

### **Course Objectives**

- Learn concepts of operating systems
- Learn the mechanisms of OS to handle processes
- Study of various mechanisms involved in memory management techniques
- Gaining knowledge of deadlocks prevention and detection techniques
- Analyzing disk management functions and techniques

### **Unit I**

Introduction to Operating Systems, Evaluation of OS, Types of operating Systems, system protection, Operating system services, Operating System structure, System Calls and System Boots, Operating System design and implementation, Spooling and Buffering.

### **Unit II**

Basic concepts of CPU scheduling, Scheduling criteria, Scheduling algorithms, algorithm evaluation, multiple processor scheduling. Process concept, operations on processes, threads, inter process communication, precedence graphs, critical section problem, semaphores, classical problems of synchronization,

### **Unit III**

Deadlock problem, deadlock characterization, deadlock prevention, deadlock avoidance, deadlock detection, recovery from deadlock, Methods for deadlock handling. Concepts of memory management, logical and physical address space, swapping, Fixed and Dynamic Partitions, Best-Fit, First-Fit and Worst Fit Allocation, paging, segmentation, and paging combined with segmentation.

### **Unit IV**

Concepts of virtual memory, Cache Memory Organization, demand paging, page replacement algorithms, allocation of frames, thrashing, demand segmentation, Role of Operating System in Security, Security Breaches, System Protection, and Password Management.

### **Unit V**

Disk scheduling, file concepts, File manager, File organization, access methods, allocation methods, free space managements, directory systems, file protection, file organization & access mechanism, file sharing implement issue, File Management in Linux, introduction to distributed systems.

### **References:**

1. Silberschatz ,”Operating system”, Willey Pub

2. Tanenbaum “ Modern Operating System” PHI Learning.
3. Dhamdhare, ”System Programming and Operating System”,TMH.
4. Stuart,”Operating System Principles, Design &Applications”,Cengage Learning
5. Operating System : Principle and Design by Pabitra Pal Choudhury, PHI Learning

### **Suggested List of Experiments**

1. Program to implement FCFS CPU scheduling algorithm.
2. Program to implement SJF CPU scheduling algorithm.
3. Program to implement Priority CPU Scheduling algorithm.
4. Program to implement Round Robin CPU scheduling algorithm.
5. Program to implement classical inter process communication problem(producer consumer).
6. Program to implement classical inter process communication problem(Reader Writers).
7. Program to implement classical inter process communication problem(Dining Philosophers).
8. Program to implement FIFO page replacement algorithm.
9. Program to implement LRU page replacement algorithm

### **Course Outcomes**

Upon successful completion of this course the students will:

- Gain knowledge of history of operating systems
- Understand design issues associated with operating systems
- Gain knowledge of various process management concepts including scheduling, synchronization, deadlocks
- Understand concepts of memory management including virtual memory
- Understand issues related to file system interface and implementation, disk management
- Be familiar with protection and security mechanisms
- Be familiar with various types of operating systems including Unix

### **Course Objectives**

- To provide students with an overview of the concepts and fundamentals of computer networks
- To familiarize with the basic taxonomy and terminology of computer networking area.
- Describe how computer networks are organized with the concept of layered approach
- To experience the designing and managing of communication protocols while getting a good exposure to the TCP/IP protocol suite

### **Unit I**

Importance of computer networks, broadcast and point to point networks, Local area networks and Wide area networks , ISO-OSI reference model, TCP/IP model , interfaces and services, Protocol data unit, connection oriented and connectionless services, service primitives, Binding Protocol Address- ARP & RARP, packet format, Encapsulation.

### **Unit II**

Data-Link layer: - Data link layer design issues, framing , flow & error control , physical addressing, Stop & Wait protocol ,Go back N ARQ ,selective repeat ARQ ,piggybacking and pipelining ,HDLC LAN Protocol stack-Logical link control and Media Access Control sublayer, IEEE 802.2 LLC Frame format; MAC layer Protocols- static and dynamic allocation, Pure and slotted ALOHA, Carrier sense multiple access, Persistent and non persistent CSMA, IEEE standard 802.3, 802.4, 802.5, FDDI,

### **Unit III**

The Network layer- logical addressing, classful & classless addressing, packet delivery & forwarding. unicast routing protocols , multicast routing protocols, Routing algorithm- Least Cost, Dijkstra's, Bellman-ford, Introduction to Internet protocol, IPv4 header, IPv4 Datagrams, Encapsulation, Fragmentation and Reassembly, IP routing, Subnet addressing, Subnet mask, Super netting- special case of IP addresses, Ipv6-Motivation, frame format and addressing. ICMP: Introduction, ICMP Header, ICMP message types.

