scripting, Variables, Basic Control Structures, Loops Command-line Arguments .

### **Administering User Accounts and Groups**

User Accounts, Administering User Accounts using GUI tool and Command Line, Administering Groups using GUI tool and Command Line, Other User Administration Programs.

### **Understanding General Services and Processes**

Manage services, configure SSH and remote desktops , managing logs with rsyslog and logrotate , starting and stopping process , setting priority to process , cron and at to schedule process .

### **Managing Network Services**

Basic network concepts, configure basic network settings , SELinux firewall , troubleshooting network .

### **Software Management**

Redhat Package Manager(RPM) , package files, Adding , removing , updating, determining , identifying packages using rpm , Querying and Verifying Package Contents ,managing software using yum.

### **Virtual Machine Management using Xen**

Understanding basic virtualization concept , installing the Xen environment and managing virtual machines .

### **Reference Books:**

1. Linux Network Servers: Craig Hunt
2. Linux Unleashed :Third Edition- Tim Parker

<b>Paper Code</b>	<b>CA/CN-104</b>
<b>Title</b>	<b>Networking Essentials</b>
<b>Total Credits</b>	<b>4</b>

### **Introduction to computer network and data communications**

Need of computer network, Evolution of computer network, Data communication fundamentals-analog signal transmission, digital signal transmission, Data transmission-serial and parallel transmission, communication models, Error control.

### **Transmission Medias**

Twisted pairs, Coaxial cable, Optical fibers, unguided transmission media.

### **Network Classification**

Classification of computer networks- classification by geographical spread, topological classification, classification by ownership

Switching and routing- circuit switching, message switching, packet switching, routing Multiplexing- Frequency Division Multiplexing, time division Multiplexing

### **Network Components**

File server, Workstation, Network Interface Unit, Transmission media, Hub, Repeaters, Bridges, Routers, Gateway, Modem.

### **Networking Protocols and OSI model**

Introduction, Protocols in computer communications, OSI model, OSI layer functions.

### **Introduction to TCP/IP model**

Introduction, TCP/IP basics, Why IP addresses, Logical addresses, The concept of IP address.

### **Examples Network**

Fiber Distributed Data Interface (FDDI), Integrated Services Digital Network (ISDN), Frame Relay.

### **Reference Books:**

1. Data Communication and Networks – Achyut S Godbole( Tata McGraw Hill)
2. Computer Networks Fundamentals and Applications – R.S. Rajesh,K.S Easwarakumar,R. Balasubramaniam ( Vikas Publishing House)
3. Computer Networks 4th Edition – Andrew S Tenenbaum ( Pearson Prentice Hall)

<b>Paper Code</b>	<b>CA/CN-201</b>
<b>Title</b>	<b>Data Structure and Analysis of Algorithm</b>
<b>Total Credits</b>	<b>4</b>

### **Introduction to Computer Problem Solving**

Introduction, The problem solving Aspects, Top Down design , Implementation of Algorithms, Program Verification.

### **Introduction to Algorithm**

The efficiency of Algorithms, Analysis of Algorithms – overview of Space and Time Complexities, Amortized Complexity, Asymptotic Notations( Big O, Omega, Theta) Practical Complexity , Performance Measurements . Thinking and writing of some fundamental algorithms for exchange , counting , summation , etc.

### **Introduction to data structures**

Basic terminology, primitive data structure operations.

### **Linked List**

Introduction, representation, traversing, searching, memory allocation and garbage collection , insertion, deletion header linked lists, two way lists.

### **Stacks, Queues and Recursion**

Representation of stacks, arithmetic expressions, polish notations, quick sort, recursion, tower of Hanoi problem, recursive procedures and stacks, queues, representation of queues, insertion and deletion in queues, dequeues, priority queues.

### **Graphs and Their Applications**

Terminology of graph, types, representation, adjacency and path matrix , DFS and BFS algorithms, topological sorting. Single-source shortest Paths ,

### **Sorting and Searching**

Linear and binary search, searching and data modification, sorting problem, insertion, selection, merging, merge, radix sort . Understanding Complexities issues in searching and sorting algorithms. Hashing

### **Trees**

Minimum Spanning Trees ,Growing a minimum spanning tree, the algorithms of Kruskal and Prim.

