APPENDIX – 32 (R&S)

UNIVERSITY OF MADRAS

SRI SANKARA ARTS & SCIENCE COLLEGE (AUTONOMOUS)

M.Sc., COMPUTER SCIENCE

(Effective from the academic year 2018-2019)

REGULATIONS

Choice based credit system

REGULATIONS :

1. CBCS SYSTEM:

All programmes (named after the core subject) mentioned earlier shall be run on **Choice Based Credit System (CBCS).** It is an instructional package developed to suit the needs of students to keep pace with the developments in higher education and the quality assurance expected of it in the light of liberalization and globalization in higher education

2. 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 Academic Council of the Autonomous College shall be eligible for admission to M.Sc Computer Science Degree Course.

3. 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 Autonomous College for a period of not less than two academic years, passed the examinations of all the Four Semesters prescribed earning 90 credits in Parts-I, II, III, IV & V and fulfilled such conditions as have been prescribed therefore. The parent university will award degrees to the students evaluated and recommended by autonomous colleges.

4. DURATION

Each academic year shall be divided into two semesters. The first academic year shall comprise the first and second semesters, the second academic year the third and fourth semesters respectively.

The odd semesters shall consist of the period from June to November of each year and the even semesters from December to April of each year. There shall be not less than 90 working days for each semester exclusive of the days for the conduct of semester examinations.

In each semester, Courses are administered in 15 teaching weeks and another 5 weeks are utilized for evaluation and grading purposes. Each week has 30 working hours spread over in a 5 day week. Depending upon the content and

specialization, a paper may have 1 to 6 credits. Total number of teaching hours in a semester will be 450 hrs.

5. MAXIMUM PERIOD FOR COMPLETION OF THE PROGRAMMES

The candidates shall complete the Masters Degree Programmes within 4 years from the date of admission. The term completing the programmes means passing all the prescribed examinations of the programme to become eligible for the degree. No candidate shall be permitted to appear for the examinations after the prescribed period for completing the programme.

6. MEDIUM OF INSTRUCTION

The medium of instruction shall be English.

7. COURSE OF STUDY

A Master's programme consists of a number of courses (papers). The term Course is used to indicate logical part of a subject matter of the programme. In each of Master's programmes, there will be a prescription of (i) Part –I (Core subjects – Theory, Practicals, Project, and Field work), (ii) Part – II (Elective subjects – Inter disciplinary or Extra disciplinary subjects), (iii) Part – III: a set of papers recommended by UGC and TANSCHE (Soft skills), (iv) Part – IV: Internship

The detail of the Study for Master Degree Courses shall consist of the following:

PART – I Core Subjects – Theory, Practicals, Project / Field work PG students shall be required to take up Project / Field Work and submit the Project Report during the second year. The Head of the Department shall allot the Guide who in turn will suggest the Project Work to the students. Two typed copies of the Project Report shall be submitted to the Department before the due date and one copy will be forwarded to the Controller of Examinations. For the Project Report, the maximum internal marks will be 20 percent, the maximum external marks will be 60 per cent and for the Viva-Voce 20 per cent (If in some programmes, if the project is equivalent to more than one paper, the project marks would be in proportion to the number of equivalent papers). Each student shall be

required to appear for Viva-Voce Examination in defence of the Project only.

PART – II Elective Subjects – Inter-disciplinary or Extra-disciplinary or self study elective or open elective

PART – III Skill Based Subjects - Soft Skills

A candidate shall be eligible for the award of the degree only if he/she has undergone the prescribed papers on Soft Skills. For three years PG degree Programme, a candidate must undergo a minimum of 2 papers (2 x 2 = 4 credits). Papers will be finalized in due course.

PART – IV Internship

Each PG student shall appear for internship training during the vacation of II Semester for a minimum period of 15 days

and shall submit the report to the controller of examinations. Each student is allotted 4 credits on submission of the report.

Course: Every course offered will have three components associated with the teaching learning process of the paper, namely (i) Lecture - L (ii) Tutorial - T (iii) Practicals - P, (iv) Self study - S where

L stands Lecture session. **T** stands Tutorial session consisting participatory discussion / self study / desk work / brief seminar presentations by students and such other novel methods that make a student to absorb and assimilate more effectively the contents delivered in the Lecture classes.

P stands Practice session and it consists of Hands on experience / Laboratory Experiments / Field Studies / Case studies that equip students to acquire the much required skill component.

