St. Peter's Institute of Higher Education and Research

(Declared under section 3 of UGC Act 1956)
Avadi, Chennai – 600 054.

M.Sc. (COMPUTER SCIENCE) DEGREE PROGRAMME

(I to IV SEMESTERS)

REGULATIONS AND SYLLABI

CHOICE BASED CREDIT SYSTEM

REGULATIONS – 2016

(Effective from the Academic Year 2016-'17)

Introduction:

M.Sc. Computer Science is a systematically designed three year course that prepares the student for a career in Software Industry. The syllabus of Computer Science subject along with that of the three allied subjects (Mathematics, Electronics and Statistics) forms the required basics for pursuing higher studies in Computer Science. The Syllabus also develops requisite professional skills and problem solving abilities for pursuing a career in Software Industry.

First year of under-graduation:

Basic foundation of two important skills required for software development is laid. A course in programming and a course in digital fundamentals forms the preliminary skill set for solving computational problems. Simultaneously two practical courses are designed to supplement the theoretical training. The second practical course also includes a preliminary preparation for website designing in the form of HTML programming. Along with Computer Science two theories and one practical course each in Statistics, Mathematics and Electronics help in building a strong foundation.

Second year under-graduation:

The programming skills are further strengthened by a course in Data structures and Object oriented programming. The advanced topics in Java programming form the second course. Two practical courses alongside help in hands-on training. Students also undertake a mini project using object oriented programming principles to solve a real world problem. Simultaneously two theories and one practical course each in Mathematics and Electronics help in strengthening problem solving abilities.

Programme Objectives:

- To develop problem solving abilities using a computer
- To build the necessary skill set and analytical abilities for developing computer based solutions for real life problems.
- To absorb quality software development practices.
- To create awareness about process and product standards
- To train students in professional skills related to Software Industry.
- To prepare necessary knowledge base for research and development in Computer Science
- To help students build-up a successful career in Computer Science

Programme Educational Objectives (PEOs)

- Graduates are prepared to be employed in the field computer Science and IT industries by providing expected domain knowledge.
- Graduates are prepared to pursue higher studies.

- Graduates are applied new technologies in Computer Science to serve the needs of industry, and society.
- Graduates are trained to demonstrate creativity, develop innovative ideas and. to work in teams to accomplish a common goal.
- Graduates are addressed with social issues and guided to operate problems with solutions.

Programme Outcomes (Pos)

1. Ability to apply knowledge of computing and mathematics appropriate to the discipline and to provide effective solution in the area of computing
2. Ability to identify, analyse, and synthesize scholarly literature relating to the field of computer science;
3. Ability to design, implement, and evaluate a computational system to meet desired needs of the industry.
4. Ability to function effectively on teams to accomplish shared computing design, evaluation, or implementation goals.
5. Ability to use software development tools, software systems, and modern computing platforms.
6. Ability to perform professionally with social, cultural and ethical responsibility as an individual as well as in multifaceted teams with positive attitude.
7. Capable of evaluating personal and professional choices in terms of codes of ethics and ethical theories and understanding the impact of their decisions on themselves, their professions, and on society
8. Capable of adapting to new technologies and constantly upgrade their skills with an attitude towards independent and lifelong learning

Program Specific Outcomes (PSOs)

1. Understand the concepts and applications in the field of Computing Sciences like Web designing and development, Mobile application development, and Network and communication technologies.
2. Ability to understand the structure and development methodologies of software systems. Possess professional skills and knowledge of software design process.
3. Apply the learning from the courses and develop applications for real world problems.
4. Explore technical knowledge in diverse areas of Computer Science and experience an environment conducive in cultivating skills for successful career, entrepreneurship and higher studies.

M.Sc. (COMPUTER SCIENCE) DEGREE PROGRAMME

Regulations – 2016

(Effective from the Academic Year 2016-`2017)

1. **Eligibility:**
   Candidates who passed B.Sc. Degree in Computer Science or B.C.A. in the University or an Examination accepted by the University as equivalent thereof are eligible for admission to M.Sc. Degree Programme in Computer Science.

2. **Duration:**
   Two years comprising 4 Semesters. Each semester has a minimum of 90 working days with a minimum of 5 hours a day.

3. **Medium:**
   English is the medium of instruction and examinations.

4. **Eligibility for the Award of Degree:**
   A candidate shall be eligible for the award of degree only if he/she has undergone the prescribed course of study in the University for a period of not less than two academic years (4 semesters), passed the examinations of all the four semesters prescribed carrying 90 credits and also fulfilled such conditions as have been prescribed thereof.

5. **Choice Based Credit System:**
   Choice Based Credit System is followed with one credit equivalent to one hour for theory paper and two hours for a practical work per week in a cycle of 18 weeks (that is, one credit is equal to 18 hours for each theory paper and one credit is equal to 36 hours for a practical work in a semester in the Time Table. The total credit for the M.Sc. Degree Programme in Computer Science (4 semesters) is 90 credits.

6. **Weightage for a Continuous and End Assessment**:
   The weightage for Continuous Assessment (CA) and End Assessment (EA) is 25:75 unless the ratio is specifically mentioned in the Scheme of Examinations. The question paper is set for a minimum of 100 marks.

7. **Course of Study and Scheme of Examinations:**

I Semester

Code No.	Course Title		Credit	Marks		
				CA	EA	Total
116PCST01	**Core Sub:**	Computer Networks	4	25	75	100
116PCST02		Advanced Java Programming	4	25	75	100
116PCST03		Mobile Computing	4	25	75	100
116PCSP01		**Practical – I: :** RDBMS Lab	3	40	60	100
116PCSP02		**Practical – II:** Advanced Java Programming Lab.	3	40	60	100
116PCST04	**Inter disciplinary Elective I**:		4	25	75	100
		Total	**22**	**180**	**420**	**600**

II Semester

Code No.	Course Title		Credit	Marks		
				CA	EA	Total
216PCST01	**Core Sub:**	Principles of Compiler Design	4	25	75	100
216PCST02		Design and Analysis of Algorithms	4	25	75	100
216PCSP01		**Practical – III**. Algorithms Lab	3	40	60	100
216PCSP02		**Practical – IV:** Image Processing using Java Lab	3	40	60	100
	Elective I:		4	25	75	100
216PCST03	**Inter disciplinary Elective II**		4	25	75	100
		Total	**22**	**180**	**420**	**600**

III SEMESTER

Code No.	Course Title		Credit	Marks		
				CA	EA	Total
316PCST01	**Core Sub:**	Systems Software	4	25	75	100
316PCST02		Information Security	4	25	75	100
316PCST03		Object Oriented Analysis and Design	4	25	75	100
316PCSP01		**Practical – V:** Mini Project	4	40	60	100
	Elective II:		4	25	75	100
	Elective III:		4	25	75	100
		Total	**24**	**165**	**435**	**600**

IV SEMESTER

Code No.	Course Title	Credit	Marks		
			CA	EA	Total
416PENP01	PROJECT PLUS VIVA VOCE	20	20	60+20	100
	Total	**20**	**20**	**80**	**100**

Electives – I (Semester – II)

Course Code	Course	Credit
216PCSE01	Artificial Intelligence	4
216PCSE02	Computer Simulation and Modeling	4
216PCSE03	Computer Graphics	4

Electives – II & III (Semester – III)

Course Code	Course	Credit
Elective II		
316PCSE01	Big data Analytics	4
316PCSE02	Cryptography	4
316PCSE03	Distributed Database Systems	4
Elective III		
316PCSE04	Multimedia Systems	4
316PCSE05	E-Commerce	4
316PCSE06	Cloud Computing	4

Inter disciplinary Elective I:

Course Code	Course	Credit
116PCSE01	Theoretical Foundations of Computer Science	4
116PCSE02	Numerical and Statistical Methods	4
116PCSE03	Resource Management Techniques	4

Inter disciplinary Elective II:

Course Code	Course	Credit
216PCSE04	Digital Image Processing	4
216PCSE05	Technical Seminar and Report Writing	4
216PCSE06	Health Care Management	4

8. **Passing Requirements:** The minimum pass mark (raw score) be 50% in End Assessment (EA) and 50% in Continuous Assessment (CA) and End Assessment (EA) put together. No minimum mark (raw score) in Continuous Assessment (CA) is prescribed unless it is specifically mentioned in the Scheme of Examinations.

9. **Grading System:** Grading System on a 10 Point Scale is followed with 1 mark = 0.1 Grade point to successful candidates as given below.

