University of Mysore

Pooja Bhagavat Memorial Mahajana PG Centre

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DEPARTMENT OF STUDIES IN COMPUTER SCIENCE

M.Sc in Computer Science

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UNIVERSITY OF MYSORE

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No.AC.2(S)/405/11-12 Dated: 18-07-2012.

NOTIFICATION

Sub: Change in the list of courses for M.Sc. Computer Science course from the Academic Year 2012-13.

Ref: 1) Proceedings of Faculty of Science & Technology Meeting held on 07-02-2012.
2) Proceedings of the Meeting of Academic Council held on 29-03-2012.

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The Board of Studies in **Computer Science (P.G.)** at its meeting held on 26.11.2011 has proposed Change in the list of courses for M.Sc. Computer Science.

The Faculty of Science and Technology and the Academic Council at their meetings held on 07-02-2012 and 29-03-2012 respectively approved the above proposals and the same is hereby notified.

The copy of the changes in the list of courses for M.Sc. Computer Science course is annexed herewith.

REGISTRAR

To

1. The Registrar (Evaluation), University of Mysore, Mysore.
2. The Chairperson, BOS/DOS in Computer Science, MGM.
3. The Dean, Faculty of Science & Technology, DOS in Chemistry, MGM.
4. The Deputy/Assistant Registrar (Evaluation), University of Mysore, Mysore.
5. The Supdt. AC.1 & AC.2, A.B., Academic Section, UOM., Mysore.
6. The P.A. to the Vice-Chancellor/Registrar/Registrar (Evaluation), UOM., Mysore.
7. The Case Worker, AC.7, Academic Section, University of Mysore, Mysore.
8. The Section Guard File(Supdt.AC.2), A.B., A.C., UOM.
9. The Schedule File.

Notification – Sc. Fac. -2012.k.bsg
Computer Science

6. INTRODUCTION TO CBCS

CBCS is a proven, advanced mode of learning in higher education which facilitates a student to have some freedom in selecting his/her own choices in the curriculum for completing a Masters degree programme. It is more focused towards a student's choice in providing a wide range of modules available in a single campus across various disciplines offered by experts in the subjects. It leads to quality education and with active teacher-student participation. In this system, three types of courses like hardcore, softcore and elective courses are included.

Hard core papers are compulsory and fundamental in requirement for a subject of study. These papers cannot be substituted by any other papers. Soft-core papers are slightly advanced papers. Every departmentof the University will furnish a detailed list of neede-based soft core papers and students can choose one/two or many of them depending upon the course structure.

The soft core paper provides enough scope for advanced learning in a subject within or outside the department. Elective papers are the concept papers and offered by ea ch department. These papers are general in nature and students have the freedom to choose any of them.

7. REGULATIONS GOVERNING CBCS

REGULATIONS FOR CHOICE BASED CREDIT SYSTEM (CBCS) AND CONTINUOUS ASSESSMENT GRADING PATTERN (CAGP) FOR POST-GRADUATE DEGREE PROGRAMMES 2010

1. Title and Commencement

2. These Regulations shall be called the University of Mysore regulations for Choice Based Credit System (CBCS) and Continuous Assessment Grading Pattern (CAGP) for Post-Graduate Degree Programs. These Regulations shall come into force from the academic year 2010- 2011.
Courses offered (as shown in Section 3 above)

2. Definitions

Course Every course offered will have three components associated with the
teaching-learning process of the course, namely
(i) Lecture – L (ii) Tutorial- T (iii) Practicals - P, 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.

In terms of credits, every one hour session of L amounts to 1 credit per semester and a minimum of two hour session of T or P amounts to 1 credit per semester, over a period of one semester of 16 weeks for teaching-learning process. The total duration of a semester is 20 weeks inclusive of semester-end examination.

A course shall have either or all the three components. That means a course 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 course is L + T + P. The credit pattern of the course is indicated as L: T : P.

If a course is of 4 credits then the different credit distribution patterns in L : T : P format could be

4 : 0 : 0, 1 : 2 : 1, 1 : 1 : 2, 1 : 0 : 3, 1 : 3 : 0,
2 : 1 : 1, 2 : 2 : 0, 2 : 0 : 2, 3 : 1 : 0, 3 : 0 : 1,
0 : 2 : 2, 0 : 4 : 0, 0 : 0 : 4, 0 : 1 : 3, 0 : 3 : 1,

The concerned BoS will choose the convenient credit pattern for every course based on the requirement. However, generally, a course shall be of 3 or 4 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 is a special course involving application of knowledge in solving / analyzing / exploring a real life situation / difficult problem. A project work up to 4 credits is called Minor Project work. A project work of 6 to 8 credits is called Major Project Work.

Dissertation is an other special course of 10 or more credits involving a problem solving component.

4. Eligibility for admission.

4.1 Candidates possessing a degree of University of Mysore, or of any other University, equivalent thereto and complying with the eligibility criteria shown in Annexure – I, are eligible for admission to Postgraduate
degree programs mentioned in regulation No.1 above.

5.0 Scheme of Instructions

5.1 A Masters Degree program is of 4 semesters-two years duration. A candidate can avail a maximum of 8 semesters – 4 years (in one stretch) to complete Masters degree (including blank semesters, if any). Whenever a candidate opts for blank semesters, he /she have to study the prevailing courses offered by the department when he / she continues his / her studies.

5.2 A candidate has to earn a minimum of 76 credits, for successful completion of a master degree. The 76 credits shall be earned by the candidate by studying Hardcore, Softcore /electives / minor project, major project, dissertation as specified in the respective PG program. Upon completion of 40 credits by a candidate, he/she will be given a Bachelor honors degree in the respective discipline / subject.

5.3 A candidate has a provision to go with a normal pace of 18 credits per semester. However, he/she may opt to go with a slow pace less than 18 credits per semester or with an accelerated pace of as high as 24 credits per semester with the approval of the department council.

5.4 In excess to the minimum of 76 credits for masters degree in the concerned discipline / subject of study, a candidate can opt to complete a minimum of 18 extra credits to acquire add on proficiency diploma in that particular discipline / subject along with the masters' degree. In such of the cases where in, a candidate opts to earn at least 4 extra credits in different discipline / subjects in addition to a minimum of 76 credits at masters level as said above then an add on proficiency certification will be issued to the candidate by listing the courses studied and grades earned.

5.5 Only such candidates who register for a minimum of 18 credits per semester and complete successfully 76 credits in 4 successive semesters shall be considered for declaration of ranks, medals and are eligible to apply for student fellowship, scholarship, free ships and hostel facilities.

5.6 A candidate admitted to Masters program can exercise an option to exit with Bachelor Honors degree / PG diploma after earning 40 credits successfully.

6.0 Continuous Assessments, Earning Of Credits and Award of Grades

The evaluation of the candidate shall be based on continuous assessment. The structure for evaluation is as follows:

6.1 Assessment and evaluation processes happen in a continuous mode. However, for reporting purposes, a semester is divided into 3 discrete components identified as C1, C2, and C3.
6.2 The performance of a candidate in a course will be assessed for a maximum of 100 marks as explained below.
6.2.1 The first component (C1), of assessment is for 25 marks. This will be based on test, assignment, seminar. During the first half of the semester, the first 50% of the syllabus (the first two units of the total units in a course) will be completed. This shall be consolidated during the 8th week of the semester.