S stands Self study session consisting participatory discussion by student with the guidance of faculty. This session is not included in the weekly hour plan.

In terms of credits, every one hour session of L amounts to 1 credit per semester, a minimum of two hour session of T or P amounts to 1 credit per semester and no credits allotted to self study hour, over a period of one semester of 15 weeks for teaching-learning process. The total duration of a semester is 20 weeks inclusive of semester-end examination.

A paper shall have either or all the three components. That means a paper may have only lecture component, or only practical component or combination of any two or all the three components. The total credits earned by a student at the

end of the semester upon successfully completing the paper are L + T + P + S. The credit pattern of the paper is indicated as L: T: P: S.

For example: a theory paper with a L-T-P-S schedule of 4-0-0-2 will be assigned 4 credits, and a lab practical paper with a L-T-P-S schedule of 0-0-3-0 will be assigned 3 credits.

The concerned Board of Studies will choose the convenient credit pattern for every paper based on the requirement. However, generally, a paper shall be of 2 - 6 credits.

Different courses of study are labeled and defined as follows:

Core Course

A course which should compulsorily be studied by a candidate as a core requirement is termed as a Core course.

A Core course may be a **Soft Core** if there is a choice or an option for the candidate to choose a course from a pool of courses from the main discipline / subject of study or from a sister/related discipline / subject which supports the main discipline / subject. In contrast to the phrase Soft Core, a compulsory core course is called a **Hard Core** Course**.**

Elective Course

Generally a course which can be chosen from a pool of courses and which may be very specific or specialized or advanced or supportive to the discipline / subject of study or which provides an extended scope or which enables an exposure to some other discipline / subject/ domain or nurtures the candidate's proficiency/ skill is called an

Elective Course. Elective courses may be offered by the main discipline / subject of study or by sister / related discipline / subject of study. A Soft Core course may also be considered as an elective. An elective course chosen generally from an unrelated discipline / subject, with an intention to seek exposure is called an **open elective**. An elective course designed to acquire a special/ advanced knowledge, such as supplement study/support study to a project work, and a candidate studies such a course on his own with an advisory support by a teacher is called a **Self Study Elective**.

A core course offered in a discipline / subject may be treated as an elective by other discipline / subject and vice versa.

Project work / Dissertation work is a special course involving application of knowledge in solving / analyzing / exploring a real life situation / difficult problem. A project work up to 4 - 6 credits is called Minor Project work. A project work of 8 - 12 credits is called Major Project Work. Dissertation work can be of 8 - 12 credits. A Project / Dissertation work may be a hardcore or a soft core as decided by the Board of Studies concerned.

Student Advisor

All teachers of the department shall function as student advisors. There will be more or less an equal number of students assigned to each student advisor of a department. The Student advisor will help the students in choosing core and elective courses of study. The student advisor shall be responsible for registration of courses (subjects) by his students.The student advisor will offer all possible student support services.

8. CREDITS

The term credit is used to describe the quantum of syllabus for various programmes in terms of periods of study. It indicates differential weightage given according to the contents duration of the courses in the curriculum design. The minimum credit requirement for a two year Master's programme shall be **91**credits. Each subject (course) is designed variously under lectures / tutorials / laboratory work / seminar / project work etc., to meet effective teaching and learning needs and credits are assigned suitably.

One credit for each lecture / tutorial / project work period per week shall be allotted. In practical, each credit should cover minimum of six experiments. One credit is allotted for two practical hours. Thus normally, in each of the subject, credits will be assigned on the basis of the lectures / tutorials / laboratory work / project work and other forms of learning in a 15week schedule.

9. SCHEME OF EXAMINATION

There shall be continuous, comprehensive evaluation of students through internal and external examination. At least 2 internal examinations (Sessional Tests) per semester and 1semester ending examination should be conducted.

Sessional Test I will he held during sixth week for syllabi covered till then. Sessional Test I will be a combination of a variety of tools such as class test, assignment, paper presentation etc. that would be suitable for the paper. This required an element of openness. The students are to be informed in advance about the nature of assessment and the

procedures. However the tests are compulsory. Test I may be for one hour duration. The pattern of question paper will be decided by the respective board of studies.

Sessional Test I will carry 20% of marks of the entire paper.