CONVERSION TABLE

(1 mark = 0.1 Grade Point on a 10 Point Scale)

Range of Marks	Grade Point	Letter Grade	Classification
90 to 100	9.0 to 10.0	O	First Class
80 to 89	8.0 to 8.9	A	First Class
70 to 79	7.0 to 7.9	B	First Class
60 to 69	6.0 to 6.9	C	First Class
50 to 59	5.0 to 5.9	D	Second Class
0 to 49	0 to 4.9	**F**	**Reappearance**

Procedure for Calculation

Cumulative Grade Point Average (CGPA) = $\frac{\text{Sum of Weighted Grade Points}}{\text{Total Credits}}$

$= \frac{\sum (CA+EA)\, C}{\sum C}$

Where Weighted Grade Points in each Course = Grade Points (CA+EA) multiplied by Credits

$= (CA+EA)C$

Weighted Cumulative Percentage of Marks(WCPM) = CGPAx10

C- Credit, CA-Continuous Assessment, EA- End Assessment

10. **Effective Period of Operation for the Arrear Candidates :** Two Year grace period is provided for the candidates to complete the arrear examination, if any.

Registrar

116PCST01 COMPUTER NETWORKS

Course Objectives:

To understand networking concepts and basic communication model

- To understand network architectures and components required for data communication.
- To analyze the function and design strategy of physical, data link, network layer and transport layer
- To Acquire knowledge of various application protocol standard developed for internet

UNIT I

Introduction – Network Hardware – Software – Reference Models – OSI and TCP/IP models – Example networks: Internet, ATM, Ethernet and Wireless LANs - Physical layer – Theoretical basis for data communication - guided transmission media

UNIT II

Wireless transmission - Communication Satellites – Telephones structure –local loop, trunks and multiplexing, switching. Data link layer: Design issues – error detection and correction.

UNIT III

Elementary data link protocols - sliding window protocols – Data Link Layer in the Internet - Medium Access Layer – Channel Allocation Problem – Multiple Access Protocols.

UNIT IV

Network layer - design issues - Routing algorithms - Congestion control algorithms – IP protocol – IP Address – Internet Control Protocol.

UNIT V

Transport layer - design issues - Connection management - Addressing, Establishing & Releasing a connection – Simple Transport Protocol – Internet Transport Protocol (TCP) - Network Security: Cryptography.

Course Outcomes:

- Able to trace the flow of information from one node to another node in the network
- Able to Identify the components required to build different types of networks
- Able to understand the functionalities needed for data communication into layers
- Able to choose the required functionality at each layer for given application
- Able to understand the working principles of various application protocols
- Acquire knowledge about security issues and services available

Text Books

1. S.Tanenbaum, 2003, Computer Networks, Fourth Edition, Pearson Education, (Prentice hall of India Ltd), New Delhi.

Reference Books

1. B. Forouzan, 1998, Introduction to Data Communications in Networking, Tata McGraw-Hill, New Delhi.
2. F. Halsall, 1995, Data Communications, Computer Networks and Open Systems, Addison Wessley, Boston.
3. D. Bertsekas and R. Gallagher, 1992, Data Networks, Prentice hall of India, New Delhi.
4. Lamarca, 2002, Communication Networks, Tata McGraw Hill, New Delhi.

Website, E-learning resources

1. http://authors.phptr.com/tanenbaumcn4/

116PCST02 ADVANCED JAVA PROGRAMMING

Course Objectives:

- To provide an overview of working principles of internet, web related functionalities
- To understand and apply the fundamentals core java, packages, database connectivity for computing
- To enhance the knowledge to server side programming
- To provide knowledge on advanced features like Swing, JavaBeans, Sockets.

UNIT I JAVA FUNDAMENTAL

Java features – Java Platform – Java Fundamentals – Expressions, Operators, and Control Structures – Classes, Packages and Interfaces – Exception Handling. PACKAGES - AWT package – Layouts – Containers – Event Package – Event Model – Painting – Garbage Collection - Multithreading– Language Packages.

UNIT II ADVANCED JAVA PROGRAMMING

Utility Packages – Input Output Packages – Inner Classes – Java Database Connectivity - Servlets - Servlet Overview – Servlet life cycle - The Java Web Server – Simple Servlet – Servlet Packages – Using Cookies - - Session Tracking - Security Issues – using JDBC in Servlets – HTML to Servlet Communication - applet to servlet communication. RMI – Swing Fundamentals - Swing Classes.

UNIT III JAVA BEANS The software component assembly model- The java bean development kit- developing beans – notable beans – using infobus - Glasgow developments - Application Builder tool- JAR files-Introspection-Bound Properties-Persistence-customizers - java beans API.

UNIT IV: EJB: EJB architecture- EJB requirements – design and implementation – EJB session beans- EJB entity beans-EJB Clients – deployment tips, tricks and traps for building distributed and other systems – implementation and future directions of EJB-Variable in perl- perl control structures and operators – functions and scope.

UNIT V: JSP: –Introduction JSP-Examining MVC and JSP -JSP scripting elements & directives-Working with variables scopes-Error Pages - using Java Beans in JSP Working with Java Mail-Understanding Protocols in Java mail-Components-Java mail API-Integrating into J2EE-Understanding Java Messaging Services-Introducing Java Transactions.

Course Outcomes:

- Able to understand the internet standards and recent web technologies like Conferencing,newsgroup etc.
- Able to implement, compile, test and run Java program,
- Able to make use of hierarchy of Java classes to provide a solution to a given set of requirements found in the Java API
- Able to understand the components and patterns that constitute a suitable architecture for a web application using java servlets
- Able to demonstrate systematic knowledge of backend and front end by developing an appropriate application

REFERENCE BOOKS:

1. Margaret Levine Young, "Internet and WWW", 2nd Edition, Tata McGraw Hill, 2002.
2. Paul J. Deitel, Harvey M. Deitel, "Internet & World Wide Web: How to Program", Pearson Education International, 2009
3. Herbert Schildt, The Complete Reference – Java 2, 4th Edition, Tata McGraw Hill, 2001
4. Joyce Farrell, "Java Programming", Cengage Learning, Sixth Edition, 2011
5. C. Xavier, "Java Programming: A Practical Approach", Tata McGraw Hill, 2011
6. Keyur shah, "Gateway to Java Programmer Sun Certification", Tata Mc Graw Hill 2002
7. Poornachandra Sarang, "Java Programming", McGraw Hill Professional, 2012
8. Herbert Schildt, Dale Skrien, "Java Fundamentals – A Comprehensive Introduction", Tata Mc Graw Hill, 2013
9. John Dean, Raymond Dean, " Introduction to Programming with JAVA – A Problem Solving Approach", Tata Mc Graw Hill, 2012.
10. Ralph Bravaco, Shai Simonson, "Java Programming : From the Ground Up", Tata McGraw Hill Edition, 2012
11. D.S.Malik, "Java Programming", Cengage Learning, 2009
12. Rashmi Kanta Das, "Core Java for Beginners" , Vikas Publishing House Pvt. Ltd., 2011

116PCST03 MOBILE COMPUTING

COURSE OBJECTIVES:

- To learn the basic concepts, aware of the GSM, SMS, GPRS Architecture.
- To have an exposure about wireless protocols -WLN, Bluetooth, WAP, ZigBee issues.
- To Know the Network, Transport Functionalities of Mobile communication
- To understand the concepts of Adhoc and wireless sensor networks.
- To impart knowledge about Mobile Application Development

UNIT I

Introduction - Mobile and Wireless Devices – Simplified Reference Model – Need for Mobile Computing –Wireless Transmissions –Multiplexing – Spread Spectrum and Cellular Systems- Medium Access Control – Comparisons.

UNIT II

Telecommunication Systems – GSM – Architecture – Sessions – Protocols – Hand Over and Security – UMTS and IMT – 2000 – Satellite Systems.

UNIT III

Wireless Lan - IEEE S02.11 – Hiper LAN – Bluetooth – Security and Link Management.

UNIT IV

Mobile network layer - Mobile IP – Goals – Packet Delivery – Strategies – Registration – Tunneling and Reverse Tunneling – Adhoc Networks – Routing Strategies.

UNIT V

Mobile transport layer - Congestion Control – Implication of TCP Improvement – Mobility – Indirect – Snooping – Mobile – Transaction oriented TCP - TCP over wireless – Performance.

COURSE OUTCOMES:

- Gain the knowledge about various types of Wireless Data Networks and Wireless Voice Networks.
- understand the architectures, the challenges and the Solutions of Wireless Communication those are in use.
- realize the role of Wireless Protocols in shaping the future Internet.
- know about different types of Wireless Communication Networks and their functionalities.
- Able to develop simple Mobile Application Using Android

Text Book:

1. J. Schiller, 2003, Mobile Communications,2nd edition, Pearson Education, Delhi.

Reference Books

1. Hansmann, Merk, Nicklous, Stober, 2004, Principles of Mobile Computing, 2nd Edition, Springer (India).
2. Pahlavan, Krishnamurthy, 2003, Principle of wireless Networks: A unified Approach, Pearson Education, Delhi.
3. Martyn Mallick, 2004, Mobile and Wireless Design Essentials, Wiley Dreamtech India Pvt. Ltd., New Delhi.
4. W.Stallings, 2004, Wireless Communications and Networks, 2nd Edition, Pearson Education, Delhi.