6.2.2 The second component (C2), of assessment is for 25 marks. This will be based on test, assignment, seminar. The continuous assessment and scores of second half of the semester will be consolidated during the 16th week of the semester. During the second half of the semester the remaining units in the course will be completed.

6.2.2.1 The outline for continuous assessment activities for Component-I (C1) and Component-II (C2) will be proposed by the teacher(s) concerned before the commencement of the semester and will be discussed and decided in the respective Departmental Council. The students should be informed about the modalities well in advance. The evaluated courses/assignments during component I (C1) and component II (C2) of assessment are immediately returned to the candidates after otaining acknowledgement in the register maintained by the concern teacher for this purpose.

6.2.3 During the 18th -20th week of the semester, a semester-end examination of 2 hours duration shall be conducted for each course. This forms the third/final component of assessment (C3) and the maximum marks for the final component will be 50.

Setting questions papers and evaluation of answer scripts.

I. Questions papers in two sets shall be set by the internal examiner for a course. Whenever there are no sufficient internal examiners, the chairman BoE shall get the questions papers set by external examiners.
II. The Board of Examiners shall scrutinize and approve the question papers and scheme of valuation.
III. There shall be double valuation for all theory paper, dissertation /project /Field works. The average of the marks awarded by the internal and external examiners shall be taken as the final marks (subject to 6.2.3 IV) for that particular course.

IV. In case of 20% or more difference in the marks awarded by the internal and external valuer, the script shall be referred to the third valuer (who shall be an external) and the average of the nearest two shall be considered for the final award of marks.

V. Challenge valuation

A student who desires to apply for challenge valuation shall obtain a Xerox copy of the answer script by paying the prescribed fee within 10 days after the announcement of the results. He / She can challenge the grade awarded to him/her by surrendering the grade card and by submitting an application along with the prescribed fee to the Registrar (Evaluation) within 15 days after the announcement of the results. This challenge valuation is only for C3 component.

The answer scripts for which challenge valuation is sought for shall be sent to another external examiner. The marks awarded in the challenge valuation shall be the final.

6.2.4 In case of a course with only practical component a practical examination will be conducted with both internal and external examiners. A candidate will be assessed on the basis of a) knowledge of relevant processes b) Skills and operations involved c) Results / products including calculation and reporting. If external examiner does not turn up then both the examiners will be internal examiners. The duration for semester-end practical examination shall be decided by the departmental council.

6.2.5 If a course has both theory and practical components with credit pattern L : T : P, then as parts of (C3), both theory and practical examinations shall be conducted for 50 marks each. The final (C3) component marks shall be decided based on the marks secured by the candidate in these two examinations with weightage factors of L+T and P respectively for theory and practical examinations. Suppose X and Y are the marks secured by a candidate out of 50 respectively in theory and practical examinations in course of credit distribution L:T:P, then the final marks M in C3 is decided by

$$M = ((L+T)*X+P*Y)/(L+T+P).$$

That is for example,

a. if a course is of credit pattern 2:1:1 with credit value 4, and the marks obtained by a candidate in theory examination is 36 out of 50 and in practical examination 48 out of 50, then the final marks M of C3 component is calculated as $M = ((2+1)*36 + 1*48)/4 = (108+48)/4 = 156/4 = 39$.

b. if a course is of credit pattern 2:0:1 (with missing tutorial component) with credit value 3, and the marks obtained by a candidate in theory examination is 36 out of 50 and in practical examination 48 out of 50, then the final marks M of C3 component is calculated as $M = ((2)*36 + 1*48)/3 = (72+48)/3 = 120/3 = 40$.

6.2.6 The details of continuous assessment are summarized in the following Table.

Component	Syllabus in a course	Weightage	Period of Continuous assessment
C_1	First 50% (2 units of total units)	25%	First half of the semester. To be consolidated by 8th week
C_2	Remaining 50% (Remaining units of the course)	25%	Second half of the semester. To be consolidated by 16th week
C_3	Semester-end examination (All units of the course)	50%	To be completed during 18th-20th Week.
Final grades to be announced latest by 24th week			

6.2.7 A candidate's performance from all 3 components will be in terms of scores, and the sum of all three scores will be for a maximum of 100 marks (25 + 25 + 50).

6.2.8 Finally, awarding the grades should be completed latest by 24th week of the semester.

6.3 Minor/ Major Project Evaluation

Right from the initial stage of defining the problem, the candidate has to submit the progress reports periodically and also present his/her progress in the form of seminars in addition to the regular discussion with the guide. Components of evaluation are as follows.

Component – I (C_1): Periodic Progress and Progress Reports (25%)

Component – II (C_2): Results of Work and Draft Report (25%)

Component– III(C_3): Final viva-voce and evaluation (50%). The report evaluation is for 40% and the viva voce examination is 10%.

The (C_3) (component-III) for both minor and major project works shall be evaluated by a panel of two members consisting of the guide and an external examiner.

6.4 In case a candidate secures less than 30% in C_1 and C_2 put together, the candidate is said to have DROPPED the course, and such a candidate is not allowed to appear for C_3. This shall be declared by the chairperson of the department before the commencement of C_3 examination.

6.5 In case a candidate secures less than 30% in C_3, Or secures more than 30% in C3 but less than 50% in C_1, C_2 and C_3 put together, the candidate is said to have not completed the course and he/she may either opt to DROP the course or to utilize PENDING option. The candidate has to give it in writing to the chairperson of the department within one week of announcement of C_3 component. The candidate with pending option shall complete C_3 component before the end of double the duration by reappearing only for C3 component of that course and he / she carries the same marks awarded in C_1 and C_2.

6.6 A candidate has to re-register for the DROPPED course when the course is offered again by the department if it is a hard core course. The candidate may choose the same or an alternate core/elective in case the dropped course is soft core / elective course. A candidate who is said to have DROPPED project work has to re-register for the same subsequently with in the stipulated period. <u>The details of any dropped course will not appear in the grade card.</u>

6.7 The tentative / provisional grade card will be issued by the Registrar (Evaluation) at the end of every semester indicating the courses completed successfully. This statement will not contain the list of PENDING or DROPPED courses.

6.8 Upon successful completion of Bachelors Honors / Masters degree a final grade card consisting of grades of all courses successfully completed by the candidate will be issued by the Registrar (Evaluation).

6.9 The grade and the grade point earned by the candidate in the subject will be as given below.

P	G	GP = V x G
90-100	9 (A++)	V X 9
80-89	8 (A+)	V X 8
70-79	7 (A)	V X 7
60-69	6 (B+)	V X 6
50-59	5 (B)	V X 5
0-49	0 (C)	V X 0

Here, P is the percentage of marks secured by a candidate in a course which is rounded to nearest integer. V is the credit value of the course. G is the grade and GP is the grade point.