Sessional Test II will he held during eleventh week for syllabi covered between seventh and eleventh weeks. Sessional Test I will be a combination of a variety of tools such as class test, assignment, paper presentation etc. that would be suitable for the paper. It will also have an element of openness. The students are to be informed in advance about the nature of assessment and the procedures. However the tests are compulsory. Test II may be for one hour duration. The pattern of question paper will be decided by the respective board of studies.

Sessional Test II will carry 20% of marks of the entire paper.

There will be one End Semester examination of 2 - 3 hours duration in each paper. The End semester examination will cover all the syllabi of the paper for 60% of Marks.

A dissertation may be offered in lieu of one / two papers / practicals. It shall be evaluated by two examiners one external and one internal appointed by the Controller of Examination. Wherever there is viva-voce, it shall be conducted by the common Viva Board consisting of the Chairman and internal members of the Board of Examination in the concerned subject, internal guide and one external expert as approved by the Controller of Examinations. End semester practical examinations shall be held before the

theory examinations to benefit the students to undertake examinations of other departments.

10. COURSE OF STUDY AND SCHEME OF EXAMINATIONS :

FIRST SEMESTER

Course components	Name of Course	Semester	Credits	Exam. Duration	Max. Marks		
					CIA	UE	Total
Core -1	System Software	I	4	3	25	75	100
Core -2	Advance Java Programming	I	4	3	25	75	100
Core -3	Design and Analysis of Algorithm	I	4	3	25	75	100
Core -4	Principles of Compiler Design	I	4	3	25	75	100
Core -5	Advance Java Programming Lab	I	2	3	40	60	100
Core -6	Algorithm Lab	I	2	3	40	60	100
	Soft Skill -I	I	2	3	40	60	100

SECOND SEMESTER

Course components	Name of Course	Semester	Credits	Exam. Duration	Max. Marks	
					CIA	UE
Core-7	Computer Network	II	4	3	25	75
Core-8	Digital Image Processing	II	4	3	25	75
Extra Disciplinary Elective -1	Theory of Computation	II	5	3	25	75
	Elective - I	II	4	3	25	75
Core–9	RDBMS – Lab	II	2	3	40	60
Core–10	Image Processing using Java Lab	II	2	3	40	60
	Soft Skill -II	II	2	3	40	60
	Soft Skill -III	II	2	3	40	60

Elective – I

1. Mobile Computing
2. Computer Simulation and Modeling
3. Computer Graphics

THIRD SEMESTER

Course components	Name of Course	Semester	Credits	Exam. Duration	Max. Marks	
					CIA	UE
Extra Disciplinary Elective - II	Object Oriented Analysis and Design	III	4	3	25	75
Core - 11	Data Warehousing and Data Mining	III	4	3	25	75
	Elective - II	III	4	3	25	75
	Elective - III	III	4	3	25	75
Core - 12	Mini Project	III	4	3	40	60
	Soft Skill – IV	III	2	3	40	60
	** Internship	III	2			100

** Internship will be carried out during the summer vacation of the first year and the report will be evaluated by two examiners within the department of the college/ institution. The marks should be sent to the controller of examination and the same will be including in the third semester marks statement.

Elective - II

1. Network Security
2. TCP/IP
3. Artificial Neural Networks

Elective - III

1. Cryptography
2. Cloud Computing
3. Distributed Database System

FOURTH SEMESTER

Course Components	Name of the Course	Semester	Credits	Exam. Duration	Max. Marks	
					CIA	UE
Core-13	Project Work	IV	20	3	20	80

Total of 30 hrs was maintained constantly for all semesters. Internship is compulsory and added in the third semester

instead of soft skill. Self study elective is optional. Self study elective carries one credit.

Question Paper Pattern for External Examination

SECTION – A (50 words)

10 out of 12 Questions - 10 X 1 marks = 10 marks

SECTION – B (250 words)

5 out of 7 Questions - 5X 5 marks = 25 marks

SECTION – C (500 words)

4out of 6 Questions - 4 x 10 marks = 40 marks

TOTAL = 75 Marks

The offer of an Add-on Courses to the students in various disciplines is to enhance their employability. The number of working hours per week for the students for getting the 90 prescribed credits should not exceed 30 hours of class per week and no faculty member should be allocated extra hours beyond the prescribed 16 lecture hours.

Marks for continuous internal assessment (CIA) shall be awarded on the basis of tests, seminars, field work, assignment etc as determined by the Board of Studies in the respective subject. The internal assessment marks shall be notified on the department notice board for information of the students and it shall be communicated to the Controller of

Examinations 5 days before the commencement of the End Semester examinations, and the Controller of Examinations shall have access to the records of such internal assessment evaluations.