116PCSP01 **RDBMS LAB**

Course Objectives:

To design and provide a practical exposure to the students

1. Library Information Processing.
2. Students Mark sheet processing.
3. Ballot counting system.
4. Gas booking and delivering system.
5. Income Tax calculations.
6. Bank Transactions.
7. Pay roll processing.
8. Airline / Railway reservation system.
9. Question Database and conducting quiz.
10. Inventory system.

Students are advised to use the concepts like Data Normalization, Link between table by means of foreign keys and other relevant data base concepts for developing databases for the following problems. The implementation of each problem should have necessary input screen Menu-driven query processing and pleasing reports. The choice or RDBMS is left to the students. Necessary validations must be done after developing database.

Data Base Management System Lab Exercise Programs

1. Data Definition Language (DDL) commands in RDBMS.
2. Data Manipulation Language (DML) and Data Control Language (DCL) commands in RDBMS.
3. High level language extension with Cursors.
4. High level language extension with Triggers.
5. Procedures and Functions.
6. Design and implementation of Payroll processing System .
7. Design and implementation of Banking System
8. Design and implementation of Library Information System.

Course Outcomes:

1. To acquire the knowledge to build the logic and develop a solution for a problem statements.

116PCSP02 ADVANCED JAVA PROGRAMMING LAB

Course Objectives:

To design and provide a practical exposure to the students

1. HTML to Servlet Applications

2. Applet to Servlet Communication

3. Designing online applications with JSP

4. Creating JSP program using JavaBeans

5. Working with Enterprise JavaBeans

6. Performing Java Database Connectivity.

7. Creating Web services with RMI.

8. Creating and Sending Email with Java

9. Building web applications

Course Outcomes:

1. To acquire the knowledge to build the logic and develop a solution for a problem statements.

II SEMESTER

216PCST01 PRINCIPLES OF COMPILER DESIGN

Course Objectives:

- To learn the process of translating a modern high-level language to executable code.
- To provide a student with an understanding of the fundamental principles in compiler design and to provide the skills needed for building compilers for various situations that one may encounter in a career in Computer Science.
- To develop an awareness of the function and complexity of modern compilers.
- To apply the code generation algorithms to get the machine code for the optimized code.
- To represent the target code in any one of the code formats
- To understand the machine dependent code
- To draw the flow graph for the intermediate codes.
- To apply the optimization techniques to have a better code for code generation

Unit 1: Introduction to Compilers - Finite Automata and lexical Analysis.

Unit-2: Syntax Analysis: Context free grammars - Derivations and parse trees – Basic parsing techniques - LR parsing.

Unit 3: Syntax - directed translation, symbol tables.

Unit 4: Code optimization - More about code optimization.

Unit 5: Code generation - Error detection and recovery.

Course Outcomes:

- To realize basics of compiler design and apply for real time applications.
- To introduce different translation languages
- To understand the importance of code optimization
- To know about compiler generation tools and techniques
- To learn working of compiler and non compiler applications
- Design a compiler for a simple programming language

Text Book:

1. A.V. Aho, J.D.Ullman, 1985, Principles of Compiler Design, Narosa Pub-House.

Reference Books:

1. D.Gries, 1979, Compiler Construction for Digital Computers, John Wiley & Sons.
2. A.V.Aho, Ravi Sethi, and J.D.Ullman, 1986, Compilers Principles, Techniques and Tools, Addison Wesley Pub. Co.

216PCST02 DESIGN AND ANALYSIS OF ALGORITHMS

Course Objectives:

- Analyze the asymptotic performance of algorithms.
- Write rigorous correctness proofs for algorithms.
- Demonstrate a familiarity with major algorithms and data structures.
- Apply important algorithmic design paradigms and methods of analysis.
- Synthesize efficient algorithms in common engineering design situations.

Unit 1: Introduction - Definition of Algorithm – pseudo code conventions – recursive algorithms – time and space complexity –big-"oh" notation – practical complexities – randomized algorithms – repeated element – primality testing **-** Divide and Conquer: General Method - Finding maximum and minimum – merge sort.
Unit-2: Divide and conquer contd. – Quicksort, Selection, Strassen's matrix multiplication – Greedy Method: General Method –knapsack problem - Tree vertex splitting - Job sequencing with dead lines – optimal storage on tapes.
Unit 3: Dynamic Programming: General Method - multistage graphs – all pairs shortest paths – single source shortest paths - String Editing – 0/1 knapsack. Search techniques for graphs – DFS-BFS-connected components – biconnected components.
Unit 4: Back Tracking: General Method – 8-queens - Sum of subsets - Graph Coloring – Hamiltonian cycles. Branch and Bound: General Method - Traveling Salesperson problem.
Unit 5: Lower Bound Theory: Comparison trees - Oracles and advisory arguments - Lower bounds through reduction - Basic Concepts of NP-Hard and NP-Complete problems.

Course Outcomes:

- Argue the correctness of algorithms using inductive proofs and invariants.
- Analyze worst-case running times of algorithms using asymptotic analysis.
- Describe the divide-and-conquer paradigm and explain when an algorithmic design situation calls for it. Recite algorithms that employ this paradigm. Synthesize divide-and-conquer algorithms. Derive and solve recurrences describing the performance of divide-and-conquer algorithms.
- Describe the dynamic-programming paradigm and explain when an algorithmic design situation calls for it. Recite algorithms that employ this paradigm. Synthesize dynamic-programming algorithms, and analyze them.
- Describe the greedy paradigm and explain when an algorithmic design situation calls for it. Recite algorithms that employ this paradigm. Synthesize greedy algorithms, and analyze them.

Text Book:

1. E. Horowitz, S. Sahni and S. Rajasekaran, 2007, Computer Algorithms, 2nd Edition, Universities Press, India.

Reference Books:

1) G. Brassard and P. Bratley, 1997, Fundamentals of Algorithms, PHI, New Delhi.
2) A.V. Aho, J.E. Hopcroft, J.D. Ullmann, 1974, The design and analysis of Computer Algorithms, Addison Wesley, Boston.
3) S.E.Goodman and S.T.Hedetniemi, 1977, Introduction to the Design and Analysis of algorithms, Tata McGraw Hill Int. Edn, New Delhi.

E-learning resources

1) http://www.cise.ufl.edu/~raj/BOOK.html

216PCSP01 ALGORITHMS LAB

Course Objectives:

To design and provide a practical exposure to the students

1. Divide and Conquer :

a. Merge Sort

b. Quick Sort

c. Maximum and Minimum

2. Greedy Method :

a. Knapsack Problem

b. Tree vertex splitting

c. Job Sequencing

3. Dynamic Programming :

a. Multistage graphs

b. All Pairs Shortest Paths

c. String Editing,

d. BFS and DFS.

4. Back Tracking :

a. 8 Queen Problems

b. Hamiltonian Cycles.

Course Outcomes:

1. To acquire the knowledge to build the logic and develop a solution for a problem statements.

216PCSP02 IMAGE PROCESSING USING JAVA LAB

Course Objectives:

To design and provide a practical exposure to the students

1) Basic image manipulation (reading, writing, quantization, sub sampling)

2) Basic Intensity transformation

3) Histogram Processing

4) Filtering in spatial domain-2D FFT and smoothing filters

5) Image coding using transformations with SPIHT algorithm

6) Color image Enhancement with spatial sharpening

Course Outcomes:

1. To acquire the knowledge to build the logic and develop a solution for a problem statements.

316PCST01 SYSTEMS SOFTWARE

COURSE OBJECTIVES:

- To understand the relationship between system software and machine architecture, design and implementation of assemblers, linkers and loaders.
- To understand the design, function and implementation of assemblers, linkers and loaders
- To have an understanding of macro processors and system software tools

Unit 1: Language processors – Language processing activities and fundamentals – Language specification – Development Tools – Data Structures for Language processing- Scanners and Parsers.

Unit 2: Assemblers: Elements of Assembly language programming - Overview of the Assembly process - Design of a Two-pass Assembler - A single pass Assembler for the IBM PC.

Unit 3: Macros and Macro processors – Macro definition, call and expansion – Nested macro calls – Advanced macro facilities - Design of a macro preprocessor - Compilers: Aspects of compilation.

Unit 4: Compilers and Interpreters – Memory allocation - Compilation of Expressions and Control structures - Code optimization – Interpreters.

Unit 5 : Linkers: Linking and Relocation concepts – Design of a linker – Self relocating Programs – A linker for MS DOS - Linking for over-lays – loaders - Software tools: Software tools for program development - Editors - Debug monitors - Programming environments – User interfaces.

COURSE OUTCOMES:

- Able to trace the path of a source code to object code and the to executable file
- To design the front end of the compiler-scanner, parser
- Understand and identify the relationship between system software and machine architecture
- Analyze the functions of assembler, compiler, linker, and loaders
- Know the design and implementation of loaders and linkers

Text Book:

1. D. M. Dhamdhere, 1999, Systems Programming and Operating Systems, Second Revised Edition, Tata McGraw-Hill, New Delhi.

