SRI SANKARA ARTS AND SCIENCE COLLEGE (AUTONOMOUS)

ENATHUR, KANCHIPURAM – 631 561
CHOICE BASED CREDIT SYSTEM
DEPARTMENT OF COMPUTER SCIENCE
M.Sc. DEGREE COURSE IN COMPUTER SCIENCE
REGULATIONS
(With effect from the academic year 2015-2016)

1. CONDITIONS FOR ADMISSION

Candidates with B.Sc. degree in Computer Science or Computer Science & Technology or B.C.A. degree of this University or any other degree accepted as equivalent thereto by the Syndicate shall be eligible for admission to M.Sc Computer Science Degree Course.

2. ELIGIBILITY FOR THE AWARD OF DEGREE

A candidate shall be eligible for the award of the degree only if he/she has undergone the prescribed course of study in a college affiliated to the University for a period of not less than two academic years, passed the examination of all the four semesters prescribed earning 90 credits and fulfilled such conditions as have been prescribed therefor.

3. DURATION OF THE COURSE

Two years Courses:

The duration of the course is for two academic years consisting of four semesters.

4 EXAMINATIONS

There shall be four semester examinations: first semester examinations at the middle of the first academic year and the second semester examination at the end of the first academic year. Similarly, the third and fourth semester examinations shall be held at the middle and the end of the second academic year, respectively.

5. COURSE OF STUDY AND SCHEME OF EXAMINATIONS

1) M.SC. COMPUTER SCIENCE

The scheme of examinations for different semesters shall be as follows:

Vide **APPENDIX-B**

The following procedure be be followed for Internal Marks:

Theory Papers: Internal Marks

Best Two tests out of 3	10 marks
Attendance	5 marks
Seminar	5 marks

Assignment	5 marks
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	25 marks

Break-up Details for Attendance

Below 60%	- No marks
60% to 75%	- 3 marks
76% to 90%	- 4 marks
91% to 100%	- 5 marks

Practical:	Internal Marks	40
Attendance	5 marks	
Practical Best Test 2 out of 3	30 marks	
Record	5 marks	

Project:

Internal Marks	Best 2 out of 3 presentations	20 marks
Viva		20 marks
Project Report		60 marks

6. REQUIREMENTS FOR PROCEEDING TO SUBSEQUENT SEMESTERS:

(i) Candidates shall register their names for the First semester examination after the admission in the PG courses.

(ii) Candidates shall be permitted to proceed from the First Semester upto the Final Semester irrespective of their failure in any of the Semester Examination subject to the condition that the candidates should register for all the arrear subjects of earlier semesters along with current (subject) Semester subjects.

(iii) Candidates shall be eligible to proceed to the subsequent semester, only if they earn, sufficient attendance as prescribed therefore by the Syndicate from time to time.

Provided in case of candidate earning less than 50% of attendance in any one of the semester due to any extraordinary circumstance such as medical grounds, such candidates who shall produce Medical Certificate issued by the Authorised Medical Attendant (AMA), duly certified by the Principal of the College, shall be permitted to proceed to the next semester and to complete the course of study. Such candidate shall have to repeat the missed semester by rejoining after completion of final semester of the course, after paying the fee for the break of study as prescribed by the University from time to time.

7. PASSING MINIMUM:

a) There shall be no Passing Minimum for Internal.

b) For External Examination, Passing Minimum shall be of 50%(Fifty Percentage) of the maximum marks prescribed for the paper.

c) In the aggregate (External + Internal) the passing minimum shall be of 50% for each Paper/Practical/Project and Viva-voce.

d) Grading shall be based on overall marks obtained (internal + external).

8. CLASSIFICATION OF SUCCESSFUL CANDIDATES:

Candidates who secured not less than 60% of aggregate marks (Internal + External) in the whole examination shall be declared to have passed the examination in the First Class.

All other successful candidates shall be declared to have passed in Second Class.

Candidates who obtain 75% of the marks in the aggregate (Internal + External) shall be deemed to have passed the examination in First Class with Distinction, provided they pass all the examinations (theory papers, practicals, project and viva-voce) prescribed for the course in the First appearance.