The following procedure be followed for Internal Marks

Theory

Papers: Internal Marks 25

Theory based Continuous Internal Assessment (CIA) - 25

Tests (2 out of 3)	= 10
Attendance*	= 5
Seminars	= 5
Assignments	= 5
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	25 marks

A model practical examination is conducted for awarding CIA marks for practical. Question paper pattern for CIA examination is similar to the pattern of end semester examination as decided by Board of Studies.

Dissertation :	Internal Marks	:	40
	External Marks	:	60
	Total Marks	:	100

Each department has complete autonomy for designing and scheduling internal examinations / assignments. However transparency and objectivity shall be the main criteria. Records are to be maintained.

11. REQUIREMENTS FOR PROCEEDING TO SUBSEQUENT SEMESTER

i. Candidates shall register their names for the First Semester Examination after the admission in PG Courses.

ii. Candidates shall be permitted to proceed from the First Semester up to 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 subject of earlier semesters along the current (subsequent) Semester Subjects.

iii.Candidates shall be eligible to go to subsequent semester, only if they earn sufficient attendance as prescribed therefore by the Academic Council from time to time. Provided in case of a candidate earning less than 50% of attendance in any one of the Semesters due to any extraordinary circumstances such as medical grounds, such candidates who shall produce Medical Certificate issued by the Authorized 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 Candidates 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 Academic Council from time to time.

iv. There shall be examinations at the end of each semester, for odd semesters in the month of October / November, for even semesters in April / May. A candidate who does not pass the examination in any paper(s) shall be permitted to appear in such failed papers in the subsequent examinations to be held in October / November or April / May.

v. The results of all the examinations will be published through the college Website.

12. PASSING MINIMUM

A candidate shall be declared to have passed:

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 for each Paper/Practical/Project and Viva-voce.

c) In the aggregate (External + Internal) the passing minimum shall be of 50%.

d) He/She shall be declared to have passed the whole examination, if he/she passes in all the papers and practicals wherever prescribed / as per the scheme of examinations by earning **90** CREDITS in Parts-I, II, III, IV & V. He / She shall also complete one certificate course to qualify for the Degree.

A candidate who fails in any of the unit / project work / Project Report / dissertation / viva voice shall reappear in that unit / project work / Project Report / Dissertation / viva-voice and pass the examination subsequently.

13. CLASSIFICATION OF SUCCESSFUL CANDIDATES

PART- I CORE SUBJECTS (COURSE): Successful candidates passing the Examinations for the Language and securing the marks 60 percent and above in the aggregate shall be declared to have passed the examination in the FIRST Class. All other successful candidates shall be declared to have passed the examination in the SECOND Class.

PART – II ELECTIVE SUBJECTS (COURSE): Successful candidates passing the examinations for English and securing the marks 60 percent and above in the aggregate shall be declared to have passed the examination in the FIRST Class. All other successful candidates shall be declared to have passed the examination in the SECOND class.

PART – III Soft skill

Successful Candidate earning of 2 credits for soft skill paper SHALL NOT BE taken into consideration for Classification / Ranking / Distinction.

PART – IV INTERNSHIP

Successful Candidate earning of 2 credits for internship SHALL NOT BE taken into consideration for Classification / Ranking / Distinction.

14. GRADING SYSTEM:

The term grading system indicates a TEN (10) 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.

Ci = Credits earned for course i in any semester.

Gi = Grade Point obtained for course i in any semester.

n refers to the semester in which such courses were credited.

For a Semester :

GRADE POINT AVERAGE [GPA] = $\sum i$ Ci Gi / $\sum i$ Ci

$$GPA = \frac{\text{Sum of the multiplication of grade points by the credits of the courses}}{\text{Sum of the credits of the courses in a semester}}$$

For the entire programme:

CUMULATIVE GRADE POINT AVERAGE [CGPA] = $\sum n \sum i$ CniGni /$\sum n \sum i$ Cni

$$CGPA = \frac{\text{Sum of the multiplication of grade points by the credits of the entire programme}}{\text{Sum of the credits of the courses of the entire programme}}$$

