PUNYASHLOK AHILYADEVI HOLKAR SOLAPUR UNIVERSITY, SOLAPUR

NAAC Accredited-2022
'B^{++}' Grade (CGPA 2.96)

Name of the Faculty: Science & Technology

New Education Policy 2020

Syllabus: Computer Science

M. Sc. Part-I (Semester-I and II)

To be implemented from Academic Year 2023-24

NEP Structure of the Syllabus- M.Sc. (Computer Science)

Part-I Semester-I						
Paper Code	Title of the Paper	Hrs/week	Distribution of Marks for Examination			Credits
			Internal	University	Total	
Discipline Specific Course Theory (DSC)						
DSC1-1	Objects Oriented Programming using C++	04	20	80	100	4
DSC1-2	Advanced DBMS	04	20	80	100	4
Discipline Specific Elective Theory (DSE) (Any One)						
DSE1-1	1. Data Structures and Algorithms 2. Operating System	04	20	80	100	4
Minor						
Minor	Research Methodology in Computer Science	04	20	80	100	4
Practical						
DSC-P-1-1	Practical based on DSC1-1	04	10	40	50	2
DSC-P-1-2	Practical based on DSC1-2	04	10	40	50	2
DSE-P-1-1	Practical based on DSE1-1	04	10	40	50	2
Total		**28**	**110**	**440**	**550**	**22**
Part-I Semester-II						
Paper Code	Title of the Paper	Hrs/week	Distribution of Marks for Examination	Credits		
			Internal	University	Total	
Discipline Specific Course Theory (DSC)						
DSC1-3	Java Programming	04	20	80	100	4
DSC1-4	Python Programming	04	20	80	100	4
Discipline Specific Elective Theory (DSE) (Any One)						
DSE1-2	1. Computer Communication Network 2. Mobile Computing	04	20	80	100	4
Practical / Project						
DSC-P-1-3	Practical based on DSC1-3	04	10	40	50	2
DSC-P-1-4	Practical based on DSC1-4	04	10	40	50	2
DSE-P1-2	Practical based on DSE1-2	04	10	40	50	2
Project-1	Project	04	20	80	100	4
Total		**28**	**110**	**440**	**550**	**22**

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Course Code: DSC-1-1,
Course Title: Object Oriented Programming using C++

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Unit – I   **15**

Overview Of C++: Object Oriented Programming, Introducing C++ Classes, Concepts of Object Oriented Programming, C++ as a superset of C, New style comments, main function in C++, meaning of empty argument list, function prototyping, default arguments and argument matching, User defined data types: enumerated types, use of tag names, anonymous unions, scope of tag names.

Classes & Objects: Classes, Structure & Classes, Union & Classes, Inline Function, Scope Resolution operator, Static Class Members: Static Data Member, Static Member Function, Passing Objects to Function, Returning Objects, Object Assignment. Friend Function, Friend Classes.

Array, Pointers References & The Dynamic Allocation Operators: Array of Objects, Pointers to Object, Type Checking C++ Pointers, The This Pointer, Pointer to Derived Types, Pointer to Class Members, References: Reference Parameter, call by reference and return by reference Passing References to Objects, Returning Reference, Independent Reference, C++'S Dynamic Allocation Operators, Initializing Allocated Memory, Allocating Array, Allocating Objects.

Unit – II   **15**

Constructor & Destructor: Introduction, Constructor, access specifiers for constructors, and instantiation, Parameterized Constructor, Multiple Constructor in A Class, Constructor with Default Argument, Copy Constructor, Destructor.

Overloading as polymorphism: Function & Operator Overloading: Function Overloading, Overloading Constructor Function Finding the Address of an Overloaded Function, Operator Overloading: Creating A Member Operator Function, Creating Prefix & Postfix Forms of the Increment & Decrement Operation, Overloading The Shorthand Operation (I.E. +=,-= Etc), Operator Overloading Restrictions, Operator Overloading Using Friend Function, Overloading New & Delete, Overloading Some Special Operators, Overloading [ ], ( ),-, Comma Operator, Overloading << And .

