SARDAR PATEL UNIVERSITY
VALLABH VIDYANAGAR

SYLLABUS EFFECTIVE FROM: 2018-19
(Under Choice Based Credit Scheme)
MCA

(પીજી બોર્ડ તા. ૦૩/૦૫/૨૦૧૭)

Semester – III

OBJECT ORIENTED PROGRAMMING USING JAVA
COURSE NO: PS03CMCA21

(3 Lectures & 1 Seminar/Tutorial per Week Total Marks: 100)

COURSE CONTENT:

1. Introduction Java and its Basic Concepts
- The Java programming language: history, evolution, features
- Introduction to the Java programming environment, JDK, JRE
- An anatomy of a Java program
- Data types, wrapper classes, automatic boxing and unboxing
- Inheritance, polymorphism, Interfaces
- Input-output
- Exception handling
- String handling

2. Graphical Programming - I
- An introduction to graphics in Java
- Introduction to the Abstract Windowing Toolkit (AWT)
- The Swing library
- Overview of Java Applets
- Writing graphical programs using Swing
- Using various Swing components

3. Graphical Programming – II and JDBC
- Managing layout using Swing
- Event handling using Swing
- Introduction to JDBC
- Different types of JDBC drivers
- Programming database applications using JDBC

4. Advanced Java Programming

- Generics, enumeration
- The Collections Framework and handling classes in it
- The java.util package and important members from it
- Introduction to serialization
- Multithreading
- File handling and network programming

MAIN REFERENCE BOOKS:

1. Schildt H. : The Complete Reference Java 2, 5th Edition, McGraw-Hill / Osborne, 2002
2. Deitel : Java : How to Program, 5th edition, Pearson Education, 2003
3. Documentation of the relevant software packages

BOOKS FOR ADDITIONAL READING:

1. Zukowski J : Mastering Java 2 J2SE 1.4, BPB Publications
2. Horstmann et al. : Core Java Vol. I, II, Pearson Education Asia, 2000

THE NET TECHNOLOGY
COURSE NO: PS03CMCA22

(3 Lectures & 1 Seminar/Tutorial per Week Total Marks: 100)

COURSE CONTENT:

1. The .NET Technology
- Introduction and evolution, architecture, Core components of .NET Framework
- Common applications of the .NET technology (standalone systems, client-server systems, web-based applications, web services, mobile development, rich client applications, etc.)
- Managed code, compilation to intermediate language, Just-In-Time compilation, garbage collection, assemblies and the GAC

2. .NET Language basics (C# .NET)
- C#.NET – Introduction and features
- Skeleton of C#.NET program
- Basic data types in the .NET framework
- Boxing and Unboxing
- Class fundamentals, OOPS concepts
- Arrays, Lists, Collections and iterating over them, Exception handling,
- User interface development using Windows Forms

3. Database Programming using C#.NET
- Different database access models and their comparison
- ADO.NET – architecture, connected and disconnected mode
- Managing database connections
- Developing data-oriented applications
- Generating reports

4. Advanced Features of .NET
- Introduction to WPF and WCF
- Advanced controls
- Multithreading
- Custom controls

MAIN REFERENCE BOOKS:
1. C# 2010 Programming covers .NET 4.0, Black Book, Dreamtech Press.
2. Beginning Microsoft Visual C# 2008, Wrox Publication.
3. C# 4.0 in a Nutshell, Authors: Joseph Albabari & Ben Albabari, O'Reilly.
4. Documentation of relevant software packages

BOOKS FOR ADDITIONAL READING:
1. Nagel et al.: Professional C# 4 with .NET 4.0, Wrox Publication.
2. Pro C# 5.0 and .NET 4.5 Framework, Author: Andrew Troelsen, APress.
3. Internet resource

ANALYSIS AND DESIGN OF ALGORITHMS

COURSE NO: PS03CMCA23

(3 Lectures & 1 Seminar/Tutorial per Week Total Marks: 100)

COURSE CONTENT:

1. **Review of Data Structures and Divide & Conquer method**
   - Review of Data Structures
     - Introduction to algorithm and its design criteria
     - Performance analysis of algorithm using Space and Time complexity
     - Asymptotic complexity
     - Heap, sets and their basic operations
   - Divide and Conquer method
     - Introduction to divide and conquer strategy
     - Binary search technique
     - Finding Maximum and Minimum from array
     - Merge sort and Quick sort

2. **Greedy method**
   - Introduction to the greedy method strategy
   - Optimal storage in tape
   - Knap sack problem
   - Job sequencing with deadlines
   - Spanning trees
   - Shortest paths

3. **Dynamic Programming**
   - Introduction to dynamic programming
   - Multistage graphs
   - Optimal binary search trees
   - 0/1 knapsack problem
   - Travelling salesman problem

4. **Backtracking and Branch & Bound Technique**
   - Backtracking
     - Introduction to the backtracking method
     - 8 queens problems
     - Graph coloring
     - Hamiltonian cycles
   - Branch & Bound
     - Introduction to the branch & bound method
     - LC Search
     - 15 puzzle problem
     - Travelling salesman problem

MAIN REFERENCE BOOKS:

1. Horowitz, Ellis & Sahni, Sartaj : Fundamental of data structures, computer science Press ,Potomac maryland, 1976.
2. Horowitz Ellis & Sahni Sartaj : Fundamentals of Computer Algorithms, Galgotia Pub. Pvt. Ltd., New Delhi, 1993.