TEN POINT SCALE

RANGE OF MARKS	**GRADE POINTS**	**LETTER GRADE**	**DESCRIPTION**
90–100	9.0–10.0	O	Outstanding
80–89	8.0–8.9	D+	Excellent
75–79	7.5–7.9	D	Distinction
70–74	7.0–7.4	A+	Very Good
60–69	6.0–6.9	A	Good
50–59	5.0–5.9	B	Average
00–49	0.0	U	Re-appear
ABSENT	0.0	AAA	ABSENT

CGPA	GRADE	CLASSIFICATION OF FINAL RESULT
9.5-10.0	O+	First Class - Exemplary *
9.0 and above but below 9.5	O	
8.5 and above but below 9.0	D++	First Class with Distinction *
8.0 and above but below 8.5	D+	
7.5 and above but below 8.0	D	
7.0 and above but below 7.5	A++	First Class
6.5 and above but below 7.0	A+	
6.0 and above but below 6.5	A	
5.5 and above but below 6.0	B+	Second Class
5.0 and above but below 5.5	B	
0.0 and above but below 5.0	U	Re-appear

* The candidates who have passed in the first appearance and within the prescribed semester of the PG Programme (Core, Elective, Non-major Electives and Extra-Disciplinary courses alone) are eligible.

15. TRANSITORY PROVISION

Candidates who have undergone the course of study prior to the academic year 2018-2019 will be permitted to appear for the examinations under those Regulations for a period of TWO years i.e. upto and inclusive of April - May 2020 Examinations. Thereafter, they will be permitted to appear for the examination only under the Regulations then in force.

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M.Sc., COMPUTER SCIENCE

(Effective from the academic year 2018-2019)

SYLLABUS

Title of the paper	**System Software**	
Category : Core – Paper	Year & Semester	Credits
	First year & Semester -I	4

Objective: This course introduces the basic concepts language processors required for computing related applications.

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.
2) Systems Programming by John J Donovan (McGraw-Hill Education)

3) System Programming with C and Unix.- Hoover (Pearson Education)

Reference Books

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

2) System Software : Nityashri,(McGraw-Hill Education)

Title of the paper	**Advanced Java Programming**	
Category :	Year & Semester	Credits
Core –Paper	**First year & Semester -I**	4

Objective:-This course gives an insight into advanced features of Java

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 info bus - 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 – STRUTS – Introduction -frame work – MVC based web application.

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 paper	**Design and Analysis of Algorithms**	
Category :	Year & Semester	Credits
Core –Paper	**First year & Semester -I**	4

Objective:-This course gives insight into the design and analysis for selected problems.

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. – Quick sort, Selection, Maximum and Minimum, Strassen's matrix multiplication – Greedy Method: General Method –knapsack problem - Tree vertex splitting - Job sequencing with deadlines – 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

1. Recommended Texts

(i) E. Horowitz, S. Sahni and S. Rajasekaran, 1999, Computer Algorithms, Galgotia, New Delhi.

(i) G. Brassard and P. Bratley, 1997, Fundamentals of Algorithms, PHI, New Delhi.

(ii) A.V. Aho, J.E. Hopcroft, J.D. Ullmann, 1974, The design and analysis of Computer Algorithms, Addison Wesley, Boston.

2. Reference Books

(i) S.E.Goodman and S.T.Hedetniemi, 1977, Introduction to the Design and Analysis of algorithms, Tata McGraw Hill Int. Edn, New Delhi.

3. **Website, E-learning resources**

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

Title of the paper	**Principles of Compiler Design**	
Category :	Year & Semester	Credits
Core –Paper	**First year & Semester -I**	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.

2) D.Gries, 1979, Compiler Construction for Digital Computers, John Wiley & Sons.

3) A.V.Aho, Ravi Sethi, and J.D.Ullman, 1986, Compilers Principles, Techniques and Tools, Addison Wesley Pub. Co.

Reference Books

1) Alfred V. Aho, Ravi Sethi Jeffrey D. Ullman, “Compilers-Principles, Techniques, andTools”, Pearson Education Asia, 2007.

2) David Galles, “Modern Compiler Design”, Pearson Education Asia, 2007.
3))Steven S. Muchnick, “Advanced Compiler Design &Implementation”, MorganKaufmann Pulishers, 2000.
4) C. N. Fisher and R. J. LeBlanc “Crafting a Compiler with C”, Pearson Education,2004

Title of the paper	**Advanced Java Programming Lab.**	
Category :	Year & Semester	Credits
Core –Paper	**First year & Semester -I**	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

10. Session Bean application (statefull and stateless).

11. Develop JDBC application to illustrate cursors

Title of the paper	Algorithms Lab	
Category :	Year & Semester	Credits
Core –Paper	**First year & Semester -I**	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.