316PCST02 **INFORMATION SECURITY**

Course Objectives:

- To understand and appreciate computer/information security as it has becomes an essential aspects of our day life.
- To provide students with concepts of computer security, cryptography, digital money, secure protocols, detection and other security techniques.

Unit 1: Introduction: Security- Attacks- Computer criminals- Method of defense Program Security: Secure programs- Non-malicious program errors- Viruses and other malicious code- Targeted malicious code- Controls against program threats

Unit 2: Operating System Security: Protected objects and methods of protection- Memory address protection- Control of access to general objects- File protection mechanism- Authentication: Authentication basics- Password- Challenge-response- Biometrics.

Unit 3: Database Security: Security requirements- Reliability and integrity- Sensitive data- Interface- Multilevel database- Proposals for multilevel security

Unit 4: Security in Networks: Threats in networks- Network security control- Firewalls- Intrusion detection systems- Secure e-mail- Networks and cryptography- Example protocols: PEM- SSL- Ipsec.

Unit 5: Administrating Security: Security planning- Risk analysis- Organizational security policies- Physical security - Legal- Privacy- and Ethical Issues in Computer Security - Protecting programs and data- Information and law- Rights of employees and employers- Software failures- Computer crime- Privacy- Ethical issues in computer society- Case studies of ethics.

Course Outcomes:

- To understand, appreciate, employ, design and implement appropriate security technologies and policies.
- To protect computers and digital information.

Recommended Text

1. C. P. Pfleeger, and S. L. Pfleeger, Security in Computing, Pearson Education, 4th Ed, 2003 2) Matt Bishop, Computer Security: Art and Science, Pearson Education, 2003.

Reference Books

1. Stallings**,** Cryptography & N/w Security: Principles and practice, 4th Edition,2006
2. Kaufman, Perlman, Speciner, Network Security, Prentice Hall, 2nd Edition, 2003
3. Eric Maiwald, Network Security : A Beginner's Guide, TMH, 1999
4. Macro Pistoia, Java Network Security, Pearson Education, 2nd Edition, 1999
5. Whitman, Mattord, Principles of information security, Thomson, 2nd Edition, 2005

Website and e-Learning Source

1) http://www.cs.gsu.edu/~cscyqz/courses/ai/aiLectures.html
2) http://www.eecs.qmul.ac.uk/~mmh/AINotes/

316PCST03 OBJECT ORIENTED ANALYSIS AND DESIGN

Course Objectives:

- To understanding importance of Object Orientation in Software engineering
- To understand the components of Unified Modeling Language
- To understand techniques and diagrams related to structural modeling
- To understand techniques and diagrams related to behavioral modeling
- To understand techniques of Object Oriented analysis, design and testing

Unit 1: System Development - Object Basics - Development Life Cycle - Methodologies - Patterns - Frameworks - Unified Approach - UML.

Unit-2: Use-Case Models - Object Analysis - Object relations - Attributes - Methods – Class and Object responsibilities - Case Studies.

Unit 3: Design Processes - Design Axioms - Class Design - Object Storage - Object Interoperability - Case Studies.

Unit-4: User Interface Design - View layer Classes - Micro-Level Processes - View Layer Interface - Case Studies.

Unit-5: Quality Assurance Tests - Testing Strategies - Object orientation on testing - Test Cases - test Plans - Continuous testing - Debugging Principles - System Usability - Measuring User Satisfaction - Case Studies.

Course Outcomes:

1. To analyse, design, document the requirements through use case driven approach.
2. To identify, analyse, and model structural and behavioural concepts of the system.
3. To develop, explore the conceptual model into various scenarios and applications.
4. To apply the concepts of architectural design for deploying the code for software.

Text Book:

(i) Ali Bahrami, Reprint 2009, Object Oriented Systems Development, Tata McGraw Hill International Edition.

Reference Books

(i) G. Booch, 1999, Object Oriented Analysis and design, 2nd Edition, Addison Wesley, Boston

(ii) Roger S.Pressman, 2010, Software Engineering A Practitioner's approach, Seventh Edition, Tata McGraw Hill, New Delhi.

(iii) Rumbaugh, Blaha, Premerlani , Eddy, Lorensen, 2003, Object Oriented Modeling And design , Pearson education, Delhi.

316PCSP01 Practical V – Mini Project

On completion of the course, students are able to:

- Deal with real world data.
- Familiar about real time IT industry enviorment.
- Expeirnance about applying the knowledge they got uptil now.
- Build a whole real time working system which will satisfy all custmor's needs.

416PENP01 PROJECT PLUS VIVA VOCE

On completion of the course, students are able to:

- Deal with real world data.
- Familiar about real time IT industry enviorment.
- Expeirnance about applying the knowledge they got uptil now.
- Build a whole real time working system which will satisfy all custmor's needs.

ELECTIVES – I (SEMESTER – II)

216PCST04 ARTIFICIAL INTELLIGENCE

Course Objectives:

- To provide a strong foundation of fundamental concepts in Artificial Intelligence
- To provide a basic exposition to the goals and methods of Artificial Intelligence
- To enable the student to apply these techniques in applications which involve perception, reasoning and learning

Unit 1: Introduction - Intelligent Agents- Problem Solving - by Searching - Informed Search and Exploration - Constraint Satisfaction Problems - Adversarial Search

Unit-2: Knowledge and Reasoning - Logical Agents - First-Order Logic - Inference in First-Order Logic - Knowledge Representation

Unit 3: Planning – Planning and Acting in the Real World - Uncertain knowledge and reasoning - Uncertainty - Probabilistic Reasoning - Probabilistic Reasoning Over Time - Making Simple Decisions - Making Complex Decisions

Unit 4: Learning - Learning from Observations - Knowledge in Learning - Statistical Learning Methods - Reinforcement Learning

Unit 5: Communicating, Perceiving, and Acting - Communication - Probabilistic Language Processing - Perception – Robotics.

Course Outcomes:

- To Understand the various searching techniques, constraint satisfaction problem and example problems- game playing techniques.
- To apply these techniques in applications which involve perception, reasoning and learning.
- To explain the role of agents and how it is related to environment and the way of evaluating it and how agents can act by establishing goals.
- To acquire the knowledge of real world Knowledge representation.
- To analyze and design a real world problem for implementation and understand the dynamic behavior of a system.
- To use different machine learning techniques to design AI machine and enveloping applications for real world problems.

Text Book:

1. Stuart Russell and Peter Norvig, 2003, Artificial Intelligence: A Modern Approach, 2nd Edition, Prentice Hall of India, New Delhi.

Reference Books

1. Elaine Rich and Kevin Knight, 1991, Artificial Intelligence, 2nd Edition, Tata McGraw-Hill, New Delhi.
2. Herbert A. Simon, 1998, The Sciences of the Artificial Intelligence, 3rd Edition, MIT Press.
3. N.J. Nilson, 1983, Principles of AI, Springer Verlag.

Website and e-Learning Source:

1. http://aima.eecs.berkeley.edu/slides-pdf/

216PCST05 COMPUTER SIMULATION AND MODELING

Course Objectives:

- To develop mathematical modelling real world situations related to engineering systems,
- To predict and evaluate the outcomes against design criteria.
- To develop solutions and extract results from the information generated in the context of the engineering domain to assist engineering decision making.
- To interpret the model and apply the results to resolve critical issues in a real world environment.
- To develop different models to suit special characteristics of the system being modelled.

Unit 1: Introduction to Simulation -Simulation Examples: Simulation of queuing systems, inventory systems and other examples - General Principles: Concepts in discrete event system simulation - List Processing

Unit 2: Programming Languages for Simulation: FORTRAN, GPSS. Simulation of Queueing Systems: Queueing System Characteristics - Queueing Notation - Transient and Steady-State Behaviour of Queues - Long-Run Measures of Performance of Queueing Systems - Steady- State Behaviour of Infinite-Population Markovian Models - Network of Queues.

Unit 3: Random-Number Generation: Properties of Random Numbers - Generation of Pseudo-Random Numbers - Techniques for Generating Random Numbers - Tests for Random Numbers. Random Variate Generation: Inverse Transformation Technique:- Uniform Distribution - Exponential Distribution - Weibull Distribution - Triangular Distribution - Empirical Continuous Distribution - Discrete Distribution - Direct Transformation for the Normal Distribution - Convolution Method for Erlang Distribution - Acceptance-Rejection Technique: Poisson Distribution - Gamma Distribution.

