RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

Credit Based Grading System

Information Technology, V-Semester

IT-5001- Theory of Computation

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.

RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

Credit Based Grading System

Information Technology, V-Semester

IT-5002 Principles of Programming Languages

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, massage 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. Cavlo Ghezzi & Mehdi Jazayeri " Programming Languages Concepts", Willey India
 6 E Horowitz, "Programming Languages", 2nd Edition, Addison Wesley

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 x2 -y2, otherwise y2 - x2).
3. Define a Recursive 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 returns reverse 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.

RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

Credit Based Grading System

Information Technology, V-Semester

IT- 5003 – Computer Networks

Unit I
Importance of computer networks, broadcast and point to point networks, Local area networks and Wide area networks , Introduction to ISO-OSI reference model, TCP/IP reference model , function of each layer, interfaces and services, Protocol data unit, connection oriented and connectionless services, service primitives, comparison of TCP/IP and ISO-OSI reference model, Novel Netware, Arpanet , X.25

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 Data link layer in the internet, Serial line IP and Pont to point protocol.

Unit III
MAC layer Protocols- , static and dynamic allocation , Pure and slotted ALOHA protocols, Carrier sense multiple access, Persistent and non persistent CSMA, IEEE standard 802.3 and Ethernet,802.3 cabling, IEEE 802.4, IEEE 802.5, FDDI Wireless LAN , Comparison of wired and wireless LAN, WIMAX

Unit IV
The Network layer- logical addressing, classful & classless addressing , address mapping, packet delivery & forwarding. unicast routing protocols, multicast routing protocols, Routing algorithm-Least Cost, Dijkstra's, Bellman-ford, congestion control algorithms, Internetworking devices, Introduction to Internet protocol IPv4.

Unit V
Transport layer-Transport services , Process to process delivery, UDP ,TCP ,congestion control, quality of service , Integrated services, Differentiated services, LAN-WAN Design and implementation-Configuring TCP/IP, using Ipconfig, ping command , study of structured LAN, study of internetworking devices and their configuration– switches, hubs, Bridges, routers and Gateways

References:-
1. "Local area networks", Forouzan, TMH, 1st edition
2. "Computer Networks" - Tanenbaum ,PHI Learning.
3. "Computer Networks: Protocols, Standards and Interfaces" By Black, PHI learning
4. "Computer Communications & Networking Technologies"-Michael A. Gallo & William M. Hancock -Cengage pearsen publications

Suggested List of Experiment
1. Establishment and configuration of LAN.
2. Colour coding standard of CAT 5,6,7 and crimping of cable in RJ-45.
3. Study of WAN.
4. Case study of STOP AND WAIT Protocols.
5. Study of sliding window protocol.

6. study of IEEE 802.3 , 802.4 ,802.5.

7. Study of FDDI.

8. Study of basic networking commands like ping, ipconfig, etc

9. Case study of various Routing Strategies.

10. Case studies of various Network Topologies.

11. Establishing & studying the various parameters of a home LAN Network.

12. Study of IOS of routers.

13. Configuring routers, bridges and switches and gateways.

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Credit Based Grading System

Information Technology, V-Semester

IT- 5004 – Digital Communication

UNIT I
Digital signal, Quantization, Quantization error, Pulse code modulation, signal to noise ratio, Eye pattern, Companding, Data rate and Baud rate, Bit rate, multiplexed PCM signal, Differential PCM (DPCM), Delta Modulation (DM), limitations of DM and Adaptive Delta Modulation (ADM), comparison of various systems.

UNIT II
Digital modulations techniques, Generation, detection, equation and Bandwidth of amplitude shift keying (ASK) Binary Phase Shift keying (BPSK), Differential phase shift keying (DPSK), offset and non offset quadrature phase shift keying (QPSK), M-Ary PSK, Binary frequency Shift Keying (BFSK), M-Ary FSK Quadrature Amplitude modulation (QAM), MODEM,

UNIT III
Information theory and coding- Uncertainity, Unit of Information, entropy, Rate of information, Joint & Conditional entropy, Mutual information, channel capacity, Shannon's Theorem, Continuous channel, Capacity of a Gaussian channel: Shannon Hartley Theorem, Bandwidth S/N ratio trade off.

UNIT IV
Coding efficiency, Shanon,Fano and Huffman coding, Error control coding-Block codes, parity check codes, linear block codes, cyclic codes, Convolutional codes.

UNIT V
Data communication concepts – Data transmission – Parallel and serial transmission, synchronous, and Asynchronous transmission, Simplex,half duplex and fullduplex , unipolar and polar line codes, Nonreturn to zero codes, return to zero codes, bipolar line codes, bauds, modem, Line configurations-Point to point and point to multipoint configuration.