### **Unit IV**

Transport layer- TCP: Introduction ,Transport services , Process to process delivery, TCP ,congestion control algorithms, quality of service, headers, connection establishment and termination, timeout of connection establishment, maximum segment size, port no. and socket addresses, TCP timers, UDP: Introduction, UDP header, UDP checksum, UDP operations, encapsulation & decapsulation, queuing, SCTP-Services, transmission sequence number, stream identifier, stream sequence number, packet format.

## Unit V

Application layer - BOOTP:-operation, packet format, DHCP:-Address allocation, configuration & packet Format, DNS: Distribution of name spaces, DNS in the internet, FTP:-Connection, Communication, command processing, TFTP, E-Mail: SMTP, POP, IMAP, SNMP. study of internetworking devices and their configuration– switches, hubs, Bridges, routers and Gateways.

### References

1. .“Computer Networks” - Tanenbaum ,PHI Learning
2. “Data Communication & Networks ” , Fourouzan TMH
3. “TCP/IP-Protocol suite”, Forouzan, TMH 3rd edition
4. “Computer Networks and Internets”, D.E.Comer, Pearson
5. “TCP/IP Illustrated” W. Richard Stevens, Volume I, Addison Wesley,
6. “Internetworking with TCP/IP Vol. I, II & III”, Comer , PHI Learning.

### Course Outcomes

Upon successful completion of this course the students will:

- Have a good understanding of the OSI Reference Model and its Layers
- Identify core networking and infrastructure components and the roles they serve; and given requirements and constraints, design an IT infrastructure including devices, topologies, protocols, systems software, management and security;
- Analyze the requirements for a given organizational structure and select the most appropriate networking architecture and technologies
- Specify and identify deficiencies in existing protocols, and then go on to formulate new and better protocols

# RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

## New Scheme Based On AICTE Flexible Curricula

### Information Technology, V-Semester

#### Departmental Elective IT- 503 (A) Theory of Computation

#### Course Objectives

- Student learns some fundamental concepts in automata theory and designing of Finite Automata, conversion NFA to DFA. Application of Finite Automata in computer science and real world.
- Obtain minimized DFA and Application of regular expression and conversion from RE to Finite Automata and Finite Automata to Regular Expression and Proving language are not regular.
- Designing of CFG's , Construction of parse trees, finding and removing ambiguity in grammars, simplification of CFG, Conversion of grammar to Chomsky Normal Form ,Greibach normal form.
- Designing problems on Pushdown Automata and conversion of grammar to PDA, PDA to Grammar.
- Designing Turing machines, understanding the working of various types of Turing machines and study P and NP type problem.

#### UNIT I

Introduction of the theory of computation, Finite state automata – description of finite automata, properties of transition functions, Transition graph, designing finite automata, FSM, DFA, NFA, 2-way finite automata, equivalence of NFA and DFA, Mealy and Moore machines.

#### UNIT II

Regular grammars, regular expressions, regular sets, closure properties of regular grammars, Arden's theorem, Myhill-Nerode theorem, pumping lemma for regular languages, Application of pumping lemma, applications of finite automata, minimization of FSA.

#### UNIT III

Introduction of Context-Free Grammar - derivation trees, ambiguity, simplification of CFGs, normal forms of CFGs- Chomsky Normal Form and Greibach Normal forms, pumping lemma for CFLs, decision algorithms for CFGs, designing CFGs, Closure properties of CFL's.

#### UNIT IV

Introduction of PDA, formal definition, closure property of PDA, examples of PDA, Deterministic Pushdown Automata, NPDA, conversion PDA to CFG, conversion CFG to PDA.

#### UNIT V

Turing machines - basics and formal definition, language acceptability by TM, examples of TM, variants of TMs – multitape TM, NDTM, Universal Turing Machine, offline TMs, equivalence of single tape and multitape TMs. Recursive and recursively enumerable languages, decidable and undecidable problems – examples,

halting problem, reducibility. Introduction of P, NP, NP complete, NP hard problems and Examples of these problems.