Unit 4: Input Data Analysis: Data Collection - Identifying the Distribution with Data - Parameter Estimation - Goodness-of- Fit Tests: Chi-Square Test - Kolmogorov-Smirnov Test; Selecting Input Models without Data - Multivariate and Time-Series Input Models. Verification and Validation of Simulation Models: Model Building, Verification and Validation - Verification of Simulation Models - Calibration and Validation of Models:- Face Validity - Validation of Model Assumptions - Validating Input-Output Transformations - Input-Output Validation using Historical Input Data - Input-Output Validation using a Turing Test

Unit 5: Output Data Analysis: Stochastic Nature of Output Data - Types of Simulation with respect to Output Analysis - Measures of Performance and their Estimation - Output Analysis for Terminating Simulations - Output Analysis for Steady-State Simulation

Course Outcomes:

- Ability to model deterministic systems and differentiate between nonlinear and linear models.
- Ability to numerically simulate linear and non-linear ordinary differential equations and deterministic systems.
- Ability to estimate and validate a model based upon input and output data.
- Ability to create a model prediction based upon new input and validate the output data.
- Ability to comprehend and apply advanced theory-based understanding of engineering fundamentals and specialist bodies of knowledge in the selected discipline area to predict the effect of engineering activities.
- Ability to apply underpinning natural, physical and engineering sciences, mathematics, statistics, computer and information sciences to engineering applications.

Text Book:

1. J. Banks, J. S.Carson II and B. L. Nelson, 1995, Discrete-Event System Simulation, 2nd Edition, Prentice Hall of India, New Delhi.

Reference Books:

1. Averill M.Law and W.David Kelton, 1991, Simulation Modeling & Analysis, 2nd Edn., Tata McGraw Hill.
2. Geoffrey Gardon, 1992, System Simulation, 2nd Edn., Printice Hall of India.
3. Narsingh Deo, 1979, System Simulation with Digital Computers, Prentice Hall of India.
4. C.Dennis Pegden, Robert E.Shannon and Randall P.Sadowski, 1995, Introduction to Simulation using SIMAN, 2nd Edn., Tata McGraw-Hill.

E-learning resources

http://www.bcnn.net

216PCST06 COMPUTER GRAPHICS

Course Objectives:

- To provide an introduction to the principles of computer graphics.
- To gain the knowledge of methods for modeling 3-dimensional objects and efficiently generating photorealistic renderings on color raster graphics devices.
- To understand how the various elements that underlie computer graphics (algebra, geometry, algorithms and data structures, optics, and photometry) interact in the design of graphics software systems.

Unit 1: Introduction to computer Graphics – Video display devices – Raster Scan Systems – Random Scan Systems - Interactive input devices – Hard Copy devices - Graphics software – Area fill attributes – Character attributes inquiry function - Output primitives – line drawing algorithms – initializing lines – line function – Circle Generating algorithms – Ellipse Generating algorithms - Attributes of output primitives – line attributes – Color and Grayscale style.

Unit 2: – Two dimensional transformation – Basic transformation – Matrix representation and Homogeneous co-ordinates - Composite transformation – Matrix representation – other transformations – two dimensional viewing – window – to- viewport co-ordinate transformation.

Unit 3: Clipping algorithms – Point clipping -line clipping - polygon clipping – Curve clipping - text clipping – Exterior clipping –– Three dimensional transformations – translation- rotation- scaling – composite-shears and reflections - Three dimensional viewing – Projection – Orthogonal and oblique parallel projections.

Unit 4: – Viewing - perspective projection – Three dimensional clipping algorithms- Visible surface detection methods –– backface detection, depth buffer, A-buffer, scan-line, depth sorting, BSP-tree, area subdivision, octree and other methods.

Unit 5 : Computer Animation - Three dimensional object representations – Spline representation - Bezier curves and surfaces – B-Spline curves and surfaces –– Color models and color applications.

Course Outcomes:

- To understand the basics of computer graphics, different graphics systems and applications of computer graphics.
- To discuss various algorithms for scan conversion and filling of basic objects and their comparative analysis.
- To use of geometric transformations on graphics objects and their application in composite form. To extract scene with different clipping methods and its transformation to graphics display device.
- To explore projections and visible surface detection techniques for display of 3D scene on 2D screen.
- To render projected objects to naturalize the scene in 2D view and use of illumination models for this

Text Book:

1. D. Hearn, M.P. Baker, and W.R. Carithers, 2011 – Computer Graphics with openGL, 4th Edition, Pearson Education

Reference Books

1. W.M. Neumann and R. F. Sproull, Principles of Interactive Computer Graphics, Tata McGraw-Hill, New Delhi.
2. S. Harrington, 1989, Fundamentals of Computer Graphics, Tata McGraw-Hill, New Delhi.
3. D. F. Rogers, J. A. Adams, 2002, Mathematical elements for Computer Graphics, 2nd Edition, Tata McGraw-Hill, New Delhi.
4. D. F. Rogers, 2001, Procedural elements for Computer Graphics, 2nd Edition, Tata McGraw-Hill, New Delhi.
5. Foley, Van Dan, Feiner, Hughes, 2000, Computer Graphics, Addison Wesley, Boston

Website and E-Learning Source

1. http://forum.jntuworld.com/showthread.php?3846-Computer-Graphics- Notes-All-8-Units

ELECTIVES – II & III (SEMESTER – III)

316PCST04 **BIG DATA ANALYTICS**

COURSE OBJECTIVES:

- To explore the fundamental concepts of big data analytics
- To learn to analyze the big data using intelligent techniques.
- To understand the various search methods and visualization techniques.
- To learn to use various techniques for mining data stream.
- To understand the applications using Map Reduce Concepts.

Unit 1: Basic nomenclature - Analytics process model - Analytics model requirements - Types of data sources – Sampling - types of data elements - Visual Data Exploration and Exploratory Statistical Analysis - Missing Values - Outlier Detection and Treatment - Standardizing Data – Categorization - weights of evidence coding - Variable selection - Segmentation.

Unit 2: Predictive Analytics: Target Definition - Linear Regression - Logistic Regression - Decision Trees - Neural Networks - Support Vector machines - Ensemble Methods - Multiclass Classification Techniques - Evaluating Predictive Models.

Unit 3: Descriptive Analytics: Association Rules - Sequence Rules - Segmentation. Survival Analysis: Survival Analysis Measurements - Parametric Survival Analysis.

Unit 4: Social Network Analytics: Social Network Definitions - Social Network Metrics - Social Network Learning -Relational Neighbor Classifier - Probabilistic Relational Neighbor Classifier -Relational logistic Regression - Collective Inference.

Unit 5: Benchmarking - Data Quality - Software – Privacy - Model Design and Documentation - Corporate Governance. Example applications: Credit Risk Modeling - Fraud Detection - Recommender Systems - Web Analytics.

Course Outcomes:

- To work with big data platform
- To analyze the big data analytic techniques for useful business applications.
- To design efficient algorithms for mining the data from large volumes.
- To analyze the HADOOP and Map Reduce technologies associated with big data analytics
- To explore on Big Data applications Using Pig and Hive
- To understand the fundamentals of various bigdata analysiss techniques

Text Book:

1. Baesens, 2014, Analytics in a Big Data World: The Essential Guide to Data Science and Its applications, Wiley India Private Limited

Reference Books :

1. Michael Minelli, Michele Chambers, 2013, Big Data, Big Analytics: Emerging Business Intelligence and Analytic Trends for Today's Businesses, Wiley CIO
2. Stephan Kudyba, 2014, Big Data, Mining and Analytics: Components of Strategic Decision Making, CRC Press.
3. Frank J. Ohlhorst, 2013, Big data Analytics: Turning Big Data into Big Money, Wiley and SAS Business Series.
4. Foster Provost, Tom Fawcett, 2013, Data Science for Business, SPD.

316PCST05 CRYPTOGRAPHY

Course Objectives:

- To understand the fundamentals of Cryptography
- To acquire knowledge on standard algorithms used to provide confidentiality, integrity and authenticity.
- To understand the various key distribution and management schemes.
- To understand how to deploy encryption techniques to secure data in transit across data networks

Unit 1: Conventional Encryption: Conventional encryption model – DES –RC 5 – Introduction to AES - Random number generation.

Unit-2: Number Theory: Modular arithmetic – Euler's theorem – Euclid's algorithm – Chinese remainder theorem – Primarily and factorization –Discrete logarithms – RSA algorithm

Unit 3: Public key Cryptography: Principles – RSA algorithm – key management- Diff – Hellman key exchange

Unit 4: Message Authorization and Hash functions: Hash functions- Authentication requirements. Authentication function- Message authentication codes –Secure Hash algorithms

Unit 5: Digital Signature and Authentication Protocols : Digital Signature- Authentication Protocols –Digital signature standard.

Course Outcomes:

- To provide security of the data over the network.
- To do research in the emerging areas of cryptography and network security.
- To implement various networking protocols.
- To protect any network from the threats in the world.
-

Text Book:

1. Stallings, W., 2005 , Cryptography and Network Security Principles and Practice, Pearson Education, Delhi.

Reference Books:

1. Charlie Kaufman, Radia Perlman, Mike specimen, Network Security- Private communication in a public world.
2. Michael Welsehenbach, 2005, Cryptography in C & C++", John Wiley.
3. Bruce sehneier , 2001 Applied Cryptography , John Wiley and sons.
4. Kailash N.Gupta , Kamlesh N. Agarwala, Pratek A. Agarwala, 2005, Digital signature Network security practices , PHI, New Delhi.