9. GRADING SYSTEM:

The term grading system indicates a Seven (7) Point Scale of evaluation of the performances of students in terms of marks obtained in the Internal and External Examination, grade points and letter grade.

SEVEN POINT SCALE (As per UGC notification 1998)

GRADE	GRADE POINT	PERCENTAGE EQUIVALENT
`O' = Outstanding	5.50 – 6.00	75 – 100
`A' = Very Good	4.50 – 5.49	65 – 74
`B' = Good	3.50 – 4.49	55 – 64
`C' = Average	3.00 – 3.49	50 – 54
`D' = Below Average	1.50 – 2.99	35 – 49
`E' = Poor	0.50 – 1.49	25 – 34
`F' = Fail	0.00 – 0.49	0 - 24

10. RANKING:

Candidates who pass all the examinations prescribed for the course in the first appearance itself alone are eligible for Ranking / Distinction.

Provided in the case of candidates who pass all the examinations prescribed for the course with a break in the First Appearance due to the reasons as furnished in the Regulations under "Requirements for Proceeding to subsequent Semester" are only eligible for Classification.

11. PATTERN OF QUESTION PAPER:

PART –A (50 words):Answer 10 out of 12 Questions	10 x 1 =	10 marks
PART –B(200 words):Answer 5 out of 7 Questions	5 x 5 =	25 marks
PART –C(500 words):Answer 4 out of 6 Questions	4 x 10 =	40 marks

12. APPEARANCE FOR IMPROVEMENT:

Candidates who have passed in a theory paper / papers are allowed to appear again for theory paper / papers only once in order to improve his/her marks, by paying the fee prescribed from time to time. Such candidates are allowed to improve within a maximum period of 10 semesters counting from his/her first semester of his/her admission. If candidate improve his marks, then his improved marks will be taken into consideration for the award of Classification only. Such improved marks will not be counted for the award of Prizes / Medals, Rank and Distinction. If the candidate does not show improvement in the marks, his previous marks will be taken into consideration.

candidate will be allowed to improve marks in the Practicals, Project, Viva-voce, Field work.

13. TRANSITORY PROVISION:

Candidates who have undergone the course of study prior to the academic year 2008-2009 will be permitted to appear for the examinations under those Regulations for a period of three years i.e., up to and inclusive of April/May 2012 Examinations. Thereafter, they will be permitted to appear for the examination only under the Regulations then in force.

M.Sc. COMPUTER SCIENCE

First Semester

Course components	Name of Course	Credits	Exam. Duration	Max. Marks	
				IA	UE
Core -1	Design and Analysis of Algorithms	4	3	25	75
Core -2	Advanced Java Programming	4	3	25	75
Core -3	Systems Software	4	3	25	75
Core – 4	Practical – I: Algorithms Lab	2	3	40	60
Core – 5	Practical – II: Advanced Java Lab.	2	3	40	60
Extra Disciplinary Elective -1	Theoretical Foundations of Computer Science	4	3	25	75
SoftSkill-1		2	3		

Second Semester

Course components	Name of Course	Credits	Duration	Max. Marks	
				CIA	UE
Core-6	Computer Networks	4	3	25	75
Core-7	Digital Image Processing	4	3	25	75
Core–8	Practical – III: RDBMS Lab.	2	3	40	60
Elective I	Elective – I	3	3	25	75
Core-9	Practical – IV: Image Processing using Java Lab	2	3	40	60
Extra Disciplinary Elective -2	Object Oriented Analysis and Design	3	3	25	75
SoftSkill-2		2	3	40	60
SoftSkill-3		2	3	40	60
Internship	4 to 6 weeks of Internship during summer vacation of I Year				

Third Semester

Course components	Name of Course	*Credits*	*Exam. Duration*	Max. Marks	
				CIA	UE
Core-10	Principles of Compiler Design	4	3	25	75
Core-11	Information Security	4	3	25	75
Core - 12	Artificial Intelligence	4	3	25	75
Elective	Elective –II	4	3	25	75
Elective	Elective – III	4	3	25	75
Core-13	Practical – V: Mini Project	2	3	40	60
Soft Skill-4		2	3	40	60
Internship	During summer vacation 4 to 6 weeks of I Year	2			100