### **Algorithm analysis**

All-pairs shortest paths , Shortest-paths and matrix multiplication, the Floyd-Warshall algorithm, Johnson's algorithm for sparse graphs The Bellman-ford algorithm, single-source shortest paths in directed acyclic graphs Dijkstra algorithm.

**Reference Books:**

- 1 How to solve it by Computers, R.G. Dromey , 8th Edition , Pearson Education.
2. Fundamentals of Computer Algorithms, Ellis Horowitz, Satraj Sahani, S. Rajasekaran , 2nd Edition , Universities Press Inc .
3. Data Structures, Lipschutz , Tata McGraw Hills .
4. Introduction to Algorithms, Corman , Leiserson and others, 2nd edition, PHI .

<b>Paper Code</b>	<b>CA/CN-202</b>
<b>Title</b>	<b>Advance Java</b>
<b>Total Credits</b>	<b>4</b>

### **The Applet & Event Handling**

Applet Fundamentals, Applet Architectures , An Applet skeleton ,The HTML APPLET tag , Passing parameters to Applet ,Delegation based Event handling ,Event class ,Event Types and Listener , Action Event , Windows Event ,Mouse Event ,Key Event.

### **Introduction to AWT: Working with windows, Graphics Text**

AWT Classes , Windows Fundamentals ,Working with Frame window , Working with Graphics , Working with Colors & Fonts , Layout Managers.

### **A Tour of Swing**

Swing & Its Features , JApplet , Icons & Labels Button & Label, TextField & Toggle Buttons, Check Boxes, Radio buttons ,Combo Box & Lists , Scroll panes ,Trees ,Tables ,Menu Bars & Menus, ToolBars ,ialog Boxes ,File Dialog , Porgress Bar ,Choosers.

### **JavaBeans**

Introduction & Advantages of JavaBeans , Application Building Tools ,Bean Development Kit ,JAR Files ,Developing Simple Bean Using the BDK ,The Java Bean API.

### **Java Database Connectivity (JDBC)**

Introduction to JDBC, Types Of JDBC Connectivity, Accessing Relational Database from java Programs Establishing database Connection.

### **Servlets**

Introduction , Servlet Overview & Architecture , Setting up Apache Tomcat Server ,Handling HTTP Get Request ,Handling HTTP Get Request Containing Data ,Handling HTTP Post Request.

### **Java Server Pages**

Introduction & Overview , JSP Example , Implicit Objects , Scripting , Standard Actions , Page Directives.

### **Reference Books:**

- 1 Java The Complete Reference by Herbert Schildt Tata McGraw-Hill.
2. Mastering Java2 J2SE1.4 by John Zukouski PBP Publication.
3. JavaTM How to Program sixth Edition By H.M Deitel, P.J. Deitel
4. Core Servlets & JavaServer Pages By Marty Hall, Larry Brown.
5. Java: An introduction to problem solving and programming by Walther Savitch, Fourth Edition, Pearson/Prentice Hall

**Paper Code** CA/CN-203  
**Title** DOT NET Technology  
**Total Credits** 4

### **Introduction to VB.NET**

What is .NET? A New Programming Platform , The .NET Framework, The Common Type System, The Common Language Specification, The Common Language Runtime, Microsoft Intermediate Language, Metadata, Executable Code, Managed Execution, Application Domains, Automatic Memory Management, Just-in-Time Deployment, Understanding Assemblies Locating Assemblies, What's in an Assembly, The Roles of the Assembly, Attributes, Reflection, and Assemblies, Strong Names, The .NET Security Model , System Objects .NET Overview.

### **Exploring the IDE**

Working with the Visual Studio IDE , Navigating the IDE , Starting from the Start Page , Creating a Visual Basic .NET Solution , Loading the Vb7cr Solution Creating a New Project , Solution Directory Structure , File Extensions , Working with the Base-Class Library , A Minimal Visual Basic .NET Application.

### **VB.NET Language Essentials**

Console Application, Hello World in VB.Net, Classes, VB.Net Type System, Strings, Arrays, Methods, Optional Parameters, Review of Object Oriented Concepts.