Reference Books:
1. Singh & Sapre, "Communication System", TMH
2. Taub & shilling, "Communication System", TMH
3. Simon Haykins, "Communication System", Willy
4. Hsu, "Analog and digital communication (Schaum)", TMH
5. B.P. Lathi, "Modern Digital and analog communication system",
6. Wayne Tomasi, "Electronic Communication system'.
7. Forouzan, "Data communication and networking", TMH 4th edition
8. Prakash C Gupta, "Data communication and Computer Networks",PHI Learning.
9. Analog & Digital Communication System; Discovery Press.
10. Frank R. Dungan, "Electronic Communication System", Thomson/Vikas.

List of Experiments

1. Study of PCM transmitter and receiver.
2. Study of ASK PSK and FSK transmitter and receiver.
3. Case Study of digital interface RS-232.
4. Case Study of Synchronous and asynchronous transmission.
5. Case Study of various multiplexing techniques.
6. Case Study of Parallel and serial transmission.
7. Study of NRZ and RZ Codes.

RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

Credit Based Grading System

Information Technology, V-Semester

Elective –I IT-5005(A): Microprocessor and Interfacing

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 8049intel 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.

Suggested Reading:

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 Microproccessor: 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

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Credit Based Grading System

Information Technology, V-Semester

Elective –I IT 5005(B) Software Testing

Unit-1
Definition of Bugs, Faults and Failures, Testing and Debugging, Common Causes of Defects and Failures. Role of Software Testing and Quality, Purpose of Software Testing, Testing Technique: Top-down and Bottom-up Techniques, General Characteristics of Software Testing, Metrics and Testing , Quality Management System (QMS), Limitations of Software Testing.

Unit-2

Software Development Models, Waterfall Model, V-Model, W-Model, Prototyping Model, Spiral Model, Agile Methodology, Object-oriented Development Methodology, Testing Life Cycle , Test Levels, Software Verification Techniques, Software Validation Techniques, Verification and Validation in the Software Development Life Cycle.

Unit-3

Static Testing: Introduction, Types of Reviews, Review Process, Static Analysis, Static Analysis Tool, Dynamic Testing: Introduction, White Box Testing, Types of White Box Testing, Black Box Testing, Defect Management, Requirement Traceability Table (RTT), Interaction Testing, Retrospection, other type of testing.

Unit-4

Testing tools, Introduction, Automation Testing, Automation Testing Frameworks, Objectives and limitations of Framework, Components of Automation Framework, Automation Framework Design Challenge, Types of Frameworks, Data-driven Automation Framework, Keyword-driven Test Framework, Modularity-driven Automation Framework, Hybrid Automation Framework, Types of Automation Tools.

Unit-5:

Test management, Test Planning, Cost Benefit Analysis of Testing, Test Organisation, Test Strategies, Testing Activities, Monitoring and Control, Non-functional Testing or Specialised Testing, Introduction of object oriented testing.

References:

1. Sandeep Desai and Abhishek Srivastava "Software Testing: A Practical Approach", PHI.
2. Dorothy Graham, E. V. Veenendaal, Isabel Evans and Rex Black "Foundations of Software Testing" Cengage Learning.
3. Milind G. Limaye "Software Testing: Principles, Techniques and Tools, Tata McGraw-Hill Education.

RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

Credit Based Grading System

Information Technology, V-Semester

Elective –I IT-5005 (C): Data Communication

Unit I
Data and signal-Analog and digital signals, Time and frequency domain, Composite signals, -Bandwidth, bit rate, bit length, Baseband and broadband transmission, Attenuation, distortion, noise,Nyquist bit rate ,Shannon capacity ,Throughout, delay ,Jitter, Bandwidth delay product.

Unit II
Data communication concepts – Data transmission – Parallel and serial transmission, synchronous, and Asynchronous transmission, Simplex,half duplex and fullduplex , unipolar and polar line codes, Non return to zero codes, return to zero codes, bipolar line codes, bauds , modem, Line configurations-Point to point and point to multipoint configuration.

Unit III
Telephone Network-Network topology, signaling- SS7,dial-up modems, modem standard, digital subscriber line – ADSL,SDSL,VDSL .Multiplexing,Frequency division multiplexing, time division multiplexing and wavelength division multiplexing, pulse code modulation, pleisochronous digital hierarchy(PDH), synchronous digital hierarchy (SDH) ,STM -1 frame, virtual container, mapping of data signals on STM- 1.

Unit IV
Switching techniques- Circuit , packet and hybrid switching, Types of error, single bit error, burst error, Error detection , Vertical redundancy check, Longitudinal redundancy check, cyclic redundancy check, error correction, Integrated services digital network, ISDN interface, ISDN devices, reference points ,ISDN services, ISDN Protocols

Unit V
Transmission media-Guided and unguided media, twisted pair ,Unshielded twisted pair and Shielded twisted pair, coaxial cable and fiber optic cable, radio waves, microwaves and infrared transmission RJ- 45,Network interface card, rack, cable standard-Category 5,6,and 7,cross connection, straight connection cable coding standards.