### Reference Books:

1. Daniel I.A. Cohen, "Introduction to Computer Theory", Wiley India.
2. John E Hopcroft, Jeffrey D. Ullman and Rajeev Motwani, "Introduction to Automata Theory, Languages and Computation", Pearson Education.
3. K.L.P Mishra & N.Chandrasekaran, "Theory of Computer Science", PHI Learning.
4. Peter Linz, "Introduction to Automata Theory and Formal Languages", Narosa Publishing.
5. John C Martin, "Introduction to languages and the theory of computation", TATA McGraw Hill.

### Course Outcomes

At the completion of the course, students will be able to...

- Convert between finite automata, regular grammars, and regular expression representations of regular languages
- Apply the pumping lemma for regular languages to determine if a language is regular
- Convert between grammars and push-down automata for context-free languages
- Determine if a language is regular or context-free
- Demonstrate that a grammar is ambiguous
- Translate a context-free grammar from one form to another
- Produce simple programs for a Turing Machine
- Explain the concept of undecidability
- List examples of undecidable problems

**RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL**

**New Scheme Based On AICTE Flexible Curricula**

**Information Technology, V-Semester**

**Departmental Elective IT- 503 (B) Microprocessor and Interfacing**

**Course Objectives:**

- To introduce basic concepts of microprocessor
- To introduce serial and parallel bus standards.
- To introduce programming in assembly language.
- To introduce basic concepts of interfacing memory and peripheral devices to a microprocessor.

**UNIT –I:**

Evolution of microprocessor, single chip micro computers, Micro processor Application, Microprocessor and its architecture, addressing modes, instruction, Instruction sets, Arithmetic and Logic Instruction, Program control instruction, Introduction –8086 family, procedure and macros, connection , Timing and Troubleshooting interrupt, 80286, 80836 and 80486 micro processor system concept.

**UNIT –II:**

Microprocessor Cycle, AIU, Timing and control Unit, Register data, Address bus, Pin Configuration, Intel 8086 instruction, Opcode and operands, limitation word size. Programming the microprocessor Assembly language, The Pentium and Pentium Pro Micro Processor with features, Pentium II, Pentium III and Pentium –IV Microprocessor with software changes. Instruction set for Intel 8086, Introduction Intimation and data formats, Addressing modes, Status flags, Symbols and abbreviations, programming of microprocessors, Assembly language, high level language, areas of application of various languages, Stacks, Sub routines system, software, commands in assembly language, software Development, Debugging program, Modular programming, Structured programming, Top-down, Bottom-up design , MACRO microprogramming.

**UNIT-III:**

Assembly language programming with Examples like Addition of 8/16-bit Binary number, subtraction of 8/16 bit binary number, Address partitioning, addressing mode, type of addressing mode, memory and I/o interfacing, Data transfer schemes, Interfacing device and I/o devices I/o ports, Basic I/o Interfacing MDS, Micro controllers, I/o processor and co-processors ,Microcomputer Development system, Single chip micro computers, intel 8748 intel 8051, inter 8096, intel 8049 intel 2920/2921, I/o processor UPI-425,UPI-41,42, Co-processor, math processor math co-processor –8087, 80287, 80387DX 803875x

**UNIT –IV:**

Bus Interface I/o port Addressing, decoding 8279, Programmable key board/display interface, 8254 Internal Timer, 16550 programmable communication interface A/D, 8259A Programmable Interrupt Controller, 8237 DMA Controller, Shared bus operation, disk Memory system Video display. ISA Bus, Extended ISA ( EISA) and VESA Local Buses, Peripheral Component Inter Connect (Pc I) Bus, Parallel Printer interface (LPT) Universal serial Bus (USB) Accelerated graphics port (AGP),Programmable Communication interfere 8251 VSART CRT Controller 8275, 6854, Floppy disk Controller 8272, I/o processor 8089.