Unit – III   **15**

Inheritance: Base Class Access Control, Inheritance & Protected Members, Protected Base Class Inheritance, Inheriting Multiple Base Classes, Using constructors and destructors in Inheritance, Passing Parameters to Base Class Constructors, Granting Access, Virtual Base Classes.

Virtual Functions & Polymorphism: Virtual Function, Pure Virtual Functions, Early Vs. Late Binding.

Exception handling in C++: try, throw, catch sequence, multiple catch blocks, uncaught exceptions, catch-all exception handler.

Unit – IV   **15**

Templates: Reason for templates compactness and flexibility, function template examples explicit specialization, class templates, out of class definition of member functions.

The C++ I/O System Basics: C++ Streams, The Basic Stream Classes C++ Predefined Streams, Formatted I/O: Formatting Using the IOS Members, Setting The Formal Flags, Clearing Format Flags, An Overloaded Form Of Setf (), Using width() Precision() and Fill(), Using Manipulators to Format I/O, Creating Your own Manipulators.

Reference Books:
1. C++: The Complete Reference: Herbert Schildt, Tata McGraw Hill.
2. Object Oriented Programming with C++: E. Balguruswami, Tata McGraw Hill.
3. Programming with C++ made simple: M. Kumar, Tata McGraw Hill.

Course Code: DSC-1-2
Course Title: Advanced DBMS

Unit – I   **15**

Introduction to Database Systems: Database – Definition, Limitations of traditional file processing systems, Advantages of DBMS, Users of DBMS.

Database Architecture and Environment: Components of DBMS, Architecture, Physical, logical and view, DDL, DML, DCL, schemas, life cycle of Database System Development, Functions of DBMS.

Conceptual Database Modelling: Data Model – Concept, types of data models, ER model, concepts of entity, entity set, attributes, domains, existence dependency, Keys: candidate, primary, composite, strong and weak entities, cardinality, specialization, generalization, aggregation, Relational Algebra, Relational Calculus.

Unit – II   **15**

Relational Database Systems: Characteristics, relation, attribute, tuple, domain, null, Normalization, Functional Dependencies, Multivalued Dependencies, 1NF, 2NF, 3NF, 4NF, 5NF Boyce codd's normal form.

SQL and PL/SQL: DDL, DML, DCL, select: From, Where, Order by, Group by, Having, Intersect, Union, Distinct, Between, In, Between, Different types of functions, Delete, Update, Insert, Nested queries, joins, create, alter and drop, constrains, index, views, Triggers, Grant, Revoke, Commit, RollBack, Savepoint, PL/SQL: %Type, %Rowtype, Exception, Cursor etc.

Unit – III   **15**

Transaction Management and Concurrency Control: Transaction – properties (ACID), states, Concurrency – control, locks, two phase locking serialization.
Distributed Databases: Standalone v/s Distributed databases, Replication, Fragmentation, Client/Server architecture, types of distributed databases.

Unit – IV   **15**

Database Recovery: Need for recovery, techniques – log-based recovery, check point, differed and immediate updates, shadowing, Catastrophic and non- catastrophic failures, Recovery in multi-database environments, two phase commit protocol.

Transaction based techniques, Multiversion approaches, Comparison of CC methods, dynamic databases, Failure classification, recovery algorithm, XML and relational databases.

Object – Relational Databases: Abstract Datatypes, Nested Tables, Varying Arrays, Large Objects, Naming Conventions for Objects.

Reference Books:

1. Database System Concepts by Korth: Abraham Silberschatz, Henry F. Korth, S. Sudarshan, McGraw-Hill Higher Education, 2006.