If G = 0 (C), (GP=0) then the candidate is assumed to have automatically dropped the course. He / she is not said to have failed in the course.

6.10 A candidate also has an option to withdraw a course even after final examination, if he / she feels that he / she should improve in the course in terms of grade. The withdrawal of a course can be either

only for C_3 components, in which the candidate has to reappear for only C3 component to improve, carrying the marks of C_1 and C_2 components (this option is called PENDING option), or for the entire course where the candidate has to reenroll for the course afresh or can chose an alternative course if the withdrawal course is a soft/elective core (this option is called DROPPED option). This act of withdrawing should be immediately within seven days after the announcement of final results.

6.11 Overall cumulative grade point average (CGPA) of a candidate after successful completion the required number of credits (76) is given by

CGPA = ΣGP /Total num ber of credits

7. Classification of results

The final grade point (FGP) to be awarded to the student is based on CGPA secured by the candidate and is given as follows.

CGPA	FGP
8 <= GPA < 10	Distinction
6 <= GPA < 8	First class
5 <= GPA < 6	Second class

8. Medium of Instruction

The medium of instruction shall be English. However, a candidate will be permitted to write the examinations either in English or in Kannada. This rule is not applicable to languages.

9 Provision for appeal

If a candidate, is not satisfied with the evaluation of C1 and C2 components, he / she can approach the grievance cell with the written submission together with all facts, the assignments, test papers etc, which were evaluated. He/she can do so before the commencement of semester-end examination. The grievance cell is empowered to revise the marks if the case is genuine and is also empowered to levy penalty as prescribed by the university on the candidate if his/her submission is found to be baseless and unduly motivated. This cell may recommend taking disciplinary/corrective action on an evaluator if he/she is found guilty. The decision taken by the grievance cell is final.

For every program there will be one grievance cell. The composition of the grievance cell is as follows.

1. The Registrar (Evaluation) ex-officio Chairman / Convener
2. One senior faculty member (other than those concerned with the evaluation of the course concerned) drawn from the department/discipline and/or from the sister departments/sister disciplines.
3. One senior faculty members / subject experts drawn from outside the University department.

10. UNIVERSITY EXAMINATION

The evaluation system of CBCS contains two parts as a) sessional assessments as Internals and b) end semester examination including evaluation by external examiners.

All the evaluations should be conducted as per the CBCS regulations and the General Examination Regulations of the University.

11. CURRICULUM PARTICULARS

The curriculum details of all the courses of the University are shown in the university website: www.uni-mysore.ac.in

ANNEXURE-I

Intake, Eligibility, and Mode of selection:

Intake

As recommended by the University of Mysore from time to time.

Eligibility

The candidates who have passed B.Sc with Computer Science / Computer Applications / Vocational Computer Applications / Computer Maintenance / Computer Systems as an optional course / BCA with minimum 45% marks in Cognate subject are eligible (relaxed to 40% in case of SC, ST and Category I Candidates). The candidates should have also studied Mathematics as a major or a minor subject in their B.Sc / BCA degree. The definition of the minimum percentage is as prescribed by the University of Mysore from time to time.

Mode of Selection

Mode of selection is as per the norms of University of Mysore.

DISCRETE MATHEMATICS

UNIT I:Mathematical Logic

Introduction Statements and Notation-connectives, WFF-Tautologies, Logical implications, Logical Equivalence, Normal Forms, Rules of inference, Predicate Calculus and Inference theory of the Predicate Calculus – Problems.

UNIT II:Set Theory

Basic concepts of set theory, Principles of Inclusion and Exclusion, Mathematical Induction, counting Principles – rules of sum and product, permutations and combinations, pigeon hole principal – simple problems.

UNIT III: Relations:

Relations – Properties, relation matrix & digraph of a relation, partition & covering, equivalence relations, compatibility relations, composition of binary relations, Manipulation of relations, Transitive closures, Warshall's Algorithm – related problems.

UNIT IV:Functions

Definition and Introduction, Various types of functions, Composition of Functions, Inverse function, Characteristic function of a Set, Permutation functions, Hashing Functions, Recursive Functions – Problems.

Text Book:

1. Discrete Mathematical Structures with Applications to Computer Science by Tremblay and Manohar (McGraw-Hill Publications).

Reference Books:

1. Elements of Discrete Mathematics by C.L.Liu(tata McGraw-Hill Publications)
2. Discrete Mathematics for Computer Science by Kolman, Busby and Ross, PHI Publication.

PRINCIPLES OF PROGRAMMING & PROBLEM SOLVING

Unit I:

Language design Issues: why study programming Languages? Impact ofprogramming paradigms, role of programming languages, C overview.

Language Translation Issues: Programming Language syntax, stages in Translation.

Elementary Data types: Properties of Types and objects, Scale & Composite data Types.

Unit II:

Encapsulation: Structured Data Types, Abstract Data Types, Encapsulation and good Program design, Types Definitions.

Inheritance: Derived classes, Methods, Polymorphism.

Unit III:

Sequence control: implicit and explicit sequence control, sequencing with arithmetic Expressions, Sequence control between statements.

Subprogram control: Subprogram sequence control, Attributes of Data Control. Parameter Transmission, Explicit common Environment.

Unit IV:

Distributed processing: Parallel Programming, Hardware Development.

Network Programming:Desktop publishing, WWW, Evolution of Scripting Languages, Applets, XML.

Language Summaries: Ada, C, Java.

TextBook:

"Programming Languages- Design and Implementation"- IV Edition by Terrence W Pratt, Marvin V Zelkowitz and T.V.Gopal.

References:

1. "Programming Language Design Concepts" - First Edition 2004 – David A. Watt and William Findlay.

"Fundamentals of Programming Languages" – Second Edition by Ellis Horowitz

ADVANCED DATA STRUCTURES

Unit I:

Dictionaries, linear list representation, skip list representation, operations insertion, deletion and searching, hash table representation, hash functions, collision resolution-separate chaining, open addressing-linear probing, quadratic probing, double hashing, rehashing, extendible hashing, comparison of hashing and skip lists.

Unit II:

Priority Queues – Definition, ADT, Realizing a Priority Queue using Heaps, Definition, insertion, Deletion, External Sorting- Model for external sorting, Multi-way merge, Poly-phase merge.

Unit III:

Search Trees , Binary Search Trees, Definition, ADT, Implementation, Operations- Searching, Insertion and Deletion, AVL Trees, Definition, Height of an AVL Tree, Operations – Insertion, Deletion and Searching, Introduction to Red –Black and Splay Trees, B-Trees, B-Tree of order m, height of a B-Tree, insertion, deletion and searching, Comparison of Search Trees

Unit IV:

Pattern matching and Trees: Pattern matching algorithms-Brute force, the Boyer –Moore algorithm, the Knuth-Morris-Pratt algorithm, Standard Trees, Compressed Trees, Suffix trees.

TEXT BOOKS:

1. Data structures, Algorithms and Applications in C++, S.Sahni, University Press (India) Pvt. Ltd, 2nd edition, Universities Press Orient Longman Pvt. Ltd.