BOOKS FOR ADDITIONAL READING:

1. Goodman, S. E. & Hedetnieni, : Introduction to the Design and Analysis of Algorithms, McGraw-Hill Book Comp., 1977.
2. Kunth. D. E. : Fundamentals of Algorithms : The Art of Computer Programming Vol. 1, Narosa Pub. House, 1985.
3. Aho, A. V., Hopcroft, J. E., Ullman J. D. : The Design and Analysis of Computer Algorithms, Addision-Wesley Pub. Co., 1974.

SYSTEM SOFTWARE

COURSE NO: PS03CMCA24

(3 Lectures & 1 Seminar/Tutorial per Week Total Marks: 100)

COURSE CONTENT:

1. Introduction

- System software and its components
- Evolution of system software
- Introduction to language processing
- Comparison of machine languages, assembly languages and high-level languages
- Internal architecture of a CPU (Intel 8086/88)
- List and use of all registers in 8086/88
- Memory addressing in 8086/88 in depth with addressing modes
- Interrupt processing
- The structure of a typical assembly language program (8086/88, MASM/TASM syntax)

2. Assembly language fundamentals

- Data transfer , Arithmetic and Bit manipulation instructions
- Conditional and unconditional transfer of control
- Iteration control
- Stack instructions
- Common system calls: Input and output of a character, input and output of a string, program termination
- Alternate syntaxes for the 8086/88 assembly language
- Ability to write complete assembly programs for simple numeric (integer only) and string processing

3. Assemblers & Compilers

- Elements of assembly language programming, overview of assembly process, Design of a two-pass assembler, Macros and Macro processors.
- Introduction to compilers and interpreters
- Significance of compiler technology
- Differences between compilers and interpreters
- Introduction to all the phases of a compiler
- Introduction to compiler development tools

4. Other Common System Software Tools & Embedded Systems

- Loading, linking and relocation
- Design of a linker
- Self-relocating programs
- Loaders: their need, function, types, etc.
- Debuggers, profilers

- An introduction and application of embedded systems
- The embedded system constraints: processing constraints, memory constraints, input/output constraints, response time constraints, predictability/reliability constraints
- Microprocessors, microcontrollers, ASICs, DSPs, FPGAs
- Sensors – introduction and applications
- Introduction to embedded systems programming

MAIN REFERENCE BOOKS:

1. Dhamdhare, D M : "System Programming", Tata McGraw-Hill Company Limited, 2011
2. Hall, D. V. : "Microprocessor & Interfacing : programming and Hardware", Tata McGraw-Hill, 2003
3. Aho A. V., Sethi R., Ullman J. D. : Compilers - Principles, Techniques and Tools, Addition-Wesley Publishing Company, 1988
4. Embedded Systems: Building and Programming Devices, Wikibook, http://en.wikibook.org

BOOKS FOR ADDITIONAL READING:

1. Abel P. : IBM PC Asembly Language and Programming, 5th edition, Prentice-Hall of India Pvt. Ltd., 2001
2. Internet resources

COMPUTER NETWORKS – II

COURSE NO: PS03CMCA25

(3 Lectures & 1 Seminar/Tutorial per Week Total Marks: 100)

COURSE CONTENT:

1. **High Speed LANs, ATM and Satellite Communication**
   - Fast Ethernet
   - Gigabit Ethernet
   - Communication Satellites: Geosynchronous Satellites, Medium-Earth Orbit Satellites, Low-Earth Orbit Satellites, Satellites versus Fiber
   - The Public Switched Telephone Network : The structure, the local loop, modems, ADSL, wireless local loops

2. **Routing, Congestion Control, Tunneling and VPNs**
   - Virtual Circuits and Datagrams
   - Routing Techniques, Congestion Control
   - Tunneling,
   - Virtual Private Networks

3. **Internetworking and Network Security**
   - Introduction and Issues that arise in Internetworking
   - Different ways in which networks differ,
   - Fragmentation,
   - Introduction, Traditional Cryptography, Fundamental Cryptographic
   - Principles, Secret-Key Algorithms, Public-Key Algorithms
   - Firewalls

4. **Wireless Networks**
   - Introduction to wireless networks
   - Principles of wireless network operations
     - Wireless network topologies
     - Cellular topology
     - Cell fundamentals
     - Mobility management
   - Wireless transmission
     - Radio, microwave, infrared, light-wave transmission
   - The mobile telephone system
     - Different generations of mobile telephone systems: technologies and applications
   - Mobile data networks : the concepts of GPRS and SMS
   - Wireless LANs
   - Wireless geolocation systems

MAIN REFERENCE BOOKS:

1. Tanenbaum A. S., Computer Networks, Prentice-Hall of India Pvt. Ltd., New Delhi, 1997.
2. Kaveh Pahlavan and Prashant Krishnamurthy: Principles of Wireless Networks, Pearson Education Asia, 2002.
3. Stallings W., Data and Computer Communications, 3rd Edition, Macmillan Pub. Company, New York, 1991.

BOOKS FOR ADDITIONAL READING:

1. Behrouz Forouzan, Introduction to Data Communications and Networking, Tata McGraw-Hill Publishing Co. Ltd., New Delhi, 1998.

PRACTICALS

COURSE NO : PS03CMCA26

Practicals based on PS03CMCA21 and PS03CMCA22