**UNIT –V:**

Memory Unit, RAM,SRAM, DRAM,ROM, PROM EPROM, EEPROM Nonvolatile RAM semiconductor Technology for memory, Shift register, Magnetic Memory, Tap, disc, main memory and secondary memory cache memory, program memory and Data Memory, Real and virtual memory Buses, memory Addressing capacity of CPU, processing speed of computer

### Reference Books:

1. Douglas V Hall, "Microprocessors and interfacing –Programming & Hardware" TMH
2. Barry B. Brey, "The intel Microprocessor –8086", Pearson Education
3. Kenneth J. Ayala, "The 8086 Microprocessor: Programming & Interfacing The PC", Cengage Learning
4. Krishna Kant, "Microprocessors and Microcontrollers", PHI Learning
5. A.K. Ray KM Bhurchandi, "Advanced Microprocessor and peripherals" McGraw Hill
6. R.S. Gaonkar, "Microprocessors and interfacing", TMH

### Course Outcomes:

At the completion of the course, students will be able to...

- Explain the microprocessor's and Microcontroller's internal architecture
- Apply knowledge and demonstrate programming proficiency using the various addressing modes and data transfer instructions of the target microprocessor and microcontroller.
- Compare accepted standards and guidelines to select appropriate Microprocessor (8085 & 8086) and Microcontroller to meet specified performance requirements.
- Analyze assembly language programs
- Design electrical circuitry to the Microprocessor I/O ports in order to interface the processor to external devices.
- Evaluate assembly language programs



**RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL**

**New Scheme Based On AICTE Flexible Curricula**

**Information Technology, V-Semester**

**Departmental Elective IT- 503 (C) Principles of Programming Languages**

**Course Objectives**

- To introduce the major programming paradigms, and the principles and techniques involved in design and implementation of modern programming languages.
- To introduce notations to describe syntax and semantics of programming languages.
- To analyze and explain behavior of simple programs using concepts such as binding, scope, control structures, subprograms and parameter passing mechanisms.
- To introduce the concepts of concurrency control and exception handling

**UNIT-I**

Language Evaluation Criteria, influences on Language design, Language categories, Programming Paradigms – Imperative, Object Oriented, functional Programming, Logic Programming. Programming Language Implementation –Compilation and Virtual Machines, programming environments

**UNIT-II**

Data types: Introduction, primitive, character, user defined, array, associative, record, union, pointer and reference types, design and implementation uses related to these types. Names, Variable, concept of binding, type checking, strong typing, type compatibility, named constants, variable initialization, Sequence control with Expressions, Conditional Statements, Loops, Exception handling.

**UNIT-III**

Subprograms and Blocks: Fundamentals of sub-programs, Scope and lifetime of variable, static and dynamic scope, Design issues of subprograms and operations, local referencing environments, parameter passing methods, overloaded sub-programs, generic sub-programs, design issues for functions overloaded operators, co routines.

**UNIT-IV**

Abstract Data types: Abstractions and encapsulation, introductions to data abstraction, Static and Stack-Based Storage management. heap based storage management. Garbage Collection. Object oriented programming in small talk, C++, Java, C#, PHP, Perl . Concurrency: Subprogram level concurrency, semaphores, monitors, message passing, Java threads, C# threads

**UNIT-V**

Exception handling, Exceptions, exception Propagation, Exception handler in C++ and Java. Logic Programming Language : Introduction and overview of logic programming, basic elements of prolog, application of logic programming. Functional Programming Languages: Introduction, fundamentals. Introduction to 4GL.

**Reference Books:**

1. Sebesta, "Concept of programming Language", Pearson Edu.
2. Louden, "Programming Languages: Principles & Practices", Cengage Learning
3. Tucker, " Programming Languages: Principles and paradigms", Tata McGraw –Hill

4. Terrance W Pratt, "Programming Languages: Design and Implementation", Pearson Edu.
5. CavloGhezzi& Mehdi Jazayeri" Programming Languages Concepts", Willey India
- 6 EHorowitz, "Programming Languages", 2nd Edition, Addison Wesley

### **Suggested List of Experiments:**

1. Define a LISP function to compute sum of squares.
2. Define a LISP function to compute difference of squares.(if  $x > y$  return  $x^2 - y^2$ , otherwise  $y^2 - x^2$  ).
3. Define aRecursive LISP function to solve Ackermann's Function.
4. Define a Recursive LISP function to compute factorial of a given number.
5. Define a Recursive LISP function which takes one argument as a list and returns last element of the list. (Do not use last predicate).
6. Define a Recursive LISP function which takes one argument as a list and returns a list except last element of the list. (Do not use but last predicate).
7. Define a Recursive LISP function which takes one argument as a list and returnsreverse of the list. (Do not use reverse predicate).
8. Define a Recursive LISP function which takes two arguments first, an atom, second, a list, returns a list after.