2. Data structures and Algorithms in C++, Michael T.Goodrich, R.Tamassia and Mount, Wiley student edition, John Wiley and Sons.

REFERENCES:

1. Data structures and Algorithm Analysis in C++, Mark Allen Weiss, Pearson Education. Ltd., Second Edition.
2. Data structures and algorithms in C++, 3rd Edition, Adam Drozdek, Thomson
3. Data structures using C and C++, Langsam, Augenstein and Tanenbaum, PHI.

Problem solving with C++, The OOP, Fourth edition, W.Savitch, Pearson education.

COMPUTER ARCHITECTURE

Unit I: Parallel Computer Models

The state of Computing – Computer Development Milestones, Elements of Modern Computers, Evolution of Computer Architecture, System Attributes to Performance. Multiprocessors and Multicomputers – Shared–Memory Multiprocessors, Distributed – Memory MulticomputersMultivector and SIMD Computers – Vector supercomputers, SIMD Supercomputers Conditions of Parallelism – Data and Resource Dependencies, Hardware and Software Parallelism. Program Partioning& Scheduling - Grain size & Latency, Program flow Mechanisms –Control flow versus Data flow versus Data flow Demand driven mechanisms.

Unit II: Processors and Memory Hierarchy

Process Technology – Instruction Pipelines, Processors and Coprocessors, Instruction-set Architectures, Representative CISC Processors, Representative RISC processors.Superscalar Processors.Memory Technology, Inclusion, Coherance and Locality. Cache Memory organization – Cache Addressing modes, Direct mapping and Associative caches, Set–Associative Cache. Shared – Memory organizations – Interleaved Memory Organization.

Unit III: Pipelining

Linear Pipeline processors – Asynchronous and Synchronous Models, Instruction Pipeline Design – Mechanisms for Instruction Pipelining, Arithmetic Pipeline Design – Computer Arithmetic Principles, Arithmetic Pipeline stages, Multifunctional Arithmetic Pipelines.

Unit IV: Multiprocessors

Multiprocessor system Interconnects – Hierarchical Bus system, Cache Coherence Problem.Message – Passing Mechanisms – Message–Routing Schemes, Deadlock and Virtual Channels, Multithreaded Architecture- Multithreading Principles, Issues and Solutions.

Text Book:

Kai Hwang – Advanced Computer Architecture – TATA McGraw- Hill Edition.

References:

1. David E Culler, J.P. Singh, Anoop Gupta - Parallel Computer Architecture.
2. John. P. Hayes – Computer Architecture and Organization -Third Edition- McGraw- Hill Edition.

NUMERICAL ALGORITHMS

Unit I: Introduction to numerical computing
Introduction, numerical data ,analog computing, digital computing, process of numerical computing, characteristics of numerical computing, inherent errors, numerical errors, modeling errors, blunders, absolute and relative errors, error propagation.

Unit II: Algorithms to solve algebraic and transcendental equations
Bracketing methods- Bisection method, false position method. Open methods- Newton Raphson method, secant method Bairstow method, Muller's method.

Unit III: Algorithms to solve system of linear algebraic equations
Direct solution of linear algebraic equations
Gauss elimination, Gauss Jordan, LU Decomposition-court's algorithm, cholesky's decomposition.
Iterative solution of linear algebraic equations
Gauss siedal and Jacobiiterativemethod.

Unit IV: Algorithms to solve ordinary differential equations and partial differential equations
Euler's method, Euler's modified method, Rungekutta – 2^{nd}order, Rungekutta – 4^{th} order, Eigen value problems.
Elliptic, Parabolic, Hyperbolic, Poisson equations.

Laboratory

Implementation of Bisection Method, False Position Method, Newton Raphson Method, Secant Method, Euler's Method, Euler's Modified Method, RK-2, RK-4 and Gauss Siedal, Jacobi's Method.

Text books:

1. Numerical methods by E. Balaguruswamy .
2. S.C chapra and R.P.Canale, "Numerical methods of engineers" McGraw Hill International Edition 1990.

References:

1. V. Rajaraman, "Computer oriented numerical method", 2^{nd} edition.
2. R.K.Jain, P.K Iyengar" Numerical methods for scientist and engineers".
3. Numerical methods by S.S.Sastry.

Engineering Mathematics III & IV, by Dr.K.S. Chandrashekar, 5^{th} Edition

MICROPROCESSOR

Unit – 1: Introduction

Organization of Microprocessor-based System, Microprocessor Instruction Set and Computer Languages, Introduction to 8085 Assembly Language Programming - Instruction Classification, Instruction, Data Format and Storage. How to write, assemble and execute a simple Program.

Unit – II: 8085 Microprocessor Architecture and Interfacing I/O Devices

Overview of 8085 Instruction Set, Microprocessor Architecture and its Operations, Memory, I/O Devices, 8085 MPU, Interfacing I/O Devices - Basic Interfacing Concepts.

Unit – III: Programming the 8085

8085 Instructions, Writing Assembly Language Programs, Debugging a Program, Programming Techniques: Looping, Counting, and Indexing. 16-bit Arithmetic Instructions, Arithmetic Operations related to Memory. Logic Operations - Rotate Compare, Stacks and Subroutines.

Unit - IV: Counters and Time Delays

Counters and Time Delays, Code Conversion, 16-bit Data Operations.Interrupts - Simple Illustrative Programs.Interfacing Data Converter.

References

1. Microprocessor Architecture Programming and Applications with the 8085 - Ramesh Gaonkar - Fifth Edition
2. The Intel Microprocessors Architecture, Programming and Interfacing - Barry .B.Brey – Sixth Edition

COMPUTER GRAPHICS

Unit I: Introduction and overview of graphic systems

Video display devices, Refresh cathode ray tubes, rater scan and random scan displays, graphics monitors and workstations, input device, hard-copy devices, graphics softwares and functions.

Output primitives and attributes: - Points and lines, line drawing algorithms, Loading the frame buffer, line function, circle generating algorithms, filled area primitives, fill area functions, area fill attributes, character attributes, Antialiasing.

Unit II :Two dimensional geometric transformation and viewing

Basic transformations, matrix representation and Homogeneous co-ordinates, Transformation between co-ordinate systems, transformation functions.

Window-to-viewport coordinate transformation, Two dimensional viewing functions,clipping operations, point clipping, line clipping, polygon clipping, text clipping.

Unit III: Three dimensional concepts, Object representations, Modeling transformations and viewing.

Three dimensional display methods, Three dimensional graphics packages, three dimensional display methods, polygon surfaces, curved lines and surfaces quadric surface, Bezier curves and surfaces, B-spline curves and surfaces.

Transformation: translations, rotation, scaling, other transformations, composite transformations, three dimensional transformation functions.

3D Viewing: viewing pipeline, viewing co-ordinates.

Unite IV:Visible surface detection methods and Color Application.

Classification of visible surface detection algorithms, Back- Face detection, depth buffer methods, RGB color model.

Text Book:

Computer Graphics –C Version – Donald Hearn and M Pauline Baker
Pearson Education, Second Edition – 2003.