References:-
1. Data communication and networking, Forouzan, TMH 4 th edition.
2. Data communication and Computer Networks, Prakash C Gupta , PHI Learning.
3. Computer Networks, Tanenbaum , PHI Learning.
4. Communication Networks-Fundamental concepts and key Architectures, Leon-Garcia, Widjaja, TMH.
5. Computer Communications & Networking Technologies, Michael A. Gallo & William M. Hancock - Cengage pearsen publications.
6. Network for computer scientists & engineers, Youlu zheng & shakil akhtar , Oxford pub.

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Credit Based Grading System

Information Technology, V-Semester

Elective –I IT-5005 (D): Java Programming

UNIT-I
The Java Environment: Java Development Kit (JDK) ,Java virtual machine , Java programming environment (compiler, interpreter, appletviewer, 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, scope and lifetime; Access specifies; Constructors; Copy constructor; 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, Scroll bar; 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; The relationship between interface, methods called, parameters and event source; Adapter classes; Event classes action Event, Adjustment Event, Container Event, Focus Event, Item Event, Eye Event, Mouse Event, Text Event, Window Event.
Applets: Applet security restrictions; the class hierarchy for applets; Life cycle of applet; HTML Tags for applet
Introduction to Swing: swing library, Building applications using Swings

UNIT-III
Multithreading and Exception Handling: Overview of simple threads, Basic idea of multithreaded programming, Thread synchronization: Locks, synchronized methods, synchronized block, Thread scheduling, Producer-consumer relationship, Daemon thread, Basic idea of exception handling, stack based execution and exception propagation, Exception types:, Exception Handling: Try, Catch, Finally, Throw statement, Assertions

UNIT-IV
Input/Output : Exploring Java I/O., Directories, stream classes The Byte stream : Input stream, output stream, file input stream, file output stream, print stream, Random access file, the character streams, Buffered reader, buffered writer, print writer, serialization. **JDBC**: JDBC-ODBC bridge; The connectivity model; The driver manager; Navigating the result set object contents; java.sql Package; The JDBC exception classes; Connecting to Remote database.

UNIT-V

Java Networking: exploring java.net packageNetworking Basics: Socket, Client server, reserved sockets, proxy servers, Internet addressing, TCP sockets, UDP sockets. RMI: Client/Server architecture, RMI registry services; Steps of creating RMI Application and an example.

References:

1. Naughton & Schildt "The Complete Reference Java 2", Tata McGraw Hill.
2. Deitel "Java- How to Program:" Pearson Education, Asia.
3. Horstmann & Cornell "Core Java 2" (Vol I & II) , Sun Microsystems.
4. lvan Bayross "Java 2.0" : BPB publications.
5. Ivor Horton's "Beginning Java 2, JDK 5 Ed., Wiley India.
6. Java Programming for the absolute beginners By Russell, PHI Learning.

RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

Credit Based Grading System

Information Technology, V-Semester

IT-5006- Application Development Lab

Course Objectives
To design and implement projects /Applications like
- Design of Total Business Solution
- Online Examination System
- Multi User Chat System
- E-tutor system
- Online recruitment system
- College information tracking system
- Student information system etc.

Prerequisites:
Web page designing (HTML, CSS), scripting languages (JavaScript), programming languages (C, C++), knowledge of database (SQL/ORACLE) etc.

Front end tools that may be used:
       HyperText Markup Language (HTML)
       Cascading Style Sheets (CSS)
       Extensible Markup Language (XML)
       JavaScript
       Hypertext Preprocessor (PHP)
       Android etc.

Back end tools that may be used:
       SQL/ MySQL/ Oracle/ Ms Access etc.

Course Outcomes:
After completion of this course students will be able to create a web based applications using HTML, PHP, CSS, Android and SQL.

References:
1. *Robin Nixon, "Learning PHP, MySQL, JavaScript, CSS & HTML5", 3rd Edition, O'Reilly Media.*
2. *Ivan Bayross, "HTML, JavaScript, DHTML and PHP", BPB Publication.*
3. *N.P. Gopalan, "Web Technology", PHI.*
4. *Web Technologies HTML, JavaScript, PHP, JAVA, JSP, ASP.NET, XML and AJAX, Black Book, Dreamtech Press.*
5. *David Schultz and Craig Cook, "Beginning HTML with CSS and XHTML" Apress.*
6. *Chuck Easttom, "Advanced JavaScript™ Third Edition" Wordware Publishing, Inc.*