### **Course Outcomes:**

At the completion of the course, students will...

- Have the background for choosing appropriate programminglanguages for certain classes of programming problems
- Be able to program in an imperative (or procedural),an object-oriented, a functional, and a logical programminglanguage
- Understand the significance of an implementation of aprogramming language in a compiler or interpreter
- Have the ability to learn new programming languages
- Have the capacity to express programming concepts andchoose among alternative ways to express things
- Be able to design a new programming language
- Make good use of debuggers and related tools

### **Course Objectives**

- To present an overview of artificial intelligence (AI) principles and approaches
- Develop a basic understanding of the building blocks of AI

### **Unit I:**

Meaning and definition of artificial intelligence, Production systems, Characteristics of production systems, Study and comparison of breadth first search and depth first search techniques, other Search Techniques like hill Climbing, Best first Search. A\* algorithm, AO\* algorithms etc, and various types of control strategies.

### **Unit II:**

Knowledge Representation, Problems in representing knowledge, knowledge representation using propositional and predicate logic, comparison of propositional and predicate logic, Resolution, refutation, deduction, theorem proving, inferencing, monotonic and non-monotonic reasoning.

### **Unit III:**

Probabilistic reasoning, Baye's theorem, semantic networks, scripts, schemas, frames, conceptual dependency, fuzzy logic, forward and backward reasoning.

### **Unit IV:**

Game playing techniques like minimax procedure, alpha-beta cut-offs etc, planning, Study of the block world problem in robotics, Introduction to understanding, natural language processing.

### **Unit V:**

Introduction to learning, Various techniques used in learning, Introduction to neural networks, applications of neural networks, common sense, reasoning, some example of expert systems.

### **References:-**

- 1 Rich E and Knight K, "Artificial Intelligence", TMH, New Delhi.
- 2 Nelsson N.J., "Principles of Artificial Intelligence", Springer Verlag, Berlin.

### **Course Outcomes:**

Upon successful completion of this course the students will:

- Be familiar with terminology used in this area

- Explain what constitutes "Artificial" Intelligence and how to identify systems with Artificial Intelligence.
- Know how to build simple knowledge-based systems
- Have ability to apply knowledge representation, reasoning, and machine learning techniques to real-world problems

### **Course Objectives**

- Discuss fundamentals of e-commerce, types and applications.
- Evaluate the role of the major types of information systems in a business environment and their relationship to each other
- Assess the impact of the Internet and Internet technology on business electronic commerce and electronic business
- Identify the major e management challenges for building and using information systems and learn how to find appropriate solutions to those challenges.
- Learn strategies for e-commerce, e government, Wireless Application Protocol, WAP technology and electronic payment system.

### **Unit I: Introduction**

Definition of Electronic Commerce, Brief history of Ecommerce, e, E-Commerce: technology and prospects, incentives for engaging in electronic commerce, needs of E-Commerce, advantages and disadvantages, , Inter Organizational E-Commerce Intra Organizational E-Commerce, and Consumer to Business Electronic Commerce, Architectural framework ,Impact of E-commerce on business, E-Commerce Models.

### **Unit II: Network Infrastructure for E- Commerce**

Internet and Intranet based E-commerce- Issues, problems and prospects, Network Infrastructure, Network Access Equipments, Broadband telecommunication (ATM, ISDN, FRAME RELAY). Mobile Commerce: Introduction, Wireless Application Protocol, WAP technology, Mobile Information device. Emerging Client Server Security Threats, firewalls & Network Security.

### **Unit III: E-Marketplaces, e Procurement and e Payment Systems**

Define e-Marketplace and Describe their Functions, Explain e-Marketplace types and their features, Describe the various types of auctions and list their characteristics, Discuss the benefits, limitations and impacts of auctions, E-Commerce in the wireless environment, Competition in the DE and impact on industry, Integration and e-Business suits, ERP, eSCM, CRM, e-Procurement definition, processes, methods and benefits , e-Payment, Discuss the categories and users of smart cards, Describe payment methods in B2B EC

### **Unit IV: Electronic Payment System**

Electronic Payments Overview of Electronics payments, Overview, The SET protocol, Payment Gateway, Digital Token based Electronics payment System, magnetic strip card, E-Checks, Smart Cards, Credit Card, Debit Card based EPS, Emerging financial Instruments, Home Banking, Online Banking.