Fourth Semester

Course components	Name of Course	*Credits*	*Exam. Duration*	Max. Marks	
				CIA	UE
Core-14	Project & Viva-Voce	20	-	20	60+ 20

Elective - I

Mobile Computing OR Computer Simulation and Modeling OR Computer Graphics

Elective - II

Big data Analytics OR Cryptography OR Distributed Database Systems

Elective - III

Multimedia Systems OR E-Commerce OR Cloud Computing

SYLLABUS
(With effect from the academic year 2015-2016)
M.Sc. DEGREE COURSE IN COMPUTER SCIENCE

REVISED REGULATIONS
Choice Based Credit System
(Effective from the academic year 2015-2016)

1. Eligibility for Admission

Candidates with B.Sc. degree in Computer Science or Computer Science & Technology or B.C.A. degree of this University or any other degree accepted as equivalent thereto by the Syndicate.

5.Course of Study and scheme of examinations:
List of courses are given below:

First Semester

Course components	Name of Course	Credits	Exam.	Max. Marks	
				IA	UE
Core -1	Design and Analysis of Algorithms	4	3	25	75
Core -2	Advanced Java Programming	4	3	25	75
Core -3	Systems Software	4	3	25	75
Core – 4	Practical – I: Algorithms Lab	2	3	40	60
Core – 5	Practical – II: Advanced Java Lab.	2	3	40	60
Extra Disciplinary Elective -1	Theoretical Foundations of Computer Science	4	3	25	75
SoftSkill-1		2	3		

Second Semester

Course components	Name of Course	Credits	Exam.	Max. Marks	
				CIA	UE
Core-6	Computer Networks	4	3	25	75
Core-7	Digital Image Processing	4	3	25	75
Core–8	Practical – III: RDBMS Lab.	2	3	40	60
Elective I	Elective – I	3	3	25	75
Core-9	Practical – IV: Image Processing using Java Lab	2	3	40	60
Extra Disciplinary Elective -2	Object Oriented Analysis and Design	3	3	25	75
SoftSkill-2		2	3	40	60
SoftSkill-3		2	3	40	60
Internship	4 to 6 weeks of Internship during summer vacation of I Year				

Third Semester

Course components	Name of Course	Credits	Exam	Max. Marks	
				CIA	UE
Core-10	Principles of Compiler Design	4	3	25	75
Core-11	Information Security	4	3	25	75
Core - 12	Artificial Intelligence	4	3	25	75
Elective	Elective –II	4	3	25	75
Elective	Elective – III	4	3	25	75
Core-13	Practical – V: Mini Project	2	3	40	60
Soft Skill-4		2	3	40	60
Internship	During summer vacation 4 to 6 weeks of I Year	2			100

Fourth Semester

Course components	Name of Course	Credits	Exam. Durati	Max. Marks	
				CIA	UE
Core-14	Project & Viva-Voce	20	-	20	60+ 20

Elective - I

Mobile ComputingOR Computer Simulation and Modeling OR Computer Graphics

Elective - II

Big data Analytics OR Cryptography OR Distributed Database Systems

Elective - III

Multimedia Systems OR E-Commerce OR Cloud Computing

M.Sc. DEGREE COURSE IN COMPUTER SCIENCE
Revised Syllabus
Choice Based Credit System
Title of the Course/ Paper

Title of the Course/ Paper	Design and Analysis of Algorithms		
Core - 1	I Year & First Semester	Credit: 4	

UNIT 1: Introduction - Definition of Algorithm – pseudocode 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.

Recommended Texts:

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

Title of the Course/ Paper	Advanced Java Programming		
Core – 2	I Year & First Semester	Credit: 4	

UNIT 1: 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.

UNIT 2: 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 3: 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 4: RMI – Overview – Developing applications with RMI: Declaring & Implementing remote interfaces-stubs & skeletons, Registering remote objects, writing RMI clients –Pushing data from RMI Servlet – RMI over Inter-ORB Protocol

Unit 5: 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.