2. Ramez Elmasri, Shamkant Navathe, Pearson Education India, 2011.
3. An Intro. to Database Systems: C. J. Date, Pearson Education India.
4. Oracle 8i – The Complete Reference: Kevin Loney, George Koch,Osborne / McGraw-Hill, 2000.

Course Code: DSE1-1

Course Title: Data Structures and Algorithms

Unit – I   **15**

Fundamental notions: Primitives and composite data types, choice of data structure and complexity of an algorithm.

Arrays: Single and Multidimensional Arrays, sparse matrices.

Stacks: Processing the stacks, Linked list implementation, Application of Stacks for expression solving, Non recursive implementation of recursive algorithms.

Unit – II   **15**

Queues: Processing the queues, Linked list implementation, Dequeues, Priority queues and their applications.

Linked List: Processing linked list, Circularly linked list, Doubly linked list, Multilinked lists, String and characters manipulation using arrays and linked list

Unit – III   **15**

Trees: Introduction to Tree, Introduction to Binary Trees, Types of Binary tree- Strictly Binary tree, Complete Binary tree, Extended (2-Tree) Binary tree, Binary expression tree, Binary Search tree, Heap Tree- Min heap tree, Max heap tree, Representation of Binary tree using- Array, Linked list Operations of Binary search tree-Creating and inserting node, Searching node, Counting total nodes, Counting and displaying leaf nodes, Tree Traversal methods- Preorder, Inorder, Postorder, Deletion of Nodes, Implementation of binary search tree, Height balanced tree/Balanced Binary Tree/AVL tree, Application of tree Graph: Concept & terminologies used in graph, Graph Representation using- Array and linked list, Graph traversals – BFS & DFS, Dijakstra's shortest path algorithm, and application of graph.

Unit – IV   **15**

Sorting and searching: Various sorts viz. Insertion, Bubble sort, Selection sort, Quick sort, Merge sort, Radix / Bucket sort, Counting sort, searching algorithms and their complexities, . Binary tree indexing, B-tree indexing, Hash indexing.

Reference Books:

1. Data structures and algorithms: Alfred Aho, John Hopcraft and Jeffrey Ullman,Addision – Wesley.
2. Introduction to data structures: Bhagat Singh and Thomas Nap, WestPublishing Company.
3. The C Programming Language: Brian W. Kernighan, Dennis M. Ritchie,Prentice Hall, 1988.
4. Introduction to Data Structures with applications: J. P. Tremble, Tata McGraw Hill, 1984.
5. Data and file structures: Weiderberg.

Course Code: DSE1-1
Course Title : Operating System

UNIT-I   **15**
Introduction and structure of Operating System: Concept of multi – programming, Parallel, Distributed and real – time – sharing, Operating system structure - Operating system components and Services System Call System.

UNIT-II   **15**
Process Management, Synchronization and Deadlocks: Process Concept, process scheduling, cooperating process, Threads, inter process communication, CPU scheduling Criteria, scheduling algorithms-FCFS, SJF, Priority, Round Robin, Multilevel feedback queue scheduling.
Process Synchronization and Deadlocks: Critical Section problem, Synchronization hardware, Semaphores, Critical region, Monitors, Deadlock system model, characterization of deadlocks and deadlock Prevention, Avoidance and detection, recovery from deadlock.

UNIT-III   **15**
Memory Management: Memory Management, Logical and physical Address Space, Swapping, Contiguous Allocation, Paging, Segmentation.
Virtual, memory: demand paging and its performance, page replacement algorithm, allocation of frames, thrashing.

UNIT-IV   **15**
File System: Secondary Storage Structure File Concept Access method, Directory Structure, Protection and consistency Semantics, File System Structure, Allocation Method, Free space Management,   Directory implementation, Disk Structure, Disk Scheduling methods, Disk Management, Swap space Management.

Introduction to RED Hat Linux: Advantages of Linux, Other Linux distributions, Red Hat Linux Installation, Concept of Linux loader, Hardware Requirements.
Working with Linux: Linux file system, Shells, Text editors, Changing User Information, File Permissions, Virtual Consoles.