316PCST06 DISTRIBUTED DATABASE SYSTEMS

Course Objectives:

- To enhance the previous knowledge of database systems by deepening the understanding of the theoretical and practical aspects of the database technologies,
- To show the need for distributed database technology to tackle deficiencies of the centralized database systems
- To introduce basic principles and implementation techniques of distributed database systems,
- To expose active and emerging research issues in distributed database systems and application development,
- Toapply theory to practice by building and delivering a distributed database query engine, subject to remote Web service calls.

Unit 1: Features of Distributed versus Centralized Databases – Why Distributed Databases – Distributed Database Management Systems (DDBMSs)- Review of Databases – Review of Computer Networks-Levels of Distribution Transparency- Reference Architecture for Distributed Databases – Types of Data Fragmentation – Distribution Transparency for read-only Applications – Distribution transparency for Update Applications – Distributed Database Access Primitives – Integrity Constraints in Distributed Databases - A Framework for Distributed Database Design – The Design of Database Fragmentation – The Allocation of Fragments.

Unit-2: Equivalence Transformations for Queries – Transforming Global Queries into Fragment Queries – Distributed Grouping and Aggregate Function Evaluation – Parametric Queries -Optimization of Access Strategies - A Framework for Query Optimization – Join Queries – General Queries. A Framework for Transaction Management – Supporting Atomicity of Distributed Transactions – Concurrency Control for Distributed Transactions – Architectural Aspects of Distributed Transactions.

Unit 3: Foundations of Distributed Concurrency Control – Distributed Deadlocks – Concurrency Control Based on Timestamps – Optimistic Methods for Distributed Concurrency Control - Reliability – Basic Concepts Nonblocking Commitment Protocols – Reliability and Concurrency Control – Determining a Consistent View of the Network – Detection and Resolution of Inconsistency – Checkpoints and Cold Restart - Distributed Database Administration – Catalog Management in Distributed Databases – Authorization and Protection.

Unit-4: Distributed object database management systems – Fundamental object concepts and Models – Object – Abstract Data Types – Composition (Aggregation) – Class – Collection – Subtyping and Inheritance. – Object Distribution Design – Horizontal Class Partitioning – Vertical Class Partitioning – Path Partitioning – Class Partitioning Algorithms – Allocation – Replication – Alternative Client / Server Architectures – Cache Consistency – Object Identifier Management – Pointer Switching Object Migration – Distributed Object Storage – Object Query Processor Architectures – Query Processing Issues – Query Execution – Correctness Criteria – Transaction Models and Object Structures – Transactions Management in Object DBMSs – Transactions as Objects – Conclusion – Bibliographic Notes – Exercises.

Unit-5 : Parallel Database Systems – Database Server Approach – Database Servers and Distributed Databases – Parallel System Architectures – Objectives – Functional Aspects – Parallel Data Processing – Parallel Query Optimization – Data Placement – Query Parallelism – Parallel Execution Problems – Initialization – Interferences and Convoy Effect – Load Balancing – Parallel Execution for Hierarchical Architecture – Problem Formulation – Basic Concepts – Load Balancing Strategy – Performance Evaluation – Conclusion – Bibliographic Notes – Exercises.

Course Outcomes:

- To identify the introductory distributed database concepts and its structures.
- To describe terms related to distributed object database design and management.
- To produce the transaction management and query processing techniques in DDBMS.
- To relate the importance and application of emerging database technology.

Text Books:

1. Stefano Ceri, Giuseppe Pelagatti, Distributed Databases Principles & Systems, McGraw-Hill.
2. M.Tamer Ozsu, Patrick Valduriez, Distributed database systems, 2nd Edition, Prentice Hall of India, New Delhi.

316PCST07 MULTIMEDIA SYSTEMS

COURSE OBJECTIVES:

- To understand computational development of graphics with mathematics
- To provide in-depth knowledge of display systems, image synthesis, shape modeling of 3D application.
- To Understand basic concepts related to Multimedia including data standards, algorithms and software
- To Experience development of multimedia software by utilizing existing libraries and descriptions of algorithms

Unit 1: Introductory Concepts: Multimedia – Definitions, CD-ROM and the Multimedia Highway, Uses of Multimedia, Introduction to making multimedia – The Stages of project, the requirements to make good multimedia, Multimedia skills and training, Training opportunities in Multimedia. Motivation for multimedia usage, Frequency domain analysis, Application Domain.

Unit 2: Multimedia-Hardware and Software: Multimedia Hardware – Macintosh and Windows production Platforms, Hardware peripherals – Connections, Memory and storage devices, Media software – Basic tools, making instant multimedia, Multimedia software and Authoring tools, Production Standards.

Unit 3: Multimedia – making it work – multimedia building blocks – Text, Sound, Images, Animation and Video, Digitization of Audio and Video objects, Data Compression: Different algorithms concern to text, audio, video and images etc., Working Exposure on Tools like Dream Weaver, Flash, Photoshop Etc.,

Unit 4: Multimedia and the Internet:

History, Internet working, Connections, Internet Services, The World Wide Web, Tools for the WWW – Web Servers, Web Browsers, Web page makers and editors, Plug-Ins and Delivery Vehicles, HTML, VRML, Designing for the WWW – Working on the Web, Multimedia Applications – Media Communication, Media Consumption, Media Entertainment, Media games.

Unit 5 : Multimedia-looking towards Future: Digital Communication and New Media, Interactive Television, Digital Broadcasting, Digital Radio, Multimedia Conferencing, Assembling and delivering a project-planning and costing, Designing and Producing, content and talent, Delivering, CD-ROM technology.

Course Outcomes:

- Gain Proficiency In 3d Computer Graphics Api Programming
- Enhance The Perspective Of Modern Computer System With Modeling, Analysis And Interpretation Of 2d And 3d Visual Information.
- Able To Understand Different Realizations Of Multimedia Tools
- Able To Develop Interactive Animations Using Multimedia Tools
- Gain The Knowledge Of Different Media Streams In Multimedia Transmission

Recommended Texts:

1. S. Heath, 1999, Multimedia & Communication Systems, Focal Press, UK.
2. T. Vaughan, 1999, Multimedia: Making it work, 4th Edition, Tata McGraw Hill, New Delhi.
3. K. Andleigh and K. Thakkar, 2000, Multimedia System Design, PHI, New Delhi.

Reference Books

1. Keyes, "Multimedia Handbook", TMH, 2000.
2. R. Steinmetz and K. Naharstedt, 2001, Multimedia: Computing, Communications & Applications, Pearson, Delhi.
3. S. Rimmer, 2000, Advanced Multimedia Programming , PHI, New Delhi..

Website and e-Learning Source :

1) http://www.cikon.de/Text_EN/Multimed.html

316PCST08 E-COMMERCE

Course Objectives

- To Understand The Interest And Opportunity Of E-Commerce
- To Know Hot To Plan And How To Manage E-Commerce Solutions
- To Apply Processes Of E-Commerce And To Analyze And Understand The Human, Technological And Business Environment Associated With E-Commerce
- To Know How To Use Technologies To Build E-Commerce Websites

Unit 1: Introduction to Electronic Commerce: Electronic Commerce Framework – Electronic Commerce and Media Convergence – The Anatomy of E-Commerce Applications – Electronic Commerce Consumer Applications – Electronic Commerce Organization Applications. The Network Infrastructure for Electronic Commerce: Components of the I way – Network Access Equipment – Global information Distribution Networks.

Unit 2: The Internet as a Network Infrastructure: The Internet Terminology – NSFNET: Architecture and Components – National Research and Education Network – Globalization of the Academic Internet - Internet Governance – An overview of Internet Applications. The Business of Internet Commercialization: Telco/Cable/On-Line Companies - National Independent ISPs – Regional Level ISPs – Local –level ISPs – Service Provider Connectivity - Internet Connectivity options.

Unit 3: Network Security and Firewalls: Client Server Network Security and Threats. Electronic Commerce and the World Wide Web: Architectural Framework for Electronic commerce – World Wide Web (WWW) as the Architecture – Hypertext Publishing - Technology behind the Web – Security and the Web. Consumer-Oriented Electronic Commerce: Consumer-Oriented Applications – Mercantile process models – Mercantile Models from the Consumers and the Merchant's Perspective.

Unit 4: Electronic Payment Systems: Types of Electronic Payment Systems – Digital Token based Electronic Payment Systems – Smart Cards and Credit Card – Based Electronic Payment Systems – Risk and Electronic Payment Systems – Designing Electronic Payment Systems. Inter-organizational Commerce and EDI: Electronic Data Interchange – Applications in Business –Legal, Security and Privacy issues - Internet –Based EDI.