Recommended Text:

1) James McGovern, Rahim , Adatia, Yakor Fain, 2003, J2EE 1.4 Bible, Wiley-dreamtech India Pvt. Ltd, New Delhi
2) Herbert Schildt, 2002, Java 2 Complete Reference, 5th Edition, Tata McGraw Hill, New Delhi.
3) Jamie Jaworski, 1999, Java 2 Platform – Unleashed, First Edition, Techmedia-SAMS.

Reference books:

(1) K. Moss, 1999, Java Servlets, Second edition, Tata McGraw Hill, New Delhi.
(2) D. R.Callaway,1999, Inside Servlets, Addison Wesley, Boston
(3) Joseph O'Neil, 1998, Java Beans from the Ground Up, Tata McGraw Hill, New Delhi.
(4) T. Valesky,T.C. Valesky, 1999, Enterprise JavaBeans, Addison Wesley.
(5) Cay S Horstmann & Gary Cornell, 2013, Core Java Vol II Advanced Features, 9th Edition, Addison Wesley.

Title of the Course/ Paper	System Software		
Core - 3	I Year & First Semester	Credit: 4	

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.

Recommended Texts

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

Reference Books

1) L. L. Beck, 1996, System Software An Introduction to System Programming, 3rd edition, Addison-Wesley.

Title of the Course/ Paper	Practical – I: Algorithms Lab		
Core – 4	I Year & First Semester	Credit: 2	

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.

Title of the Course/ Paper	Practical – II: Advanced Java Programming Lab		
Core – 5	I Year & First Semester	Credit: 2	

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

Title of the Course/ Paper	Theoretical Foundations of Computer Science		
Extra Disciplinary Elective -1	First Year & First Semester		

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 ε-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.

1. Recommended Texts

1. J.P.Tremblay and R.Manohar, 1997, DiscreteMathematical 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.

2. Reference Books

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

Title of the Course/ Paper	Computer Networks		
Core - 6	I Year & Second Semester	Credit: 4	

UNIT 1: Introduction – Network Hardware – Software – Reference Models – OSI and TCP/IP models – Example networks: Internet, 3G Mobile phone networks, Wireless LANs –RFID and sensor networks - Physical layer – Theoretical basis for data communication - guided transmission media

UNIT-2: Wireless transmission - Communication Satellites – Digital modulation and multiplexing - Telephones network structure – local loop, trunks and multiplexing, switching. Data link layer: Design issues – error detection and correction.

UNIT 3: Elementary data link protocols - sliding window protocols – Example Data Link protocols – Packet over SONET, ADSL - Medium Access Layer – Channel Allocation Problem – Multiple Access Protocols.

UNIT 4: Network layer - design issues - Routing algorithms - Congestion control algorithms – Quality of Service – Network layer of Internet- IP protocol – IP Address – Internet Control Protocol

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UNIT 5: Transport layer – transport service- Elements of transport protocol - Addressing, Establishing & Releasing a connection – Error control, flow control, multiplexing and crash recovery - Internet Transport Protocol – TCP - Network Security: Cryptography.

Recommended Texts:

1) A. S. Tanenbaum, 2011, Computer Networks, Fifth Edition, Pearson Education, Inc.

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.
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://peasonhighered.com/tanenbaum

Title of the Course/ Paper	Digital Image Processing		
Core - 7	I Year &Second Semester	Credit: 4	

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: Image enhancement in spatial domain – some basic gray level transformations – histogram processing – enhancement using arithmetic, logic operations – basics of spatial filtering and smoothing.

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.

Recommended Texts:

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

Reference Books

1) Pratt.W.K.,DigitalImage 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.

Title of the Course/ Paper	Practical – III: RDBMS Lab		
Core - 8	I Year & Second Semester	Credit: 2	

1. Library Information Processing.
2. Students Mark sheet processing.
3. Telephone directory maintenance.
4. Gas booking and delivery system.
5. Electricity Bill Processing.
6. Bank Transactions (SB).
7. Pay roll processing.
8. Inventory
9. Question Database and conducting quiz.
10. Purchase order processing.