References:

1. Computer Graphics: Principles and Practice- Foley etalAddison-Wesley professional 2ndedition.

2. Principles of Interactive Computer Graphics- Newman &Sproull McGraw-Hill, Inc, New York NY,USA.

ALGORITHMICS

Unit I: Introduction and Divide and conquer method

Algorithms, structured algorithms, analysis of algorithms, time and space complexity, trade off, asymptotic complexity, review of stack, queues, Recursion, heaps and heap sort, hashing.

Divide and conquer general method, binary search, maximum and minimum, merger sort, quick sort.

Unit II: Greedy method

General method, optimal storage on tapes, knapsack problem, job sequencing optimal merge pattern, Minimum cost spanning trees(prim's algorithm and Kruskal's algorithm),single source shortest paths.

Unit III : Dynamic programming and Backtracking

General methods, multistage graphs,all pairs shortest paths, Traveling salesman problem,0/1 Knapsack problem, General method for backtracking , 8-queen Problem, sum of subsets, knapsack problem.

Unit IV: Branch and Bound

General method, 0/1 knapsack problem, traveling salesman problem.

Text Book:

Fundamentals of Computer Algorithms- Horowitz & Sahni, Galgotia Publications 1985.

References:

Introduction to Algorithms- Coremen, ThLaiser.

COMPUTER NETWORKS

Unit I: Introduction

Computer Network: Uses, Goals, Services, Classification, Structures, Topologies, Protocols, Characteristics, Functions. The OSI Layer, TCP/IP Protocol Suite, Operation of TCP and IP. A Comparison of the OSI and TCP/IP Reference Model, Physical Layer Standards, IEEE Standards for LANs, Data Link Layer.

Unit II: Network Layer

Network Layer Design Issues: Store and Forward Packet Switching Services provided to the Transport Layer, Implementation of Connectionless Services, Implementation of Connection Oriented Services, Routing Algorithms, flow control, Congestion Control Algorithms, General Principles of Congestion Control, BGP Internet Multicasting, Mobile IP.

Unit III: Web Security

Web Security Considerations, Web Security Threats, Secure Socket Layer and Transport Layer Security, SSL Architecture, SSL Record Protocol, Handshakes Protocol, Cryptographic Computation, Transport Layer Security.

Unit IV: Network Management Security

Network Management Architecture, Overview of SNMP, FTP.

Text books:

1. Andrew S. Tanenbaum, Computer Networks, 4th Edition, Pearson Education, Asia
2. William Stallings, Network Security Essentials (Applications and standards), 3rd Edition, Pearson Education, Asia, 2009.

SYSTEM SOFTWARE AND OPERATING SYSTEM

Unit I: Introduction

Language Processors: Introduction, Language Processing Activities, Fundamentals of Language Processing & Language Specification, Language Processor Development Tools, Data Structures for Language Processing: Search Data structures, Allocation Data Structures, Software Tools: Software Tools for Program Development, Editors, Debug Monitors, Programming Environments, and User Interfaces.

Unit II: Assemblers and Macro Processors

Assemblers: Elements of Assembly Language Programming, A Simple Assembly Scheme, Pass Structure of Assemblers, Design of a Two Pass Assembler, Macros and Macro Processors.

Unit III: Process Management and Deadlocks

Process-concept, Process scheduling and its algorithms, Operations on Processes, Inter-process Communication, multi-processor scheduling, Threads: Multi-threading models, Synchronization: Critical section problem, semaphores, Classical problems of synchronization, (Dinning philosopher's problem, Bounded buffer problem, Reader's- Writers problem), Deadlock characterization, deadlock detection, deadlock prevention, deadlock avoidance, Recovery from deadlock.

Unit IV: Memory Management and File Systems

Need, Swapping, contiguous memory allocation, Fragmentation, Paging, Structure of Page table, Segmentation, Virtual memory management: Demand paging, Page replacement algorithms, Allocation of frames, Thrashing, Copy-on-Write, File concepts, access methods, Directory structure, File sharing, Protection, File system structure, allocation methods, free space management, Efficiency and performance, recovery.

Text Books:

1. Stallings W, "Operating Systems",6th Edition, Prentice Hall India
2. Silberschatz, A., Peter B. Galvin and Greg Gagne, "Operating System Principles", Wiley – Indian Edition, 8th Edition,2009.
3. Tanenbaum A.S., "Modern Operating Systems",4th Edition, PHI, 2001.
4. D. M. Dhamdhere, "Systems Programming and Operating Systems", Second Revised Edition, Tata McGraw-Hill, 1999.

GRAPH THEORY

Unit I: Introduction of Graph, Paths and Circuits

Overview of graph, applications, Finite and Infinite Graphs, Incidence and Degree, Isolated Vertex, Pendant Vertex and Null Graph, Brief history of Graph Theory, Isomorphism, Subgraphs, A puzzle with multicolored cubes, Walks, Paths and Circuits, Connected Graphs, Disconnected Graphs and Components, Euler Graphs, Operations on Graphs, More on Euler Graphs, Hamiltonian path & circuits, Travelling salesman problem.

Unit II: Trees and Fundamental Circuits, Cut-sets and Cut-vertices

Trees, Properties of trees, Pendant vertices in a tree, Distance and Centers in Tree, Rooted and Binary trees, On counting trees, Spanning Trees, Fundamental Circuits, Finding all spanning trees of a Graph, Spanning trees in a weighted graph, Cut-sets, Properties of Cut-set, Cut-sets in graph, Fundamental circuits and cut-sets, Connectivity and separability, Network flows

Unit III: Planar and Dual Graphs, Matrix representation of graphs

Combinatorial Vs. Geometric Graphs, Planar Graphs, Kuratowski's Two Graphs, Different representations of planar graph, Detection of Planarity, Geometric Dual, Combinatorial Dual, More on Criteria of Planarity, Thickness and Crossings, Incidence matrix, Submatrices of A(G), Circuit matrix, Fundamental circuit matrix and rank of B, An application to switching network, Cut-set matrix, Relationships among Af, Bf, Cf, Path matrix, Adjacency matrix.

Unit IV: Directed graphs, Graph Theoretic algorithms and computer programs

Directed graphs, Types of diagraphs, Diagraphs and binary relations, Directed paths and connectedness, Euler Digraphs, Trees with Directed Edges, Fundamental circuits in Diagraphs, Matrices A, B and C of diagraphs, Adjacency matrix of a digraph, Algorithms, Some basic algorithms, Shortest-path algorithms, Depth-first search on graph.

Textbook:

Graph Theory and Applications by N.Deo. Kluwer Academic Publishers Norwell, MA, USA.

References:

1) Graph Theory and Applications by Hararay. Academic Press Inc. U.S (January 1968).
2) Algorithm Design, Addison-Wesley,2005 by J. Kleinberg, E.Tardos.

DATA COMMUNICATION

Unit I: Overview and Data Communication

Data communication and networking, communications model, data communications, networks, internet, the need for a protocol architecture, the TCP/IP protocol, OSI model, data transmission concepts and terminology (simplex and duplex modes), Analog and Digital data transmission , transmission impairments, channel capacity, guided transmission media (twisted pair, co-axial cable, fiber optic cable, satellite links), Wireless transmission, wireless propagation, line of sight transmission.