Semester – II

Title of the paper	Computer Networks	
Category :	Year & Semester	Credits
Core –Paper	**First year & Semester -II**	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.

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.

2) B. Forouzan, 1998, Introduction to Data Communications in Networking, Tata McGraw Hill, New Delhi.

3) F. Halsall, 1995, Data Communications, Computer Networks and Open Systems, Addison Wessley.

Reference Books

1) D. Bertsekas and R. Gallagher, 1992, Data Networks, Prentice hall of India, New Delhi.

2) Lamarca, 2002, Communication Networks, Tata McGraw Hill, New Delhi.

Website, E-learning resources

1) http://peasonhighered.com/tanenbaum

Title of the paper	**Digital Image Processing**	
Category :	Year & Semester	Credits
Core –Paper	**First year & Semester -II**	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.

2) Pratt.W.K.,Digital Image Processing, 3rd Edition, John Wiley & Sons

3) Rosenfled A. &Kak, A.C, 1982, Digital Picture Processing, vol .I & II, Academic Press

Reference Books

1) Sonka, Hlavac, Boyle, Digital Image Processing and Computer Vision, Cengage Learning, 2009
2) Chanda&Majumdar, Digital Image Processing and Analysis, Prentice Hall ,3rdEdition.
3) Anil K. Jain, 1994, Fundamentals of Digital image Processing, 2nd Edition, Prentice Hall of India, New Delhi.

Website and e-Learning Source:

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

Title of the paper	**Theoretical Foundations of Computer Science**	
Category : Extra Disciplinary Elective -I	Year & Semester	Credits
	First year & Semester -II	5

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

1. Recommended Texts

(i) J.P. Tremblay and R. Manohar, 1997, Discrete Mathematical Structures with applications to Computer Science, Tata McGraw-Hill, New Delhi.

(ii) P. Linz, 1997, An Introduction to Formal Languages and Automata, Second Edition, Narosa Pub. House, New Delhi.

(iii) S. Lipschutz and M. Lipson, 1999, Discrete Mathematics, Second Edition, Tata McGraw-Hill, New Delhi.

(iv) J.E.Hopcraft and J.D.Ullman, 1993, Introduction to Automata Theory, Languages and Computation, Narosa Publishing House, New Delhi.

2. Reference Books

(i) D.C.Kozen, 1997, Automata and Computability, Springer-Verlag, New York.

(ii) J. Martin, 2003, Introduction to Languages and the Theory of Computation, 3rd Edition,

Tata McGraw-Hill, New Delhi.

Title of the paper	**Mobile Computing**	
Category :	Year & Semester	Credits
Elective	**First year & Semester -II**	4

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.

2)Hansmann, Merk, Nicklous, Stober, 2004, Principles of Mobile Computing, 2nd Edition, Springer (India).

3) Pahlavan, Krishnamurthy, 2003(2002), Principle of wireless Networks: A unified Approach, Pearson Education,Delhi.

Reference Books

1) MartynMallick, 2004, Mobile and Wireless Design Essentials, Wiley Dreamtech India Pvt. Ltd., NewDelhi.

2) 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 paper	**Computer Simulation and Modeling**	
Category :	Year & Semester	Credits
Elective	**First year & Semester -II**	4

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.

2) Averill M.Law and W.DavidKelton, 1991, Simulation Modeling & Analysis, 2nd Edn., Tata McGraw Hill.

3) Geoffrey Gardon, 1992, System Simulation, 2nd Edn.,Printice Hall of India.

Reference Books

1) NarsinghDeo, 1979, System Simulation with Digital Computers, Prentice Hall of India

2) C.DennisPegden, Robert E.Shannon and Randall P.Sadowski, 1995, Introduction to Simulation using SIMAN, 2nd Edn., Tata McGraw-Hill. **E-learning resources**

Website and e-Learning Source

1) http://www.bcnn.net

Title of the paper	**Computer Graphics**	
Category :	Year & Semester	Credits
Elective	**First year & Semester -II**	4

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, 4th Edition, Pearson Education

2)W.M. Neumann and R. F. Sproull, Principles of Interactive Computer Graphics, Tata McGraw-Hill, New Delhi.

3) S. Harrington, 1989, Fundamentals of Computer Graphics, Tata McGraw-Hill, New Delhi.