Reference Books:
1. Operating System Principles: Abraham Silberschatz, Peter Galvin, Greg Gagne, 7th ed., Wiley Student Edition.
2. Operating System: Bawn.
3. Modern Operating Systems: Andrew S. Tanenbaum, Prentice Hall India.
4. Operating Systems: Stuart E. Madnick, John J. Donovan, McGraw-Hill, 1974.
5. Operating system: Peterson.
6. Red Hat Linux 6 Unleashed: David Pitts, Bill Ball, Sams, 1999
7. Red Had Fedora 4 Unleashed: Paul Hudson, Andrew Hudson, Bill Ball, Hoyt Duff, Sams,2000.

<div align="center">**Course code: Minor**
Course Title Research Methodology</div>

Course Outcomes
- Students who complete this course will be able to understand and comprehend the basics in research methodology and applying them in research/ project work.
- This course will help them to select an appropriate research design.
- With the help of this course, students will be able to take up and implement a research project/ study.
- The course will also enable them to collect the data, edit it properly and analyze it accordingly. Thus, it will facilitate students' prosperity in higher education.
- The Students will develop skills in qualitative and quantitative data analysis and presentation.
- Students will be able to demonstrate the ability to choose methods appropriate to research objectives.

Unit 1: Research fundamentals   15
Definition, objectives, motivation, types of research and approaches, research-descriptive, conceptual, theoretical, applied and experimental.

Unit 2: The initial research process   15
Literature review, research design, assortment of the problem, identification of problem, defining a problem, objective, sub objective and scope, assumptions, validation criteria, research proposal(synopsis)

Unit 3: Report writing and presentation of results   15
Need, report structure, formulation, sections, protocols, graphs, tables, IEEE format, evaluation of report, writing abstract, writing technical paper.

Unit 4: Information communication technology   15
Introduction, e-research, indices, virtual lab, digital lab, ethical issues in research.
Patent Rights: Scope of patent rights, licensing and transfer of technology, patent information and databases

Reference Books
1. Research Methodology: Methods and Techniques, C.R. Kothari, New Age International Publishers, 2nd revised Edition
2. Fundamental of Research Methodology and Statistics, Yogesh Kumar Sing, New Age International Publishers
3. Research Methodology, Concepts and Cases, Deepak Chawla
4. Intellectual Property in New Technological Age, Robert P. Merges, Peter S. Menell, Mark A. Lemley, 2016.
5. Intellectual Property Rights by Neeraj Pandey And Khushdeep Dharn

M.Sc. Part-I (Semester-II)

Course Code: DSC-1-3
Course Title: Java Programming

Unit – I   **15**
Introduction to Java: Importance and features of java, keywords, constants, variables and data types, Operators and expressions, Decision making, branching looping: if..else, switch, ?: operator, while, do, for statements, labeled loops, jump statements: break, continue, return.

Classes and Objects: defining a class, adding variables and methods, creating objects, constructors, class inheritance.
Arrays and strings: creating an array, one and two dimensional arrays, string array and methods, String and StringBuffer classes, Wrapper classes.

Unit – II   **15**
Inheritance: Basics types, using super, Multilevel hierarchy abstract and final classes, Object class, Packages and interfaces, Access protection, Extending Interfaces, packages.
Exception Handling: Fundamentals, exception types, uncaught exceptions, throw, final, built in exception, creating your own exceptions.
Java Networking: Introduction, InetAddress class, Two way communication, Socket Overview, Networking Classes and Interfaces.
Multithreaded Programming: Fundamentals of Java thread model, priorities, synchronization, messaging, thread class, Runnable interface, interthread Communication, suspending, resuming and stopping threads.

Unit – III   **15**
Event Handling: Event Model, Event Classes, Event Listener Interfaces, Adapter and Inner Classes, Working with windows, graphics and text, using AWT controls, Layout managers and menus, handling Image, animation, sound and video, Java Applet.