Unit II: Signal Encoding Techniques and Digital Data Communication Techniques.

Digital data- digital signals, analog signals- analog data, digital signals -analog data, analog Signals.

Asynchronous and synchronous transmission, types of errors, error detection, error correction, line configurations.

Unit III: Data link Control Protocols and Multiplexing.

Flow control, error control (LRC/EDC/ARQ), high-level data link control (HDLC)

Multiplexing:- Frequency- division multiplexing, synchronous time division multiplexing, statistical time division multiplexing, asymmetric digital subscriber line, XDSL.

Unit IV:

Switched communications networks, circuit switching networks, circuit switching concepts, soft switch architecture, packet switching principles, X.25, frame relay, protocol architecture, ATM cells and Transmissions.

Text Book:

Data and Computer Communication- William Stallings, Eighth Edition ,PHI learning private limited.

References:

Data Communication and Distributed Networks- Uyless Black, Prentice Hall inc, Second Edition.

Technical Aspects of Data Communication- M.E. John, Digital Press, Third Revised Edition.

Pattern Recognition

Unit 1:-Introduction

Machine perception, Pattern recognition systems, Design cycle, Learning and adaptation.

Introduction, Bayesian decision theory - Continuous features, Classifiers Discriminate functions and Decision surfaces, Normal density and Discriminant functions for the Normal Density, Bayes decision theory- Discrete features

Unit 2:- Maximum Likelihood and Bayesian Parametric Estimation

Introduction, Maximum likelihood estimation, Bayesian estimation, Bayesian parametric estimation, Sufficient statistics, Problems of dimensionality, Component Analysis and Discriminants

Unit 3:- Nonparametric Techniques

Introduction, Density estimation, Parzen windows, K_n Nearest neighbor estimation, The nearest neighbor rule, Metrics and Nearest Neighbor Classification, Fuzzy Classification, Basics of Neural networks, Support vector machines

Unit 4:- Unsupervised Learning

Mixture Densities and Identifiability, Maximum – Likelihood Estimates, Application to Normal Mixtures, Unsupervised BayesianLearning, Data Discription and Clustering, Criterion Functions for Clustering, Hierarchical clustering, Online clustering, Graph Theoretic Methods,

Reference Books

1 R.O Duda, P.E. Hart and D.G. Stork, Pattern Classification, 2nd Edition, Wiley publications

2 Earl Gose, Richard, Johnsonbaugh, Steve Jost, Pattern Recognition and Image Analysis, Prentice Hall of India, Pvt Ltd.

JAVA PROGRAMMING

Unit I:

Fundamentals of object oriented programming- introduction, object-oriented paradigm, basic concepts of OOP, Benefits of OOP, applications of OOP, Java evolution, overview of java.

Unit II:

Constants, Variables and data types, operators and expressions, decision making and branching, decision making and looping.

Unit III:

Classes, objects and methods, interfaces: multiple inheritance, defining interfaces, extending interfaces, implementing interfaces, accessing interface variables, packages: system packages, using system packages, naming conventions, creating packages, accessing a package, using a package, adding a class to a package, hiding classes.

Unit IV:

Applet programming- Introduction, Preparing to write applets, building applet code, applet life cycle, creating an executable applet, designing a web page, applet tag, adding applet to HTML file, running the applet, Graphics Programming- the graphics class, lines and rectangles, circles and ellipses, drawing arcs, polygons, line graphs.

TextBooks:

1. Programming with JAVA- A Primer, E. Balagurusamy.
2. JAVA for you- P Koparkar, Tata Mc-Graw-Hill Publishing Company Limited.

INTRODUCTION TO INFORMATION TECHNOLOGY

Unit I

Using technology to transform the organization, information technology in the workplace, what is information technology, information technology & the manager, interpreting and understanding information, nature of information, how people interpret information from information to knowledge.

Unit II

Information technology in perspective, a Framework based on IT, basics of information systems. Information technology, the components of a personal computer, CISC VS RISC.
A proliferation of computers, the computers of today.

Unit III software is the key, data box management, file elements, database in system, data modeling role of database administrator distributed database, data warehouse data mining.

Unite IV : communications, communications between computers, networks. Networks and electronic commerce, impact of communications technology. Internet: A case of phenomenal growth.

Reference:

Information technology for management 7th edition Henry C.Lucas, Jr.

THEORY OF LANGUAGES

Unit I:

Introduction, Sets, Logic, Functions, Relations, Languages, Proofs, Principle of Mathematical Induction, Strong Principle of Mathematical Induction, Recursive Definitions, Structural Induction.

Unit II:

Regular Languages and regular expressions, Finite automata(FA), Distinguishing one string from another, Unions, Intersections and complements, Non-deterministic Finite automata, Non-deterministic Finite Automata with Λ-Transitions, Kleene's Theorem, Criterion for Regularity, Minimal Finite Automata, Pumping Lemma for regular languages.

Unit III:

Introduction to Context-Free Grammar (CFG), Regular grammars, Derivation trees and ambiguity, Unambiguous CFG for algebraic expressions, Simplified forms and normal forms.

Unit IV:

Introduction to Pushdown automata (PDA), Deterministic Pushdown Automata, PDA corresponding to a given CFG, CFG corresponding to a given PDA, Parsing, Pumping Lemma for Context-free languages.

Textbook:

Introduction to Languages and Theory of Computation, 3rd edition, TMH Publication, John C Martin.

References:

1) Design and Analysis of Algorithms, Pearson Education, Parag Dave &Himanshu Dave.

2) Introduction to Automata Theory, Languages and Computation, Addison-Wesley, 1979 by J.Hopcroft and Ullman J.

DATA BASE MANAGEMENT SYSTEM

Unit I: Overview of Database Systems and Entity- Relationship Model

A historical perspective, file system versus a DBMS, advantages of a DBMS, levels of abstraction in a DBMS, structure of a DBMS, people who work with databases, an example of database application, entity types, entity sets, attributes and keys, relationships and relationship sets, additional features of ER-model- key constraints, participation constraints, weak entities.

Unit II: Relational model, Relational Algebra and Structured Query Language

Relational model concepts, relational constraints and relational database schemas, Basic relational algebra operations, additional relational operations, examples of queries in relational algebra.Data definition, constraints and schema changes in SQL, Basic queries in SQL, insert, delete and update statements in SQL, views in SQL.

Unit III: Database Design, Overview of storage and indexing

Informal design guidelines for relational schemas, functional dependencies, normal forms, general definitions of second and third normal forms, boyce-codd normal forms, file organization and indexing, clustered indexes primary and secondary indexes, index data structures, hash based indexing, tree-based indexing, comparison of file organizations.

Unit IV: Overview of transaction management

The ACID properties, consistency and isolation, atomicity and durability, transaction on schedules, concurrent execution of transactions, motivation for concurrent execution, serializability, anomalies due to interleaved execution, lock-based concurrency control, strict two phase locking, performance of locking.