Reference Books

1) D. F. Rogers, J. A. Adams, 2002, Mathematical elements for Computer Graphics, 2nd Edition, Tata McGraw-Hill, New Delhi.

2) D. F. Rogers, 2001, Procedural elements for Computer Graphics, 2nd Edition, Tata McGraw-Hill, New Delhi.

3) 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.htm

Title of the paper	**RDBMS Lab**	
Category :	Year & Semester	Credits
Core –Paper	**First year & Semester -II**	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.

11. Income tax processing system

Title of the paper	Image Processing using Java Lab	
Category :	Year & Semester	Credits
Core –Paper	**First year & Semester -II**	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.

Semester –III

Title of the paper	**Object Oriented Analysis and Design**	
Category :Extra	Year & Semester	Credits
Disciplinary Elective -II	**Second year & Semester - III**	4

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

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

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

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

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

Books for Study:

1. Ali Bahrami - Object Oriented Systems Development - McGraw Hill International Edition - 1999.
2. Grady Booch- Object Oriented Analysis and design – Addison Wesley.
3. Rumbaugh, Blaha, Premerlani , Eddy, Lorensen, 2003, Object Oriented Modeling And design , Pearson education, Delhi.

Reference Book:

1. Mala, D. Jeya. *Object Oriented Analysis and Design Using UML*. Tata McGraw-Hill Education, 2013.

2. Ramnath, Sarnath, and Brahma Dathan. *Object-oriented analysis and design*.Springer Science & Business Media, 2010.

3. Kahate, Atul. *Object Oriented Analysis & Design*. Tata McGraw-Hill Education, 2004

Title of the paper	Data Warehousing and Data Mining	
Category :	Year & Semester	Credits
Core –Paper	**Second year & Semester -III**	4

Unit 1: Introduction: Data Mining tasks – Data Mining versus Knowledge Discovery in Data bases – Relational databases – Data warehouses – Transactional databases – Object oriented databases – Spatial databases – Temporal databases – Text and Multimedia databases – Heterogeneous databases - Mining Issues – Metrics – Social implications of Data mining.

Unit 2: Data Preprocessing: Why Preprocess the data – Data cleaning – Data Integration – Data Transformation – Data Reduction – Data Discretization.

Unit 3: Data Mining Techniques: Association Rule Mining – The Apriori Algorithm – Multilevel Association Rules – Multidimensional Association Rules – Constraint Based Association Mining.

Unit 4: Classification and Prediction: Issues regarding

Classification and Prediction – Decision Tree induction – Bayesian Classification – Back Propagation – Classification Methods – Prediction – Classifiers accuracy.

Unit 5 : Clustering Techniques: cluster Analysis – Clustering Methods – Hierarchical Methods – Density Based Methods – Outlier Analysis – Introduction to Advanced Topics: Web Mining , Spatial Mining and Temporal Mining.

1. Recommended Texts

(i) J. Han and M. Kamber , 2001, Data Mining: Concepts and Techniques, Morgan Kaufmann, .New Delhi.

(ii) M. H.Dunham, 2003, Data Mining : Introductory and Advanced Topics , Pearson Education, Delhi.

(iii) PaulrajPonnaiah, 2001, Data Warehousing Fundamentals, Wiley Publishers.

2. Reference Books

(i) S.N. Sivananda and S. Sumathi, 2006, Data Mining, Thomsan Learning, Chennai.

Title of the paper	Network Security	
Category : **Elective - II**	Year & Semester	Credits
	Second year & Semester - III	4

Unit I : Overview-Symmetric Ciphers: Classical Encryption Techniques

Unit II : Symmetric Ciphers: Block ciphers and the Data Encryption Standards Public key Encryption and Hash Functions: Public-Key Cryptography and RSA

Unit III : Network Security Practices: Authentication applications-Electronic Mail Security

Unit IV : Network Security Practices: IP Security-Web Security

Unit V : System Security: Intruders-Malicious Software-Firewalls

1. Recommended Texts

i) William Stallings, Cryptography and Network Security-Principles andPractices, Prentice-Hall, Third edition, 2003

ii) Johannes A. Buchaman , Introduction to cryptography, Springer-Verlag.

iii)Atulkahate , Cryptography and Network Security, TMH.