Unit – IV   **15**
Input/Output: Basics, Streams, Byte and Character stream, predefined streams, Reading and writing from console and files. Using Standard Java Packages (lang, util, io, net).
JDBC: JDBC API, JDBC Drivers, Products, JDBC Design considerations, Basic steps to JDBC, setting up a connection to database, Creating & executing SQL statements.

Reference Books:
  1. Java 2: The Complete Reference: The Complete Reference, Patrick Naughton, Herbert Schildt, McGraw Hill Professional, 1999.
  2. Programming with JAVA - A Primer: E. Balaguruswamy, 3rd Edition, McGraw Hill.
  3. Computing Concepts with Java 2 Essentials: Cay Horstmann, John Wiley.

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Course Code: DSC1-4
Course Title: Python Programming

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Unit –I   **15**

String, List, Tuple ,Dictionary ,Function, Module, Set, Package

String -Declaring string ,String manipulation using string functions, formatting string literals
List-Introduction to list ,list functions
Tuple- Introduction to tuple ,manipulating tuple.
Dictionary- Introduction**,** Accessing values in dictionaries**,** create,delete and update dictionary items.
Function- Types of function**,** Defining function ,calling function**,** advantages of function function parameters, Anonymous function, Global and local variables, inbuilt functions-map,zip,reduce,filter ,any,chr ,ord etc. **Modules-**Importing module**,** creating and exploring modules ,math module**,** time module,random module**,** OS,calendar,sys etc. **Set-**Introduction to set**,** manipulate set. **Package-**Introduction**,** importing from package**,** json
File-File opening ,closing file**,** various types of file modes**,** reading and writing to file manipulating directories **Exception handling -** try,else**,** finally**,** raise keyword.
Regular Expression- various types of regular expression**,** using match and search function.
GUI -Introduction to GUI library**,** Advantages**,** Layout management**,** Events and binding Drawing on canvas(line, oval, rectangle etc) widget such as Frame, Label, Button, Checkbutton, Entry, Listbox, Radiobutton, Text, Spinbox etc.
Database-Introduction**,** Connections**,** Executing queries**,** Transactions**,** Error Handling

Unit –II   **15**
OOPs Concept : Introduction to OOP, Classes and objects, Inheritance Method overloading and method overriding ,Abstract method and Abstract class, Interfaces in python ,Abstract class VS Interfaces,constructor,instance methods ,class methods, static methods.
Generators- Introduction**,** communicating with generators with send( )
Decorators –Introduction**,** simple function decoratoes**,** classes as decorators**,** chained decorators decorator arguments .
Threads – Introduction**,** Uses of Threads**,** creating Thread without using a class**,** creating a Thread by creating a Sub Class to Thread Class**,** creating a Thread without creating a Sub Class to Thread Class, Communication between Threads, Thread communication using notif() and wait() methods

Unit –III   **15**
Data science using python
Data Frame-Creating Data Frame from an Excel Spreadsheet**,** Creating Data Frame from .csv file**,** Creating Data Frame from python Dictionary**,** Creating Data Frame from python List of Tuples, Operations on Data Frames.
Data visualization-Bar Graph ,Histogram ,Creating a pie chart ,creating line graph

Unit – IV   **15**
NumPY
Introduction, creating NumPYarrays, indexing and slicing in NumPy.
Pandas-Introduction**,** installation of panda**,** data frame**,** series**,** range data**,** slice data,drop a colomn,**,** concatenation.
Django-Introduction to django**,** ddjango templates**,** introduction to WSGI