Text books

1. Database management systems-Raghu Ramakrishnan and JohneesGehrke, 3rd edition McGraw-Hill, 2003.
2. Fundamental of database systems-Elmastri and Navathe, 3rd edition, Addison Wesley, Pearson education 2000.

Reference books

1. Database system concepts – Silberschatz, Korth and Sudarshan, 4th edition, McGraw-Hill Publications
2. Database management systems- Alex Leon, Vikas Publications House
3. Database system: A practical approach to design, implementation and management - conolly 3rd edition, Pearson Education.

SOFTWARE ENGINEERING

Unit I: Introduction to Software Engineering

Software Process, Methods and Tools, Software Process Models, Metrics in Software Measurement, Software in Project Planning- Project Planning Objectives, Software Project estimation.

Unit II: Software Analysis Concepts and Principles

Requirement Analysis, Analysis Principles- Information Domain Modeling, Partitioning, Software Prototyping, Specification- Principles, Representation, Software Requirements Specification, Specification Review, Analysis Modeling- Elements of Analysis, model, Data modeling, Functional modeling and Behavioral modeling.

Unit III: Software Design Concepts and Principles

Design Process, Design Principles, Design Concepts- Abstraction, Refinement, Modularity, Control Hierarchy, Structural Partitioning, Modular Design- Functional Independence, Cohesion, Coupling, Architectural Design- Data Design, Architectural styles, User Interface Design Process and activities, Component-level design, Overview of Object-Oriented Design process.

Unit IV: Software Testing

Testing Fundamentals, Test case Design, Testing Techniques – White–Box Testing, Basis Path Testing, Control Structure Testing, Black Box Testing Strategies- Verification and Validation, Unit Testing, Integration Testing, Validation Testing, System Testing and Debugging approaches.

Text Book:

Roger.S.Pressman – "Software Engineering – A Practitioner's approach", Fifth Edition, McGraw- Hill International Edition.

References:

1. PankajJalote -An Integrated Approach to Software Engineering –Narora Publications.

2. Ian Sommerville - Software Engineering – Eighth Edition.

ARTIFICIAL INTELLIGENCE

Unit I: Introduction

AI Problems, AI Techniques, Defining the Problem as State Space Search, Production Systems, Problem Characteristics, Production System Characteristics, Issues in the Design of Search Programs.

Unit II: Heuristic Search Techniques and Knowledge Representation

Generate and Test, Hill climbing, BFS, DFS, Knowledge Representation Issues, Approaches to Knowledge Representation, Procedural Versus Declarative Knowledge, Inferential Versus Inheritable Knowledge, Normal Forms in Predicate Logic and Clausal Forms, Introduction to Non-monotonic Reasoning, Logics for Non-monotonic Reasoning.

Unit III: Knowledge Representational Structures

Weak Slot and Filler Structures: Semantic Nets, Frames.
Strong Slot and Filler Structure: Conceptual Dependency, Scripts.

Unit IV: Game Playing, Planning and Expert Systems

Game Playing: Minimax Search Procedure, Adding Alpha-Beta Cut Offs, Planning-Goal Stack Planning, Expert Systems: Expert System Versus Conventional Computer, Expert System Shells, Explanation Based Learning.

Text Books:

1. Rich Elaine Knight Kevin – " Artificial Intelligence" – Tata McGraw Hill – 1993.
2. Patterson W Dan – "Introduction to Artificial Intelligence and Expert system" – Prentice Hall.

Digital Image Processing

Unit 1:- Introduction

Introduction, Fundamental steps in digital image processing, Components of an image processing system, A simple image formation model, Sampling and Quantization.

Some basic relationships between pixels, Image Enhancement in Spatial Domain, Basic gray level transformations, Histogram processing, Enhancement using Arithmetic/Logic operations, Basics of spatial filtering, Smoothing spatial filters, Sharpening spatial filters, Implementation.

Unit 2:- Image Enhancement in Frequency Domain

Introduction to the Fourier transform and the frequency domain, Smoothing frequency domain filters, Sharpening frequency domain filters, Homomorphic filtering, Implementation.

Unit 3: Morphology

Basic concepts of set theory, Dilation and Erosion, Opening and Closing, Hit or Miss transformations, Boundary extraction, Region filling, Thinning, Thickening, Morphological operations for gray scale images.

Unit 4:- Image Segmentation

Line detection, Edge detection,Hough transform, Edge linking and boundary detection, Thresholding, Region-based segmentation, Segmentation by morphological watersheds.

Representation and Description,Representation, Boundary descriptors, Regional descriptors, Use of principal components for description, Regional descriptors

TEXT BOOKS:

1. **Digital Image Processing** by Rafael C. Gonzalez & Richard E. Woods, Second Edition. Pearson Education Inc.
2. **Image Processing, Analysis and Machine-Vision** by Milan Sonka, Vaclav Hlavac& Roger Boyle, Second Edition.

DOT NET Technology

Unit I: C# Language Fundamentals

Introduction to the .NET framework, The Anatomy of a Basic C# Class, Creating objects: Constructor Basics, The Composition of a C# Application, Default Assignment and Variable Scope, The C# Member Initialization Syntax, Basic Input and Output with the Console Class, Understanding Value Types and Reference Types, The Master Node: System, Object, The System Data Types (and C# Aliases), Converting Between Value Types and Reference Types: Boxing and Unboxing, Defining Program Constants, C# Iteration Constructs, C# Controls Flow Constructs, The Complete Set of C# Operators, Defining Custom Class Methods, Understating Static Methods, Methods Parameter Modifiers, Array Manipulation in C #, String Manipulation in C#, C# Enumerations, Defining Structures in C#.

Unit II: Object- Oriented Programming with C#

Default Public Interface of a Type, Recapping the Pillars of OOP, The First Pillars: C#'s Encapsulation Services, Pseudo- Encapsulation: Creating Read-Only Fields, The Second Pillar: C#'s Inheritance Supports, keeping Family Secrets: The "Protected" Keyword, Nested Type Definitions, The Third Pillar: C #'s Polymorphic Support.

Unit III: Exceptions and Object Lifetime

Ode to Errors, Bugs, and Exceptions, The Role of .NET Exception Handling the System.Exception Base Class, Throwing a Generic Exception, Catching Exception, CLR System – Level Exception(System.Exception), Custom Application-Level Exception (System. Exception), Handling Multiple Exception, The Family Block, the Last Chance Exception Dynamically Identifying Application – and System Level Exception Debugging System Exception Using VS. NET, Understanding Object Lifetime, the CIT of "new", The Basics of Garbage Collection, Finalization, The Finalization Process, Building an Ad Hoc Destruction Method, Garbage Collection Optimizations, The System.GC Type.

Unit IV: Interfaces, Collections, Callback Interfaces, Delegates, and Events

Defining Interfaces Using C#, Invoking Interface Members at the object Level, Exercising the Shapes Hierarchy, Understanding Explicit Interface Implementation, Interfaces As Polymorphic Agents, Building Interface Hierarchies, Implementation, Interfaces Using VS.NET, understanding the IConvertible Interface, Building a Custom Enumerator (IEnumerable and Enumerator), Building Cloneable objects (ICloneable), Exploring the system. Collections Namespace, Understanding Callback Interfaces, Understanding the .NET Delegate Type, Members of System. Multicast Delegate, The Simplest Possible Delegate Example, Building a More Elaborate Delegate Example, Understanding Asynchronous Delegates, Understanding (and Using)Events.