### **Unit V: e-Government**

Definition of e-Governments, theoretical background of e-governance, issues in e-governance applications, evolution of e-governance, Implementation, E-Government Services, Challenges and Opportunities, E-Government Benefits, e-governance models- broadcasting, critical flow, comparative analysis, mobilization and lobbying, interactive services / G2C2G.

## Reference Books

1. Ravi Kalakota, Andrew Winston, "Frontiers of Electronic Commerce", Addison Wesley.
2. Pete Lohsin , John Vacca "Electronic Commerce", New Age International
3. Goel, Ritendra "E-commerce", New Age International
4. Laudon, "E-Commerce: Business, Technology, Society", Pearson Education
5. Bajaj and Nag, "E-Commerce the cutting edge of Business", TMH
6. Turban, "Electronic Commerce 2004: A Managerial Perspective", Pearson Education
7. Denieal Amor, " The E-Business Revolution", Addison Wesley
8. Diwan, Sharma, "E-Commerce" Excel
9. J. Satyanarayan, "E-government: The science of the possible", PHI Learning Private Limited
10. C.S.R. Prabhu, "E-governance: concept and case study", PHI Learning Private Limited

## Course Outcomes

Upon successful completion of this course the student will be able to:

- understand the e-business concepts.
- understand the e-business models and infrastructure.
- learn how e-business concepts are applied to different fields, such as: education, banking, tourism and so on.
- will come up with online business ideas and will be motivated to apply what they learned.

**Course Objective:**

- To learn the basic concepts and techniques which form the object oriented programming paradigm
- To identify Java language components and how they work together in applications.
- To design and program stand-alone Java applications.
- To learn how to use exception handling in Java applications.
- To learn Java Event Handling

**UNIT-I**

The Java Environment: Java Development Kit (JDK) , Java virtual machine, Java programming environment(compiler, interpreter, applet viewer, debugger), Java Applications Programming Interface(API),Basic idea of application and applet. Java as an object oriented language: objects, classes, encapsulation, inheritance and software reuse, polymorphism, abstract classes and abstract methods, defining an interface, implementing & applying interfaces, variables in interfaces, extending interfaces, Packages,scopeandlifetime;Accessspecifies;Constructors;Copyconstructor;this pointer; finalize() method; arrays; Memory allocation and garbage collection

**UNIT- II**

AWT: Containers and components, AWT classes, window fundamentals: Component, Container, Panel, Window, Frame, Canvas, AWT Controls, Layout Managers and Menus: adding and removing control, Labels, Button, Check Box, Radio Button, Choice, menu, Text area, Scroll list, Scrollbar; Frame; Layout managers-flow layout, Grid layout, Border layout, Card layout. Java Event Handling Model: Java's event delegation model –Ignoring the event, Self-contained events, Delegating events; The event class hierarchy; Relationship between interface, methods called, parameters and event source; Adapter classes; Event classes action Event, Adjustment Event, Container Event, Focus Event, Item Event, Mouse Event, Text Event,Window Event. Applets: Applet security restrictions; the class hierarchy for applets; Life cycle of applet; HTMLTags for applet Introduction to Swing: swing library, Building application using Swings

**UNIT-III**

Multithreading and Exception Handling: Overview of simple threads, Basic idea of multi threaded programming, Thread synchronization: Locks, synchronized methods, synchronized block,Thread scheduling,Producer-consumerrelationship,Daemon thread,Basicidea ofexception handling,stack basedexecutionandexceptionpropagation,Exception types: Exception Handling:Try,Catch,Finally,Throw statement,Assertions

**UNIT-IV**

Input/Output: Exploring Java I/O., Directories, stream classes The Bytestream: Inputstream, outputstream, file input stream, file output stream, print stream, Randomaccess file, the character streams, Buffered reader, buffered writer, print writer, serialization. JDBC: JDBC-ODBCbridge; The connectivity model; The driver manager; Navigating there sult set object contents; java.sql Package; The JDBCexception classes; Connecting to Remote database.