Unit 5: Advertising and the Marketing on the Internet: The New Age of Information based marketing and advertising on the Internet – Consumer Search and Resource Discovery Paradigms and Retrieval - Electronic Commerce Catalogs or Directories – Information filtering – Consumer – Data Interface: Emerging Tools. On Demand Education and Digital Copyrights: Computer based Education and Training – Technological Components of Education on demand. Software Agents: Characteristics and Properties of Agents – The Technology behind Software Agents – Applets, Browsers and Software Agents- Software Agents in Action.

Course Outcomes

- To define And Analyze the Principles of E-Commerce and Basics of World Wide Web.
- To define and analyze The Concept of Electronic Data Interchange and its Legal, Social and Technical Aspects.
- To define and analyze The Security Issues Over the Web, The Available Solutions and Future Aspects of E-Commerce Security.
- To define And Analyze The Concept Of E-Banking, Electronic Payment System

Text Book:

1. Ravi Kalakota and Andrew B. Whinston, Eleventh Impression, 2011,, Frontiers of Electronic Commerce, Pearson Education Inc., Delhi.

Reference Books:

1. Daniel Minoli, and Emma Minoli, Seventh Reprint 2003, Web commerce Technology Handbook, Tata McGraw Hill, New Delhi.

316PCST09 CLOUD COMPUTING

Course Objectives:

- To Introduce The Broad Perceptive Of Cloud Architecture And Model
- To Understand The Concept Of Virtualization And Design Of Cloud Services
- To Be Familiar With The Lead Players In Cloud.
- To Understand The Features Of Cloud Simulator
- To Apply Different Cloud Programming Model As Per Need.
- To Learn To Design The Trusted Cloud Computing System
-

Unit 1: Understanding Cloud Computing: Cloud Computing –History of Cloud Computing –Cloud Architecture –Cloud Storage –Why Cloud Computing Matters – Advantages of Cloud Computing –Disadvantages of Cloud Computing –Companies in the Cloud Today –Cloud Services

Unit 2: DEVELOPING CLOUD SERVICES: Web-Based Application –Pros and Cons of Cloud Service Development –Types of Cloud Service Development –Software as a Service – Platform as a Service- Infrastructure as a service –Web Services –On-Demand Computing –Discovering Cloud Services Development Services and Tools –Amazon Ec2 –Google App Engine –IBM Clouds

Unit 3: CLOUD COMPUTING FOR EVERYONE: Centralizing Email Communications – Collaborating on Schedules –Collaborating on To-Do Lists –Collaborating Contact Lists – Cloud Computing for the Community –Collaborating on Group Projects and Events –Cloud Computing for the Corporation

Unit 4: USING CLOUD SERVICES: Collaborating on Calendars, Schedules and Task Management –Exploring Online Scheduling Applications –Exploring Online Planning and Task Management –Collaborating on Event Management –Collaborating on Contact Management –Collaborating on Project Management –Collaborating on Word Processing - Collaborating on Databases –Storing and Sharing Files

Unit 5: OTHER WAYS TO COLLABORATE ONLINE: Collaborating via Web-Based Communication Tools –Evaluating Web Mail Services –Evaluating Web Conference Tools – Collaborating via Social Networks and Groupware –Collaborating via Blogs and Wikis.

Course Outcomes:

- Compare the Strengths and Limitations of Cloud Computing
- Identify the Architecture, Infrastructure and Delivery Models of Cloud Computing
- Apply Suitable Virtualization Concept.
- Choose the Appropriate Cloud Player, Programming Models And Approach.
- Address the Core Issues of Cloud Computing Such As Security, Privacy and Interoperability
- Design Cloud Services and Set a Private Cloud

Text Books:

1. Michael Miller, Cloud Computing: Web-Based Applications That Change the Way You Work and Collaborate Online, Que Publishing, August 2008.
2. Kumar Saurabh, "Cloud Computing –Insights into New Era Infrastructure", Wiley Indian Edition, 2011.
3. Haley Beard, Cloud Computing Best Practices for Managing and Measuring Processes for On-demand Computing, Applications and Data Centers in the Cloud with SLAs, Emereo Pty Limited, July 2008

INTER DISCIPLINARY ELECTIVE – (SEMESTER – I)

116PCST04 THEORETICAL FOUNDATIONS OF COMPUTER SCIENCE

Course Objectives:

- To develop your coding and problem-solving skills with a focus on data and data science.
- To design as well as fundamental programming concepts such as data, selection, iteration and functional decomposition, data abstraction and organisation.
- To build effective problem-solving skills, including exposure to problem solving processes and strategies.

Unit 1:

Propositions and Compound Propositions – Logical Operations – Truth Tables – Tautologies and Contradictions – Logical Equivalence –Algebra of Propositions – Conditional and Biconditional Statements –Arguments – Logical Implication – Quantifiers – Negation of Quantified Statements – Basic Counting Principles – Factorial – Binomial Coefficients – Permutations – Combinations – Pigeonhole Principle – Ordered and Unordered Partitions.

Unit 2:

Order and Inequalities – Mathematical Induction – Division Algorithm – Divisibility – Euclidean Algorithm – Fundamental Theorem of Arithmetic – Congruence Relation – Congruence Equations – Semigroups – Groups – Subgroups – Normal Subgroups – Homomorphisms – Graph Theory: basic definitions-paths, reachability, connectedness matrix representation of graphs, trees.

Unit 3:

Finite Automata and Regular Expressions: Finite State Systems – Basic definitions – Non-deterministic finite automata – Finite automata with -moves – Regular expressions.

Unit 4:

Properties of Regular sets: Pumping lemma – Closure properties – Decision Algorithms – My hill – Nerode Theorem – Context Free Grammars – Derivation Trees.

Unit 5:

Simplifying Context free grammars - Chomsky normal forms – Greibach Normal forms – Pushdown automata and context-free languages.

Course Outcomes:

- To design, implement and test algorithms using fundamental programming constructs and data structures.
- To translate between machine level representations and demonstrate how data is represented in computers.
- To identify, evaluate and use information sources to support the practice of programming, including APIs, tutorials and documentation.
- To calculate and compare the runtime complexity of common searching and sorting techniques and their implementations – both iterative and recursive

Text Books:

1. J.P. Tremblay and R. Manohar, 1997, Discrete Mathematical Structures with applications to Computer Science, Tata McGraw-Hill, New Delhi.
2. P. Linz, 1997, An Introduction to Formal Languages and Automata, Second Edition, Narosa Pub. House, New Delhi.
3. S. Lipschutz and M. Lipson, 1999, Discrete Mathematics, Second Edition, Tata McGraw-Hill, New Delhi.
4. J.E.Hopcraft and J.D.Ullman, 1993, Introduction to Automata Theory, Languages and Computation, Narosa Publishing House, New Delhi.

Reference Books:

1. D.C.Kozen, 1997, Automata and Computability, Springer-Verlag, New York.
2. J. Martin, 2003, Introduction to Languages and the Theory of Computation, 3rd Edition, Tata McGraw-Hill, New Delhi.

116PCSE02 NUMERICAL AND STATISTICAL METHODS

Course Objectives:

- To Understand And Apply Numerical Methods For Solving Systems Of Linear Equations
- To Understand And Apply Numerical Integration And Differentiation
- To Solving Initial Value Problems Of Ordinary Differential Equations Numerically
- To Provide An Understanding Of The Statistical Methods And Probabilistic Concepts By Which Real-Life Problems Are Analyzed (Focus On Problems- No Derivations)

UNIT I LINEAR SYSTEM OF EQUATIONS

Solution of Systems of equations – Solution of Simultaneous linear equations – Gauss elimination methods – Gauss Jordan methods, Jacobi and Gauss Seidal iterative methods.

UNIT II NUMERICAL DIFFERENTIATION AND INTEGRATION

Interpolation, Differentiation and integration – difference table – Newton's forward and backward interpolation –Lagrangian interpolation –Differentiation formulae– Trapezoidal and Simpson rule Gaussian – Quadrature.

UNIT III DIFFERENTIAL EQUATIONS

Ordinary Differential equations–Taylor Series and Euler methods, Runge– Kutta methods – Predictorcorrector method – Milne and Adam – Bashforth methods – Error Analysis.

UNIT IV PROBABILITY DISTRIBUTIONS

Probability axioms- Bayes Theorem- One dimensional Discrete random variables and Continuous random variables – Density and Distribution functions – Binomial and normal distribution.