Laboratory:

Programs on C# concepts.

Text Books:

1. Andrew Troelsen: Pro C# with .NET 3.0, Special Edition, Dream tech Press, India, 2007.
2. E. Balaguruswamy: Programming in C#, 5th Reprint, Tata McGraw Hill, 2004.
3. Herbert Schildt: C# Complete Reference, Tata McGraw Hill, 2004.

Reference Book:

Tom Archer: Inside C#, WP Publishers, 2001.

PROGRAMMING CONCEPTS IN C (Open Elective)

Unit I - Basics of Computers, History of Computers, Types of Overview of C, constants, variables & data types operators and expressions.

Unite II - Managing input and output operations. Decision making and branching decision making and looping

Unite III – Arrays character Arrays & strings

Unite IV – user defined functions structures & unions

References:

1. Programming in ANSI C by E Balaguruswamy
2. Let us C – Yashwant kanetkar
3. Programming with c Shaum series.

Compiler Construction

Unit-1

Introduction and Lexical Analysis (Scanning)

What is a compiler? A high level view of compilation, General Structure of a compiler, an overview of compilation technology.

Regular Languages/Expressions, finite state machines, building regular expressions from finite automation.

Unit-2

Syntax Analysis (Parsing)

Expression Syntax, Context Free Grammers, Top-Down Parsing, Bottom-Up Parsing.

Unit-3

Semantic Analysis

Context-Sensitive Analysis, Attribute Grammers, Symbol Tables, Type Checking.

Unit-4

Intermediate Representations

Properties, taxonomy, graphical IRs, Linear IRs, storage management, the procedure abstraction, linkage convention, run-time storage organization, code optimization, code generation

Reference:

1. Aho, A.V., Sethi R and Ullman J.,D., compilers,principles,techniques and tools (ISBN 0-201-101-947) Addison Wesley 1985
2. Keith Cooper, Linda Torczon, "Engineering a compiler", Morgan Kaufmann, 2003
3. Hunter R., The Essence of Compilers, Prentice Hall,1999

ADVANCED DATABASE MANAGEMENT SYSTEMS

Unit I: Database Design Methodology, Query Processing and Physical Design

Database Design and Implementation process, UML diagrams as an aid to Database Design Specification, Overview of Query Processing : Measures of Query cost, Algorithms for SELECT and JOIN Operations, Pipelining : Implementation of Pipelining, Evaluation algorithms for pipelining, Overview of Query Optimization, Physical Database Design in Relational Databases.

Unit II: Transaction Processing Concepts, Object and Object-Relational Databases

Introduction to Transaction Processing: Transaction and System Concepts, Desirable Properties of Transactions, Transaction Support in SQL.

Concepts for Object Databases: Overview of Object-Oriented Concepts, Object Identity, Object Structure, and Type Constructors, Encapsulation of Operations, Methods, and Persistence, Type Hierarchies and Inheritance. Overview of the Object Model of ODMG, Overview of SQL and its Object-Relational Features, Evolution of Data Models and Current Trends

Unit III: Security, Advanced Modeling and distribution

Database Security : Security issues,Enhanced Data Models for Advanced Applications: Active Database Concepts and triggers, Distributed Databases: Distributed Database Concepts, Data Fragmentation, Transparency,DistributedTransactions, Types of Distributed Database Systems, Overview of Concurrency Control Distributed Databases.

Unit IV: Emerging Technologies

Overview of Data Mining Technology, Emerging Database Technologies and Applications: Mobile Databases, Multimedia Databases, Geographic Information Systems (GIS).

Text Book:

1. Fundamentals of Database Systems – Fifth Edition – RamezElmasri, Shamkant B Navathe
2. Database system Concepts – Abraham Siberschatz, Henry F. Korth, S. Sudarshan Fifth Edition- McGraw – Hill International Edition.
3. Database Systems – Thomas Connolly, Carolyn Becg – Third Edition – Pearson Education
4. An Introduction to Database Systems – Eight Edition- Date C J - Addison Wesley
5. Strategic Database Technology – Simon A R, Morgan Kaufmann

DATA MINING

Unit I: Introduction

Data Mining Fundamentals, Data Mining Functionalities, Classification of Data Mining Systems, Data Mining Task Primitives, Integration of a Data Mining System with a Database or Data Warehouse System, Major Issues in Data Mining, Data Preprocessing –Data Cleaning, Data Integration and Transformation, Data reduction. Introduction to Data Warehouse and OLP technology.

Unit II: Mining Patterns, Associations and Correlations

Basic concepts – Frequent Itemsets, Closed Itemsets and Association rules, Frequent Pattern Mining- Apriori Algorithm, Generating Association rules from Frequent Itemsets, Mining Closed Frequent Item sets, Mining Multilevel Association Rules, Correlation Analysis.

Unit III: Classification and Prediction

Classification and Prediction, Issues Regarding Classification and Prediction, Classification by Decision Tree Induction- Decision Tree Induction, Tree Pruning, Bayesian classification – Bayes' Theorem, Naive Bayesian Classification, Bayesian Belief Networks, Rule Based Classification, Associative classification, Prediction, Accuracy and Error Measures.

Unit IV: Cluster Analysis

What is Cluster Analysis? Types of Data in cluster Analysis, Major Clustering methods-Partioning methods-K means, Hierarchical methods, Agglomerative Clustering, BIRCH, ROCK, Density-Base methods-DBSCAN, OPTICS, Model-Based Clustering methods – Neural Network Approach, Constraint – Based Cluster Analysis – Clustering with Obstacle objects, Constrained Cluster Analysis, Statistical Distribution – Based Outlier Detection. Application and trends in Data Mining: Introduction to spatial, multimedia & web mining, Additional themes on Data Mining, Social Impacts of Data Mining.

Text Book:

1. Data mining Concept and Techniques -Jiawei Han and MichelineKamber- Second Edition.

References:

1. Principles of Data Mining-David Hand, HeikkiMannila, Padhraie Smyth.
2. Data Mining Techniques - Arun K Pujari, University Press.

OFFICE AUTOMATION- (Open Elective)

Unit - 1

Introduction to Computers, Basic Anatomy of Computers Introduction to MS-office

Unit – II

MS-Word – Word Basics, Formating Features, Menu, Commands, Tool Bars and their Icons, Mail Merge, Macros Creating Tables.

Unit – III

MS-Excel - Introduction, Menu, Commands. Tool Bars and their Icons, Functions.

Unit – IV

Ms-Power Point – Menus, Toolbar, Navigating in PowerPoint, Working with PowerPoint, Introduction to MS-Access.

Reference:

1. MS Office for Everyone – Sanjay Sanena, Vikas Publishing House
2. Step by Step Microsoft Office XP Prentice Hall of India.