References :
1. INTRODUCTION TO COMPUTATION AND PROGRAMMING USING PYTHON: WITH APPLICATION TO UNDERSTANDING DATA, John V. Guttag
2. THINK PYTHON, by Allen B. Downey, O'Reilly
3. INTRODUCING PYTHON: MODERN COMPUTING IN SIMPLE PACKAGES by Bill Lubanovic
4. PYTHON PROGRAMMING: AN INTRODUCTION TO COMPUTER SCIENCE by John Zelle
5. Core Python Programming, Dr. R. Nageshwara Rao, Dreamtech
6. Introduction to Computer Science using Python, Charles Dierbach, Wiley

E-Resources: -
1. Python Book (http://upload.wikimedia.org/wikipedia/commons/9/91/Python_Programming.pdf) http://pythonbooks.revolunet.com/
2. Python Threading: http://www.tutorialspoint.com/python/python_multithreading.htm GUI:
3. https://wiki.python.org/moin/TkInter https://wiki.python.org/jython/LearningJython http://www.tutorialspoint.com/python/python_gui_programming.htm
4. Database:Python MySQL API https://wiki.python.org/moin/DatabaseInterfaces http://www.tutorialspoint.com/python/python_database_access.htm
5. Web Framework: http://webpy.org/docs/0.3/tutorial

Course Code: DSE-1-2
Course Title: Computer Communication Network

Unit – I   **15**

Introduction: Uses of Computer networks: Business Applications, Home Applications, Mobile Users, Social Issues; Network Hardware: Local Area Networks, Metropolitan Networks, Wide Area Networks, Wireless Networks, Home Networks, Internetworks; Network Software: Protocol Hierarchies, Design Issues for the Layers, Connection-Oriented and Connectionless Service Primitives, Relationship of Services to Protocols; Example of Networks: The Internet, The ARPANET, NSFNET, Internet usage, Architecture of the internet.

Data Link Layer: Data Link Layer Design Issues: Services Provided to the Network Layer, Framing, Error Control, Flow Control; Error Detection and Correction: Error-Correcting Codes, Error-Detecting Codes; Elementary Data Link Protocols: An Unrestricted Simplex Protocol, A Simplex Stop-and-Wait Protocol, A Simplex Protocol for a Noisy Channel; Sliding Window Protocols: A One-Bit Sliding Window Protocol, A Protocol Using Go Back N, A Protocol Using Selective Repeat; Example Data Link Protocols: HDLC—High-Level Data Link Control, The Data Link Layer in the Internet.

Unit – II   **15**

Network Layer: Network Layer Design issues: Store and Forward packet Switching, Services Provided to the Transport Layer, implementation of Connectionless Service, Implementation of Connection-oriented Services, Comparison of Virtual Circuit and Datagram subnets; Routing algorithms: The Optimality Principle, Shortest Path Routing, Flooding, Distance Vector Routing, Link state Routing, Hierarchical Routing, Broadcast Routing, Routing for Mobile Hosts; Congestion Control Algorithms: General Principles of Congestion Control, Congestion Prevention Policies, Congestion Control in Virtual-Circuit Subnets, Congestion Control in Datagram Subnet, Load Shedding, Jitter Control; Quality of Service: Requirements, Techniques for Achieving Good Quality of Service; Internetworking: Differences in Networks, Network Connection, Concatenated Virtual Circuits, Connectionless Internetworking; Tunneling; Internetwork Routing, Fragmentation; The Network Layer in the Internet: The IP Protocol, IP Addresses, Internet Control Protocols, Mobile IP; IPV6.

Unit – III   **15**

The Transport Layer: The Transport Service: Services Provided to the Upper Layers, Transport Service Primitives, Berkeley Sockets; Elements of Transport Protocols: Addressing, Connection Establishment, Connection Release Flow Control and Buffering, Multiplexing, Crash Recovery; The Internet Transport Protocol – UDP: Introduction to UDP, Remote Procedure Call, The Real-Time Transport Protocol; The Internet Transport Protocols – TCP: Introduction to TCP, The TCP Service Model, The TCP Protocol, The TCP Segment Header, TCP Connection Establishment, TCP Connection Release, Modeling TCP Connection Management TCP Transmission Policy, TCP Congestion Control, Wireless TCP and UDP.