2. Reference Books

i) Stallings**,** Cryptography & N/w Security: Principles and practice, 4th Edition,2006

ii)Kaufman, Perlman, Speciner, Network Security, Prentice Hall, 2nd Edition, 2003

iii)Macro Pistoia, Java Network Security, Pearson Education, 2nd Edition, 1999

Title of the paper	**TCP/IP**	
Category : **Elective - II**	Year & Semester	Credits
	Second year & Semester - III	4

UNITI : Internetworking concepts and architecture model – classful Internet address – CIDR–Subnetting and Supernetting – AARP – RARP- IP- IP Routing – ICMP – IPV6.

UNIT II -TCPServices – header – connection establishment and termination – interactive data flow –bulk data flow – timeout and retransmission – persist timer – keep alive timer – futuresand performance.

UNIT III - IP IMPLEMENTATIONIP global software organization – routing table – routing algorithms – fragmentation and reassembly – error processing (ICMP) – Multicast Processing (IGMP).

UNIT IV - TCP IMPLEMENTATION I Data structure and input processing – transmission control blocks – segment format –comparison – finite state machine implementation – Output processing – mutual exclusion – computing the TCP Data length.

UNIT V - TCP IMPLEMENTATION II Timers – events and messages – timer process – deleting and inserting timer event –flow control and adaptive retransmission – congestion

avoidance and control – urgentdata processing and push function.

TEXT BOOKS:

1. Douglas E Comer," Internetworking with TCP/IP Principles,Protocols andArchitecture",Vol 1 and 2, Vth Edition

2. W.RichardStevans "TCP/IP Illustrated" Vol 1.2003.

3.Forouzan, " TCP/IP Protocol Suite" Second Edition, Tate MC Graw Hill, 2003.

REFERENCES:

1. W.Richard Stevens "TCP/IP Illustrated" Volume 2, Pearson Education 2003

Title of the paper	**Artificial Neural Networks**	
Category : **Elective - II**	Year & Semester	Credits
	Second year & Semester -III	4

Unit 1: Introduction to Neural Networks – Basic Concepts of Neural Networks – Inference and Learning – Classification Models – Association Models – Optimization Models – Self-Organization Models.

Unit 2: Supervised and Unsupervised Learning – Statistical

Learning – AI Learning – Neural Network Learning – Rule Based Neural Networks – Network Training – Network Revision- Issues- Theory of Revision- Decision Tree Based NN – Constraint Based NN

Unit 3: Incremental learning – Mathematical Modeling – Application of NN- Knowledge based Approaches.

Unit 4: Heuristics- Hierarchical Models – Hybrid Models – Parallel Models – Differentiation Models- Control Networks – Symbolic Methods- NN Methods.

Unit 5: Structures and Sequences – Spatio-temporal NN – Learning Procedures – Knowledge based Approaches.

1. Recommended Texts

(i) L. Fu, 1994, Neural Networks in Computer Intelligence, Tata McGraw Hill, New Delhi.

(ii) R. J. Schalkoff, 1997, Artificial Neural Networks, Tata McGraw Hill, New Delhi.

Anderson, 2001, An Introduction to Neural Network, PHI, New Delhi.

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

2. 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.

Title of the paper	Cryptography	
Category :Elective - III	Year & Semester	Credits
	Second year & Semester - III	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.
2) Charlie Kaufman, Radia Perlman, Mike specimen, Network Security- Private Communication in a public world.
3) Michael Welsehenbach, 2005, Cryptography in C & C++", John Wiley.

Reference Books

1) Bruce sehneier , 2001 Applied Cryptography , John Wiley and sons.

2) KailashN.Gupta ,Kamlesh N. Agarwala, Pratek A. Agarwala, 2005, Digital signature Network security practices , PHI, New Delhi.

Title of the paper	Cloud Computing	
Category : Elective - III	Year & Semester	Credits
	Second year & Semester -III	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

Reference Book:

1)Handbook of Cloud Computing – BorkoFurht, Armando Escalante Editors, Springer

Title of the paper	Distributed Database	
Category : Elective - III	Year & Semester	Credits
	Second year & Semester -III	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 – Sub typing 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.TamerOzsu, Patrick Valduriez, Distributed database systems, 2nd Edition, Prentice Hall of India, New Delhi.
3. Özsu, M. Tamer, and Patrick Valduriez. *Principles of distributed database systems*. Springer Science & Business Media, 2011.

Reference Book:

1. David, Bell, and Jane Grimson. "Distributed Database Systems." *Addison — Wesley* (1992).