UNIT V SAMPLING DISTRIBUTIONS

Small sample, t-test, F-test, □2 –test, ANOVA one way classification and two way classification

COURSE OUTCOMES:

- Develop a good understanding of the various methods used for the numerical solution of scientific problems
- Able to solve system of linear equations and initial value problems of ordinary differential
- equations numerically
- Help to understand the value of probability and Statistics in acquiring knowledge and making decisions
- Develop an ability to apply statistical tests in experiments, as well as to analyze and interpret data

REFERENCES:

1. Baghel Singh Grewal, "Numerical Methods in Engineering and Science,Khanna Publisher 2011
2. John.E..Freund, Irwin Miller, Marylees Miller "Mathematical Statistics with Applications ", Seventh Edition, Prentice Hall of India, 2011.
3. T.Veerarajan , "Probability, statistics and random process" third edition Tata Mcgrawhill
4. publications,2009
5. Steven C. Chapra, Raymond P. Canale, " Numerical methods for Engineers", McGraw-Hill Higher Education, 01-Aug-2010
6. A.M.Natarajan & A.Tamilarasi, "Probability Random Processes and Queuing theory", New Age International Publishers, 2nd Edition, 2005.
7. C. Woodford, "*Numerical Methods* with Worked Examples: Matlab Edition Springer,2012.

116PCSE03 - RESOURCE MANAGEMENT TECHNIQUES

Course Objectives:

- To Provide The Concept And An Understanding Of Basic Concepts In Operations Research Techniques For Analysis And Modeling In Computer Applications.
- To Understand , Develop And Solve Mathematical Model Of Linear Programming Problems
- To Understand , Develop And Solve Mathematical Model Of Transport And Assignment Problems
- To Understand Network Modeling For Planning And Scheduling The Project Activities

UNIT I LINEAR PROGRAMMING MODELS

Mathematical Formulation - Graphical Solution of linear programming models – Simplex method – Artificial variable Techniques- Variants of Simplex method.

UNIT II TRANSPORTATION AND ASSIGNMENT MODELS

Mathematical formulation of transportation problem- Methods for finding initial basic feasible solution – optimum solution - degeneracy – Mathematical formulation of assignment models – Hungarian Algorithm – Variants of the Assignment problem.

UNIT III INTEGER PROGRAMMING MODELS

Formulation – Gomory's IPP method – Gomory's mixed integer method – Branch and bound
technique.

UNIT IV SCHEDULING BY PERT AND CPM

Network Construction – Critical Path Method – Project Evaluation and Review Technique – Resource Analysis in Network Scheduling.

UNIT V QUEUEING MODELS

Characteristics of Queuing Models – Poisson Queues - (M / M / 1) : (FIFO / ∞ /∞), (M / M / 1) : (FIFO/ N / ∞), (M / M / C) : (FIFO / ∞ / ∞), (M / M / C) : (FIFO / N / ∞) models.

COURSE OUTCOMES:

- Understand And Apply Linear, Integer Programming To Solve Operational Problem With Constraints
- Apply Transportation And Assignment Models To Find Optimal Solution In Warehousing And Travelling,
- To Prepare Project Scheduling Using PERT And CPM
- Identify And Analyze Appropriate Queuing Model To Reduce The Waiting Time In Queue.
- Able To Use Optimization Concepts In Real World Problems

REFERENCES:

2. Taha H.A., "Operations Research : An Introduction " 8th Edition, Pearson Education, 2008.
3. A.M.Natarajan, P.Balasubramani, A.Tamilarasi, "Operations Research", Pearson Education, Asia, 2005.
4. Prem Kumar Gupta, D.S. Hira, "Operations Research", S.Chand & Company Ltd, New Delhi, 3rd Edition , 2008.
5. John W. Chinneck "Feasibility and Infeasibility in Optimization Algorithms and Computational Methods' Springer, 2008
6. Ravindran, Phillips, Solberg,"Operations Research: Principles And Practice", 2ND ED, John Wiley & Sons, 01-Jul-2007.
7. Ibe, O.C. "Fundamentals of Applied Probability and Random Processes", Elsevier, U.P., 1st Indian Reprint, 2007.
8. Gross, D. and Harris, C.M., "Fundamentals of Queueing Theory", Wiley Student, 3rd Edition, New Jersy, 2004.

216PCSE04 DIGITAL IMAGE PROCESSING

Course Objectives:

- To study the image fundamentals and mathematical transforms necessary for image processing.
- To study the image enhancement techniques
- To study image restoration procedures.
- To study the image compression procedures.

Unit 1: Introduction – steps in image processing - Image acquisition - representation - sampling and quantization - relationship between pixels. – color models – basics of color image processing.

Unit-2: Introduction – steps in image processing - Image acquisition - representation - sampling and quantization - relationship between pixels. – color models – basics of color image processing.

Unit 3: Image enhancement in Frequency domain – Introduction to Fourier transform: 1-D, 2 –D DFT and its inverse transform - smoothing and sharpening filters.

Unit 4: Image restoration: Model of degradation and restoration process – noise models – restoration in the presence of noise- periodic noise reduction. - Image segmentation: Thresholding and region based segmentation.

Unit 5: Image compression: Fundamentals – models – information theory – error free compression –Lossy compression: predictive and transform coding - JPEG standard.

Course Outcomes:

- Review the fundamental concepts of a digital image processing system.
- Analyze images in the frequency domain using various transforms.
- Evaluate the techniques for image enhancement and image restoration.
- Categorize various compression techniques.
- Interpret Image compression standards.
- Interpret image segmentation and representation techniques.

Text Book:

1) C. Gonzalez, R.E.Woods, 2009, Digital Image processing, 3rd Edition, Pearson Education.

Reference Books

1) Pratt.W.K.,Digital Image Processing, 3rd Edition, John Wiley & Sons.
2) Rosenfled A. & Kak, A.C, 1982, Digital Picture Processing, vol .I & II, Academic Press.

Website and e-Learning Source:

1) http://www.imageprocesssingplace.com/DIP/dip-downloads.

216PCSE05 - TECHNICAL SEMIANR AND REPORT WRITING

Course Objectives:

- To train the students to critically evaluate a well-defined set of research subjects.
- To summarize the findings concisely in a paper of scientific quality.
- To understand a topic, communicate it and identify the issues.
- To associate students and a committee of faculty members.

1. Every student selects a topic related to current trends and the same should be approved by the respective committee. This selection should have at least 5 distinct primary sources.
2. Every student must write a short review of the topic and present it to fellow students and faculty (discuss the topic – expose the flaws – analyze the issues) every week.
3. The faculty should evaluate the short review and award marks with respect to the following.
    a. Has the student analyzed – not merely quoted – the most significant portions of the primary sources employed?
    b. Has the student offered original and convincing insights?
    c. Plagiarism to be checked.
4. Every student should re-submit and present the review article including issues/ comments/ conclusions which had arisen during the previous discussion.
5. Every student should submit a final paper as per project specifications along with all short review reports (at least 4 internal reviews) and corresponding evaluation comments.
6. Every student should appear for a final external review exam to defend themselves.

Course Outcome:

To acquire the knowledge to build the logic and develop a solution for a problem statements.

216PCSE06 - HEALTH CARE MANAGEMENT

Course Objectives:

- To understand the basic concepts of health care system.
- To know about creating and maintaining health care information systems
- To ensure access of clinical information system on the fly
- To understand IT governance and assessment of health care information system

UNIT I INTRODUCTION

Introduction to health care information – Health care data quality – Health care information regulations, laws and standards.

UNIT II HEALTH CARE INFORMATION SYSTEMS

History and evolution of health care information systems – Current and emerging use of clinical information systems – system acquisition – System implementation and support.

UNIT III INFORMATION TECHNOLOGY

Information architecture and technologies that support health care information systems – Health care information system standards – Security of health care information systems.

UNIT IV MANAGEMENT OF IT CHALLENGES

Organizing information technology services – IT alignment and strategic planning – IT governance and management.

UNIT V IT INITIATIVES

Management's role in major IT initiatives – Assessing and achieving value in health care information systems. Case study.

Course Outcomes:

- Develop An Understanding Of Basic Research Skills Applicable To The Design, Evaluation And Implementation Of Appropriate Healthcare Information Systems (His) ;
- Define And Analyse The Impact, Strengths And Weaknesses Of Various His In Any Healthcare Settings
- Write Reports On The Roles Of His And Their Impact On Facilitating Superior Healthcare Delivery
- Design A Suitable His Architecture
- Use Research Methods And Analysis Together To Plan The Successful Implementation Of An Appropriate His Solution

Reference Books:

1. Karen A Wager, Frances Wickham Lee, John P Glaser, " Managing Health Care Information Systems: A Practical Approach for Health Care Executives", John Wiley, 2 nd edition 2009.
2. Marion J. Ball, Charlotte Weaver, Joan Kiel ,"Healthcare Information Management Systems: Cases, Strategies, and Solutions", Springer, 2010, 3 rd edition
3. Rudi Van De Velde and Patrice Degoulet, "Clinical Information Sytems: A Componenet based approach", Springer 2005.
4. Kevin Beaver,Healthcare Information Systems, Second edition Best Practices, CRC Press,2002
5. Marion J. BallHealthcare Information Management Systems: A Practical Guide Springer-Verlag GmbH, 1995

****