Title of the Course/ Paper	Practical – IV: Image Processing using Java Lab		
Core – 9	I Year & Second Semester	Credit: 2	

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.

Title of the Course/ Paper	Object Oriented Analysis and Design		
Extra Disciplinary Elective - 2	I Year &Second Semester	Credit: 3	

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.

Recommended Texts

(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.

Title of the Course/ Paper	Principles of Compiler Design		
Core - 10	II Year & Third Semester	Credit: 4	

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.

Recommended Texts:

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.

Title of the Course/ Paper	Information Security		
Core - 11	II Year & Third Semester	Credit: 4	

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.

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/

Title of the Course/ Paper	Artificial Intelligence		
Core 12	II Year & Third Semester	Credit: 4	

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.

Recommended Texts:

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/

Title of the Course/ Paper	Practical – V:Mini Project		
Core – 13	II Year & Third Semester	Credit: 2	

Each student will develop and implement individually application software based on any emerging latest technologies.

Title of the Course/ Paper	Project & Viva-Voce		
Core-14	II Year & Fourth Semester	Credit: 20	

The project work is to be carried out either in a software industry or in an academic institution for the entire semester and the report of work done is to be submitted to the University.

LIST OF ELECTIVES

Title of the Course/ Paper	Mobile Computing		
Elective – 1	I Year & Second Semester	Credit: 3	

UNIT 1: 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 2: Telecommunication Systems – GSM – Architecture – Sessions – Protocols – Hand Over and Security – UMTS and IMT – 2000 – Satellite Systems.

UNIT 3: Wireless Lan - IEEE S02.11 – Hiper LAN – Bluetooth – Security and Link Management.

UNIT 4: Mobile network layer - Mobile IP – Goals – Packet Delivery – Strategies – Registration – Tunneling and Reverse Tunneling – Adhoc Networks – Routing Strategies

UNIT 5: Mobile transport layer - Congestion Control – Implication of TCP Improvement – Mobility – Indirect – Snooping – Mobile – Transaction oriented TCP - TCP over wireless – Performance.

Recommended Text

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(2002), Principle of wireless Networks: A unified Approach, PearsonEducation,Delhi.

3) Martyn Mallick, 2004, Mobile and Wireless Design Essentials, Wiley Dreamtech India Pvt. Ltd., NewDelhi.

4) W.Stallings, 2004, Wireless Communications and Networks, 2nd Edition, Pearson Education, Delhi.

Website and e-Learning Source

1) http://csbdu.in/pdf/mobile%20communication.pdf

Title of the Course/ Paper	Computer Simulation and Modeling		
Elective - 1	I Year & Second Semester	Credit: 3	

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

Recommended Text

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

1) http://www.bcnn.net

Title of the Course/ Paper	Computer Graphics		
Elective - 1	I Year & Second Semester	Credit: 3	

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.

Recommended Text

1) D. Hearn, M.P. Baker, and W.R. Carithers, 2011 – Computer Graphics with openGL, 4thEdition, 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
2) http://www.cs.kent.edu/~farrell/cg05/lectures/index.html

Title of the Course/ Paper	Big Data Analytics		
Elective - 2	II Year & Third Semester	Credit: 4	

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.

Recommended Text:

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.

Title of the Course/ Paper	Cryptography		
Elective - 2	II Year & Third Semester	Credit: 4	

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.

Recommended Texts:

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.

Title of the Course/ Paper	Distributed Database Systems		
Elective - 2	II Year & Third Semester	Credit: 4	

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.

Recommended Text:

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.

Title of the Course/ Paper	Multimedia Systems		
Elective – 3	II Year & Third Semester	Credit: 4	

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.

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.
4.

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

Title of the Course/ Paper	E-Commerce		
Elective – 3	II Year & Third Semester	Credit: 4	

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 – NetworkAccess 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 inBusiness –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.

Recommended Texts

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.

Title of the Course/ Paper	Cloud Computing		
Elective – 3	II Year & Third Semester	Credit: 4	

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

Recommended Text

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

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