### **Exceptions: Handling and Classes**

Overview, Why Do We Need Exception Handling? Structured Exception Handling, Exception-Handling Models, The Resumption Model, The Termination Model, Recovering from Exceptions, Exception Statements, Try, Catch, Finally, When Filters Nesting Try Blocks, Throw, Exception-Handling Tips, Creating Your Own Exception Classes, The .NET Exception Hierarchy, Choosing a Base Class from which to Inherit.

### **Working With DataBase**

ADO.NET vs ADODB, ADO.NET Object Model, Provider Namespaces, Connections, Disconnected Data Access, Select/Update/Insert/Delete on Database, DataGridView Control, and Database Related tools.

### **Reference Books:**

- 1 Application Development Using VB.NET By Robert J. Oberg and Others.
2. The Complete Reference VB.NET By Jeffrey R. Shapiro Beginning VB.NET.

<b>Paper Code</b>	<b>CA/CN-204</b>
<b>Title</b>	<b>RDBMS - I</b>
<b>Total Credits</b>	<b>4</b>

### **INTRODUCTION**

Basics of database systems, Problems in Traditional file oriented approach, Three level architecture of DBMS , views , instances , General Architecture of DBMS , discussions on various modules in it . Roles of DBA , Data Dictionary , Advantages and Disadvantages of DBMS

### **DATA MODELS**

Concept of Abstraction and Data Model ,Introduction of Entity Relationship model, Elements of the E-R Model , types of entities, relationships, Modeling examples using E-R Model , Extended ER Model, Introduction to Relational Model , Elements of the Relational Model ,Modeling examples using Relational Models , E-R to Relational Conversion Keys and their types.

### **RELATIONAL ALGEBRA**

Relational Algebra: Basics of Relational Algebra, Unary and Binary Operators including Set Operators , Cross product , division etc., Join and its types , writing Relational Algebra notations for user queries

### **OBJECT ORIENTED DATA MODELS**

Need of Object Oriented Models, Object oriented concepts of OO Data Models , Comparison of RDBMS and OODBMS

### **NORMALIZATION**

Overview of Relational Model , Anomalies in databases ,Functional Dependencies – Determinant, partial , full , transitive ,Various Normal Forms and normalization process ,First Normal form, Second Normal Form, Third Normal Form , Boyce-Codd Normal Form , Lossy and Lossless Joins , Multi-valued dependency, Fifth Normal Form. Overview of SDLC- Life Cycle

### **SECURITY AND INTEGRITY**

Basic threats ,General defense Mechanism ,Authorization , Identification and Authentication policies ,Discussions on roles of DBA, Data Dictionary . Basic Integrity threats ,General Integrity Model ,Domain level constraints , Referential Constraints .

### **SQL**

Introduction to data retrieval languages like QBE, QUEL, SQL Discussions on SQL,Table , View Definitions ,DDL Statements, DML Statements, DCL Statements ,Implementation of Security and Integrity Constraints , Keys and Foreign Keys, Constraints on Attributes and Tuple, Modification of Constraints SQL Functions ,Introduction to PL/SQL , Triggers , Cursors.

### **QUERY EXECUTION**

Steps in Query Processing , various algorithms for selection , join operators , Understanding Cost issues in queries ,Optimization of Queries- Rule based and Heuristics ,Query Evaluation Plans , Pipelined Evaluations.

### **DISTRIBUTED DATABASES , DATA WAREHOUSE AND DATA MINING**

Homogeneous And Heterogeneous Database, Distributed Data Storage, Distributed Transaction, 2PC& 3PCCommit Protocols, Concurrency Control In Distributed Databases. Concept of Data warehouse , its general architecture , concept of Data Mining and its applications

**Reference Books:**

1. Raghu Ramakrishnan/Johannes Gehrke, "Database Management Systems", Tata Mc Graw Hill.
2. Silber Schatz. Korth, "Database System Concepts", Tata Mc Graw Hill.
3. ShamKanth B. Navathe, "Fundamental of DataBase System", Pearson Education.
4. Database management System, Bipin desai
5. Oracle Development Language Oracle PL/SQL Programing , Steven Feuerstein , O'Reilly Publications
6. Oracle Documentation available on WWW