The Application Layer: DNS – The Domain Name System: The DNS Name Space, Resource Records, Name Servers; Electronic Mail: Architecture and Services, The User Agent, Message Formats, Message Transfer, Final Delivery; The World Wide Web: Architectural Overview, Static Web Documents, Dynamic Web Documents, HTTP, Performance Enhancements, The Wireless Web.

Reference Books:

1. Computer Networks: Andrew S. Tanenbaum, 4th Edition, Pearson Education, Asia, 2002.
2. Communication Networks: Fundamental Concepts and Key Architectures, Alberto Leon-Garcia, Indra Widjaja, Tata McGraw Hill, 2006.
3. Data Communications and Networking: Behrouz A. Forouzan, Tata McGraw Hill, Second Edition, 2001.

Course Code: DSE1-2
Course Title: Mobile Computing

Unit – I   **15**

Introduction to Personal Communications Services (PCS) PCS Architecture, Mobility management, Networks signaling. Global System for Mobile Communication (GSM) system overview: GSM Architecture, Mobility management, Network signaling.

Unit – II   **15**

General Packet Radio Services (GPRS) &Wireless Application Protocol (WAP) GPRS Architecture, GPRS Network Nodes. Mobile Data Communication: WLANs (Wireless LANs) IEEE 802.11 standard, Mobile IP. Wireless Application Protocol (WAP): The Mobile Internet standard, WAP Gateway and Protocols, wireless mark up Languages (WML).

Unit – III   **15**

Third Generation (3G) Mobile Services Introduction to International Mobile Telecommunications 2000 (IMT 2000) vision, Wideband Code Division Multiple Access (W-CDMA), and CDMA 2000, Quality of services in 3G. Wireless Local Loop (WLL): Introduction to WLL Architecture, wireless Local Loop Technologies.

Unit – IV   **15**

Global Mobile Satellite Systems Global Mobile Satellite Systems; case studies of the IRIDIUM and GLOBAL STAR systems, Enterprise Networks Introduction to Virtual Networks, Blue tooth technology, Bluetooth Protocols. Advanced techniques in mobile computing.

Reference Books:

1. "Wireless and Mobile Networks Architectures", by Yi-Bing Lin & Imrich Chlamtac, John Wiley & Sons, 2001.
2. "Mobile and Personal Communication systems and services", by Raj Pandya, Prentice Hall of India, 2001.
3. "Guide to Designing and Implementing wireless LANs", by Mark Ciampa, Thomson learning, Vikas Publishing House, 2001.
4. Wireless Web Development", Ray Rischpater, Springer Publishing, 2000.

Equivalence papers for M.Sc.-I Sem I and II (Computer Science)

Sr.no.	Old Paper	New Paper
1	HCT 1.2 Object Oriented Programming using C++ (Sem. I)	DSC1-1 Objects Oriented Programming using C++ (Sem. I)
2	HCT 1.2 Advanced DBMS (Sem. I)	DSC1-2 Advanced DBMS (Sem. I)
3	HCT 1.3 Data Structures and Algorithms (Sem. I)	DSE1-1 Data Structures and Algorithms (Sem. I)
4	SCT 1.1 Software Engineering (Sem. I)	No equivalence
5	SCT 1.2 UML (Sem. I)	No equivalence
6	HCT2.1 Java Programming (Sem. II)	DSC1-3 Java Programming (Sem. II)
7	HCT 2.2 Python Programming (Sem. II)	DSC1-4 Python Programming (Sem. II)
8	SCT 1.1 Computer Communication Network (Sem. II)	DSE1-2 Computer Communication Network (Sem. II)
9	SCT 1.2 Artificial Intelligence (Sem. II)	No equivalence
10	OET 2.1 Office Automation (Sem. II)	No equivalence