## UNIT-V

Java Networking: exploring java. Net package Networking Basics: Socket, Client server, reservedsockets, servers, Internetaddressing, TCPsockets, UDPsockets. RMI: Client/Server architecture, RMI registry services; Step sofcreating RMI Application and an example

### References:

1. Naughton&Schildt "TheCompleteReferenceJava
2. TataMcGraw Hill.2.Deitel "Java-How toProgram:"PearsonEducation,Asia.
3. Horstmann&Cornell "CoreJava2" (Vol I&II) ,SunMicrosystems.
4. LvanBayross"Java2.0":BPBpublications.
5. Ivor Horton's"BeginningJava2,JDK5Ed.,WileyIndia.
6. JavaProgrammingfortheabsolutebeginnersByRussell,PHILearning

### Course Outcomes

Upon successful completion of this course the student will:

- Have the knowledge of the structure and model of the Java programming language
- use the Java programming language for various programming tasks
- develop software in the Java programming language
- evaluate user requirements for software functionality required to decide whether the Java programming language can meet user requirements
- propose the use of certain technologies by implementing them in the Java programming language to solve the given problem



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**New Scheme Based On AICTE Flexible Curricula**

**Information Technology, V-Semester**

**Departmental Lab IT-505 Advanced Java Lab**

**Course Objective:**

- To learn Designing and developing Web applications
- Designing Enterprise based applications by encapsulating an application's business logic.
- Designing applications using pre-built frameworks.

**Unit I**

Java Database Connectivity(JDBC): JDBC Product, Types of Drivers, Two-Tier Client/Server Model, Three-Tier Client/Server Model, Basic Steps of JDBC, Creating and Executing SQL Statement, The Result Set Object, Working with Database MetaData Interface

**Unit II**

Java Servlets:Servlet Interaction & Advanced Servlets, Life cycle of Servlet, Java Servlet Development Kit, Javax.servletpackage, Reading Servlet Parameters, Reading Initialization Parameters, The javax.servlet.http Package, Handling HTTP.

**Unit III**

JavaServer Pages(JSP): JSP Technologies, Understanding the Client-Server Model, Understanding Web server software, Configuring the JSP Server, Handling JSP Errors, JSP Translation Time Errors, JSP Request Time Errors, Creating a JSP Error Page

Remote Method Invocation (RMI): RMI Architecture, Designing RMI application, Executing RMI application

**Unit IV**

Enterprise Java Beans (EJB): Types of EnterpriseJava beans, Session Bean & Entity Bean, Features of Session Bean, Life-cycle of Stateful Session Bean, Features of Entity Bean, Life-cycle of Entity Bean, Container-managed Transactions & Bean-managed Transactions, Implementing a container-managed Entity Bean

**Unit V**

Struts: Introduction to the Apache Struts, MVC Architecture, Struts Architecture, How Struts Works? Introduction to the Struts Controller, Introduction to the Struts Action Class, Using Struts ActionFrom Class, Using Struts HTML Tags, Introduction to Struts Validator Framework, Client Side Address Validation in Struts, Custom Validators Example, Developing Application with Struts Tiles

**References**

- 1.Java the Complete Reference, ninth edition by Herbert Schild, Publisher: McGraw Hills
- 2.Head First EJB 3.0 by Kathy Sierra, Bert Bates, Publisher: O'Reilly Media
- 3.Head First Servlets and JSP by Bryan Basham, Kathy Sierra & Bert Bates, Publisher: O'Reilly Media
- 4.Just Hibernate, A Lightweight Introduction to the Hibernate Framework by Madhusudhan Konda, Publisher: O'Reilly Media

**Course Outcomes:**

Upon successful completion of this course students will be able to-

- learn to access database through Java programs, using Java Data Base Connectivity (JDBC)
- create dynamic web pages, using Servlets and JSP.
- make a reusable software component, using Java Bean.
- invoke the remote methods in an application using Remote Method Invocation (RMI)
- understand the multi-tier architecture of web-based enterprise applications using Enterprise JavaBeans (EJB).
- developStateful, Stateless and Entity Beans.
- use Struts frameworks, which gives the opportunity to reuse the codes for quick development.